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EDITORIAL

Tres años han transcurrido desde que ARCHIVOS MEXICANOS DE ANATOMIA recibieron el honroso cargo de ser publicación oficial de la ASOCIACION PANAMERICANA DE ANATOMIA, por acuerdo unánime de los representantes que concurrieron a la Sesión de Trabajo del II Congreso Panamericano realizado en Caracas, Venezuela en 1969.

Ahora, llegar al III Congreso que se realizará en New Orleans, Louisiana, E.U.A., expresamos cumplido agradecimiento por dicho honor y a la vez, informamos el haber cumplido fielmente nuestra promesa de procurar cada vez el hacerlo mejor en beneficio de nuestras organizaciones.

No hemos omitido esfuerzo alguno para cumplir tan distinguida designación que nos fue otorgada; reconocemos la deuda que tenemos para con nuestros colaboradores y muy especialmente con los señores profesores: doctor Liberato J.A. DiDio y Dr. Melvin Hess, Presidente y Secretario respectivamente de la Asociación Panamericana de Anatomía quienes siempre han sido fuente de ayuda y de sincera colaboración.

Surge de nosotros hoy, el mensaje de comunicación enviado durante esta etapa a los anatomistas investigadores y a los que han escrito en nuestras páginas sus trabajos con el loable espíritu de amistad y ejemplo, para extender nuestros horizontes.

Por el contenido de este editorial, hacemos solemne acto de presencia ante el magno III Congreso Panamericano, saludando a los asistentes y formulando votos por el éxito de sus trabajos y conclusiones, que servirán para consolidar las bases de nuestra nueva escuela en el ejercicio de tan noble labor.

Esperamos de las determinaciones de la Reunión de Negocios que se realicen durante dicho evento, el voto favorable para continuar nuestro esfuerzo conjunto, que ha marcado especial trayectoria en el campo de la Morfología y que los días venideros sean los encargados de juzgar nuestro esfuerzo ganado por amistad y amor al servicio de la enseñanza de las ciencias morfológicas.

EDITORIAL

Three years have passed since the MEXICAN ARCHIVES OF ANATOMY were vested with the honorable task of becoming the official publication of the PANAMERICAN SOCIETY OF ANATOMY, by unanimous agreement of the representatives who participated in the Work Session of the II Panamerican Congress held in Caracas, Venezuela in 1969.

Now, on the threshold of the III Congress, to be held in New Orleans, Louisiana, U.S.A. we express our gratitude for this honor and at the same time we report having faithfully fulfilled our promise of constant improvement for the benefit of our organizations.

No effort has been neglected to fulfill such a distinguished appointment. We are indebted to our contributors, especially Professors Dr. Liberato J.A. DiDio and Dr. Melvin Hess, President and Secretary respectively of the Panamerican Society of Anatomy. They have always been a source of support and of sincere cooperation.

We wish to emphasize today the communication efforts carried out by the research anatomists and those who have written of their work in our pages with a praiseworthy spirit of friendship and as an example to expand our horizons.

Through this editorial we bring our presence before this important III Panamerican Congress greeting the participants and formulating our wishes for the success of its works and of its conclusions. They will consolidate the foundations of our new school in the exercise of such a noble task.

We await a favorable vote from the decisions of the Business Meetings which will be held during this event, in order to continue our joint effort which has impressed a special trajectory in the field of Morphology. Let the forthcoming days bear witness of our effort achieved through friendship and love to serve in the teaching of morphological sciences.

In Memoriam

Archivos Mexicanos de Anatomía hace recuerdo de noble agradecimiento a la memoria del Sr. Prof. Dr. Fernando Quiroz Pavia, de quien nació la entusiasta idea de fundar la Asociación Panamericana de Anatomía logrando la realización de su ideal y siendo Primer Presidente de dicha Institución. Su entusiasmo, trayectoria y méritos, serán siempre reconocidos.

Igualmente recordamos con singular cariño al prof. Dr. Jesús Yerena, también fundador de la Asociación Panamericana de Anatomía y Segundo Presidente.

Nuestros fervientes recuerdos para ellos!!

In Memoriam

Mexican Archives of Anatomy recall with noble gratitude the memory of Professor Dr. Fernando Quiroz Pavia who, with enthusiasm, first bore the thought of founding the Pan american Association of Anatomy thus achieving the realization of his ideal and becoming the First President of this Institution. His enthusiasm, his trajectory and his merits will always be acnowledged.

We equally remember with special affection Professor Dr. Jesus Yerena, also a founder of the Pan american Society of Anatomy and its Second President.

Our fervent remembrances in their memory!

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SECTION I

Abstract of Short Papers and Demonstrations

ADAMO, N. J. and DAIGNEAULT, E. A. Louisiana State University Medical Center, New Orleans, Louisiana. Desmosome-like attachments in the spiral ganglia of cats.

Spiral ganglia were taken from normal cats and from animals with vestibular nerve lesions. The tissue was fixed by glutaraldehyde-paraformaldehyde perfusion, decalcified, and prepared for electron microscopic examination. The usual glianeuronal relationships previously described by other investigators were observed. In addition, however, desmosome-like structures were found not only between lamellae of myelin sheath, but also between the glia and plasma membranes of both heavily and lightly myelinated neurons.

Our observations indicate that neurons might interdigitate and form desmosome-like attachments at various sites along the contact zones. However, the possibility exists that a neuronal plasma membrane might invaginate and desmosome-like attachments form along apposing membranes of the same neuron. The latter does not propose an appropriate functional significance. In the absence of usual synaptic nerve terminals on neurons in the spiral ganglia of cats, the suggestion is made that through these desmosome-like attachments between neurons, and between neurons and glia, the functional activity of spiral ganglia neurons is modified.

(Supported by NIH research grants R01 NS07557 and R01 NB06261).

ADES, H. W. University of Illinois, Urbana, Illinois. Effects of intense sound stimulation on stereocilia and cuticular surface of hair cells of the organ Corti as studied by scanning electron microscopy.

The organs of Corti of several species of animals (including cats, guinea pigs, and chinchillas) which were exposed to various kinds of noise were cochleogrammed, using light/phase contrast microscopy on the surface preparations. The surface preparation is a whole mount of the entire organ of Corti which permits examination of the free surface and evaluation of each cell in its proper site and relations (cochleogramming). Thereafter, the same specimens were studied by scanning electron microscopy. This method permits detailed study of the surface topography of the organ of Corti and demonstrates structural changes of the organ of Corti not visible under light/phase contrast microscopy. The changes include disarrangement of hairs, fusion of stereocilia, and the formations of giant hairs which exceed the normal stereocilia in length and thickness in the immediate neighborhood of the main lesions.

Some of the cats were tested behaviorally before and after exposure, and their auditory deficiencies were thus established to be greater than the lesions of the hair cells would seemingly warrant. The giant hairs were seen most frequently in cats following low frequency exposure; moreover, the cuticular plates of the sensory cells were often extensively deformed. It is doubtful if these cells, which may appear normal as studied by light/phase contrast microscopy, were still functional; thus explaining the apparent discrepancy between audiogram and damage. Evidence is presented to show that this phenomenon represents a non-specific reaction to noxious agents.

(This study supported by NASA Grant NGL 14 005 074).

ALBANESE, A. M. Universidad del Salvador, Buenos Aires, Argentina. Acerca del así denominado tejido sub o preperitoneal. Su procedencia del mesodermo vascular.

Este trabajo está basado en 250 disecciones en adultos y fetos y en estudios microscópicos hechos entre los años 1961 y 1971.

Hemos observado que el tejido preperitoneal está solamente presente cuando hay un vaso importante, como los vasos epigástricos o los espermáticos y sus ramas.

Cuando no hay vasos, el tejido preperitoneal está ausente en esa área y el peritoneo se encuentra en inmediato contacto con los tejidos músculo-aponeuróticos.

Esta es la razón por la cual este tejido está bien desarrollado en la región retro-inguinal formando una lámina de tejido conectivo laxo en el cual transcurren los vasos epigástricos y sus ramas, en la misma forma se comporta con respecto a los vasos espermáticos en el área postero-lateral.

Resulta altamente demostrativo de la naturaleza no celomática de este tejido el de que acompañen a los vasos epigástricos cuando estos cambian de plano y al mismo tiempo abandone al peritoneo.

Se propone considerar las paredes del abdómen constituídos por los siguientes tejidos desde adentro hacia afuera:

1o.) tejidos derivados del celoma: peritoneo.

2o.) tejidos derivados del mesodermo vascular: lámina vascular subperitoneal (formada por tejido conectivo laxo).

3o.) tejidos derivados del miotomo:

a — fascia transversalis: formada por conjuntivo fibroso y fusionada al músculo transverso. Es la hoja profunda de envoltura del músculo transverso.

b — músculo transverso, oblícuo menor, oblícuo mayor y recto anterior mayor del abdómen.

ALBANESE, A. R. Universidad del Salvador, Buenos Aires, Argentina. Los diez sistemas venosos del miembro inferior.

En la pierna encontramos y describimos diez sistemas venosos, que son:

1) El sistema de la safena interna, extendido entre el pie y la ingle y profunda y medial en el subcutáneo.

2) El sistema de la safena externa, extendido entre el pie y la región poplítea, ubicada lateral y dorsal y haciéndose subaponeurótica en su mitad craneal.

3) Los afluentes de la vena safena interna. Este sistema se compone a nivel del muslo de dos venas ventrales y otras dos dorsales. A nivel de la pierna, distal a la rodilla, está formado por tres venas ventrales y otras tres dorsales. En el muslo ellas son proximales y distales. En la pierna son proximal, media y distales.

4) El sistema venoso subdérmico lateral, extendiéndose desde el pie al muslo y figura en X. Frecuentemente incompleto y con su zona de cruzamiento a nivel de la rodilla.

5) El sistema de venas comunicantes, extendido sobre toda la pierna y conectando entre sí los sistemas venosos superficiales.

6) El sistema venoso dérmico, ubicado predominante en el hemicírculo lateral del muslo y menos frecuentemente en otras zonas.

7) La vena afluente de la femoral superficial extendiéndose anteromedial desde la zona del canal de Hunter hacia la parte anterior de la pierna. Ella puede ser confundida con la safena interna.

8) El sistema venoso profundo largo, ubicado subaponeurótico e intermuscular y extendido desde el pie hasta la ingle e integrado por la plantar lateral, tibial posterior, poplítea y femoral superficial y común.

9) El sistema venoso profundo corto, también subaponeurótico y no sobrepasando en longitud los límites de un segmento de miembro. La femoral profunda y la circunfleja lateral en el muslo y la peronea y tibial anterior en la pierna forman este sistema.

10) El sistema de venas perforantes, conectando las venas profundas subaponeuróticas con cualquiera de las venas subcutáneas y pasando a través de orificios en la aponeurosis. Nosotros señalamos la frecuencia de esas venas perforantes conectando ambos sistemas venosos profundos a los de venas subdérmicas y afluentes en el subcutáneo.

ALBANESE, E. F. Universidad del Salvador, Buenos Aires, Argentina. Lámina vascular del arco duodenopancreático posterior.

Las relaciones de la 3a. y 4a. porciones del duodeno con la cabeza del páncreas son diferentes a la de la 1a. y 2a. Las mismas son en las porciones distales del duodeno más laxas, avanzando a este nivel el tejido pancreático únicamente por delante del duodeno. Esto determina algunas características en la irrigación de estas zonas del duodeno-páncreas.

Las ramas inferiores de las pancreático-duodenales izquierdas, ramas de la mesentérica superior, se anastomosan con las homólogas derechas formando un arco vascular posterior a la cabeza del páncreas. El arco vascular y las ramas que de él se desprenden hacia el duodeno están incluidos en una lámina de tejido conectivo. Corresponde a una lámina vascular. Ubicada en un plano frontal, se sitúa dorsal a la cabeza del páncreas.

Esta lámina de tejido conectivo puede ser considerada la equivalente a la ubicada en el espesor del mesenterio, pudiendo ser interpretada como su porción craneal, la cual toma esa posición cuando se forma el ángulo duodeno-yeyunal.

ALBANESE, E. F., ALBANESE, A. M. and ALBANESE, A. R. Universidad del Salvador, Buenos Aires, Argentina. Las arterias císticas.

Trabajo basado en 100 disecciones realizadas por los autores entre los años 1965 a 1971.

De ellas, 75 fueron hechas en cadáveres fijados en formol al 10 % y las otras 25 corresponden a comprobaciones quirúrgicas en colecistectomías y disecciones posteriores de las piezas obtenidas. Se tomaron dibujos y fotos en todos los cien casos.

De acuerdo a previas investigaciones hechas por uno de nosotros (A. R. A.) antes de 1965, nosotros remarcamos la existencia de tres arterias císticas. Se describe la ubicación de cada una de ellas: pre-biliar, inter-bilio-portal y retro-portal, y se hacen consideraciones sobre la frecuencia en que se les ha hallado.

Del estudio y análisis del número, origen, relaciones y distribución de las arterias císticas se deducen aspectos relacionados con una más exacta cirugía de las vías biliares.

ALVARENGA, J. R. Universidad de El Salvador, San Salvador, El Salvador.

Cito histoquímica de las células cebadas del útero y líquido peritoneal durante los estadios reproductivos y embarazo.

En este trabajo se han utilizado ratones hembras en los diferentes estadios reproductivos, y en etapas de preñez temprana.

La población y características reaccionales de las células cebadas ha sido estudiado usando safranina, Alcian Blue y Azufre A a diferentes pH; ocasionalmente se ha hecho ABPAS, reacción para hierro, y aldehidofucsina.

Un estudio comparativo de la citología de las células en el líquido peritoneal está siendo llevado a cabo.

Se pretende aportar datos que contribuyan a esclarecer el papel de las células cebadas en el tracto reproductivo del mamífero.

ARANDIA, A., EBERSTADT, P., COO, J. and GARCIA, C. Universidad Nacional Autónoma de México, Mexico City, Mexico. Complete step by step morphologic study of hypotonic hemolysis, resemblances with specific anemias.

The study of hemolysis in hypotonic media of varying osmolarities in wet preparations, under the phase contrast microscope revealed many morphologic resemblances with a number of hemolytic anemias. The erythrocytes under these conditions went through a series of stages, which were followed carefully. Some shapes stood out looking like sickle cell ghosts, target cells, cells with Cabot rings, with Heinz bodies, acanthocytes and microspherocytes. All these cells belong to well defined hemolytic and megaloblastic anemias. The method described not only establishes a possible mechanism of producing shapes with striking similarities, but indicates that they are the sequential steps in hypotonic hemolysis.

ARAUZ AGUILAR, C. M. and ARGUADAS OCAMPO, O. Universidad de Costa Rica, San José, Costa Rica. Contribución al estudio del paladar hendido.

Se provoca paladar hendido en ratones inyectando Vitamina A y Dexamatazona en madres durante el embarazo.

Se trata de tipificar la cepa de ratones con que cuenta el Bioterio de la Facultad de Medicina de Costa Rica, según la respuesta a estas drogas.

Reporte de las anomalías obtenidas.

Se plantea el grave problema de la automedicación y aún de la medicación no controlada en este país.

ASLING, C. W. University of California, San Francisco, California. The "Capsule lecture": A time-conserving learning aid in Anatomy.

Experience is reported with the "capsule lecture" as a response to stringent reduction of time allowed for presenting anatomy courses in recently revised medical curricula. Some topics in the lecture series could be presented in forms other than the typical lecture, and in particular were adaptable as "capsule lectures". Although this device cannot replace formal lectures, it is preferable to omission of such topics for want of time.

Sequences of slides in a cartridge are projected automatically. Each special slide frame has soundtrack and standard 5 × 5 cm. transparency (photographed from text illustrations, original preparations, or diagrams resembling blackboard drawings). One cartridge carries up to 36 slides, each with narration up to 35 seconds, or 21 minutes maximum. (We and our students prefer shorter, single-topic presentations of 10 to 15 minutes). Cartridges and special projector are always available to students in the study-room. Transparencies and related narration (pre-recorded by the teacher on the slide-frames) are reproduced concurrently by the same projector. Typically the full sequence continues automatically, but simple controls allow students to over-ride this to "hold picture", "repeat sound", or "back-up".

Except where showing of motion is necessary, this system has numerous advantages over television tapes and motion picture film strips:

A. Staff preparation time and cost of materials are much lower.

B. Students study and review a topic when most motivated, often making constructive use of short free-time intervals.

C. Sequences are easily revised (change in text or transparency, interpolation of material, expansion of presentation).

D. The instructor's individual, personal approach is favored, permitting each to correlate with local course schedule and simulate his own lectures. Examples of "capsule lectures" (English and Spanish narration) will be on demonstration.

ASLING, C. W. University of California, San Francisco, California. Resorption at bony and cartilaginous surfaces: a generalizing concept and nomenclature.

Elsewhere in this Congress, Sacostin-Asling describes differences in erosion of Meckel's cartilage and the tracheal cartilage rings, the differences apparently being related to calcification of matrix in the former and its lack in the latter. The present report is intended

(1) to enquire whether these differences are potential generalizations, by examining other sites of normal erosion of cartilage: the calcified matrix of epiphyses of developing long bones, and the noncalcified cartilaginous enclosure of the growing otic labyrinth;

(2) to review briefly the various viewpoints in the literature respecting the tissue mechanisms of cartilage resorption, and

(3) to examine the suitability of present nomenclature for the cells active at cartilage erosion fronts.

Based on the demonstration that normal cartilage erosion fronts are maintained by *multi*nucleated cells, morphologically identical to osteoclasts, if the matrix is calcified,* and *mono*nucleated cells in the absence of such matrix calcification, a terminologic reconciliation of general applicability is tentatively proposed: "polyclasts" for those multinucleated cells active against calcified mucopolysaccharide-collagen complexes (whether bone or calcified cartilage) and "monoclasts" for those active against primarily organic matrix. The former term emphasizes both the multinucleation and the more diverse function related to demineralization and organic dissolution, while the latter emphasizes both the single nucleus and the simpler function of the relevant cells.

* Intimated by K. H. Knese, Stuttgart, 1970 in proposing the name "mineraloclasts". (Supported by University of California Academic Senate Research Grant 221).

BACCARINI, I. M. and POWELL, E. W. University of Arkansas, Little Rock, Arkansas. Comparison of selective fixative for C. N. S. and electron microscopic evaluation.

It is important to find a method of fixation that is suitable for silver impregnation and electron microscopic procedures. Mammillary body tissue was fixed in five differently prepared fixing solutions. All solutions were perfused into the left ventricle of heart of anesthetized rats except in one case. The mammillary body in this case was excised from the brain and placed in the fixative solution according to the method described by Zambroni and De Robertis, 1969. Observations pertaining to mitochondria, myelin, synapses, neurotubules and synaptic membranes were made after using the following fixatives: 1. Glutaraldehyde 3%: Formaldehyde 2% in phosphate buffer (pH 7.2), and 1% buffered osmium tetroxide. 2. Formalin 10% (pH 5.5) and 1% buffered osmium tetroxide. Tissue unfrozen. 3. Glutaraldehyde 1%: Paraldehyde 4% (pH 5.5) and 1% buffered osmium tetroxide. Tissue frozen. 4. Formalin 10% (pH 7.2) plus 1% buffered osmium tetroxide. Tissue frozen. 5. Formalin 10% (pH 5.5) plus 1% buffered osmium tetroxide. Tissue frozen. After fixation and dehydration, the tissue was embedded in epon-araldite and stained with uranyl acetate-lead citrate. Procedures 2, 3 and 5 worked equally well for the rendition of all detail except that some myelin lamellae have been slightly altered by the freezing process. Procedure 4 was the poorest one used for fixation of all elements studied, especially for myelin. After procedure 1, the appearance of mitochondria, synapses and vesicles was very good. However, the condition of myelin, neurofilaments and microtubules was less desirable than following the other procedures. Electron micrographs from this study indicate that perfusion is preferable to the block immersion method. Buffered formalin did not improve the fixation of the tissue.

BASMAJIAN, J. V. and HRYCYSHYN, A. Emory University, Atlanta, Georgia. Electromyography of oral diaphragm during swallowing.

An electromyographic investigation of geniohyoid, anterior digastric, mylohyoid, and genioglossus of twenty human subjects was carried out to determine the temporal relationships of their activities during the act of swallowing. Although there were variations in the firing order of the four muscles within the same subject, the best estimate of the "true" firing sequence was established for each of the eighteen subjects who had statistically significant data. However, no definite universal pattern could be established for the four muscles studied because there was great inter-subject variability in both the duration and the sequence of activity. Therefore, it was concluded that, at least with respect to the four muscles studied, each individual has his own swallowing pattern, but that different people may swallow quite differently.

The type of bolus (saliva *vs.* water) may influence the duration of the muscles' activity. On the other hand, posture (semi-reclined *vs.* sitting) did not seem to have any such influence. There was no evidence to indicate that there is a correlation between posture or the type of bolus on the one hand and the sequence of muscular activity on the other.

Anterior digastric was not active in one-quarter of the swallows studied. All muscles studied, when active during deglutation, had a general electromyographic pattern of one to many summations of activity separated by relatively quiet periods before and after each swallow.

BENNETT, M. H., DYER, R. F. and DUNN, J. D. University of Pittsburgh, Pittsburgh, Pennsylvania and L. S. U. Medical Center, New Orleans, Louisiana. Light induced retinal degeneration: Effects upon light-dark discrimination.

Light microscopic and behavioral investigations were used to assess the effects of low-level, long-term, continuous light exposure upon retinal morphology and visual function. Performance in a light-dark discrimination task was used to measure visual function in albino rats following 200 lux continuous light exposure of from 51 to 400 days. Nine out of ten rats, in which no intact rod cells could be found, were capable of performing the light-dark discrimination at from 77 to 97% correct responses. Two of these animals were able to perform the discrimination task with retinas in which no rod cells could be found following extensive microscopic examinations. The performance was dependent upon the eye since no animal could perform the task above chance levels following bilateral enucleation. A rough correspondence was demonstrated between degree of rod cell degeneration and duration of exposure.

A second series at 400 lux continuous light demonstrated that the initial learning rate was inversely related to duration of exposure. However, the presence of rod cells at the start of training was necessary for maintenance of the discrimination following complete rod cell degeneration with continued exposure. These data were interpreted to demonstrate the existence of a cell type(s) other than the rod cell subserving light detection in the rat retina. In addition, a process of generalization of function from rod cell to another cell type(s) was proposed to explain the dependence of subsequent performance upon the number of rod cells present at the start of training.

BLUMEN, G. and MERZEL, J. Universidad Estaual de Campinas, São Paulo, Brasil. The decrease in the concentration of organic material in the course of formation of the enamel matrix.

Enamel maturation consists in the transformation of the previously secreted young enamel, rich in organic material and water and poor in calcium salts, into the highly calcified mature enamel. A loss of organic material has been reported by radioautographic and biochemical studies.

Continuously growing molar teeth of guinea pigs given either ^{3}H-Thymidine (1μCi/g of body weight) or ^{3}H-Proline (2.5μCi/g of body weight) and sacrificed at several time intervals, were sectioned after decalcification and radioautographed. By correlating the rate of migration of ameloblasts labeled with ^{3}H-Thymidine and the concentration of ^{3}H-Proline over enamel matrix, it was hoped to establish when the loss of organic material took place.

The velocity of migration of ameloblasts was determined as being 2.36 cell positions per hour, i. e. each ameloblast took about 25 minutes to move from its position to next immediately occlusal one.

Silver grain counts over well determined regions of enamel matrix showed that their concentration, after reaching a peak over young enamel 24 hours after a single injection of ^{3}H-Proline, decreased thereafter as the matrix migrated to the occlusal surface.

Assuming that enamel matrix moves up at the same rate as the ameloblasts and by correlating the results it was found that the decrease in proteins labeled with ^{3}H-Proline occurred while the matrix was still in the secretory zone. Thus, one of the steps of enamel maturation, the removal of organic material is probably related to the activity of secretory ameloblasts and not to the shortened ameloblasts as sometimes stated in the literature.

This work was supported by grants from FAPESP (São Paulo), (Proc. med. 85/62 and biol. 311/65).

BUSTAMANTE, J. and SUESCUN, P. Universidad de Antioquía, Medellín, Colombia. Lesiones renales y adrenales en ratas tratadas con aloxano.

Repetidos estudios han demostrado lesiones en animales tratados con aloxano, principalmente a nivel de las células beta de los islotes de Langerhans, y responsables de un estado diabético evidenciable aún a las pocas horas después de la administración de la droga. También se ha observado cómo estos animales (ratas y perros) pueden desarrollar lesiones renales similares a la glomeruloesclerosis intercapilar, descrita como complicación de la diabetes mellitus en el hombre.

Nosotros hemos mantenido ratas por tres y cuatro meses después de una sola inyección de aloxano y en algunas de éllas hemos encontrado asociadas a las lesiones características de la glomeruloesclerosis intercapilar, notorias lesiones en la corteza adrenal según describimos a continuación.

Particularmente aparecen lesiones en las zonas reticular y fascicular, consistentes en egrosamiento notorio de la pared del sinusoide. Muchos de los sinusoides aparecen aún obstruidos por masas de un material amorfo, PAS positivo, que es comparativamente similar al presente en los capilares del glomérulo afec-

to de la glomeruloésclerosis a que hemos hecho referencia. Las células glandulares en las zonas vecinas a los sinusoides trombosados muestran cambios degenerativos.

La coexistencia de diabetes y lesiones adrenales en animales de experimentación, recuerda la asociación de la diabetes y la enfermedad de Adison registrada en el hombre con alguna frecuencia.

BUSTOS, E. and POTOCNJAK, P. Universidad de Chile, Santiago, Chile. Spermatogenesis in a wild rodent *(Octodon degu M.)*.

Octodon deguis a rodent native to the southern regions of South America that has recently been kept in captivity and started to be used in laboratory research. We have studied the morphology and renewal of spermatogonia (Bustos y Casas-Cordero, 1969) and found four classes of them, namely A, B, C and D. The latter behaved as a reserve stem cell, whereas B was the spermatogonial generation prior to the onset of meiosis. The duration of the cycle was also analyzed (Potocnjak y Bustos, 1970) by radioautography after thymidine-H3 injection and found to be 6.38 days. In order to check the data mentioned above and to correlate these findings with the data available in other rodents, cell repopulation was studied histometrically following X-irradiation (300 r). Cell countings were corrected by the Sertoli cell factor (Bustos-Obregón, 1970). It was found that type D spermatogonia were twice as much more resistant than type A and started proliferation one cycle after X-irradiation. The following cycle then gave rise to new type A, which by three cycles after X-irradiation had already reached 75 % of the control value. This situation is essentially similar to the spermatogonial repair found in the rat following X-irradiation (Dym and Clermont, 1970). Hence, type D spermatogonia are comparable to A_0 in the rat and type A to the population A_1 –A_4 in the rat. Moreover, the model proposed for spermatogonial renewal in *Octodon* fits the scheme previously reported for the rat (Clermont and Bustos-Obregón, 1968), subsequently extended to other rodents by De Rooij (1968).

At present we are analyzing the germ cell population in newborn up to senile animals.

CALASANS, O. M., DE SOUZA, R. R., y FERRAZ DE CARVALHO, C. A. Universidad de Sao Paulo, Sao Paulo, Brasil. Arquitectura del colículo seminal.

Después de ser retiradas las próstatas de cadáveres de individuos adultos en la sala de autopsia, abríamos la uretra, exponiéndose así el colículo seminal. Con una jeringa inyectábamos vinilite colorada en los ductos eyaculatorios por la porción terminal de los ductos deferentes. En seguida, las piezas anatómicas eran tratadas por el método de Zemper.

Con el auxilio del Microscopio Estereoscópico realizamos una minuciosa disección.

En otras próstatas incluidas en celoidina hacíamos cortes estereoscópicos 100 μ transversales y sagitales al mayor eje de la uretra colorados por el Método de Azan.

Se llegó a la conclusión que el colículo es en grande parte muscular con haces de fibras lisas, envolviendo en forma de anillo los ductos eyaculatorios desde la porción más cranial de la próstata hasta lo más caudal del colículo. En ese trayecto los anillos se interrumpen en la apertura del utrículo prostático y en la extremidad inferior del colículo las fibras convergen caudalmente, bajando por la cresta uretral hasta la extremidad inferior de la uretra prostática.

Los autores discuten del punto de vista morfofuncional la participación de esa disposición en el mecanismo de la eyaculación.

CANELOS SALAZAR, P. and PACHECO, V. M. Universidad Central, Quito, Ecuador.
Anatomía radiológica del sistema venoso craneal.

Se analizan más de ochocientos Angiogramas Carotideos, y cincuenta Angiogramas Vertebrales, realizados en el Hospital "Carlos Andrade Marín" del Seguro Social de Quito, Ecuador, durante los años de 1970-1971.

El estudio del ángulo venoso y su formación por gía y de Neurocirugía del mencionado hospital, y en un trabajo preliminar a una investigación post-morten al respecto. Se examina el sistema venoso superficial determinado por las características y variantes de sus venas anatómicas principales como son: La vena anastomótica de Trolard y la vena anastomótica de Labbe.

Estudio del ángulo venoso y su formación por medio de las venas septales y tálamo-estriada, sus variantes de constitución y confirmación y su importantísima relación con el Agujero de Monro. Se analizan las características de la vena Cerebral Interna, Vena de Galeneo, y sus cambios anatómicos.

Las variantes anatómicas de posición, dimensiones, calibre de los senos venosos durales son motivo de investigación, especialmente el seno lateral.

Se practica un análisis exhaustivo del drenaje venoso de la fosa posterior. Finalmente es revisado un grupo de 30 pacientes que presentan drenaje anómalo y precoz, en los cuales puede deducirse presencia de fístulas arteriovenosas ocultas y verdaderas malformaciones arteriovenosas.

En la investigación participa un grupo de doce estudiantes del segundo año de la Facultad de Medicina de la Universidad Central de Quito, Ecuador, que tienen entre sus materias especiales la Anatomía Descriptiva y Radiológica.

CHACKO, K. University of California, Davis, California. Mitosis in myorcardial cells in rat embryos: Ultra-structural study.

Cardiac tissues from Sprague-Dawley rat embryos of day 10, 11, 12, 13, 14, and newborn rats were fixed in buffered glutaraldehyde followed by post-fixation in osmium and were processed for electron microscopy. Early 10 day myocardium at the 6-8 somite stage, comprised mainly of loosely packed cells is characterized by a dearth of organelles and abundant distribution of fer ribosomes. By the middle of the 11th day (15-17 somites), when the heart is already functional, manifested by regular beats and circulation of fluids, the myocardial cells contain fully differentiated myofibrils, free myofilaments and other organelles.

The cells of the differentiating myocardium are mitotically very active and the different stages of cell

division are readily discernible. A unique observation in the developing myocardium is the detection of the simultaneous occurrence of mitosis and synthesis of contractile proteins (myofilaments) in the same cells. Mitotic cells containing sites of myofilaments are discernible throughout the gestational period covered in this investigation, including the myocardium of the newborn. In spite of this intense mitotic activity, myocardial cells are characterized by mononuclearity, and, unlike skeletal muscle, cell fusion is not distinguishable in the embryonic cardiac tissue. In skeletal muscle the accumulation of detectable quantities of muscle-specific protein occurs only after cell division ceases. The rat embryonic myocardial cells are strikingly different in this respect in that the onset fibrillogenesis is not correlated with the cessation of mitotic activity.

CHATAIN, I. and DELGADO, A. Universidad del Valle, Cali, Colombia.

Decadencia de la clase magistral en anatomía macroscópica.

Los Autores han substituido la clase magistral por un conjunto de medios autodiovisuales.

En 1970 se empleó exclusivamente el sistema DICOS (Diapositivas con sonido), abarcándose los principales temas de Anatomía Funcional, con su síntesis embriológica, histológica, fisiológica y sus aplicaciones clínicas. Los estudiantes acogieron satisfactoriamente el método; la evaluación final dio un promedio favorable sobre los datos anteriores.

En 1971 se organizó un museo Audiovisual. Treinta y cinco vitrinas abarcan las principales regiones del cuerpo humano, excluyendo la Neuroanatomía. Contienen disecciones personales, las radiografías correspondientes, y transparencias a color de los cortes histológicos esenciales. Cada vitrina es comentada mediante una reproductora de "cassette" con una duración no mayor de quince minutos. La vitrina es utilizada, con adecuadas modificaciones de la grabación, por los estudiantes de Cursos Superiores y de Escuelas Intermedias.

Un Circuito Cerrado de Televisión ofrece la orientación topográfica y dirige activamente la disección, ampliamente facilitada por condiciones favorables en nuestro medio.

La relación Profesores-Estudiante en el Anfiteatro establece los principios generales y doctrinarios y valora el "feedback" de la información audiovisual. La programación para Audiovisuales, conforme a las Nóminas Anatómica, Embriológica e Histológica se ofrece a un precio que permite su compra a todos los estudiantes.

Las piezas del museo permitirán, en 1973, la elaboración de un filmstrip que ilustre esta programación.

Estas técnicas docentes, permiten al Profesor una utilización más eficiente de su tiempo, y, al estudiante, un conocimiento igual o superior al logrado con la tradicional clase magistral.

CRUZ G. R., VENEGAS B. R., SUAREZ L. J., ZAMORA M. R. BRENES P., VINOCOURI G. R., MORA U. J. and MORERA V. P. Universidad de Costa Rica, San José, Costa Rica. Cardiopatía congénita familiar múltiple.

El objeto de este trabajo es la presentación de casos de malformaciones congénitas del corazón que han ocurrido en varios miembros de una misma familia.

Se hizo revisión de la literatura mundial correspondiente.

Se insiste en un caso familiar excepcional en la literatura médica mundial y se comunica en este trabajo.

La presentación se hace con estudios especializados de electrocardiografía, radiología, fonocardiografía y cateterismo cardíaco con estudio hemodinámico. Se hizo comprobación anatómica en algunos pacientes al hacer su corrección quirúrgica: en todos se practicó el estudio genético y cromosómico correspondiente.

En el caso familiar extraordinario aludido se refiere que una paciente acudió a examen por presentar palpitaciones; se le estudió y demostró una comunicación interatrial; a su hija mayor se le estudió por manifestar disnea y se le diagnosticó estenosis pulmonar valvular que fue operada a los cuatro años de edad. A la segunda hija también se le estudio por presentar disnea, y se le demostró una comunicación interatrial, comunicación interventricular y estenosis pulmonar infundibular; ambas fueron sometidas a cirugía con circulación extracorpórea con excelentes resultados a largo plazo. Una tercera hija de tres meses de edad fue llevada por la madre al hospital para estudio y se le demostró una comunicación interventricular. La madre y esta última hija no requieren cirugía en la actualidad.

Por lo extraordinario de esta malformación cardíaca congénita familiar múltiple, y ocurrir sólo en mujeres, se decidió hacer el estudio genético y cromosómico respectivo, cuyos resultados se presentan.

CUELLO. A. C., CONS, J., GANON, W. F. and DE GROOT, J. University of San Francisco, San Francisco, California. Subcellular localization of monoamines in the median eminence of the rat hypothalamus.

Monoamines are present in the external layer of the median eminence of the hypothalamus. There is no general agreement on the subcellular storage of these substances in this area of the brain. Some authors assign them to the large granular vesicles (or intermediate type), around 700 to 1,300 A°, others assign them to the small synaptic like (or clear) vesicles, around 300 to 500 A°. To clarify this problem several techniques currently used in electron microscopy to demostrate monoamines have been applied to the median eminence. Monoamines are recognized with these procedures by precipitation of chromium dioxide (Wood's glutaraldehyde-dichromate), silver deposition (Tramezzani's glutaraldhyde-silver reaction) or precipitation of manganese dioxide (Richardson's potassium permanganate).

Adult Sprague-Dawley rats were used for these series of experiments. Median eminence and control organs were quickly removed after decapitation and processed accordingly. Control organs (adrenal medulla, vas deferens, pineal gland) in which these techniques have been thoroughly tested were used to compare the reactions.

In contrast to obviously positive results in the control organs, erractic, unclear findings were obtained in the median eminence tissue. These experiments suggest that there exist differences in the characteristics

of the monoamine storage between the median eminence and other monoamine containing organs. A modification of the glutaraldehyde-dichromate technique recently introduced by Tranzer (Krebs Ringer paraformaldehyde-glutaraldehyde, dichromate, osmium) showed comparable positive results in both median eminence and the control organs. This reaction was present in certain axons of the pallisade zone of the median eminence in small synaptic like as well as in granular vesicles. The reaction disappeared after reserpinization and was enhanced by the use of monoamine oxidase inhibitors plus L-dihydroxyphelalamine.

(Supported by NIH postdoctoral fellowship TW-01599 and USPHS Grant AM-06704).

CUTTS, J. H., DUNKERLEY, G. B. and LEESON, C. R. University of Missouri, Columbia, Missouri. Audiovisual teaching aids in a combined anatomy course.

Three years ago, this department combined embryology, histology and gross anatomy into a single course designed to enable the student better to understand and integrate his knowledge. The autotutorials available commercially are relatively expensive and often are difficult to adapt to a non-traditional curriculum. We have prepared supplementary audiovisual programs on a variety of topics. These programs consist of 35 mm slide sets accompanying descriptive audio tapes, and may be used in the laboratories or in individual carrels.

The programs have been designed to meet different objectives. One series, Introductory Topics in Systematic Anatomy, covers basic material in osteology, arthrology, myology, neouroanatomy and angiology and has been formulated to aid students who have an inadequate or weak scientific background. Other programs cover areas of particular systems or organs and embrace developmental, histological and gross anatomical considerations. A third type of program is restricted to particular aspects of a single subdiscipline such as the back and selected topics in neuroanatomy. Coupled to a "learning board", these programs stress self instruction and self evaluation. Displays are used at appropriate periods throughout the course and serve to introduce and reinforce the material of a particular program.

These aids have several advantages:

1. The student may schedule his own viewing time.
2. Programs are available for repetition and review as desired.
3. Availability of self evaluation.
4. Economy of production.
5. Ease of alteration and revision.
6. Available in compressed speech for rapid review.

DE LARA GALINDO, S., CUSPINERA, M. E. and CASTAÑEDA D. N. Universidad Nacional Autónoma de México, Mexico City, Mexico. Observaciones semimicroscópicas sobre la cara lateral de la base del estribo en fetos y adultos.

Se hacen estudios semimicroscópicos sobre la frecuencia de aparición de la cresta situada en la cara lateral de la base ya que une los pilares del estribo.

Se utiliza el microscopio estereoscopio y se estudian 100 especímenes entre fetos y adultos.

DE OLMOS, J. S. Iowa State University, Iowa City, Iowa. Las proyecciones eferentes del núcleo amigdalino en el cerebro de la rata.

Esta comunicación describe resultados obtenidos primordialmente con el uso de la técnica cupro-argéntica desarrollada en este laboratorio, aunque también se usaron modificaciones del método de Fink-Heimer. Los cerebros fueron obtenidos de animales jóvenes sacrificados entre 30 horas y 4 días después de la producción de lesiones estereotáxicos en la amígdala o estructuras relacionadas con ella.

Entre otros resultados, se reveló la existencia de una proyección diferenciada de la estría al núcleo hipotalámico ventromediano, con el componente dorsal o supracomisural terminando en la periferia de este núcleo, y el componente ventral o postcomisural en las porciones centrales del mismo. El componente dorsal, por otra parte, emite una radiación parolfatoria que inerva entre otras estructuras la capa granular interna del bulbo olfatorio accesorio. El componente ventral carece de ella. Proyecciones al núcleo amigdalino y paleocorteza contralaterales fueron trazadas vía el componente "comisural" de la estría. Un pequeño manojo derivado del componente dorsal conecta entre sí los núcleos amigdalinos corticales de ambos hemisferios.

Lesiones en distintas partes de la amígdala revelan que mientras el componente dorsal se origina exclusivamente en el tercio caudal del grupo nuclear contimedial, el componente ventral lo hace desde el resto rostral de este grupo y desde los núcleos amigdalinos central, lateral y basal lateral. Sin embargo, las fibras provenientes desde estos tres últimos núcleos, que forman la división lateral del componente estrial ventral, terminan exclusivamente en el núcleo intersticial de la estría.

Se discuten también las llamadas amigdalofugales ventrales y estos resultados son comparados con aquellos obtenidos en el conejillo de indias.

DE ZUBIRIA, R. Departamento de Desarrollo de Recursos Humanos, Organización Panamericana de la Salud. Washington, D. C. Programa de textos de medicina de la organización panamericana de la salud.

La adquisición de libros de textos es un problema de considerables proporciones para el estudiante de medicina de los países latinoamericanos.

La Organización Panamericana de la Salud comprobó que el problema básico era la incapacidad económica de los estudiantes para adquirir los libros recomendados como textos, y en 1966 formuló un programa con los siguientes objetivos:

Provisión de libros de texto en unas 22 asignaturas de la docencia de pregrado, a bajo costo, en venta de contado y a plazos, a un total de 100.000 estudiantes de cerca de 150 escuelas de medicina de América Latina; constitución de un fondo que permita sostener indefinidamente el programa; y revisión y estructuración de los programas docentes.

Para la ejecución del plan se celebraron acuerdos con los gobiernos de los países, así como con las escuelas de medicina, y en cada una de ellas, se organizaron administraciones locales con personal especialmente adiestrado para la operación del programa.

Para la selección de los textos, la OPS promueve la formación de Comité de Expertos en cada una de

las asignaturas de la carrera médica mediante encuestas entre todos los profesores, donde se les solicita la nominación de candidatos para integrar los Comités y también su opinión sobre los textos de enseñanza en sus áreas respectivas.

Los Comités, en sus reuniones, hacen las recomendaciones que permiten seleccionar los textos, que son finalmente enviados a las escuelas para su venta a los estudiantes. Los Comités continúan reuniéndose cada tres años para revisar sus decisiones.

Los estudiantes pueden comprar los libros al contado o a cuatro plazos, por precios que oscilan entre la tercera parte y la mitad del valor comercial de los textos.

Hasta la fecha se han seleccionado y publicado 12 libros, los cuales se encontrarán en circulación completamente en el próximo mes de mayo de 1972. En los primeros cinco títulos se han editado 75.000 ejemplares de los cuales se ha vendido aproximadamente 43,000 ejemplares, el 80 % de ellos de contado.

Se tiene planeado la publicación y distribución en los primeros cinco años del programa, un total aproximado de 800.000 textos en las 22 asignaturas seleccionadas.

DEL CERRO, M., and SNIDER, R. S. University of Rochester Medical Center, Rochester, New York. The ultrastructure and properties of neuronal and glial growth cones.

The electron microscopical (EM) identification of growth cones as sites of the growing fibers populated by ovoid or elongated vesicles ranging in size between 600 to 1 200 A° (Bodian, 1968; del Cerro and Snider, 1968) has been confirmed by numerous investigators. However, the functional significance of such vesicles remains obscure.

To gain insight into this problem, EM observations have been made on the developing cerebellar cortex of albino rats and spinal cord implants in dorsal fins of Axolotls. The experimental animals received a local injection of either ferritin or horseradish peroxidase. The distribution of ferritin was observed directly in both non-stained and slightly stained sections while the presence of peroxidase was demonstrated by incubating the tissue in a diaminobenzidine-hydrogen peroxidase medium. Both tracer molecules readily diffuse along the intercellular gaps and are quickly picked up by "coated" pinocytotic vesicles in the perikaria and concentrated in lysosomes. Axonal growth cones incorporate little, if any, tracer while cones at the tip of Purkinje dendrites and Bergmann glial processes show accumulation of both macromolecules into their vesicles and tubules. These structures may be related to the smooth endoplasmic reticulum. Similarly the axonal growth cones in salamander implants show little incorporation while Schwann cells show some. This unexpected differential behavior of different types of growth cones allows a new approach to the study of the origin and ultrastructure of them and may prove helpful to the future understanding of their function.

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DIAZ VALBUENA, R. Universidad del Zulia, Maracaibo, Venezuela. Formación y lugar de origen del nervio sural en el hombre.

Mediante la disección de la región posterior de la pierna a los 71 cadáveres, para ver el origen y recorrido del nervio sural; asimismo como es estudio histológico y medición de los mismos; se llega a la conclusión de que el nervio sural en la mayoría de los casos se origina en el tercio inferior de la cara posterior de la pierna por la unión de una rama lateral proveniente del ciático poplíteo lateral y una rama medial provenientes del ciático poplíteo medial.

DIDIO, L. J. A. Medical College of Ohio, Toledo, Ohio. Teaching of Anatomy in an integrated medical curriculum.

From experience gathered in the teaching of the anatomical sciences (cytology, histology, embryology, gross anatomy, neuroanatomy, medical anthropology, living, radiologic, clinical and surgical anatomy) in a partially and in totally integrated medical curriculum, the author analyzes the sequence of subjects, and the teaching and learning activities.

During the first trimester, an introduction of the broad principles governing organization of the human body along with the general and most of the special nomenclature are given to the students. Models, tridimensional color pictures, films, charts, and other audiovisual materials are utilized. Simultaneously, in depth courses in cytology (cell biology) and medical anthropology, plus general lectures on histology (tissue biology), embryology, and neuroanatomy (neurobiology) are taught in as close a correlation as possible with introductory information from other basic and clinical departments.

In the following 12 months, the anatomy of each system or apparatus (7) is taught from the level of subcellular structure to the level of adult structure, including biology of human races and the community: (1) locomotor system; (2) nervous system; (3) circulatory and respiratory systems; (4) digestive system; (5) endrocrine system and metabolism; (6) urogenital system and electrolytes; (7) hematology. Anatomy is not taught in the eighth section, which deals with infectious diseases. Clerkship, internship and residency follow, during which special lectures and seminars on particular topics of anatomy as well as other medical sciences are given as needed.

Reactions of students, faculty, and administrative members are described, and the advantages and disadvantages are pointed out and evaluated.

DIDIO, L. J. A., ZAPPALA, A. and CARDOSO, A. D. Medical College of Ohio, Toledo, Ohio; University of California at Davis; and University of Alagoas, Brazil. Musculus articularis cubiti dorsalis in human fetuses, newborns and young individuals.

Dissections and microscopic studies of the musculus articularis cubiti dorsalis were performed in 39 cadavers (78 superior members) of human fetuses, newborns and young individuals (23 males and 16 females, 36 Caucasians and 3 Negroes). Warm liquid gelatin colored with a blue pigment was injected into the cavity of the elbow joint. Transection of the triceps muscle and downward reflection of its distal one-third allowed the study of the *m. articularis cubiti dorsalis*. In all of the cases the muscle was present on the posterior surface of the humerus, being symmetrical bilaterally as far as the number of its bundles in the great majority of cases (94.4 %). The muscle exhibited a rectangular shape (50%), a triangular shape (40.3%), a square shape (6.9%) and a

lambdoid shape (2.8 %). In most of the cases (97.2 %) the muscle was represented by a single bundle, but it also appeared in 2 bundles (2.8 %). The length of each muscular bundle varied between 2 and 44 mm, averaging 14 mm. The width varied between 1 and 24 mm, the average being 6 mm. The origin of the *m. articularis cubiti dorsalis* is at the distal third of the posterior surface of the humerus and the insertion into the superior part of the articular capsule of the elbow point. Histologic sections were made from 3 cadavers after paraffin embedding and stained by the Mallory-Azan method. The microscopic evaluation showed the muscular fibers inserted into the membrana fibrosa of the *capsula articularis* in close relationship with the membrana synovialis.

DUFF, T. A., COHEN, D. H. and MACDONALD, R. L. University of Virginia, Charlottesville, Virginia. Responses of single optic tract afferent to the pigeon tectum evoked by diffuse retinal illumination.

This is the first in a series of studies of laminar organization of the avian tectum and its processing of visual intensity information. As a prelude to investigating tectal neurons, this study quantitatively describes response characteristics of ganglion cell axons in the most superficial tectal lamina, the stratum opticum.

The retina was diffusely illuminated using an optical system which projected a light spot of calibrated intensity and diameter. Penetrations of the anterior contralateral tectum with metal-filled micropipettes allowed characterization of 300 stratum opticum fibers. Of these, 93 % responded to a 600 foot-lambert stimulus with a burst at onset (mean latency = 33.2 ± (S. E.) 1.07 msec.; mean burst size = 2.8 ± (S. E.) 0.13 impulses). As stimulus intensity was reduced the percent of responsive units decreased (e. g. 50 % responded to 6 foot-lamberts). Furthermore, mean latency increased and mean burst size decreased linearly with log intensity. Following the "on" response, discharge generally ceased for the stimulus duration (< 30 sec.). At termination of a 600 foot-lambert stimulus 50% of the fibers showed an "off" response, the remainder gradually resuming spontaneous activity. The latency and burst size of the "off" response varied with intensity similar to the "on" response. Anesthesia and level of background illumination predictably affected the responses quantitatively but did not alter them qualitatively.

Unexpected findings were the high percent of fibers responding to diffuse illumination and the absence of sustained responses with maintained illumination. Further, the low variability of responses among fibers and their linearity with log intensity are highly favorable characteristics for subsequent studies of deeper tectal laminae.

DUTTA, H. M. Kent State University, Kent, Ohio. The suspensorium of the fishes, *Anabas testudineus, Ctenopoma acutirostre,* and *Macropodus opercularis:* A comparative functional analysis in relation to respiration, feeding and gulping.

The methods used were dissection, observation and cinematography. In both *A. testudineus* and *M. opercularis* the suspensorium is triangular. However, the length of the infraorbital region between hyomandibula and metapterygoid is much longer in the latter species. This is due to the larger size of the entopterygoid. In *C. acutirostre* the suspensorium is irregularly shaped with an extensive gap between the hyomandibula and metapterygoid. A large part of the musculus adductor arcus palatini occupies this space. In *A. testudieneus* the relative size and the processes of the hyomandibula are larger.

In all three species, the lower jaw and suspensorium are functionally interdependent. The lower jaw of *C. acutirostre* is more dorsoventrally oriented and the articular is very large with a knob-like retroarticular bone on the ventral corner of the former. This relates to the bottom resting habit of this species.

In *A. testudienus* the musculus adductor maxillae is roughly gradiangular with three divisions; whereas, in *C. acutirostre* it is semicircular with two divisions. In *M. opercularis* this muscle is crescentshaped without any division. In *A. testudineus* the division of the musculus adductor maxillae is probably related to its habit of holding food.

In all three species the suspensorium has been influenced by the architectonic pattern of the head. The curvature of the suspensorium seems to be a structural adaptation to fit the streamlined head shapes of *A. testudineus* and *M. opercularis.* The concave infraorbital region of the metapterygoid is probably adapted to the shape and position of the eye.

DYER, R. F. and KIRCHHEIMER, W. F. L. S. U. Medical Center New Orleans, Louisiana and U. S. Public Health Hospital, Carville, Louisiana. Membrane-particle complexes in cultured mouse foot pad cells exposed to *Mycobacterium thamnopheos.*

Certain temporal studies designed to investigate the phagocytosis of *Mycobacterium thamnopheos* by cultured mouse foot pad (MFP) cells have revealed an accumulation of glycogen-like particles in the bacterial and animal cells. These particles have been seen only when the two cell types are exposed to one another. The particicles in *M. thamnopheos* resemble either alpha of beta glycogen, while those in the MFP cells appear as beta glycogen routinely associated with smooth membranes forming cisternal spaces. The particles may be within the spaces or external to them. Membrane-particle complexes are frequently seen in association with MFP cell cytoplasmic lipid inclusions. The factors responsible for the presence of these particles are not known, nor is it known why the particles are present at all time intervals studied in some cultures but totally absent in others.

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EMMERS, R. and JAFFE, M. H. College of Physicians and Surgeons, Columbia University, New York, N. Y. A double somatotopic representation of afferent projection in the rat trigeminal nuclei.

Since the chief sensory nucleus (Ch V) and the spinal nucleus (Sp V) of the trigeminal complex send separate projections to the first and the second somesthetic regions (SI and SII) of the rat thalamus *(Anat. Rec. 169:* 477, 1971), the question was raised as to whether the Ch V and the Sp V are homologous to SI and SII with respect to their somatotopic organiza-

tion. Consequently, a detailed analysis was made of those peripheral projection fields which provide somesthetic input for groups of neurons within the trigeminal nuclei. The method of study was similar to that used to analyze the organization of the rat somesthetic thalamus *(J. Comp. Neurol. 124:* 215, 1965); steel electrodes with 10 to 30 micra tip diameter were used to record neural activity evoked by mechanical stimulation of the animal's skin, and some 60 to 75 projection fields were outlined with each experimental animal. Maps of these projection fields indicated the following relationships: 1) Afferents from the entire half of the head ipsilaterally to the recording sites terminate in a somatotopically organized manner in the Ch V and with a duplicate of this organization in the Sp V. 2) Although the mandibular, maxillary, and opthalmic divisions project into the nuclei along a dorso-ventral axis, this axis is angulated at its dorsal aspect of the nucleus throughout its rostro-caudal difrom the ear project ventro-medially and terminate at about the same rostro-caudal level as the lower jaw and the tongue. The latter are oriented dorso-medially, while the snout points in a postero-lateral and dorsal direction. 4) In Sp V the snout points postero-medially with the upper lip extending along the dorso-medial aspect of the nucleus throughout its rostro-caudal dimension. The tongue projection region is in the far rostral, dorso-medial position; it borders the duplicate tongue projection region in the Ch V. Since a sparse contralateral input was detected, projection fields in V had a bilateral representation. These findings satisfy the main criteria for grouping the Ch V with the SI system, and the Sp V with SII. (Aided by grant NS-03266 from NINDS).

EPPLE, A. W. and CARR, J. R. Thomas Jefferson University, Philadelphia, Pennsylvania. The relative roles of hypophysis and adrenals in lipid utilization by male diabetic rats.

The published information on the Mongolian gerbil is greatly inadequate and because of its natural characteristics and susceptibilities it is uniquely valuable as an experimental animal in medical research.

Previous microscopic investigations in our laboratory established and compared the stages of development of normal human and mouse adrenal glands and human anencephalic adrenal glands placing special emphasis on the transient-zone.

This study of the gerbil adrenal gland cortical zonular pattern development shows it to proceed at a significantly slower rate than in human and mouse; and that an area representing the transient-zone is not present or shows unique developmental properties. The developmental pattern of the gerbil adrenal was established using the following criteria: 1) relationship of age to the developing zone; 2) times of formation of definitive zonation; and 3) the morphological determination of developmental patterns based on staining characteristics.

Using these criteria, development was compared to the human and mouse adrenal and divided into five phases: 1) condensation of coelomic epithelium; 2) secondary proliferation of coelomic epithelium; 3) presence or absence of PAS-positive material within the transient-zone; 4) decline and disappearance of the transient-zone; and 5) establishment and stabilization of the definitive zonular patterns.

A second phase of this study is the histochemical and the electron microscopic analyses and evaluation of the cellular structure and contents of the transient-zone of the gerbil adrenal cortex.

ERHART, E. A. Universidad de Sao Paulo, Brasil. Modified nerve suture technique improving rehabilitation of recent and long-term post-tramatic nerve injuries.

In previous papers (1958 up to 1970) we have reported the following observations: (i)—Human and dog nerve fibers which, after having been completely transected for a long time (one or more years) exhibited normal structure and function in the completely separated distal segments because they had been maintained, undisturbed, in their natural connective tissue bed. (ii)—It is possible to prevent total Wallerian degeneration by means of an adequate and properly timed nerve suture. (iii)— The very encouraging results obtained with nerve suture in long-term post-traumatic nerve injuries.

Several experienced surgeons, on a large traumatic university service, who had accompanied our experimental work and then made practical use of our conclusions by operating on their series of already over 400 patients, can now make the following statement: adequate nerve suture and or neurolysis are highly indicated, even after a delay of many years, for the rehabilitation of patients with long-term post-traumatic nerve injuries.

The modification of the nerve suture technique, which will be presented for discussion was developed based on the above-referred data. It improves motor and sensory rehabilitation of long-term post-traumatic nerve injuries and may prevent total Wallerian degeneration of the distal nerve segment when properly performed with adequate timing. In no case did a clinical failure occur when the necessary precautions were taken.

FASO, P. J. University of Dayton, Dayton, Ohio. Reinforcement of anatomical learning through laboratory experience.

There are almost endless ways in which learning situations may be developed. All teachers agree that there is no one best way but, rather, a combination of ways wherein the teacher may find suited to his particular situation. In order to evaluate the different systems of teaching of the past versus that of the present, to reveal possible values for the forseeable future, it must surely go beyond that of the various testing programs. Testings, no matter how well conceived and administered, can never be equated with the prior necessity of excellence in teaching particularly, in a climate lending itself to intellectual stimulation.

During a span of more than a quarter of a century of teaching, this writer believes that an accenting of the laboratory program over that of the lecture is long overdue. This is the area of instruction that is all too often minimized. The laboratory, by its very nature lends itself more validly than does the lecture in the development of skills, to gain firsthand knowledge of concepts, to develop a better sense of self-criticism, to learn self-reliance in the investigating of a problem, and to learn the methods of inductive reasoning. Further, it is my conviction that in order for these merits

to develop there ought to be more time allotted to the laboratory program. Additional laboratory time would make possible a greater frequency of more expanded practical examining and, the results of which, are always a more reliable index as to the student's progress as well as providing a gauge to measure the teacher's abilities.

As teachers of Morphology, it may be opportune to ask of ourselves certain basic questions: What is the proper function of a Morphology offering? How can this function be most effectively discharged? Few would quibble that, for either the preprofessional student or the terminal student, the value of such a course lies in the number of different animals the student learns to know in the essential particulars, or for which, at the conclusion of the course, he can, if asked, state all the minutiae and life histories. It should be remembered that the mastery of facts and details does not, of and by itself, constitute the whole educational process; the tendency to confuse information with knowledge is all too common. The teacher should encourage the student to think broadly and comparatively regarding the study of animals not as an end in itself but as furnishing a basis for the understanding of vital processes at all levels of biological complexity.

FENOGLIO, C. M., LANE, N. and KAYE, G. I. College of Physicians and Surgeons, Columbia University, New York, N. Y. Distribution of lymphatics in normal, hyperplastic and neoplastic human colonic mucosa.

Light and electron microscopic studies of lymphatic distribution and structure in the several types of colonic mucosa show that lymphatic vessels form a network around the muscularis mucosae. Occasionally, loops from this network extend into the lamina propria to the level of the bases of the crypts. We have not observed lymphatics penetrating into the intercryptal lamina propria, except in the mucosa of the hyperplastic polyps, and then never past the lower one-third to one-half of this widened zone.

Only fenestrated venous capillaries are seen immediately subtending the absorptive surface epithelium in all of the several forms examined. In colonic adenomas, in which the muscularis mucosae becomes frayed, what lymphatics are found follow the muscle strands. In the less common villous adenomas strands of muscle often extend into the lamina propria of the villi carrying lymphatics with them.

Previous reports of lymphatic distribution in the gastrointestinal tract have generally assumed that the distribution in the colon followed the same pattern as that in the stomach and small intestine. The difference in lymphatic distribution found in the present study may be of significance in diseases of the human colon.

FERRAZ DE CARVALHO, C. A., COSTACURTA, L., DE CARVALHO FILHO, J. R. y DE ANDRADE, E. P. Universidad de Sao Paulo, Sao Paulo, Brasil. Estudio histológico, histoquímico y ultraestructural del ependima del *Bradypus tridactylus.*

Se estudió el revestimiento ependimario de los ventrículos encefálicos del *B. tridactylus* en ocho ejemplares adultos de esa especie.

Para el estudio histológico nos valemos de cortes de 8,5 micras de encéfalos, incluidos en parafina, y colorados por los métodos de Azan (M. Heidenhain) del Alumen Cromico – Hematoxilina-Phloxina (método de Gomori, usado por Bargmann para neurosecreción), el de Klüver-Barrera para células y fibras nerviosas, y también los de la impregnación de Palmgren, Cajal de Castro, Pessacq y Rio-Ortega, estos dos últimos empleados para evidenciación de las células gliales, en cortes de 50 a 100 micras, obtenidos por congelación.

Se determinó en el revestimiento ependimario de las paredes ventriculares áreas de diferentes características histológicas, del mismo modo que sus relaciones con el tejido nervioso que lo envuelve.

Se comprobó la presencia de substancia Gomori positiva en el infundíbulo de la hipófise y en determinadas áreas del III ventrículo.

Utilizándose los métodos del PAS (McManus), de la Digestión por la Ribonucease (Brachet), Feulgen, Fosfatase Acida y el de la Metacromasia, se evidenció regiones que muestran comportamientos histoquímicos distintos.

Se seleccionaron algunas áreas del ependima y se estudiaron las mismas con el microscopio electrónico, utilizándose fijadores de tetróxido de osmio y gluteraldehido, taponados por el Millonig; se trataron los cortes por el citrato de plomo o acetato de uranilo y se incluyó en araldita.

El estudio ultraestructural nos posibilitó identificación de regiones del ependima con aspectos citológicos distintos que sugieren relaciones con fenómenos de absorción y secreción.

FIX, J. D. Indiana University Medical Center, Indianapolis, Indiana. A cytomorphometric analysis of the nucleus dentatus sieve lateralis cerebelli of *Ateles ater.*

A morphometric analysis of the dentate nucleus of *Ateles ater* was performed. Numerical cell densities, cell size, and gray-cell coefficients were determined. The selection of this primate was predicated upon phylogenetic and cytoarchitectural criteria. This griseum is morphologically identical to human dentatum. The brains were perfused, paraffin embedded, stained with Cresylechtviolett and sectioned serially in the coronal plane at 20 μ. Unequivocal glial differentiation was achieved with phase contrast microscopy. Quantification was made with both phase contrast and bright field optics. The gray-cell coefficients were determined by Haug's method. The dentate nucleus is characterized by the presence of large somatochromic and small karyochromic perikarya, and the typical three glial elements.

The ratio between the numerical cell densities of the large and small cells was 1:1. The oligodendrocytes had the highest numerical cell density, followed by the lastrocytes, and the Hortega cells. Friede's total *Gliaindex* was computed to be 13.13. In the *corpus medullare* the oligodendrocytes presented the highest numerical cell density; the numerical cell densities of the Hortega cells and the astrocytes were not significantly different from each other. Linear measurements of the glial nuclei revealed that the astrocytes were the largest of the glial elements, showing no difference in size related to gray and white matter. The size of the oligodendrocytes in the dentate nucleus corresponded to their size in the white matter. The length of the Hortega cell nuclei in the dentate nucleus does not differ from the longest diameter of the oligodendrocytes. In the *corpus medullare* the Hortega cell

nuclei are shorter in length than those found in the gray substance.

The gray cell coefficients were transformed into volume percentages. Only 7 % of the dentate nucleus is composed of nerve cell perikaria and glia cell nuclei; the glial cell nuclei represent only 2 % of the total white matter.

The morphometric differences between the cellular elements in both gray and white substance is correlated with the functional roles ascribed to the neuroglia in relation to capillary and neuronal density. The glial satellites are predominately oligodendocytes.

GARCIA, O. S. and FERRAZ DE CARVALHO, C. A. Universidad de Sao Paulo, Sao Paulo, Brasil. Estudio electromiográfico de los músculos "Flexor carpi ulnaris" y "Abductor digit minimi".

La acción de los músculos "Flexor carpi ulnaris" y "Abductor digiti minimi" fue analisada simultáneamente en 16 individuos, de 18 a 22 años siendo 8 del sexo masculino y 8 del sexo femenino, de los cuales 14 derechos.

Los potenciales de acción fueron obtenidos por medio de un Electromiógrafo TECA TE 2-7 con electrodos de Aguja Coaxial simples introduzidos en la masa muscular un poco caudalmente a las inserciones proximaes.

En la mayoría de los casos la acción de esos músculos fue examinada en 32 movimientos, siendo uno de los objetivos fundamentales de esta pesquisa el análisis de sus relaciones funcionales.

Entre los resultados obtenidos por nosotros es bueno resaltar las siguientes conclusiones en lo que se refiere a la simultaneidad funcional.

1—Abducción y flexión del 5o. dedo en 50 % de los casos.

2—Aducción de la mano con los dedos, sea en posición de reposo, sea leve o fuertemente flexionados, tanto con o sin resistencia y aún con la posición de extensión en la mayor parte de los pacientes.

Constatamos también que el "Flexor Carpi Ulnaris" no participa en los movimientos de pronación y supinación de la mano partiendo de la posición de repozo como también de la flexión y extensión del codo, con o sin resistencia.

GARCIA RAMOS, M., DE LARA GALINDO, S., BALBANERA ABREU, M. y RAMOS CARRASQUEDO, R. Universidad Nacional Autónoma de México, D. F. La Ligadura de las Arterias Hipogástricas como medida Profiláctica de las Hemorragias en Cirujía Prostática.

Se hace revisión semi-macroscópica de la circulación de la próstata, se realiza estudio radiológico de la circulación prostática, se practica estudio histológico, se valoriza encuesta sobre hemorragias transhipost-operatorias y de la estadística mexicana de las hemorragias de la próstata. Con base en este estudio, y al terminarlo, se pretende hacer conclusiones que tengan aplicación a la cirujía, con base en los estudios anatómicos.

GASSER, R. F. Louisiana State University Medical Center, New Orleans, Louisiana. The early development of parotid gland around the facial nerve and its branches.

The exhibit presents the manner in which the parotid gland develops around the extracranial branches of the facial nerve and the related blood vessels in man. The study was made with the aid of reconstructions on 15 human embryos and fetuses that have a gestational age of 7 + to 13.5 weeks The gland begins as a solid, epithelial bud from the buccal mucosa and grows toward the auricle to the point where the facial nerve divides into its temprofacial and cervicofacial rami. As ductules of the gland develop, nerve branches of the temporofacial ramus (temporal, zygomatic and upper buccal) occupy a superficial position among the ductules whereas branches of the cervicofacial ramus (lower buccal, marginal mandibular and cervical) are deeper and more closely related to blood vessels. As the gland becomes more complex, connections between its superficial and deep portions are evident between many branches of the facial nerve. A complete cleavage plane through the gland with a single mass of communicating ductules (isthmus) was never observed.

GILANI, S. H. New Jersey College of Medicine, Newark, New Jersey. Lead poisoning in the chick embryos.

The present study was performed to evaluate the effects of lead acetate on the developing chick embryos. Lead acetate was injected into the chicken eggs at 3 days of incubation. The LD_{50} for the 3rd day was 0.015 mg per embryo. All the embryos, treated as well as controls, were studied on the 8th day of incubation. The following abnormalities were observed: ectopia visceraum, micromelia, defective curvature of the body, and shortening of the neck. Most of the embryos showed reduced body size. The incidence of these anomalies increased with the amount of the injected lead acetate.

Lead acetate was also found to affect the normal development of the heart. The malformations of the atrioventricular valves, and the ventricular septal defects were observed. (Supported by Essex County Heart Association, East Orange, N. J., U. S. A.).

GODINHO, H. P. Universidad Federal de Minas Gerais, Brasil. Patterns of parenchymal branches of the testicular artery in domestic ruminants.

The arterial supply to the testis of domestic ruminants presents interesting features which are different from other mammals, including man. The testicular artery reaches the organ at the dorsal pole and winds down to the ventral pole where it divides into several branches. Smaller vessels (penetrating rami, PR) arise from the latter, dip into the parenchyma and course toward the mediastinum.

Vinyl casts obtained from oxen, sheep and goats revealed two main types of PR.

Type I – PR that ran almost straight through the testicular mass without giving collaterals of significant diameter. At the mediastinum each PR divided in a variable manner giving rise to recurrent rami (RR). The RR coursed back toward the surface and distributed in the parenchyma. According to the mode of division at the mediastinum they were classified as: (a) dichotomic– a PR termination in which the resulting two branches coursed dorsad and ventrad, respectively, in the mediastinum. They were mainly found in the middle portion of the testis; (b) bent– in this case the mediastinal termination of the PR

bent dorsad or ventrad in the mediastinum. They supplied the dorsal pole; (c) coiled– the PR terminated twisting several times around itself resembling a wool yarn. They supplied the ventral pole; and, (d) arcuate– these were the most numerous PR found in the testes. They divided in two to four smaller branches which bent at the mediastinum and ramified back in the parenchyma. They were mainly found in the middle portion.

Type II – These vessels did not reach the mediastinum, instead they divide in several twigs immediately after dipping into the parenchyma. They constituted approximately 20 % of all PR.

The average number of PR per testis was 34.9 in ox, 43.8 in sheep and 81.2 in goat. No anastomoses between PR were found. Evidence exists that the different types of PR have their proper area of distribution in the testis.

GOMEZ ALVAREZ, S., Universidad Nacional Autónoma de México, Mexico City, Mexico. La dinámica de los colores en la enseñanza de la neuroanatomía.

Estudio de una serie de láminas de estructuras del sistema nervioso en que experimento la dinámica de los colores con el propósito de facilitar la enseñanza y ayudar a la mejor comprensión, memorización y aprendizaje de esta importante disciplina.

HAYASHI, H. Escola Paulista de Medicina, Sao Paulo, Brasil. The development of the interstitial tissue of the human testis.

The morphology of the interstitial tissue of human testes varies considerably during life as in other mammals. The Leydig cells experience one stage of hypertrophy in fetal life, followed by an atrophy about the time of birth, and at puberty they once again increase to become fairly constant in number during adult life; and only in old age do they at last retrogress. Many authors found no Leydig cells before puberty except for the first months after birth in normal human testes.

It was, therefore, decided to observe the differentiation of Leydig cells between birth and puberty, investigating the interstitial tissue of undescended testes, which retain many fetal charactetistics, and normal scrotal testes in the age range 1-16 years.

A histologic study of the development of the interstitial tissue of prepubertal, cryptorchid, and normal human testes showed that the absolute number of undifferentiated cells within a unit volume of 1 cu. mm. of interstitial tissue is higher in undescended testes from individuals of the same age. Leydig cells are absent from the interstitial tissue of prepubertal undescended testes, but are present during the 1st year of postnatal life in normal testes; they appear first in undescended testes near puberty by differentiation from mesenchymal cells.

HEIDGER, P. M., JR. Tulane University School of Medicine, New Orleans, Louisiana. Specialized junction between Sertoli cells in the dog testis.

Utilizing perfusion fixation, the fine structure of the seminiferous tubules of the adult dog has been studied, with particular reference to the structural relationships between adjacent Sertoli cells within the seminiferous epithelium. The epithelium is underlain by a well-defined basal lamina and a very loosely arranged lamina propria. The lamina propria is bounded by smooth muscle-like (myoid) cells arranged circumferentially about the tubule. In this species, the myoid cell layer usually consists of a single layer of cells; these cells are joined to each other by means of long, overlapping cytoplasmic processes. Peripheral to the myoid cell layer, attenuated processes of fibroblastic cells loosely ensheath the tubule. The tubules are often seen in close relationship to lymphatic channels similar to those described previously in other species (Fawcett, Heidger and Leak, 1969), Within the seminiferous epithelium, the basally situated Sertoli cells may be separated by a 180-200 A° intercellular space; however, more apically within the epithelium, specialized juntional complexes between Sertoli cell processes are observed. These may extend for 10 microns or more, and share the essential morphological features described previously in other species (Flickinger and Fawcett, 1967; Heidger, 1970. In each of the adjacent cells, a narrow band of peripheral cytoplasm is defined by long cisternae of endoplasmic reticulum oriented parallel to the plasmalemma. This zone of cytoplasm typically contains dense bundles of fine filaments. The adjoining cell membranes may be separated by a 90 A° space, or may form 20 A° "gap" junctions, or fusion junction. These observations thus extend to another species the possibility that junctional complexes between Sertoli cells may prevent or impede the free intercellular passage of substances across the epithelium, and may therefore contribute to the "blood-testis" barier.

(Supported by Grant No. 1 R01 HD06207-01 from NIH.)

HEIMER, L. Massachusetts Institute of Technology, Cambridge, Massachusetts. The projection of the olfactory tubercle in the rat.

Superficial lesions were produced in the olfactory tubercle of rats with the aid of a heated silver plate. Following survival times of 1-5 days the animals were sacrificed and the brains prepared for light and electron microscopic mapping of degenerating fibers. To ensure optimal sampling for the electron microscopic study, 5-7 μ thick plastic sections were stained with silver for degenerating axons and axon terminals prior to the trimming of the block for ultramicrotomy.

The most massive projection field of olfactory tubercle fibers is localized in the substantia innominata primarily on the dorsal aspect of the medial forebrain bundle. The region where the tubercle fibers terminate is characterized by many large dendrites surrounded by a continuous sheath of boutons. The majority of the boutons possess large (mean diameter = 610A°) synaptic vesicles and "symmetric" membrane densities, whereas the rest of the boutons have smaller (mean diameter = 480 A°) vesicles and "asymetric" membrane densities. The olfactory tubercle fibers belong to the first category.

A less dense termination is found in the mediodorsal nucleus of the thalamus as well as in nuclei gemini. Although these fibers project through the lateral hypothalamus, there is no evidence for a significant synaptic interaction between the olfactory tubercle fibers and cells of the lateral hypothalamus except in the nuclei gemini. Nor is there evidence for direct fiber connections to the habenular complex. Ros-

trally directed olfactory tubercle fibers terminate in the plexiform layer of the olfactory peduncle and the anterior continuation of hippocampus.

HELTNE, P. G. The Johns Hopkins University School of Medicine, Baltimore, Maryland. Adult weight and gestation period of *Callimico goeldii.*

Callimico goeldii is an endangered South American primate. Systematically, *C. goeldii* is the sole member of the family Callimiconidae which is intermediate between the other South American primate families, the Callithricidae (marmosets and tamarins) and the Cebidae (monkeys).

Since 1967, a small breeding colony of this rarely observed species has been studied. Longitudinal weight records on sixteen animals will be presented. Nineteen pregnancies from three breeding pairs have been confirmed. Data on length of gestation give minimal figures of 163, 164, 169, 170 and 171 days for full-term births. No multiple pregnancies have been observed. Birth weight is from 50-60g.

Figures from this *Callimico* group will be compared with other *C. goeldii* data and related information from the cebids and callithricids.

HENDRICKSX, A. G. University of California, Davis, California. Embryotoxic and teratogenic effects of aminoacetonitrile in rhesus monkeys *(Macaca mulatta).*

Female rhesus monkeys were exposed to the male for approximately two hours once during the menstrual cycle, usually two days before midcycle. The day of mating was considered day 0, and all pregnancies were surgically terminated on day 100. Aminoacetonitrile was dissolved in saline solution and given intramuscularly as single treatments (50mg/kg) on days 29 and 42, as five day treatments (50mg/kg) on days 29-33 and 38-42, or as ten day treatments (75mg/kg) on days 29-38 and 38-47. The 3 fetuses receiving the drug on days 29 and 42, respectively, were normal. Treatment on days 29-33 resulted in 1 normal, 1 resorbed and 1 dead fetus. Treatment on days 38-42 resulted in 1 normal, 1 slightly malformed (meromelia, left arm) and 1 dead fetus. Treatment on days 29-38 resulted in 1 severly malformed (ectopia cordis, malrotation of head), 1 slightly malformed (facial dysmorphia) and 1 dead fetus, while treatments on days 38-47 resulted in 2 abortions (days 50-54) and 1 dead fetus. These data suggest that aminoacetonitrile has a nonspecific effect on the embryo when administered during the period of primary and secondary palate formation.

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HERNANDEZ PERALTA, B. E. Universidad Central de Venezuela, Caracas, Venezuela. Ultraestructure of exfoliative cells from the buccal mucous membrane of cancerous persons.

For the first time Electron Microscopy technique has been adapted for the study of exfoliative cells. The microstructure of the buccal exfoliative cells of a group of 27 patients with confirmed diagnosis of malignancy was studied. 27 healthy individuals were used as a control group. Both groups had a clinically healthy buccal mucous membrane. The normal control group showed three different types of cells which have been classified as superficial intermediate, and basal cells. A group of cells was observed in the exfoliative cells of buccal mucous of patients with malignancy. They differed from the cells of the control group in the following: (1) Nuclear pleomorphism and clumping and irregular distribution of chromatin. (2) Presence of abundant and hypertrophied tonofilaments. (3) Decreased amount of glycogen granules in the cytoplasm. These changes seem to be a reflexion of a generalized alteration, the nature of which remains to be elucidated.

HESS, A. Rutgers Medical School, New Brunswick, New Jersey. La estructura fina de la musculatura que mueve los ojos en el pollo.

Los músculos oculares en el pollo han sido estudiados en el microscopio electrónico y después de teñir con *cholinesterase* y *ATP-ase.* Estos músculos tienen fibras despaciosas con pocas terminaciones nerviosas, mientras las fibras rápidas tienen un solo término. También, las fibras despaciosas tienen las triadas irregulares, las fibras rápidas tienen las triadas regulares a la juntura de A y I bandas. Las fibras rápidas tienen ramificaciones. Uniones son formadas entre rápidas fibras musculares por cortas ramas levantadas desde ayacentes fibras. Es posible que estas fibras despaciosas en el pollo son como fibras despaciosas en la rana y no se pueden contraer. Estas fibras despaciosas en los músculos oculares son diferentes de otras fibras despaciosas en el pollo en el músculo anterior latissimus dorsi. Sus múltiples terminaciones nerviosas son diferentes en apariencia, también como en distribución. Además, estas fibras musculares aparentemente son coloreadas por *ATP-ase* en bajo pH 4.4. Unas fibras despaciosas están situadas alrededor de los bordes de los músculos oculares, pero también pocas fibras despaciosas pueden hallarse en el interior de todos los músculos.

HESS, M. and RUBY, J. R. Louisiana State University Medical Center, New Orleans, Louisiana. Use of color television in teaching histology.

Recently we have been using color television as a teaching aid for microanatomy. This method allows for a more rapid and efficient way to orient students on the material being studied. Although live demonstrations can be done, we have preferred to make videotapes. This demonstration will show how we have used these tapes. The tape will include the study of a section of the esophagus and show we can move from a low magnification study of the layers of the organ to a more detailed study at higher magnification without losing general orientation. We will also demonstrate how effectively the television system can be used to help the student in studying histological "look-alikes".

HIGGINBOTHAM, F. H. West Virginia University Medical Center, Morgantown, West Virginia. Light microscope study of the aorta of the Virginia opossum, *Didelphis virginiana.*

Aortas were removed from opossums being used in a variety of neurological experiments. Segments were taken from the ascending, arch, thoracic and abdominal segments and fixed for 24 hours in buffered

formalin. Paraffin embedded tissues were stained by H&E, PAS, Verhoeff and Verhoeff-vanGieson methods; frozen sections were stained with oil-red-0 and toluidine blue; cryostat sections were tested for ATPase and non-specific alkaline phosphatase activity. In general, the structure in all segments resembled that previously reported for dog aorta. Low abdominal segments, near the origin of the common iliac arteries, appeared to contain a greater number of medial elastic lamellae than more cranial abdominal segments. Some aortas had intimal thickenings, mostly in abdominal segments, with many interruptions in the elastic lamellae. No sudanophilia was seen. Adventitial mast cells were numerous. ATPase activity was strong only in endothelial cells of aorta, vasa vasorum and adventitial vessels. Smooth muscle of the media showed moderate, uniformly distributed ATPase activity; no gradients, as reported for dog, were seen. Only occasional non-specific alkaline phosphatase activity could be demonstrated in endothelial cells.

HOLLAND, R. C. and NEGORO, H. Mahidol University, Bangkok, Thailand. Inhibition of unit activity in the hypothalamic paraventricular nucleus following antidromic activation.

The activity of 202 units in the paraventricular nucleus (PVN), identified by antidromic activation of the neurohypophysis, was studied during and after single shock or train stimulation. After a single shock at 20% above threshold intensity there was a mean period of 54.7 msec of inhibition of spontaneous firing. Increasing the intensity increased the duration of the inhibitory period until an upper limit, depending upon the neurone, was reached.

Train stimulation of 5 sec was followed by several seconds of inhibition. The duration of inhibition was longer if the intensity or frequency of the stimuli in the train was increased. Under these conditions the B (SD) potential was lost early in the train and only the A (IS) potential followed each stimulus. It is suggested that recurrent inhibition at the soma accounts for the loss of the B potential and the poststimulation period of inhibition of spontaneous firing and that the inhibition is cumulative. Although presynaptic inhibition of PVN afferents cannot be excluded, we could find no evidence for this type of inhibition in PVN.

After a period of fast spontaneous discharge or an antidromic train, the refractory period was lengthened and the threshold for antidromic activation was elevated. Hyperpolarizing after-potentials very likely are the basis for these changes in the neurophysiological characteristics of the neurone and at least in part account for the gradual lengthening of the latency of the antidromic response observed with longer trains of up to 60 sec.

The results suggest that within the PVN is a mechanism which would provide for release of oxytocin in a phasic manner in spite of continuing activity in excitatory afferents to the PVN.

HUANG, J. C. C. and HOSCHINO, K. University of Manitoba, Winnipeg, Manitoba, Canada. The lethal factor obtained from submandibular gland of male mice with special reference to LD_{50}.

Isografted submandibular glands of adult male mice were found to be capable of releasing the lethal factor which kills the recipient mice (Hoshino and Lin, 1968, Anat. Rec. 160: 474). Its androgen-dependency, sexual and strain differences and others were subsequently found. The BALB/c mice possessed the strongest lethal factor. In the present studies, instead of utilizing transplantation technique, the intraperitoneal injections were made into the young adult BALB/c female mouse as a test animal, with the homogenate of submandibular glands of adult male BALB/c mice, with its cell-free water extracts, or with lyophilized preparation of such extracts. Similar preparations were made from several other organs, such as liver, spleen, kidney, pancreas and parotid glands. The lethal factor was bioassayed by mortality rates of the recipient mice. The lethal factor was detected only from preparations made from submandibular glands. Most of the lethal factor was readily water-extractable. The lethal factor is nondialyzable, heat-sensitive and probably protein in nature, although its lethality was increased following incubation of the lethal factor with proteolytic enzymes at room temperature for 20 minutes. The LD_{50} of lyophilized water-extracts was 8.26 mg $\pm$ 1.20 mg (S. D.). The dose-time relationship in mortality was linear, confirming the previous data obtained from isografting experiments (Hoshino and Lin, 1969, Canad. J. Physiol. Pharm. 47: 329). A simple, rapid, yet accurate bioassay of the lethal factor utilizing the present data is possible. (Supported by Medical Research Council of Canada.)

HULLINGER, R. L. Purdue University, Lafayette, Indiana. Judge and be judged – on the Anatomy of evaluation.

In a professional school, students are evaluated continually. These evaluations should serve both to certify possession of minimum skills and understandings and to stimulate further learning. Evaluation like learning should be open-ended and continuing. Those who teach must be responsive to the need of each student for evaluation. The evaluation must not be merely measurement, which can be done by a machine, but it must take a form which will assist the student in a judging process; a personal appraisal in dialogue. The structure of these evaluations will determine in large degree the student's attitude toward his role in the formal learning environment and the methods by which he shall evaluate continuing education received throughout his learning lifetime. Objectives for the learning experience are a must. But objectives stated only in cognitive behavioralistic terms for an entire period of learning define only training quantity. Evaluation which is enmeshed in this guise of objectivity measures only quantity. Evaluation must measure the achievement of objectives stated in qualitative, subjective form. Students and teachers must be prepared to explore their accomplishments by judging and allowing themselves to be judged. Students may learn to evaluate themselves on a basis similar to the way in which others evaluate them. Their teachers should help them in the use of subjective guides in judging their effectiveness by blending the objective and subjective, the content and process, the structure and function in classroom evaluation.

IONESCU, M. Institut de Medicine et de Pharmacie, Tirgu-Mures Roumanie. La Formation et le futur des Anatomistes dans la Republique Socialiste Roumaine.

En Roumanie, en terminant les diverses classes d'école primaire et secondaire (le lycée) on peut en-

trer à la Faculté de Médecine en se soumettant à un concours difficile comprenant des épreuves écrites et orales de la matière étudiée au lycée: anatomie et physiologie, physique et chimie.

Sont admis les meilleurs, soit 10 % des candidats car les places sont limitées.

L'Anatomie est étudiée à la Faculté de Médecine pendant les deux premières années aux cours et aux travaux pratiques, à l'aide de diapositives, de planches, de dessins, de démonstrations de pièces anatomiques et de pièces plastiques mais le plus important est l'étude individuelle par la dissection de tous les éléments et des régions du corps humain, sous la direction d'un assistant.

Les étudiants les meilleurs qui sont interessés par l'Anatomie poursuivent un travail d'Anatomie pendant leurs études, en faisant des préparations de pièces pour le musée, pour les démonstrations et les travaux pratiques avec les étudiants des premières années. Ils préparent aussi leur travail de diplôme, c'est à dire qu'ils font partie du cercle Scientifique de la chaire d'Anatomie.

Au terme de leurs études (6 ans) il existe encore un concours d'internat préclinique qui permet de rester à l'Institut d'Anatomie et d'y devenir par après préparateurs et assistants.

Les uns, après quelques années d'anatomie, partent dans les cliniques d'Orthopédie, de Chirurgie, de Gynécologie, de Neurologie ou dans d'autres.

Les jeunes anatomistes qui se sont préoccupés non seulement de l'activité didactique auprès des étudiants mais dans le même temps d'élargir leurs connaissances dans l'Embryologie, l'Anthropologie, l'Anatomie comparée, les travaux de laboratoire de microscopie et les recherches expérimentales, peuvent devenir chercheurs scientifique à l'Académie ou chefs de travaux à l'Anatomie, plus tard professeurs associés et enfin professeur chef de la chaire d'Anatomie.

Actuellement parmi les six instituts de Médecine et de Pharmacie de notre pays, nous avons huit professeurs chef d'Anatomie humaine et plusieurs professeurs agrégés. Al'âge de 65 ans il est permis de rester professeur consultant.

Nous sommes aussi beaucoup préoccupés de l'Education et de la vie des étudiants.

Nous avons enfin et surtout une formation Anatomique de type français et aussi d'influence allemande.

JAFFEE, O. C. University of Dayton, Dayton, Ohio. Analysis of the experimental production of partial transposition in chick embryo hearts.

Partial transposition (double outlet right ventricle) has been produced in chick embryo hearts by two different methods, related only in time of experimental intervention (third day of incubation). In the first of these methods, mechanical compression of the bulbus arteriosus for 48 hr., partial transposition was produced by interfering with the alignment of the ventricular outflow with the developing aorta. When this technique was used on the fourth day, overriding aorta was produced.

Partial transposition was also produced utilizing hypoxia in dosages considered moderate (5 % O_2 for 6 hr). This degree of hypoxia was found to produce the "edema syndrome of Grabowski", a situation featured by osmotic disturbances and changes in heart rate and blood pressure. The present study has shown that this situation led to changes in the blood flow patterns in the developing cardiovascular system, as observed in five and seven day (incubation) chick embryo hearts. Both partial transposition and overriding aorta was found following hypoxia, as determined by the flow pattern studies noted above and confirmed in histotogical studies of seven day hearts, when septation is normally completed.

Moderate hypoxia produces an altered physiological/hemodynamic state and the production of cardiac defects in such circumstances provides strong evidence for the role of hemodynamic factors in cardiac development. Hypoxia has also long been suspected as a cause of birth defects.

(Supported by N. I. H. Grant HE11432, and a grant from the Miami Valley Heart Association).

JIMENEZ-MARIN, D. Dalhousie University, Halifax, Canada. Genetics of esterases of Long Evans rats.

Sixteen esterases were distinguished in tissues on the basis of their mobilities during gel electrophoresis in a buffer of pH 8.6. All utilized a-naphthylacetate, a-naphthylpropionate and a-naphthylbutyrate as substrates, but for most a-napthylpropionate was the most favorable. The mode of inheritance of the three esterases which varied within the population sample were estimated from breeding experiments. Esterase-1 which migrated most rapidly toward the anode and was very active in plasma and kidney was present in some individuals but absent in others. Its presence was determined by an autosomal dominant gene. Esterase-3, a prealbumin was active in many tissues of females but was not present in tissues of males. Esterase-12, a betaglobulin was active in heart, liver and kidney. The phenotypes observed in heart tissues of different individuals were determined by a pair of autosomal genes. Patterns of four of the remaining esterases were invariant within the population but had either unique properties or distribution. Esterase-8, an alphaglobulin for which a-naphthylbutyrate was the most favorable substrate, was an erythrocyte enzyme. Esterase-13 a betaglobulin of plasma has been identified as a cholinesterase. Esterase-14, another betaglobulin was widely distributed but preferred a-naphthylacetate as substrate. Esterase-16 occurred only in pancreas and was the only esterase of cathodal mobility.

JOSEPH, J. Guy's Hospital Medical School, England. The effects of oxymethrone on regeneration on the rabbit's ear.

If a hole 1 cm^2 in size is punched through the whole thickness of the rabbit's ear, the defect is filled by new tissue in about 50 days. There is a more rapid regeneration of tissue, consisting of cartilage and skin, in males than in females. Male sex hormones in the form of testosterone and nandrolone, if administered to females, increase the rate of regeneration in females to that in males, but have no effect of regeneration in males. Oxymetholone increases the rate of regeneration in females so that the regeneration at 28 days is as great as that seen at 49 days in untreated controls. Unlike the other male sex hormones oxymetholone has a similar effect in males and produces as much regeneration at 28 days as that seen at 42 days. This may be due to its lack of gonadotrophin inhibitory action as was shown in rats.

KAISER, H. E. Silver Spring, Maryland. Phylogenetic age and recent distribution of normal true animal and plant tissues, a comparative basic question of Oncology.

The multicellular organisms of both kingdoms, animals as well as plants are composed either of multicellular structures without reaching the stage of particular characteristic tissues and those organisms composed of true tissues. The latter ones start in the animal kingdom with the epithelia of sponges; in the plant kingdom, with the first true tissues of psilophytales, or the lowest ferns. The first true animal tissues must have developed in early Pre-cambrian time; the first plant tissues in Silurian/Devonian time. The different tissues show a parallelism of phylogenetic age and recent distribution. Emphasis is placed on the distribution of animal tissues, in relation to phylogenetic age. Bone, for example, is the youngest major type known only from the vertebrates, belonging to the phylum chordata. Throughout the phylum of chordata, chordal tissue is distributed. Cartilage is found in annelids, cephalopods and vertebrates. A number of other examples may be cited. The histology of normal tissues provides the basis for understanding pathohistology in the field of comparative oncology. Without an understanding of the distribution and characteristics of the tissues in the different phyla of both kingdoms, a proper evaluation and comparison of the different types of neoplasms found in the several phyla of both kingdoms is impossible. The comparative oncologist for example knows that a chordoma is a characteristic neoplasm for the chordates. These facts and characteristics enable us to reach proper conclusions with regard to the so important field of comparative oncology. It can be concluded at this time that in both animal and plant kingdoms, a more or less pronounced phylum specific spectrum of tumors exists in consonance with the varying normal tissue combination (mixed tumors).

KASTEN, F. H., CERDA-OLMEDO, N. and EL-KADI, S. L. S. U. Medical Center, New Orleans, Louisiana. Detection of an unusual Golgi apparatus associated with the nuclear membrane of cultured rat myocardial cells.

Newborn rat heart cells are isolated by stepwise trypsinzation and cultured in Rose chambers for several weeks. Endothelial cells and spontaneously contracting myocardial cells are observed in the living state by high-resolution phase-contrast optics (Kasten, Acta Histochem. Suppl. Vol. 9:775, 1971). The nucleus of the myocardial cell is surrounded by a clearly visible double membrane whereas that of the endothelial cell appears single. Electron microscopic observations indicate that there is no unusual spacing between the two membranes of the nuclear envelope of the myocardial cell which could account for this result.

At the light microscope level, the outer of the two visible membranes stains specifically for thiamine pyrophosphatase (TPPase), a marker enzyme for the Golgi apparatus. Cells incubated in solutions lacking the TPP substrate fail to stain. Golgi apparatus fits tightly around the base of the nucleus like a doughnut. Little TPPase activity is seen in cryostat sections of intact heart tissue from newborn or adult rats. As a control, sections of adult epididymis were stained for TPPase and shown to contain abundant quantities of enzyme, as reported by others.

These results indicate that the "nuclear-associated Golgi apparatus", which we propose to call NAGA, develops as an adaptation to culture conditions. It is suggested that NAGA functions to control contractile activity in the nuclear region by regulating nuclear-cytoplasmic exchange of essential substances. Film sequences will be shown which demonstrate contractile activity of cultured cells.

(Supported by Public Health Service Research Grants Nos. NS-03113 from the National Institute of Neurological Diseases and Stroke and CA-12067 from the National Cancer Institute).

KAYE, G. I., FENOGLIO, C. M., PASCAL, R. R. and LANE, N. College of Physicians and Surgeons, Columbia University, New York, N. Y. Comparative electron microscopic studies of normal human colonic epithelium and the epithelium of hyperplastic and adenomatous colonic polyps.

Previous reports (Morson and Bussey, Current Problems in Surgery, Feb., 1970; Lane, Kaplan and Pascal, Gastroenterology, *60*:537, 1971) have established histopathologic criteria for the differential diagnosis of hyperplastic and adenomatous polyps. Histologic and histochemical studies had convinced us that the mucosa of the hyperplastic polyp was literally hyperplastic, i. e., an overdevelopment of fully mature mucosal structures, whereas the mucosa of the adenomatous polyp was indeed immature, resembling that of the lower half of the normal colonic crypt in staining qualities, cytology and replicative capacity.

Studies of the fine structure and dynamics of the pericryptal fibroblast sheath of these two types of polyp (Kaye, Lane and Pascal, Gastroenterology, *60*: 515, 1971) confirmed the conclusion that they represented divergent pathways of differentiation.

The normal colonic epithelium exhibits a regular pattern of differentiation proceding from the base of the crypt to the free surface. In the lowest one-third of the crypt, just above the primary germinative zone, are many partially differentiated cells containing small mucus droplets in the apical cytoplasm. These intermediate cells gradually differentiate, as they migrate up the crypt, into mature absorptive and goblet cells until finally, at the free surface, the epithelium consists primarily of absorptive cells with numerous regular microvilli, well developed apical tight junctions, apical mitochondrial concentrations and some multivesicular bodies, lipid droplets and lysosomes. These cells are separated by convoluted intercellular spaces which are generally dilated, indicating active fluid and electrolyte transport.

In the hyperplastic epithelium all cells and cell organelles are overdeveloped, and differentiation of special features occurs at lower levels of the crypt than normal. Mature goblet cells are evident low in the crypt and, at higher levels, are usually overstuffed. All cells have tall microvilli with long rootlets. The lateral margins of the cells are more highly convoluted than normal, and the distention of the intercellular spaces indicative of transport function begins in the upper one-third of the crypt. All cells, with the exception of the corpulent goblet cells, are very thin and very tall.

In the adenomatous epithelium, however, the majority of cells and cell organelles at all levels of the

crypt rarely differentiate past the degree found in the lowest one-third of the normal crypt. Even at the free surface, very thin, very tall cells resembling immature absorptive cells are found along with intermediate cells. The intercellular spaces are only slightly convoluted and only slightly dilated at the free surface. Microvilli are fewer and shorter than normal and are irregularly arranged.

Cellular and sub-cellular structure at all levels of the crypt in each type of epithelium will be compared and the significance of the differences will be related to the previous studies of the mucosa as well as to the pathologic potential of the adenomatous epithelium.

(Supported in part by Grant AM-12396, NIAMD, NIH, USPHS; by Grants ET-15-F and IN-4, American Cancer Society; and by a gift from Mr. and Mrs. Jacques Weber).

KAYE, G. I., HOEFLE, F. V. and SIBLEY, R. C. College of Physicians and Surgeons, Columbia University, New York, N. Y. Penetration of horseradish peroxidase into the intercellular spaces of rat and frog corneal endothelium.

In an effort to evaluate further the barrier quality of the junctional complex (terminal bar) of the rabbit corneal endothelium, and to compare the results with a new colloidal tracer (horseradish peroxidase HPO) with those previously reported from rabbit and frog corneal endothelium using ThO_2 and saccharated iron oxide as tracers (J. Cell Biol., *12*:457, 481; *15*: 241), rabbit corneas were perfused *in vitro* according to the method of Dikstein and Maurice with a modified medium containing 2 mg/ml Sigma Type VI horseradish peroxidase (HPO) for 5 and 20 minutes before primary fixation with 4% glutaraldehyde in 0.1 M Sorensen's buffer at pH 7.38.

In addition, a drop of HPO solution was injected into the anterior chamber of each eye of three female *Rana pipiens*. One pair was fixed after 5 minutes exposure, another after 20 minutes, and the last after 40 minutes. After primary fixation, all corneas were rinsed and stored in 0.1 M Sorensen's phosphate buffer, pH 7.38, plus 5% sucrose. Corneas were later reacted for HP0 activity according to the method of Graham and Karnovsky. Corneas were then rinsed, postfixed in 2% OsO_4, and processed for electron microscopic study. The sections were examined both unstained and stained with uranyl acetate and lead citrate.

After 5 minutes exposure to HPO, the intercellular spaces of the rabbit corneal endothelium were seen, in stained sections, to be filled with reaction product for about 50-75% of their length. The lateral cell membranes seemed to particularly adsorb the reaction product. A few pinocytotic vesicles contained reaction product. Again in stained sections, after 20 minutes, the whole length of the intercellular spaces were filled with a heavy precipitate of reaction product, and some large vacuoles as well as small vesicles contained reaction product. The apical surface of the endothelial cell had numerous projections, flaps and/or filopodia after 20 minutes exposure to HPO. There appeared to be no barrier to this enzyme at the level of the cell junctions.

In unstained sections, the outlining of the lateral membranes was clearer, and it could be observed not only that the HP0 penetrated the junctional zone, but that reaction product lined the membranes of what have previously been considered maculae occludentes along the lateral margins of the cells. Marker is also clearly seen adsorbed on the apical surface and in numerous pinocytotic vesicles.

It is now evident that the junction in the rabbit corneal endothelium is, at best, a gap junction or an adhaerens junction. This would be consistent with both the reported reflection coefficients for this cell layer, as well as with previous studies from this laboratory on the lability of the junction in Ca-free medium and its physiologic and morphologic restoration by perfusion with a total medium.

As previously reported (J. Cell Biol., *15*: 241), there is no junctional complex in the corneal endothelium of *R. pipiens*. At 5 minutes, however, no peroxidase reaction product is evident in the intercellular spaces. On the other hand, by 40 minutes, reaction product may be found in the spaces, in large vacuoles in the endothelial cytoplasm, and in vesicles and vacuoles in the posterior stromal cells. This picture is identical with that found with other colloidal tracers and is similarly interpreted as representing influx via the intercellular channel and efflux via vesicular transport (ibid).

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KLEISS, E. University of Los Andes, Mérida, Venezuela. About a rare case of human double monsters.

A photographic report shows the different stages of dissection of human conjoined twins, with four upper and four lower limbs, but only one head and one face. Nearly the same kind of united twins was found in a goat too, which is also presented in a pictorial report. An explanation of the mode of origin of such double monsters is attempted and outlines for a classification of fused twins are given.

KNOBEL, D. M. University of Pretoria, Pretoria, Republic of South Africa. The teaching of Anatomy at the University of Pretoria.

Courses in Anatomy at the University of Pretoria are given to students in Medicine, Dentistry and the Paramedical disciplines such as Nursing, Occupation and Physiotherapy and Radiography. In all cases the Anatomy is integrated with the other subjects included under these courses. A short account is given of the contents of each programme, and particular consideration is given to the unique demands which exist in the Republic of South Africa with reference to these professions.

KOKKO-CUNNINGHAM, A. and ADES, H. W. University of Illinois, Urbana, Illinois. Ultrastructural demonstration of acetylcholinesterase and acid phosphatase in the organ of Corti of the chinchilla under normal and partially destroyed condition.

In agreement with the previous studies it was found that acetylcholinesterase (AChE) activity is restricted to the efferent nerve elements. The reaction product is localized around the nerve fibers and endings. The most intense activity is found in the inner spiral bundle. Activity related to the afferent fibers

is seen only when they are in close contact with efferent fibers. AChE-positive endings abutting inner hair cells are seen rarely. The majority of the spiral tunnel bundle and radiating fibers seem to be AChE-positive. The radiating fibers, while crossing the tunnel, branch frequently. Large, vesiculated, AChE-positive nerve endings are found underneath all the three rows of outer hair cells except for the apicalmost part of the apical coil.

When hair cells were destroyed with intense sound, degeneration of efferent fibers lagged behind. Rather normal looking, reactive nerve elements could be seen some time after hair cells had disappeared. The inner spiral bundle seemed to be the most resistant to degeneration.

Acid phosphatase is localized in the lysosomes in both inner and outer hair cells, being more numerous in the inner hair cells. Some lysosomal activity is also seen in the Hensen, Deiters', and pillar cells. After exposure to intense sound there seemed to be an increased activity of acid phosphatase both in sensory and supporting cells. Increased activity was due to an increase in the number of lysosomes as well as appearance of reaction in Golgi apparatus. The morphological and histochemical changes will be compared with the results obtained from the behavioral hearing tests.

(This research is supported by NASA Grant NGL 14 005 074).

KUMER GAUR, R. Motilal Vigyan Mahavihyalaya, Bhopal, India. Cardiac conducting system of House Gecko, *Hemidactylus gracilis*.

The conducting system of the heart of house-gecko, *Hemidactylus gracilis* has been studied and described at various stages of development. The presence of the specialized conducting tissues has been confirmed. Although distinct sinouatrial and atrioventricular nodes have been observed, an atrioventricular bundle is absent. The absence of the latter has been co-related with the absence of the complete interventricular septum. The contraction of impulse from atria to the ventricle is exclusively done by the atrioventricular valves. The differentiation of the specialized conducting tissues commences as sinouatrial node and atrioventricular node at 10.2 mm. and 15.4 mm. stge respectively. The latter appearance of the atrioventricular node may be co-related to the comparatively slower rate of heart beat in the earlier stages of development. Only at earlier stages of development the nodal fibres are in syncitium with the surrouding myo-acardial fibres. The specialized tissue appears earlier than the nervous elements. However, the nerves do not appear in the region of the specialized tissues until the latter are well developed. It is maintained that the muscles —specialized and unspecialized— as well as the nervous elements form the pathway for the transmission of the cardiac impulse of contraction. However, at the earlier stages of development the muscle fibres alone form the conducting system.

KUPERMAN, J., MAROTTA, F. H., DE ELIA, J. and LILLO, M. C. Escuela de Medicina, Mendoza, Argentina. Vascularización arterial de la palma de la mano.

Hemos actuado sobre 150 manos, de adultos 144 y de fetos 6.

Introducimos en las arterias cubital y radial, una solución de formol al 10 %, esperamos una hora, lavamos con acetona y luego inyectamos una solución de celuloide diluída en acetona, con el agregado de un colorante sintético rojo. Este material, llena muy bien las arterias, hasta las de fino calibre. Pasadas las 24 horas, se disecan las manos y se pintan los vasos de color rojo para la documentación fotográfica.

Las manos en su mayor son obtenidas de salas de autopsia.

Las arterias de la mano, proceden principalmente de 3 orígenes, que muestran variaciones, que dependen de la participación de la Cubital, Radial y Mediana y la formación de los arcos volares Superficial y Profundo.

Se emiten conceptos de embriología para explicar las variedades encontradas.

Se estudia el Sistema Volar Superficial, dividiéndole en 6 grupos, de acuerdo a la intervención de las arterias Cubital, Radiopalmar y Mediana, con formación de arco y sin él.

Con arteria Cubital exclusivamente un 18 % de manos.

Cubital y Radiopalmar con formación de arco: 38.6 %.

Cubital y Radiopalmar sin formación de arco: 40 %.

Cubital, Radiopalmar y Mediana: 2.6 %.

Hemos encontrado 5 arterias digitales en un 74 % de las manos.

Se indican los porcentajes y variedades de origen de la Cubitopalmar.

Se formaba arco Volar Profundo en el 98 % de los casos.

Arterias Interóseas que se continúan como Digitales, se encontraron en un 24 %.

Finalmente, existían grandes anastomosis de ambos sistemas en un 39 %, de las manos disecadas.

LAKSMAN, A. B. and ISACC, P. Laurentian University, Sudbury, Ontario, Canada. Mode of action of Cyproterone acetate (CA) on the sex accessories of the male rat.

6-Chlor delta^6 – alpha methylen-17 alpha hydroxyprogesterone acetate (CA) was administered orally to adult male rats. After 30 days of treatment the animals were sacrificed and a few organs were fixed. After routine processing, the pituitary glands were stained with the PAS-mb-orG method and differential cell counts were made. The percentage of various cell types were as follows:

	Acidophils	*Beta basophils*	*Delta basophils*	*Chromophobes*
Control	59.03	1.79	6.06	33.10
Low dose	36.80	2.33	6.26	54.27
High dose	39.26	1.39	6.16	53.17

Effects of cyproterone acetate was not only confined to genital structures but also to other parts of the body such as the adrenal and the hypophysis. The local antagonism of CA to endogenous androgen was clearly seen in a weight decrease of the prostate and levator ani of steroid treated animals. Spermatogenesis was inhibited quantitatively (at the doses we tried) whereas a marked effect was seen on the acidophils of the pituitary and on sex accesories.

It is concluded that normal phsysiology of the prostate and levator ani is dependent upon androgen and growth hormone of the pituitary. Cyproteroneacetate not only acts as an antiandrogen but also affects the synthesis of growth hormone of the pituitary by a feed back mechanism at the hypothalamic level.

(Supported by the National Research Council of Canada and The Population Council of New York).

LEAL-MEDINA, L. J. Universidad Central de Venezuela, Mérida, Venezuela. Ultraestructura de las células parafoliculares de la tiroide de bovinos.

El presente trabajo fue realizado en glándulas tiroides de 10 vacas. Fueron fijadas en glutaraldehido por 30 minutos, post fijadas en Tetróxido de Osmio al 2%, dehidratadas en alcohol etílico y oxipropileno e incluidas en Epon. Los cortes fueron hechos con cuchilla de diamante en un ultramicrotomo Porter Blum M2. Los cortes fueron recolectados en rejillas de cobre de 300 "meshs" y teñidas con acetato de uranilo al 1.5% y citrato de plomo. Posteriormente observadas en un microscopio electrónico Hitachi Hu11b1.

Con los resultados obtenidos se pudo constatar que las células parafoliculares de la tiroides de estos animales, forman parte de la pared folicular en una proporción menor que las células principales. No fueron localizadas en los espacios interfoliculares como en el caso de los humanos y caninos. Estas células se extienden desde la membrana basal de los folículos hacia la porción superior del resto de células, aunque nunca alcanzan la cavidad folicular.

El núcleo es grande, de forma redondeada u oval. Las mitocondrias son escasas. El aparato de Golgi está muy desarrollado. Los ribosomas son abundantes y se disponen en pequeños grupos. Los gránulos de secreción son muy abundantes y esparcidos por todo el citoplasma. El retículo endoplasmático rugoso es numeroso y el liso es escaso, lo cual difiere sustancialmente de las otras células parafoliculares de los demás mamíferos y del resto del amplio grupo de células endocrinas de diferentes órganos que se agrupan bajo el calificativo de células secretoras polipeptidicas o células de la serie A. P. U. D.

LIEBELT, A. G., KLIMA, M., WHEELER, E. J. and LIEBELT, R. A. Medical College of Georgia, Augusta, Georgia and Texas Medical Center, Houston, Texas.
Biology and morphology of transplantable pituitary tumors in inbred mice.

Two pituitary tumors which originally arose from normal glands placed intraoculary in intact (Af $\times$ I^s) F_1 hybrid mice have been maintained as transplant lines for 10 years. Subcutaneous transplants have a latent period of approximately 1 year. Tumor-bearing animals show increased body weight and altered serum proteins. Grossly, transplants are soft and highly vascularized, sometimes cystic. Chromophobe-type cells constitute the major cell population of tumors with occasional acidophils following special stains. Electron microscopy revealed the majority of cells to contain distended cisternae of rough endoplasmic reticulum, hyperplastic Golgi apparati and membrane-bound granules ranging from 95 – 180 m μ.

Autopsy findings in tumor-bearing hosts consistently show stimulated mammary glands with milk secretion. Additional findings include grossly granular livers and enlarged reticuloendothelial tissues. Microscopically 39 of 97 livers were diagnosed as cirrhotic and 17 of 97 as precirrhotic. Hepatocytes differed from those of control mice by being enlarged and having intensely basophilic cytoplasm and ellipsoidol nuclei. Nuclei of these enlarged cells showed two unique features: 1) multiple cytoplasmic invaginations that appeared as nuclear inclusions with light microscopy, and 2) an increased number of nucleoli per nuclear profile in 5μ sections, ranging from 6-15 in livers of tumor-bearing animals as compared to 2-3 in controls. These nucleoli were large and appeared as "ring-shaped nucleoli" with rearrangements of granular and fibrillar components.

These data suggest that these two tumors are elaborating both mammotropic and somatotropic hormones with unique effects on the intracellular components of hepatic cells.

LOYO GUERRA, D., MARTINI F. R. and MARTUCCI DIAZ, A. Universidad Central de Venezuela, Caracas, Venezuela. La gonada masculina durante el periodo fetal.

Este trabajo tiene por objeto presentar las observaciones obtenidas en el estudio de 200 donadas masculinas correspondientes a 100 fetos de diferentes edades (3-4-5-6 y 7 meses), a fin de conocer los siguientes aspectos:

1º) Crecimiento y desarrollo de la gonada.
2º) Situación anatómica durante el descenso testicular.
3º) Anomalías.
4º) Estudio Histológico de la gonada y el gubernáculum.

Cada feto fue disecado de acuerdo a técnica establecida en la Cátedra, y se procedió a estudiar:

a) Forma, peso y situación anatómica.
b) Topografía in sutu.
c) Anatomía de gubernáculum y pedículo vascular.
d) Estudio Histológico de gonada y gubernáculum.
e) Disección del trayecto inguinal para el estudio de la formación del conducto peritoneo vaginal.

Se correlacionó el peso de las gonadas y el peso global del feto, con cifras máximas y mínimas para cada estudio de desarrollo.

Se ilustra el trabajo con fotografías macroscópicas y microfotografías y se establece las variedades de situación de la gonada en el feto y desarrollo estructural en las diferentes etapas.

MAIBENCO, H. C. University of Illinois, Chicago, Illinois. DNA synthesis in the rodent reproductive tract.

It now seems evident that many steroids including estrogen effect a two-step interaction with protein receptor substances found in cell populations susceptible to these hermones. Estrogen interaction within the cell stimulates formation of new RNA and synthesis of protein substances. This effect is most dramatic in the female reproductive tract where synthesis of DNA fluctuates with hormonal titers during the estrous cycle. The incorporation of labeled thymidine as a precursor of DNA synthesis has been observed in all cells

populations in the hamster servix, uterus and oviduct. As been observed in other species, epithelial cells were more activite than any other types in the incorporation of thymidine. Connective, tissue was less active than epithelium and a minimal number of smooth muscle cells took up the label. There appears to be differences in timing and in the quality of response in contiguous segments of the hamster reproductive system. A quality of autonomy, not yet fully understood seems to exist at various levels of the reproductive tract in the hamster as well as in that of other rodents.

MALLOY, R. B., NARAYANAN, C. H. and SOHAL, G. S. Louisiana State University Medical Center, New Orleans, Louisiana. Assessment of osteoid development in avian embryos: a quantitative fluorescent method.

In the present report, an assessment was made as to the applicability and teratological effects of the tetracycline fluorescence technique in studying the osteoid development of chick and duck embryos. The chick (White leghorn) and duck (White Pekin) embryos were kept in a standard environment for the duration of the study. On predetermined embryonic days, tetracycline (4 mg/kg wet body weight) was given with a 32 gauge needle directed into a membranous vein. Control embryos received no injections, while sham received a volume of physiologic saline corresponding to the volume of tetracycline. During the hatching period (19-20 days), the animals were sacrificed by decapitation, and measurements of the third toe were made. Following these measurements, the femurs and angular bones were cleared of soft tissue, fixed in 10 % Neutral buffered formalin, and prepared for routine paraffin sections.

The specimens were then analyzed by various histochemical methods (VanKossas, Polychrome, Alcian blue) and utraviolet light. Assessment of the three groups of chicks and ducks, by each analytical method, showed no significant differences either in the quantity or quality of the osteoid tissue among the groups.

Therefore, our observations seem to indicate that tetracycline (in low concentrations) does not produce gross abnormalities in ossification patterns, and may be used effectively to study osteoid development in avian embryos.

(Aided by USPHS Grant No. RR-05704 to L. S. U. School of Dentistry to Dr. C. H. Narayanan).

MARCONDES, O. C., SEBASTIAO, O. G. and FERRAZ DE CARVALHO, C. A. Universidad de Sao Paulo, Sao Paulo, Brasil. Contribución para el estudio de la arquitectura funcional del ligamento arterioso.

La construcción del ligamento arterioso en el hombre, fue considerada, teniendo en vista la busca de una interpretación funcional en lo que concierne a la participación de esa estructura, en la estática y en la dinámica del arco aórtico, durante las fases del ciclo cardíaco.

Fueron estudiadas seis piezas anatómicas de individuos adultos, conteniendo la crossa de la aorta, la arteria pulmonar y el ligamento arterioso; cuatro, después de ser colocados en ácido crómico a 0.5 % y deshidratadas en la serie de los alcoholes, fueron disecadas minuciosamente bajo microscopio estereoscópico; de dos colocadas en formol a 10 % e incluidas en celoidina, fueron realizados cortes seriados en 100 micras y coloreados por los métodos de Weigert (Resorcina-fucsina) para fibras elásticas o por el Azan, según técnica de Dabelow, modificada por Ferraz de Carvalho.

Parte de los cortes fue estudiada el microscopio de polarización.

Los resultados obtenidos, nos permiten concluir: los componentes muscular, colágeno y elástico se presentan como haces de disposición espiralada, como una cuerda torcida, según su centro longitudinal, extendida entre la arteria pulmonar y la aorta.

El Ligamento Arterioso está dirigido de la arteria pulmonar para la aorta, de tal forma que los componentes considerados, son como que la continuación de casi toda la túnica media y de la adventicia de la primera, en los estratos más externos de la túnica media y adventicia de la cara anterior de la segunda. Todo indica que el ligamento, por sus componentes mioelástico y colágeno, además de resistencia, ejerce función dinámica en el control de la curvatura de la crossa de la aorta.

MARTIN, G. S., MEGRIAN, D. and CONNER, J. B. Ohio State University, Columbus, Ohio. The origin, course and termination of the corticospinal tract of the Tasmanian Potoroo *(Potorous tridactylus apicalis)*.

Numerous studies indicate that there is considerable variation in the corticospinal tracts of placental mammals. In contrast, similar studies on marsupials are scarce. This study was designed to investigate the possibility of variation within the marsupial corticospinal tract by examining it in marsupial adapted for hopping and comparing the results with those obtained previously on the opossum and arboreal phalanger. For this purpose cortical lesions were placed in 17 potoroos and after a 7-14 day surival time the brains and spinal cords were processed by the Nauta and Fink-Heimer methods for degenerating axons.

Corticospinal degeneration was present after lesions caudal and ventricaudal to the orbital sulcus. After complete decortication fiber degeneration was present in the base of the dorsal funiculus whis could be traced as far caudally as T-11. A few scattered degenerating fibers were present deep within the lateral funiculus as far as T-8. At cervical levels fiber degeneration was abundant in the medial portions of Rexed's laminae III-VI. In addition, some fiber degeneration was present in the lateral portions of laminae III through VI and in the dorsal and lateral part of laminae VII. Horizontal sections revealed that many of the degenerating axons in the dorsal horn (mainly laminae III and IV) ran longitudinally for some distance before ending. At thoracic levels the axonal degeneration became progressively restricted to the medial part of laminae V. Lesions restricted to either postorbital or ventral parietal cortex produced fiber degeneration within relatively restricted areas of the above regions.

(Supported by NIH grant NS 07410-04)

MARTINI F. R., LOYO GUERRA D. and MARTUCCI DIAZ, A. Universidad Central de Venezuela, Caracas, Venezuela. Anomalías de emergencia de las del cayado aórtico.

El presente trabajo corresponde a las observaciones de 150 fetos disecados y cuyas edades están comprendidas entre 3 y 7 meses del desarrollo.

Observamos 17 variedades, las cuales correspondieron a 8 fetos masculinos y 9 femeninos.

Los tipos de anomalías encontradas fueron las siguientes:

a) Tronco común de carótida izquierda y tronco arterial braquiocefálico, con arteria vertebral izquierda emergiendo del arco aórtico: 2 casos.

b) Arteria vertebral izquierda emergiendo directamente del arco aórtico: 7 casos.

c) Tronco común de origen para la carótida izquierda y el tronco arterial braquiocefálico: 7 casos.

d) Emergencia común del tronco arterial braquiocefálico y carótida izquierda, subclavia derecha emergiendo del arco aórtico lateralmente de la subclavia izquierda, dirigiéndose a la derecha con trayecto retro-traqueal: 1 caso.

Nuestras observaciones corresponden a:

1 feto de 3 meses
9 fetos de 5 meses
5 fetos de 6 meses
2 fetos de 7 meses

lo cual da 11.33 % de variedades de emergencia de ramas del cayado aórtico en 150 fetos.

MARTINI, F., R., LOYO GUERRA, D. and MARTUCCI DIAZ, A. Universidad Central de Venezuela, Caracas, Venezuela. Consideraciones sobre el desarrollo de la glándula tiroides, el timo y las glándulas suprarrenales durante el período fetal.

En este trabajo presentamos las observaciones correspondientes al desarrollo de 150 glándulas Tiroides, 150 glándulas Tímicas y 300 glándulas suprarrenales en fetos cuyas edades están comprendidas entre 3 y 7 meses. Para la obtención del material objeto de este trabajo se procedió a la disección sistemática de las diferentes regiones anatómicas, mediante un plan previamente establecido.

Después de la disección y extirpación de las glándulas en estudio se determinó su peso y dimensiones, al igual que su crecimiento proporcional, su ritmo de crecimiento y su estructura microscópica.

En nuestro estudio correspondiente a 150 fetos, apreciamos que el desarrollo y crecimiento de la Tiroides no acusa un ascenso permanente, debido a que su crecimiento proporcional y su ritmo de crecimiento, revelan un descenso durante la etapa comprendida entre los 5 y 7 meses.

Referente al desarrollo estructural apreciamos que entre los 5 y 6 meses, existe una clara organización de la glándula con formación de Folículos Tiroides. No observamos la presencia de coloide intrafolicular aun en la etapa de 6 meses.

El Timo presentó un ascenso permanente en su crecimiento hasta los 7 meses. Estructuralmente observamos que entre los 5 y 6 meses hay diferenciación entre corteza y médula tímica y presencia de los corpúsculos de Hassal.

El desarrollo y crecimiento de las suprarrenales presentó ascenso permanente hasta los 7 meses en la derecha la suprarrenal izquierda disminuyó su crecimiento a partir de los 5 meses. La diferenciación entre la zona glomerular y fasciculada de la corteza ocurre a los 6 meses.

MARTUCCI DIAZ, A., MARTINI F. R. and LOYO GUERRA, D. Universidad Central de Venezuela, Caracas, Venezuela. El pulmón fetal. Aspectos morfológicos.

En el presente trabajo se exponen las observaciones correspondientes al estudio morfológico, macroscópico y estructural de los pulmones durante el período fetal.

Presentamos observaciones de un total de 300 pulmones procedentes de 150 fetos de edades comprendidas entre los 3 y 7 meses y los cuales fueron disecados mediante técnica sistemática.

Se procedió a la determinación de su peso y dimensiones (largo, ancho y espesor), crecimiento proporcional; capacidad pulmonar y su ritmo de crecimiento.

El material observado fue procesado para estudio histológico en diferentes estadios del desarrollo.

Así mismo fue estudiado el desarrollo pulmonar en embriones de ratón de 9.5 y 10.5 días.

En nuestras observaciones, pudimos apreciar que durante el período fetal el pulmón derecho presentó características de peso y dimensiones mayores que el izquierdo.

Igualmente pudimos observar que la evolución ponderal, mensural y el volumen pulmonar aumentaron progresivamente, hasta la etapa de 6 meses. Microscópicamente apreciamos la presencia de bronquiolos entralobulillares, terminales y respiratorios, notándose la falta de comunicación entre ellos y las cavidades alveolares.

MASCORRO, J. A. and YATES, R. D. University of Texas Medical Branch, Galveston, Texas. Ultrastructural studies on paraganglia innervations.

Extra-adrenal chromaffin tissue was described with the light microscope many years ago and has recently been defined at the ultrastructural level. However, several questions concerning the innervation of this tissue type remain unanswered. In the present study extra-medullary chromaffin tissue, or paraganglia, from Syrian hamsters and squirrel monkeys was investigated for the presence or absence of typical cholinergic type synapses such as are commonly observed apposing adrenal medullary cells.

Animals were perfused with 3 % phosphate buffered glutaraldehyde and post-fixed phosphate buffered 1 % osmium tetroxide. Retroperitoneal tissue blocks containing the trunks of the superior and inferior mesenteric arteries were embedded in Epon 812. Paraganglia were localized in these areas.

Hamster and monkey paraganglion cells generally exhibited an ultrastructural likeness to their analogues in the adrenal medulla and parasympathetic paraganglia, and displayed numerous cytoplasmic granules similar to the typical catecholamine containing ones of chromaffin tissues. Hamster paraganglia were characterized by unmyelinated nerve fibers enclosed within Schwann cell sheaths. These fibers closely approximated the granule containing cells and in certain places were separated only by a small space reminiscent of a synaptic cleft. However, true synaptic contacts between axons and granule cells were not observed. On the other hand, large well defined axon terminals containing usual synaptic vesicles together with mitochondria and glycogen particles closely apposed paraganglion cells in the monkey. The actual synaptic contacts, however, were not on the granule containing

cells but on the satellite cells which usually enveloped the paraganglion cells.

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MASTERS, E. M. Jefferson Medical College, Philadelphia, Pennsylvania. Monoamine oxidase in cultured brown fat cells.

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After 96 hours of incubation, insulin (20 micrograms/ml) was added to test cultures, and at 120 hours test and control cultures were examined for monoamine oxidase using nitro blue tetrazolium with typtamine as substrate (Glenner's method). Cells were then fixed in 10 % formalin, counterstained with methyl green, defatted in acetone and mounted in permount. A-pretreatment of cultures with sodium cyanide (0.01 M) reduced cytochrome activity. Incubation with tetrazolium without substrate, and incubation with addition of iproniazid (0.05 M) served as staining controls.

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The increase in monoamine oxidase activity may reflect the antagonism in this tissue between insulin and the catecholamines: by increasing the enzyme, insulin may protect the tissue from excessive stimulation by norepinephrine.

MATEER, J. S. and HA, H. The Milton S. Hershey Medical Center of the Pennsylvania State University, Hersey, Pennsylvania. Transneuronal degeneration in the somatic sensory relay nuclei following deafferentiation in the cat.

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Unilateral mid-thoracic dorsal funiculectomy produced ipsilateral changes in the caudal gracilis at 90 days. Hemisection at C_{3-4} produced ipsilateral changes in the dorsal column nuclei and NCL at 90 days. Changes varied from disappearance of normal neurons in caudal gracilis to involvement of 1-3 cells per cell cluster in the "nest" region of the gracilis and cuneatus. Unilateral S-M cortex ablations produced changes contralaterally in NCL and bilaterally in gracilis at the C_1 level and bilateral changes in the gracilecuneate interface region at the obex level at 90 days. Combined lesions of the dorsal column and S-M cortex produced additive effects.

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MC CLUGGAGE, S. G. and MC CUSKEY, R. S. Louisiana State University Medical Center, New Orleans, Louisiana and University of Cincinnati, Cincinnati, Ohio. The relationship of the microvascular system to bone resorption and growths in living bone marrow *in situ.*

In order to study the relationship of the microvascular system to bone resorption and growth *in situ,* metallic chambers were installed transversely into the proximal tibias of rabbits. This provided a means of chronically studying bone marrow *in vivo* under the following experimental conditions: (1) during regeneration of marrow and bone within the gap of the chamber; and (2) during increased hemopoietic activity induced by phlebotomy or exogenous administration of erythropoietin. These studies suggested the presence of two functional parts of the microvascular system in the marrow cavity. One was associated with growth and resorption of cancellous bone; the other was associated with hemopoietic areas of the marrow. The process of resorption of cancellous bone seems to result when large venules with rapid flow are present in the marrow spaces. These vessels were located solely within the marrow spaces and did not seem to play a role during increassed hemopoietic activity. During regeneration or growth of bone spicules, these vessels were not seen, nor were they seen in areas of increased hemopoietic activity. Thus, *in vivo* observations have demonstrated the vulnerability of thin trabeculae to increased vascularity within the marrow spaces. A motion picture will be presented demonstrating these results. (Supported by N. I. H. AM-10507, GM-38179).

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Briefly, the method is the following. Each animal is anesthetized, the organ to be examined exposed, transilluminated with wavelengths of light between

390 and 650 m μ and studied at magnifications between 225 and 1500 X. Optical images are recorded directly by cinephotomicrography or are projected onto the photocathode of a vidicon or image orthicon television system, and the resulting images kinerecorded from the video monitor. Under optimal conditions the resolution of the system is 0.3 — 0.5 μ. Quantitative information from the optical images can be obtained by direct measurements with a calibrated filar micrometer ocular while that from the video images by the line selector method and subsequent stop-motion analysis of the motion picture film.

A motion picture film will be shown to illustrate the methods and representative images obtained from the adult and fetal mesentery and liver, and from the adult pancreas, spleen and bone marrow. In so doing the film illustrates the feasibility as well as the value of examining the dynamic microscopic anatomy of complex living organs *in situ* with the light microscope where the rate, duration, magnitude and direction of dynamic events can be evaluated and recorded continuously.

MEENAGHAN, M. A., BLAZY H. y GLOMSKI, C. A. Universidad del Estado de Nueva York en Buffalo, Nueva York. Fabricación de modelos embriológicos de consistencia dura mediante duplicación de antiguos especímenes de cera.

Los modelos de cera clásicamente diseñados han sido y aún siguen siendo los mejores medios de que se disponen para la enseñanza de la Anatomía Embriológica y del Desarrollo. Estos modelos, que empezaron a ser producidos a principios de este siglo, desafortudamente han sido con mucha frecuencia relegados a servir como piezas de museo y no como elementos de aprendizaje. El uso a través de los años y las repetidas laceraciones han ido debilitando paulatinamente su consistencia. Por tanto la obtención de duplicados puede considerarse como una tarea útil en vista de que tales modelos ya no se encuentran en el comercio. Los viejos especímenes pueden ser duplicados sin daño alguno del original mediante la aplicación de las usuales técnicas de impresión aunque con ciertas modificaciones. El proceso en sí consiste en tomar una impresión de alginato en dos etapas de tal suerte que cada una cubra exactamente la mitad del modelo original. Después de esto, el especimen de cera es removido sin daño alguno y limpiado y no necesitará ser manipulado de nuevo. Estando el alginato de la consistencia adecuada, se vierte cera derretida sobre cada mitad. Cuando la cera esté ya solidificada se sacan las dos mitades de sus respectivos moldes los cuales son suficientemente flexibles; luego, mediante el uso de calor las dos partes son soldadas entre sí para formar una sola pieza. Esto viene a restablecer la forma exterior y también el tamaño del modelo original. Los detalles pueden ser acentuados o modificados usando los instrumentos convencionales para tallado en cera. El paso siguiente consiste en usar la réplica de cera para la construcción de un nuevo molde de dos mitades separables. La parte exterior es hecha de yeso piedra amarilla marcha Kerr, mientras que la parte interna es barnizada con acrasil que es un tipo de silicona. Después de esto se hacen unas rendijas en el yeso piedra, las cuales deben ser semi-circulares y paralelas entre sí. El objetivo de estas rendijas es el de permitir el relleno completo del molde, el rebasamiento de los excesos de material y el escape de aire. La réplica de cera es colocada dentro del molde antes de que el acrasil se endurezca de manera que labre en él la imagen del embrión en negativo. Después de esto se abre el molde y se retira la réplica de cera. Se procede luego a rellenar el molde con una resina de autopolimerización y las dos mitades son de nuevo acopladas. Cuando la resina haya completado su proceso de polimerización, se abre el molde y se remueve el modelo de resina, sólido y consistente. Este modelo puede ser rígido o flexible y de diversos colores de acuerdo al material empleado. Algunas resinas ofrecen la posibilidad de ser barnizadas. El mismo molde puede ser usado de nuevo.

MEINEKE, H. A. and HALL, J. L. University of Cincinnati, Cincinnati, Ohio. A profile of the graduate program in Anatomy in the midwest.

The results of a questionnaire soliciting information and opinions about graduate programs in Departments of Anatomy in the Midwest form the basis of this report. Replies from 88 faculty and 156 graduate students in 37 universities were analyzed. Several questions concerning individual goals, curriculum, language requirements, grading and student participation in departmental affairs were asked of both groups enabling direct comparison of the opinions of the two. Faculty only polled on recruitment policies, finances, and departmental needs. Students were asked about their selection of departments, financial needs and teaching preferences. Both were asked for subjective comments on the strengths, weaknesses and suggestions for improving their program. The entire results cannot be presented in this abstract, but some selected areas of interest are indicated. Eighty-six percent of the faculty stated that their goal was the training of a combined researcher-teacher and 78 % of the students were in agreement with this objective. Most agreed that training in research was very adequate, but that more emphasis should be placed on training in teaching procedures. There was an expressed desire for more in-depth training in anatomy, increased opportunities for electives, and an expression of fear of encroaching mediocrity into graduate programs. These are interpreted by us as indicating a desire on the part of both faculty and students to improve their professional competence. The individual results of a wide variety of specific questions and our analysis will be presented for consideration.

MOFFATT, D. J. and METCALF, W. K. University of Iowa, Iowa, City, Iowa. Gross Anatomy teaching: the role ob behavioral objectives.

A fifty page statement of behavioral objectives has been developed for a course in gross anatomy and embryology for medical students in the University of Iowa College of Medicine. 95% of the students considered that clearly stated objectives had been provided.

The frequent question about concise behavioral objectives concerns the extent to which they restrict the student who might wish to study further. Evidence is presented that the objectives statement did not restrict the student during the course and that his interest in further study after the course was considerable.

The teachers (faculty and graduate students) in the course noted that there was no increase in the number of questions asked by the students but that it was easier to prepare instruction. Several teachers

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A motion picture film will be shown to illustrate the methods and representative images obtained from the adult and fetal mesentery and liver, and from the adult pancreas, spleen and bone marrow. In so doing the film illustrates the feasibility as well as the value of examining the dynamic microscopic anatomy of complex living organs *in situ* with the light microscope where the rate, duration, magnitude and direction of dynamic events can be evaluated and recorded continuously.

MEENAGHAN, M. A., BLAZY H. y GLOMSKI, C. A. Universidad del Estado de Nueva York en Buffalo, Nueva York. Fabricación de modelos embriológicos de consistencia dura mediante duplicación de antiguos especímenes de cera.

Los modelos de cera clásicamente diseñados han sido y aún siguen siendo los mejores medios de que se disponen para la enseñanza de la Anatomía Embriológica y del Desarrollo. Estos modelos, que empezaron a ser producidos a principios de este siglo, desafortudamente han sido con mucha frecuencia relegados a servir como piezas de museo y no como elementos de aprendizaje. El uso a través de los años y las repetidas laceraciones han ido debilitando paulatinamente su consistencia. Por tanto la obtención de duplicados puede considerarse como una tarea útil en vista de que tales modelos ya no se encuentran en el comercio. Los viejos especímenes pueden ser duplicados sin daño alguno del original mediante la aplicación de las usuales técnicas de impresión aunque con ciertas modificaciones. El proceso en sí consiste en tomar una impresión de alginato en dos etapas de tal suerte que cada una cubra exactamente la mitad del modelo original. Después de esto, el especimen de cera es removido sin daño alguno y limpiado y no necesitará ser manipulado de nuevo. Estando el alginato de la consistencia adecuada, se vierte cera derretida sobre cada mitad. Cuando la cera esté ya solidificada se sacan las dos mitades de sus respectivos moldes los cuales son suficientemente flexibles; luego, mediante el uso de calor las dos partes son soldadas entre sí para formar una sola pieza. Esto viene a restablecer la forma exterior y también el tamaño del modelo original. Los detalles pueden ser acentuados o modificadqs usando los instrumentos convencionales para tallado en cera. El paso siguiente consiste en usar la réplica de cera para la construcción de un nuevo molde de dos mitades separables. La parte exterior es hecha de yeso piedra amarilla marcha Kerr, mientras que la parte interna es barnizada con acrasil que es un tipo de silicona. Después de esto se hacen unas rendijas en el yeso piedra, las cuales deben ser semi-circulares y paralelas entre sí. El objetivo de estas rendijas es el de permitir el relleno completo del molde, el rebasamiento de los excesos de material y el escape de aire. La réplica de cera es colocada dentro del molde antes de que el acrasil se endurezca de manera que labre en él la imagen del embrión en negativo. Después de esto se abre el molde y se retira la réplica de cera. Se procede luego a rellenar el molde con una resina de autopolimerización y las dos mitades son de nuevo acopladas. Cuando la resina haya completado su proceso de polimerización, se abre el molde y se remueve el modelo de resina, sólido y consistente. Este modelo puede ser rígido o flexible y de diversos colores de acuerdo al material empleado. Algunas resinas ofrecen la posibilidad de ser barnizadas. El mismo molde puede ser usado de nuevo.

MEINEKE, H. A. and HALL, J. L. University of Cincinnati, Cincinnati, Ohio. A profile of the graduate program in Anatomy in the midwest.

The results of a questionnaire soliciting information and opinions about graduate programs in Departments of Anatomy in the Midwest form the basis of this report. Replies from 88 faculty and 156 graduate students in 37 universities were analyzed. Several questions concerning individual goals, curriculum, language requirements, grading and student participation in departmental affairs were asked of both groups enabling direct comparison of the opinions of the two. Faculty only polled on recruitment policies, finances, and departmental needs. Students were asked about their selection of departments, financial needs and teaching preferences. Both were asked for subjective comments on the strengths, weaknesses and suggestions for improving their program. The entire results cannot be presented in this abstract, but some selected areas of interest are indicated. Eighty-six percent of the faculty stated that their goal was the training of a combined researcher-teacher and 78 % of the students were in agreement with this objective. Most agreed that training in research was very adequate, but that more emphasis should be placed on training in teaching procedures. There was an expressed desire for more in-depth training in anatomy, increased opportunities for electives, and an expression of fear of encroaching mediocrity into graduate programs. These are interpreted by us as indicating a desire on the part of both faculty and students to improve their professional competence. The individual results of a wide variety of specific questions and our analysis will be presented for consideration.

MOFFATT, D. J. and METCALF, W. K. University of Iowa, Iowa, City, Iowa. Gross Anatomy teaching: the role ob behavioral objectives.

A fifty page statement of behavioral objectives has been developed for a course in gross anatomy and embryology for medical students in the University of Iowa College of Medicine. 95% of the students considered that clearly stated objectives had been provided.

The frequent question about concise behavioral objectives concerns the extent to which they restrict the student who might wish to study further. Evidence is presented that the objectives statement did not restrict the student during the course and that his interest in further study after the course was considerable.

The teachers (faculty and graduate students) in the course noted that there was no increase in the number of questions asked by the students but that it was easier to prepare instruction. Several teachers

stated that they were able to teach with more confidence as a result of the issuance of objectives.

One obvious difference between the class which received a detailed statement of objectives and the previous year's class which took the same course without written behavioral objectives concerned their questions about relevance. While the previous year's freshmen asked continuously about relevance and asked for repeated assurances, the class which received objectives was prepared to accept that the faculty had planned a course for them and did not seek further reassurance.

We are convinced that the course was greatly improved by the statement of objectives, that the student attitudes were extremely gratifying and that the teachers of the course were successful in using the students' time efficiently.

MORALES, R. and DUNCAN, D. University of Texas Medical Branch, Galveston, Texas. Prismatic and other unusual arrays of mitochondrial cristae in astrocytes of cats and hamsters.

Further work with mitochondria containing prismatic cristae has revealed that this type occurs as a constant feature and in some abundance in the dorsolateral region of the spinal cord of the cat at cervical, thoracic and lumbar levels. All such mitochondria occur in astrocytes. The most common forms are long rods with an abundance of matrix and very few cristae. The matrix in the majority of such mitochondria is of moderate density and without discernible organization. In others the matrix consists of closely packed rodlets with or without occasional prismatic cristae. A frequent pattern is a core of longitudinal rodlets surrounded by a rim of circumferential ones. In the circumferential zone a single row of triangular cristae is present The unusual motochondria vary greatly in size, from 0.2 — 5.0 μ. Mitochondria containing ordered arrays of cristae that are tringular in cross section are for the most part much smaller than those with very few cristae and smaller than similar mitochondria described in the Syrian hamster. It is concluded that close packing in the matrix (obviously hexagonal in many instances) is the cause of the prismatic shape of the cristae.

MORENO, A., WAISMAN, J., SANCHEZ MERA, M. Universidad Nacional de Tucumán, Argentina. Anatomía Microscópica en Estómagos de Bovinos.

Los rumiantes poseen un estómago policavitario con tres dilataciones sacciformes llamadas pre-gástricas, que carecen de glándulas: rumen, redecilla o bonete y librillo; y un verdadero estómago glandular, el chajar, que puede compararse al estómago de los monogástricos.

Todas las cavidades están representadas histológicamente de acuerdo al esquema general para el aparato digestivo: es decir constan de: mucosa, submucosa, muscular y serosa.

Las cavidades pre-gástricas están tapizadas por epitelio pavimentoso estratificado con eminencias papilares o crestas que también están cornificadas. El cuajar está revestido por epitelio cilíndrico simple de tipo secretor.

Las tres primeras cavidades anatómica e histológicamente se comportan como dilataciones esofágicas y sólo la última responde a una estructura gástrica.

Se describen las diversas capas constitutivas y se analiza su estructura celular de acuerdo al desarrollo embrionario de 0 a 9 meses.

Se realiza una correlación anatómica, histológica y funcional de cada cavidad en relación al proceso de la rumiación.

MORGANE, P. J. and STERN, W. C. Worcester Foundation, Shrewsbury, Massachusetts. Chemically coated neural circuits involved in sleep and waking behavior.

A series of integrations as complex as those involved in the constantly alternating states of sleep and waking necessarily involve neural systems interacting at multiple levels in the brain. Understanding of the special connectivities of these pathways and their chemical coding is necessary in order to develop neural models of the sleep-wakefulnes continuum. Recent work has shown correlations between the destruction of specific brain areas (raphé complex, basal forebrain area, lateral hypothalamus, locus coeruleus, etc.), decreases in regional levels of brain monoamines, and changes in sleep-waking profiles. Of prime concern is the raphé nuclear complex since lesions here greatly decrease slow-wave sleep (SWS), with lesser effects on rapid eye movement (REM) sleep. Serotonin levels in the basal forebrain area decay in the degeneration time of the raphé projections in the medial forebrain bundle (MFB). Depletion of forebrain serotonin may, thus, deactivate synchronizing mechanisms in the thalamus and descending inhitory systems normally responsible for "tuning down" the reticular activating systems. It is possible that many of the effects on SWS following either basal forebrain lesions (decrease SWS) or stimulation (which induces SWS) are due to alterations in the noradrenaline/serotonin ratios which modulate a descending, possibly cholinergic, inhibitory system which passes in the MFB. The lateral reticular areas of the brainstem, especially the locus coeruleus, form a noradrenergic system which projects rostrally in the dorsal portion of the MFB. Lesions in the locus coeruleus primarily block muscular atonia of REM sleep. Thus, changes in brain neurochemicals following discrete lesions in neural circuits markedly alter sleep profiles. These studies, together with histofluorescence mapping, are leading to identification of chemically coded neural circuits which control the states of vigilance. (Supported by NIMH Grants MH-02211 and MH-10625).

MOROS, S. Universidad Central de Venezuela, Caracas, Venezuela. Ultraestructura de las células de purkinjey y sus relaciones sinópticas en el cerebelo del conejo.

Mediante el empleo del Microscopio Electrónico y utilizando los reactivos Glutaraldehido y Tetroxido de Osmio como fijadores, se han observado organelas citoplasmáticas como el Aparato de Golgi el cual aparece formado por una serie de láminas donde hallamos unas vesículas, el llamado retículo endoplásmico o sistema citomembranoso se observa formado en su mayor parte por paredes lisas, en la membrana celular no se observa la forma triliminar típicas de otras membranas, los microtúbulos son escasos, la forma celular sigue la imagen piriforme, ubicándose el núcleo hacia la parte estrecha del Soma Celular. En cuanto a la membrana nuclear, se observa una zona limitante, extensa entre el citoplasma celular y el núcleo, en esta

membrana se observan unos poros y una disposición bilaminar, en el interior del núcleo se nota un nucleolo bastante nítido. En las fibras nerviosas observamos gran cantidad de retículo endoplasmático, mitocondrias en forma ovalada con sus crestas y una delimitación externa bien definida. En la unión sináptica se encuentran elementos observados en otras especies tales como membranas sinápticas, espacio y vesículas.

El trabajo se hizo en cerebelo de conejo sacrificado por anestesia y las observaciones se hicieron en un Microscopio Electrónico Hitachi, modelo HU11B1 a 50 K. V. ángulo de apertura 50 M.

MOSCOVICI, M. and DE ALEIMDA, J. M. Escuela de Medicina, Rio de Janeiro, Brasil. Functional aspects of the structure and insertions of the temporomandibular articular disc in man.

Observations were made on 30 temporomandibular articulations in adults. Special care was given to the study of the articular disc considering that same, as a biconcave ellipsoid disc, completely enwraps the mandible condyle head. The disc inserts itself in the lateral and medial poles of the condyle accompanying it in its movements. The preceding displacement is limited by a fibrous and elastic tissue tying the posterior edge of the articular disc to the anterior margin of the squamotympanic fissure (Sappey pad). Choucas and Sicher have already demonstrated that this posterior ligament, macroscopically confused with the articular disc, wrongly configurates its form. Saggital and frontal sections were prepared, dyed in two series: with hematoxylin eosin and orcein. The articular disc is constituted by dense fibrous connective tissue with scarce cartilaginous cells. The elastic fibers encountered predominate in the posterior pad which presents itself bilaminally with a group of inferior fibers inserting themselves in the condyle neck together with fibers of the articular capsule. In the anterior edge are found capsular fibers inserting themselves into the articular disc; among these there are many elastic fibers. The meniscal posterior pad is richly vascularized. The conclusion is that the function of the articular disc is to amplify the trajectory of the mandibular movements forming two articular planes: supra-meniscal and infra-meniscal. The infra-meniscal is narrower due to the intimate adaptation of the articular disc to the head of the condyle, enwrapping it completely and rotation movements only are possible in this plane.

MOTTA, P. and DI DIO, L. J. A. Universitadi Roma, Italy and Medical College of Toledo, Toledo, Ohio. Problems arising from the morphologic study of the ovarian stigma in mammals.

A morphologic study of the stigma of the preovulatory follicle in rabbits, rats, mice, guinea pigs, and women was performed with light microscopy, and with scanning and transmission electron microscopy. It was observed that a locus minoris resistentiatiae is formed at the follicular apex just prior to ovulation: vascular structures were extremely reduced and had practically disappeared; the follicular wall together with the peripheral ovarian layer became progressively thinner and thinner owing to cytolysis (of elements to the stratum granulosum, theca folliculi, tunica albuginea, and epithelium superficiale) and labilization of the fundamental substance and fibers of the connective tissue.

At the same time, on the other hand, in the deep areas of the preovulatory follicle the granulosa layer and the theca maintained their thickness and many luteocytes presented signs of early luteinization with indication of secretory activities; vessels were often dilated and numerous, displaying features of stasis.

Morphologic findings led to the assumption that the degenerative phenomena responsible for the gradual thinning of the follicular apex and for the consequent appearance of the "stigma" may be correlated to the reduction and then to the disappearance of vessels in the apical area.

The scarcity of muscular elements was a strong indication that they do not play a direct role, if any, in the process of ovulation.

Further investigation is necessary to answer the questions of (1) whether the reduction of the vascular component at the follicular apex was caused by the stretching of the wall (owing to the liquor folliculi continuously secreted in the cavity) without further proliferation of vessels, or (2) if rather active local lytic phenomena supported by enzymes favored the establishment of necrotic processes.

NAIK, D. V. University of Sherbrooke, Sherbrooke, Quebec, Canada. Electron microscopic studies on the pars intermedia and ACTH cells of the pituitary gland in the mouse.

The hypertrophied pars intermedia (PI) in the hereditary nephrogenic diabetes insipidus (DI Os/+) mice and the role of neurosecretion in the pituitary-adrenal axis has been discussed (Naik, 1970, Z. Zellforsch, *107*, 317). The hypertrophied PI in DI Os/— mice is taken as a model to study the ultrastructure of these pituitaries, and compared to those of normal VII +/+ mice. Three types of nerve fibers are found in the PI of these mice. 1) Peptidergic fibers, contain true neurosecretory granules measuring 1200-1800 A°; 2) Adrenergic fibers, measure 700-900 A°; 3) Cholinergic fibers, measure 300-400 A°. All these fibers are more common in the DI Os/+ mice than in the normals. Furthermore, 3 types of cells are observed in the PI of both these genotypes. Majority of them are light glandular cells, fewer dark cells and a third type of cells which resemble the ependymal cells, more common on the periphery of the hypophysial cleft. The light cells contain two types of membrane bound granules: 1) Electron dense core granules, which measure 1500-2500 A°; 2) Electron lucent vesicles which measure 3000-4000 A° in diameter. In the DI Os/+, the light glandular cells are much bigger with predominant dense core granules whereas, in normals, the cells are smaller with predominant electron lucent vesicles. Similar size and structure membrane bound dense core granules are found in ACTH cells of pars distalis in both the types of mice. To elucidate whether these dense core granules in ACTH and light glandular cells have the same functional relationship, the DI Os/+ mice were subjected to various stresses and adrenalectomy. Surprisingly, it was found that both these dense core granules respond simultaneously to various stress and adrenalectomy. Hence, it is concluded that the membrane bound dense core granules in light cells and the ACTH granules of pars distalis may be similar in function. The MSH and ACTH relationship in the light cells and the probable role of three types of nerve fibers in PI will be discussed.

(This study was supported by MRC of Canada Grant No. MA-3759).

NARAYANAN, C. H. Louisiana State University Medical Center, New Orleans, Louisiana. Function of heterotopic brachial spinal cord segments in lumbosacral position and of heterotopic lumbosacral segments in brachial position in the chick embryo.

Brachial spinal cord segments were substituted for lumbosacral segments (B1 series) and vice versa (Lb series), in 2–½ day chick embryos. Spontaneous motility (type I) was recorded in 9 to 17 day embryos at daily intervals. The total motility (percent of time spent in activity in 10-minute periods) and total leg and wing motility did not differ significantly from the normals in both the experimental groups. Qualitative recordings of the frequency of wing, leg and combined wing and leg were also made to determine whether or not region-specific differences existed between the brachial and lumbosacral neural systems. In both experimental series, combined wing and leg movements were significantly higher, and independent wing or leg movements appeared to be less frequent than in normal embryos. The marked increase in the combination wing/leg movement in experimental embryos of both series demonstrates that two brachial spinal cord segments or two lumbosacral spinal cord segments are functionally more tightly linked together than the brachial and lumbosacral region in the normal embryo. In the hatched chicks of the B1 series the close coupling of wing and leg movements persisted in the post hatching period. Wings and legs moved simultaneously in the experimental embryos while independent wing and leg movements spontaneous or evoked were rarely observed. In the hatched chicks of the B1 series the legs were found to be incapable of making alternating stepping movements and were always adducted and abducted simultaneously as in wing flapping. It is suggested that regional specifications of spinal cord appear to be determined in early embryonic life.

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OLIVARES, P. E. Universidad Nacional de Córdoba, Argentina, Aportaciones a la segmentación pulmonar.

Mediante inyecciones coloreadas de gelatina y celuloide, se inyectan los segmentos pulmonares, arterias y venas pulmonares y se practica un estudio anatómico en 100 pulmones adultos. Se aportan con nuevos detalles de valor aplicativo.

OLIVARES, P. E. Universidad Nacional de Córdoba, Argentina. Museo Antatómico de Córdoba.

Se realiza una contribución cronológica y detalles del Museo Anatómico que cuenta con más de 1,100 piezas. Se describen detalles de preparación y conservación de los preparados, que incluyen transparencias, inclusiones, parafinados, etc.

ORTMAN, R. and DOUNCE, A. L. City College of New York and University of Rochester, New York, N. Y. Electron microscopic studies of cell membranes of hepatic cells of rats of different ages.

Specimens from livers of male rats (Sprague-Dawley strain), ages from 2 months to 1½ years, were fixed in 2% acrolein in 0.1M cacodylate buffer, washed in cacodylate buffer, and finally treated with 1% O_sO_4 (Palade's). Araldite sections were stained with uranyl acetate and lead citrate and examined with the Philips EM 300.

The hepatocytes from the oldest rats show a prominent development of cytoplasmic fibers running parallel and near to the plasma membrane, and, in addition, development of thick, electron-dense areas immediately underneath the plasma membrane. The morphologic features are relatively less conspicuous in the liver cells of younger rats.

These morphological changes will be discussed in connection with the relative ease or difficulty of liberating the nuclei from such liver cells.

OWERS, N., CLABOUGH, J. W. and JORDAN, R. L. Virginia Commonwealth University, Richmond, Virginia. A Gross Anatomy course for freshmen and junior dental students.

In order to offer a gross anatomy course which would be more relevant to dentistry and to present it to students who could approach it with a knowledge of their needs, a two part gross anatomy course was developed as part of the new "diagonalized dental curriculum" at the Medical College of Virginia. Part I, taught to freshmen, consists of 156 hours of general study of the entire body with approximately equal time spent on each of four regions: extremities, abdomen-pelvis, thorax, and head and neck. To conserve time and facilitate learning, students are presented with 1) cadavers in which certain regions are pre-dissected, 2) fifteen minute pre-lab talks and unlabelled drawings of the region to be dissected during each session, 3) selected one hour lectures on the less tangible aspects of anatomy, including one session per region with a practicing clinician, and 4) informal review sessions prior to examinations. Part II, a 50 hour head and neck course of three weeks' duration, is offered at the end of the first semester of the junior year. Since by this time, students have a general knowledge of anatomical terminology, techniques of dissection, extraoral and intraoral surface anatomy, and anatomical relationships important to dentistry; they may concentrate their review and study on selected areas and make educated approaches to diseccion. Lectures presented by anatomists and dental clinicians, include anatomy of the head and neck and its clinical considerations. Students' performances and evaluations of this course will be discussed.

PACE, J. L. Royal University of Malta, Malta. The anatomical features of prehistoric man in Malta.

The Maltese Islands have what is probably the world's largest number of megalithic monuments per unit area. These prehistoric remains have received careful study but the physical characteristics of the people who inhabited and used them have not been given much attention.

A Neolithic race must have settled in the Maltese Islands around the first half of the fourth millenium B. C. This report is of an investigation carried out into the anatomical features of this race through a survey of all available prehistoric material —skeletal remains, statuettes and figurines— found at these sites. A description will be given of the skulls, including mandibles and teeth, the stature, the physical features of the face, trunk, and limbs, as well as of some pathological conditions which characterized pheristoric Man in Malta.

PACHECO, V. M., GUERRERO, L., JARAMILLO, J. and MORENO, V. Universidad Central, Quito, Ecuador. Anatomía radiológica de la región y lumbo-sacra en grupos étnicos ecuatorianos.

Trabajo auspiciado por el Departamento de Ciencias Morfológicas de la Facultad de Medicina y el Departamento Médico del Seguro Social Ecuatoriano.

INTRODUCCION.—Nos propusimos determinar las características morfológicas de la región lumbosacra, sus variedades congénitas, aspectos que, según se conoce, están relacionados con las razas, de algunos grupos étnicos del Ecuador. Si los hallazgos son patológicos debían ser tratados o se daban las indicaciones preventivas para que no evolucionen.

MATERIAL Y METODOS.—Se tomaron cuatro grupos: estudiantes de segundo año de Medicina (38), Indios Colorados (20), Indios Salasacas (18), negros (19). Forman parte de un conjunto planeado de 200 personas que, por motivos diversos, aún no se han examinado.

A cada una de las personas se les practicó cuatro radiografías, en distintas incidencias, de la región lumbosacra: una en decúbito dorsal (Posición de Ferguson) con inclinación del rayo X central de 20 grados hacia la cabeza; dos radiografías en decúbito, posiciones oblícua posterior derecha y oblicua posterior izquierda; una radiografía lateral de pie.

Se procuró que los factores de exposición sean iguales, no obstante de haber trabajado con equipos de rayos X y en lugares diferentes. Sólo los estudiantes fueron examinados en el hospital del Seguro Social de Quito; para los otros grupos tuvimos que movilizarnos a sus lugares de residencia habitual fuera de la ciudad de Quito.

En cada una de las radiografías obtenidas se hizo las medidas respectivas, conforme a un esquema preparado.

RESULTADOS.—En 20 transparencias se presentan tablas, diagramas, fotografías de los porcentajes, promedios y desvíos standard. Analizamos: edad, alimentación, existencia de lumbociatalgias; hallazgos radiográficos: forma de las vértebras (quinta lumbar), lesiones degenerativas, vértebras transicionales, orientación de las apófisis articulares lumbosacras, espina bífida oculta, longitud y anchura de las apófisis transversas, espóndilolisis y espóndilolistesis; valor de los ángulos de Ferguson, promontorio, lumbosacro, etc.

Se muestran los valores obtenidos junto a los suministrados por autores europeos y norteamericanos.

Finalmente señalamos las conclusiones y la bibliografía.

PALLIE, W. and HYNES, D. M. McMaster University, Hamilton, Ontario, Canada. Identification and Delimitation of Morphology (Anatomy and Radiology) for Medicine Through clinical problem solving.

Traditional undergraduate medical programs are overloaded, especially as they disregard expectations of postgraduation training and continuing education of the physician. Over rating formal teaching disregards that this is not synonymous or necessarily concurrent with learning. While the aim is production of physicians serving societal goals, there is need for "elective options" to allow individual predelections and ambitions. His role is to problem solve and seek solutions efficiently, in conjunction with available resources in his setting. Such problems are identifiable and, at McMaster Medical School, posing such problems is the basis around which the program is built. Students pursue activities germaine to their solutions, through discussions, library study and audiovisual aids and some faculty prepared sesions. Faculty updates and "shepards" the processes.

Here, the manner in which morphological sciences and radiodiagnosis relate to this philosophy is exemplified re. a) Problem solving b) Evaluation c) Illustrating anatomical principles d) Applied morphology via pathology.

Engramatically, medical education history unfolded the apprentice, the barber-surgeon, the discipline multiplication, the sub-discipline explosions and all sorts of "—ists". The contemporary student is in this maze of bi products. Is there a case for going full cycle and training students more meaningfully in chosen and essential apprentiships, to let him blossom his own (guided) way through evolutions to come?

PALTAN, J. D. University of Pittsburgh, Pittsburgh, Penssylvania. The sciatic nerve in primates.

In order to clarify a controversy about the Sciatic nerve, gross anatomy and histological studies were performed in early and full term Primate fetuses. The huge single Sciatic nerve, usually found in man apes, really is only apparently single. Inner structure corresponds to a strong multibundle nerve joined by thick connective tissue layers, inside and around the nerve.

The old world and new world monkeys, baboon, macaca, alouatta, marmoset, and the Prosimians, lemur and galago present two independent nerves invested by different sheaths of connective tissue.

Considering the above results the sciatic nerve should be called *Tibial-Peroneal nerves*, instead of its usual designation.

A comparative study throughout the species allows the classification of these nerves to be placed in three categories:

1. Elemental arrangement of nerve fibers inside a single layer: galago, lemur, (prosimians).

2. Two independent small fascicles with thin layers of connective tissues: marmoset, alouatta (new world monkeys); baboons, macaca (old world monkeys).

3. A huge trunk formed by several isolated bundles of nerve fibers divided by tortuous, gross, trabeculae of connective tissue, in the gibbon, orangutan, gorilla and in the human. The differences may be due to an evolutionary phenomenon brought about by locomotion or erect posture.

These finds are discussed in relation to previous observations and descriptions of the Sciatic nerve in human adult bodies and in a few cases of other primate and human fetuses.

PAREIRA RAMALHO, J. Medical School, Janeiro-Guanabara, Brasil. Modern techniques in research and teaching anatomy.

We have used soon after the conservation of the bodies replective injections with many stains to make it easy to study macroscopic anatomy in dissections of many segments.

We have used for the study of less segments colored latex emulsion or synthetic resin of vinilic or

vinoacrilical self-polimerization. The diafanization has been used in the studies of determined segments or then when the individualization for transparency of the vascular net.

It's important the aid of radiological anatomy. We associate bario's salt, lead, mercury or iodine to our preparations submitting them to the arteriographical study. We have the custome to associate them to the latex or resins to obtain radiopaque models to study and searches, principally to the segmentar study.

In the neural system after the special methods of conservation, we proceed to cuts and inclusions to classes and searches. We intend to use conservation techniques that permit the macroscopic identification of the neural structures.

We present the results of our works, the techniques that we use, not only to the searches as to the anatomy teaching.

PAZ-OSSORIO, R., GONZALEZ, G. y ALVAREZ-URIA, M. Universidad de Concepción, Chile e Instituto Cajal, Madrid, España. Ultraestructura de las terminaciones nerviosas en la glándula submandibular del gato *(Felis domestica)*.

La modalidad de inervación a nivel de los acinos secretores de las glándulas de secreción externa ha sido objeto de numerosos estudios con resultados contradictorios. Algunos autores describen contactos "directos" entre las terminaciones nerviosas y las células efectoras con una distancia de aproximadamente 200 A° separando al axolema de la membrana plasmática de las células acinares. Por el contrario, otros autores describen contactos "indirectos" en los cuales un espacio de 0,1 μ o más separa ambas membranas y siempre con la interposición de la mebrana basal del acino.

Mediante el microscopio electrónico se estudiaron las características ultraestructurales de la inervación vegetativa de la glándula submandibular de *Felis domestica*.

Se constató la presencia de axones entre las células secretoras o entre éstas y las células mioepiteliales, por dentro de la membrana basal del acino. El diámetro de estos axones varió entre 0,3 μ a 0,9 μ evidenciándose la existencia de dilataciones cada ciertos intervalos. El axoplasma a nivel de la dilataciones muestra gran cantidad de vesículas agranulares de un diámetro de 380 A° a 600 A°; menos cantidad de vesículas granulares con diámetro de 700 A° a 1200 A°. Numerosas mitocondrias, escasos neurofilamentos y no se observan neurotúbulos. Carecen de envoltura de Schwann y el axolema está separado de la membrana celular por un espacio de aproximadamente 200 A°. No se distinguen especializaciones en el axolema ni en la mebrana celular.

La mayoría de los acinos secretores son mixtos y los axones intra-acinares sólo se encontraron en relación con las células mucosas y mioepiteliales, pero no con las células de las semi-lunas.

Estas observaciones apoyan el concepto de contactos "directos" en la inervación autónoma de las células mucosas y mioepiteliales de esta glándula. Se discuten estos resultados.

PEREIRA RAMALHO, J. Instituto Biomédico, Río de Janeiro-Guanabara, Brasil. The gastrocnemius in the Brazilian Negroes – its athletical render.

Among the pointed observations that are referred to the inferior member, we meet that which converge to the gastrocnemius. Which is the muscular portion that descends more: the medial or the lateral one? EDWARD LOTH concludes saying that it'll be interesting to examine the colored races to determine if there are differences among them. We are intending with this realized search, to demonstrate the better athletical rendition of the negro runners in olympic games, in the jump, run proof, principally those of great distances, revenue relationed to the disposition of his lean system. We proceed the measures taking: stature and weight, height of the proximal tibial and fibular insertion, height of the muscular portion, length of the tendinous distal portion, leg's perimeter, arch of circumference of the calf, breadth of the calcaneous insertion and the indexes described by frey relationed to the tibial height, to the gastrocnemius length, to the calcaneous insertion and to the calcaneous length. The muscle masses of the longilinean are more lengthened than thick. This establishes conditions to the sportsman and athlete in which the speed proponderates to the force.

LEFROU says that it is classical to insist over the aspect fusiform and delicated of the negroes calf, and that it is in relation with the great length of the calcaneous in comparison of the white, the flexor muscles of the foot, and then they do not have the necessity of a great effort to act.

Our observations correspond to 200 negro corpses, of both sexes; 50 males and 50 females of many professions and 100 different athletical activities in both sexes, selected in some Rio de Janeiro's Clubs.

We can conclude about the fusiform and length disposition of the gastrocnemius, muscle less strong in the region, with higher crowbar branch for its calcaneous insertion, that cause a great revenue in the run course.

PEREIRA RAMALHO, J. and PAPAIS, R. M. Instituto Biomédico, Río de Janeiro-Guanabara, Brasil. Comparative cephalometric study among different Brazilian groups. The facial and nasal index.

Our search intends to study the facial and the nasal index among the Brazilian Indian groups. We used to this end the results of our searches among the KAIAPO and KARAJA making comparison with the conclusions of other authors in different groups.

Facial index-the male series KAYAPO is MESOPROSOPES with tendency to LEPTOPROSOPES, and the female series is MESOPROSOPES with tendency to EURIPROSOPES. The KARAJA in the two series are MESOPROSOPES.

The male indians TERENO (WILLEMS) are accented MESOPROSOPES, and also the PARECI, TARUNA, CHIRIGUANO and MATAKO; these two last groups are in the superior level of MESOPROSOPES. The TOBA are LEPTOPROSOPES, the MEHINAKU, MACHEYENGA and YAMADI are HIPER-EURIPROSOPES. Much more accented is the difference in the facial index of female TERENO, according with the other groups, because not one of them approach from the EURIPROSOPES of TERENO female. Among the male PIRO, IPURINA and WAPISIANA the EURIPROSOPES are present.

The facial index from ARUAK female is greater than the male of the correspondent tribes, but the

differences among the female groups are much accented and do not combine with those that were pointed with relation to the male. The unique exception are the female MEHINAKU that are HIPER– EURIPROSOPES, as the men (WILLEMS).

The XAVANTE of both sexes are EURIPROSOPES (NEEL et al;)

Nasal Index– the differences are less accented. All the groups are MESORRHYNEAN, but there is strong oscilations and the distances that separate the TERENO of the other groups are not greater than that we can observe among them. The male and female XAVANTE are MESORRHYNEAN too.

In our searches the male and female KAYAPO are MESORRHYNEAN. The male KARAJA is MESORRHYNEAN presenting in the PLATIRRHYNEAN its great incidence, and the female MESORRHYNEAN with tendency to the PLATIRRHYNEAN.

PORTER, K. R. (in collaboration with P. ANDREWS and M. BONNEVILLE), University of Colorado, Boulder, Colorado. Surface configurations of cells and tissues revealed by scanning electron microscopy.

The free surfaces of cells and tissues limiting body spaces generally possess microvilli which vary enormously in length and number, depending on the location of the cells in question. Transmission microscopy of thin sections has been widely used in the study of these structures for both their external and internal morphology. Though valuable, such images do not provide a ready impression of the overall appearance of the surfaces, *i. e,* a panoramic view. To a large extent this hiatus in our information is being filled in by scanning electron microscopy. Using this microscope in the secondary emission mode, one can obtain highly informative images of all manner of tissue and cell surfaces. Stereo pairs enhance the three dimensional aspects of the single image and provide highly realistic representations that are excellent for instructional purposes.

This paper will describe the methods used and will illustrate their effectiveness with micrographs of surfaces, including kidney tubules, lung alveoli and bronchioles, trachea, intestine and stomach. Each possesses a characteristic display of microvilli as well as elevations at the cell junctions. The surfaces facing the peritoneal, pulmonary and pericardial cavities are especially remarkable in the number and length of microvilli they possess. These are most prominent on surfaces which move most actively over another, and it is proposed that they provide a cushion against the abrasive forces involved.

PORTER, K. R. and ANDREWS, P. University of Colorado, Boulder, Colorado. The surfaces of cells and miscellaneous soft tissues as revealed by scanning electron microscopy.

Four methods of drying specimens for scanning microscopy have been compared in studies of miscellaneous cells and soft tissues. None has been found to improve on the CO_2 critical-point method introduced to electron microscopy by T. F. Anderson. In this the water in the object is replaced by alcohol and this by amyl acetate. Thereafter, the specimen is transferred to liquid CO_2 from which it is eventually dried under pressure. The distortion resulting from this procedure is minimal; even the finest microvilli and slender filopodia remain extended in natural position and orientation. Examples illustrating the values of this approach for the study of surfaces will be drawn from examinations of the glomeruli and tubules of the kidney, from surfaces of the peritoneal cavity, where mesothelial cells are covered with large numbers of microvilli, from ciliated epithelia of trachea and oviduct, and from cells grown in tissue culture. Stereo images of such surfaces are particularly valuable for showing the surface contours and add a dimension particularly valuable in teaching.

RAMIREZ, L. C. National University of Mexico. Mexico. Estudio comparativo del aparato trabecular en mamíferos.

Se presenta un estudio comparativo del aparato trabecular en algunos mamíferos, con el objeto de proporcionar datos filogenéticos útiles que ayuden a comprender mejor su estructura en el humano y, a través de ella, varias de sus alteraciones patológicas.

Se seleccionaron ojos de animales de hábitos diurnos, nocturnos y arrítmicos, entre los cuales hay algunos que dependen principalmente de su visión y otros en los que ésta juega un papel secundario. Se fijaron las piezas en formol, se levaron, se colocaron en alcohol de 60° y se estudiaron macroscópicamente cortándolas en 2 ó 3 segmentos horizontales paralelos. Se hizo un cuidadoso estudio de la región del ángulo incluyendo su situación, sus relaciones con el iris, córnea y cuerpo ciliar; su tamaño y morfología. Se procesaron los segmentos principales de cada ojo por el método de parafina y se obtuvieron cortes a 8 micras de grosor que se tiñeron con H. E., Masson, Gallego y P. A. S. Se hizo un cuidadoso análisis comparativo de los diferentes ojos, incluyendo la disposición de sus láminas, extensión y características citológicas. Se hizo especial énfasis en la morfología de esta estructura en el humano.

RAUCHBACK, E., MAROVITZ, W. F. and CROWLEY, D. Washington University School of Medicine, St. Louis, Missouri. The basilar papilla of the Tockay Gecko.

The basilar papilla is an auditory reception area in reptiles, which corresponds to the organ of Corti in higher animals, and is derived from the epithelium of the cochlear duct. Lizards are known to have a well developed cochlear duct and basilar papilla. Among the different families of lizards the only one to exhibit developed vocality and auditory communication are Geckos.

Physiological experiments have shown an irregular, non-linear relationship between intensity functions and sound pressure levels in this animal.

In addition, analyses of the cochlear potentials of the Gecko have indicated a strong second harmonic component which creates distortions occurring at all frequencies and modifying the wave shape potentials from sinusoidal to a double frequency form.

Thus, it appears that the ear of the Tockay Gecko cannot serve as a simple model of a mamalian auditory organ, but rather it presents complex problems in determining the auditory capabilities of this animal.

An anatomical examination of the basilar papilla of the Tockay Gecko was conducted. This study in-

cluded preparation of 24 specimens for regular, phase, and scanning electron microscopy.

Examination of the basilar papilla revealed a very special organization of the hair cells. These hair cells compose two distinct groups whose stereocilia are oriented in opposite directions.

This anatomical evidence will be discussed, and is an important factor in determining the characteristics of the cochlear potentials recorded from this animal.

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RODRIGUES, H. Universidad Federal de Juiz de Fora, Minas Gerais, Brasil. La relación anatómica entre el músculo faringo-esofágico, el plexo venoso submucoso faringo-esofágico y los puntos débiles de la pared posterior de la transición faringo-esofágico.

El A. realiza el estudio macro y mesoscópico de las relaciones anatómicas entre el músculo faringo-esofágico, el plexo venoso submucoso faringo-esofágico y los puntos débiles del segmento faringo-esofágico. Utilizó cerca de 93 segmentos de jóvenes, adultos y viejos (30 individuos del sexo femenino y 63 del sexo masculino).

El punto débil supra-esfinctérico o faríngico fue observado en 10 casos (20 % ± 5, 6) y el infra-esfinctérico en 2 casos (4 % ± 2, 7).

Fue notada la presencia del punto débil supra-esfinctérico y la ausencia del músculo faringo-esofágico en 5 casos (10 % ± 4, 2).

La presencia del punto débil infra-esfinctérico fue observado en 2 casos (4 % ± 2, 7), en los cuales no existía músculo faringo-esofágico. Este músculo cuando presente, refuerza lateralmente la pared posterior de la faringe, limitando una área débil en la línea mediana y refuerza también la pared posterior del esófago en su porción cranial.

RODRIGUEZ-PERALTA, L., VALOVE, P., and NOSKOW, S. Temple University, Philadelphia, Pennsylvania. Hematogonadal barriers at sea and at high altitude levels.

Acriflavine neutral was injected intravenously into adult male and female albino rabbits at doses to produce free concentrations of 3.38×10^{-8} M in the circulating blood.

Acriflavine neutral is not toxic at these doses, does not pass hematic barriers, and its presence, penetration, and precise sites where it is stopped in living humans and animals can be determined by preparing the tissues in systematized method of ultrareezing, sublimizing, and embedding in vacuum, and then studying them under the flourescent microscope, and by fluorometry.

The rabbits were divided into two groups: 1) Those whose tissues for the study were taken one hour after the acriflavine injection. 2) Those whose tissues were taken at various lengths of time after the injection and after the living animals were submitted to simulated high altitude environments from 4,500 m. to 5,500 m. above sea level.

Results: 1. A hemato-testicular and a hemato-ovarian barrier were found present. The former was located in the inner part of the cell membrane of the "myoid" cells. Additional barriers were found in the outer part of the epithelial cell membrane of the rete testis, epididymis, and vas deferens. An ovarian barrier was also found present, but its site changes from the follicular cells in the primary follicle, to the zona pellucida in the mature follicle. An additional barrier was found present in the outer part of the cell membrane of the uterine tubes.

2. Striking physiologic changes were found present in both hematogonadal barriers of rabbits submitted to high altitude environments.

RUBY, J. R. and WEBSTER, R. M. Louisiana State University Medical Center, New Orleans, Louisiana. Origin of the Golgi complex in fetal ovarian germ cells in the free-tailed bat.

Fetal ovaries of the free-tailed bat *(Tadarida brasiliensis cynocephala)* were obtained between April and June and processed for electron microscopy by fixation in four percent glutaraldehyde in cacodylate buffer. The fetuses appeared normal in their gross activity and development (C-R lengths ranging from 15 to 35 mm).

True intercellular bridges connected the developing germ cells as noted in the early developmental stages of other mammals (rat, mouse, human), birds (chicken) and amphibians (grass frog). Unlike these other ovaries, however, there was no definitive clustering of the germ cells in the bat.

The presence of dense lamellated bodies within the nucleus and cytoplasm was one unusual feature noted in the early developing germ cells of the bat. Their structure was variable, but in many areas the close conformity of the membranes suggested a myelin-like appearance. It appeared that these bodies were first organized within the nucleus. They were subsequently released into the cytoplasm retaining an outer membrane derived from the nuclear envelope. In the cytoplasm many of the dense bodies appeared to become less compact with membranes projecting peripherally into the cytoplasm. In some areas of the cell, these membranous projections became well organized stacks of saccules resembling a dictyosome. These dictyosomes aggregated in the more mature ovarian germ cells to form a typical Golgi complex.

RUDERMAN, M. I., HAND, P. J. and MORRISON, A. R. University of Pennsylvania, Philadelphia, Pennsylvania. Cerebral cortical projection zones of thalamic neurons transmitting gustatory and somatosensory facinformation in the cat.

The exact location of the cortical taste areas determined with natural stimuli is not well defined. As a new approach to the problem, an orthograde degeneration study supported by prelesion recordings with natural stimuli was performed to ascertain the exact cortical receptive zones of the thalamocortical projections originating in both medial parvocellular (pc), (gustatory), and lateral (somatosensory) areas of the nucleus ventralis posteromedialis (VPM). Gustatory stimulation was elicited with solutions of citric acid; while a camel's hair brush was used to test for tactile responses of the tongue and facial areas. Three cats were used for controls; four for VPMpc lesions, and three for lateral VPM lesions. Small electrolytic lesions placed in pc and lateral VPM areas resulted in separate regions of cortical degeneration as demonstrated with the Fink-Heimer I stain. Control lesions of sur-

rounding thalamic nuclei produced no significant degeneration in those cortical areas receiving VPMpc and lateral VPM projections. VPMpc lesions resulted in degeneration hidden within both banks of the pre-sylvian sulcus, the most medial lesions producing the most medial degeneration. Only lateral VPM lesions of neurons responsive to somesthetic stimuli produced degeneration in the coronal gyrus, an area included in the taste region determined by chorda tympani stimulation. Lateral VPM lesions generally resulted in denser degeneration than that found from VPMpc lesions. The primary contribution of this study has been to demostrate that the gustatory region of VPM, as defined by natural stimulation, projects to cortex hidden within the pre-sylvian sulcus and largely outside the area previously determined by chorda tympani stimulation.

(Supported by NIH grants NS-08410 and NS-06716)

SAAVEDRA LOPEZ, A. Hospital Regional del Pacífico, Guadalajara, México. Anatomía de los segmentos bronquiales. Nueva nomenclatura.

La nomenclatura aceptada actualmente es la de Jackson y Huber. Se basa en la numeración progresiva de los segmentos bronquiales, empezando por el lóbulo superior derecho; sin embargo, al llegar al lóbulo superior izquierdo hace la separación de los segmentos ápico posterior y anterior como división superior de dicho lóbulo dejando los segmentos lingulares como división inferior; al lóbulo inferior le asigna únicamente cuatro segmentos. Esto evidentemente crea una confusión para el correcto entendimiento del tema que se trata.

La nomenclatura que nosotros proponemos a esta H. Asamblea es más sencilla aún y consiste en substituir los términos de lóbulo por el de divisiones: así por ejemplo dividiremos el pulmón derecho en tres divisiones:

PULMON DERECHO

TRES DIVISIONES: SUPERIOR, MEDIA E INFERIOR

DIVISION SUPERIOR: Tres segmentos: 1 (Apical) 2 (Anterior) 3 (Posterior)

DIVISION MEDIA: Dos segmentos: 4 (Interno) 5 (Externo)

DIVISION INFERIOR: Cinco segmentos: 6 (Superior) 7 (Antero-Interno) 8 (Antero-Externo) 9 (Postero-Interno) 10 (Postero-Externo)

PULMON IZQUIERDO

DOS DIVISIONES: SUPERIOR E INFERIOR

DIVISION SUPERIOR: Tres segmentos: 11 (Apico-Posterior) 12 (Anterior) 13 (Lingular)

DIVISION INFERIOR: Cinco segmentos: 14 (Superior) 15 (Antero-Interno) 16 (Antero-Externo) 17 (Postero-Interno) 18 (Postero-Externo).

SAUL, F. P. Medical College of Ohio, Toledo, Ohio. Osteology, Pedagay in osteobiography.

The teaching of osteology in terms of the skeleton as a recorder of life history ("Osteobiography") is discussed using examples drawn from the author's own research on ancient Maya skeletal remains.

This approach offers many opportunities for emphasizing the dynamic nature and functional responsiveness of the skeleton, as well as other skeletal variations pertaining to life cycle, population, *etc.*

Fringe benefits accrue in relation to paleopathology, paleoepidemiology and other aspects of the history of medicine.

SAVOSTIN-ASLING, I. University of California, San Francisco, California. A comparison of cartilage resorption in the presence and absence of matrix calcification.

Previous reports have described active cartilage resorption in two situations in fetal and newborn rats: the inner aspect of the growing tracheal rings (Fifth National Congress of Anatomy, Mexico, 1971), and Meckel's cartilage (International Association for Dental Research, 1972). These situations provide opportunity for comparison of resorption of matrix in an uncalcified state (tracheal ring) or calcified (Meckel's).

In each situation the primary agents of matrix resorption are cellular, capillaries being remote from the resorptive front. In each the resorption is related to provision of space during development – for the tracheal lumen or the growing and expanding root of the mandibular incisor tooth.

Cellular traits are markedly different. In the tracheal ring, *mono*nucleated cells of the endochondrium form a row impinging on the innermost matrix; as lacunar wall matrix is resorbed, the oval, viable chondrocytes are released and join this chondrolytic layer. In Meckel's cartilage, limited loci of matrix calcification are first established. *Multi*nucleated cells form, perforate the thin perichondrium, and attack this calcified matrix. These cells appear identical with osteoclasts of nearby bone. Chondrocytes of the opened lacunae are rounded, hypertrophic, and vesicular, but occasionally appear to fuse with the entering multinucleated cells. Further evidence for the identity of these chondrolytic cells with osteoclasts can be found at the extremities of the erosion front, where a cell may lie in part against true (perichondral) bone and in part against calcified cartilage matrix. The necessity of matrix calcification appears from sites where osteoclasts *per se* have eroded through perichondral bone but unless the underlying cartilage matrix is calcified they do not erode it.

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SCHEVING, L. E. and PAULY, J. E. University of Arkansas Medical Center, Little Rock, Arkansas. The chronobiology of man.

Biochemical profiles in man are characterized by oscillations with frequencies ranging from seconds to a year or more. The frequency that has been studied most extensively in recent years is the so-called circadian oscillation whose natural period approximates the 24-hour day (circa-about; dies-day). The present demonstration shows the characteristic circadian fluctuations in over fifty different variables in man such as vital signs (temperature, pulse, pulmonary function and blood and intraoccular pressures); constituents of serum including urea nitrogen, gamma globulin, triglycerides, alkaline phosphatase, transaminase, several electrolytes, and serotonin; constituents of urine

(creatinine, 17-ketosteriods, catecholamines, several electrolytes and trace metals); the ability to perform mental and physical tasks; psychological response and others. A brief consideration of computerized methods suitable for analyzing time series also will be presented. Such data serve to refute the concept that circadian rhythms represent no more than minor changes around a daily mean and consequently do not warrant the additional amount of work and expense that are required to explore further for their full significance. The data challenge the wisdom of accepting tables of "normal values" that have come into existence without consideration of the temporal organization of man. The continuation of the teaching of the concept of biological homeostasis is in error; on the contrary, oscillation is a fundamental property of all life.

(Supported by NIH grant AM 12389 and National Science Foundation B8-2530R.)

SCHNITZLEIN, H. N. and CROSBY, E. C. University of Alabama, Birmingham, Alabama. The telencephalon of the hagfish, *Mysine glutinosa*.

Microscopic material of the telencephalon, illustrated from thionin, pyridine silver and protargol serial sections, will be oriented with reference to the gross brain. The major nuclear masses of the telencephalon have been identified.

The sessile olfactory bulbs are relatively large but their lamination is not discrete. The glomeruli are several clusters which are replaced by specific hemisphere areas. Lateral and medial olfactory tracts are recognizable.

Nucleus olfactorius anterior forms a considerable portion of the rostral hemisphere. The hippocampal formation has three secondary subdivisions. Precommissural and postcommissural components of the fornix are present.

The septal area is small but caudally the major nuclear subdivisions are present. The medial forebrain bundle is diminuitive. The tuberculum olfactorium has a medial part interrelated with septal and hippocampal areas and a lateral part associated with the lateral olfactory tract and the amygdala.

The prepyriform-pyriform complex and accompanying lateral olfactory tract extend along the lateral hemisphere wall. The large amygdala reaches the caudal pole of the hemisphere; it has two major subdivisions. Amygdalohabenular and pyriformhabenular components of stria medullaris, together with association bundles, form laminae in the lateral hemisphere wall. Amygdaloid and piriform areas are interrelated with hypothalamus through stria terminalis.

The striatal area has two major portions and a transition area. Its interconnections are through the lateral forebrain bundle. A general pallial area is present.

Lack of lateral ventricles and a concomitant surrounding of the diencephalon by the telencephalon give a unique configuration to the rostral part of the myxinoid brain.

(Supported in part by National Science Foundation Grant NSF-55-6551 and University of Alabama in Birmingham General Research Fund 54-6400).

SCHWEISTHAL, M. R. and SIBEL, H. R. East Carolina University, Greenville, North Carolina. Use of fresh specimens in teaching Gross Anatomy.

Traditionally, a knowledge of gross anatomy is acquired, for the most part, through a dissection of embalmed cadaver specimens. Initially, surgeons learn their anatomy in a similar manner with the addition of close attendance at the operating table. However, in the first instance, the tissue appearance and texture of the cadaver specimen is far removed from that seen in the operating room. This could partially account for the lack of return of clinicians to the anatomy laboratory once this exercise is completed in medical school. In an attempt to mimic more closely the living anatomy observed in surgery, fresh specimens were introduced into the dissection laboratory.

From pilot studies begun in 1967, it was found that extremities, head and neck, and heart-lung preparations adapted very well to use in the dissection laboratory. Due to limited facilities, abdominal and pelvic viscera were best presented by demostration.

Since these initial studies, fresh specimens have been used in teaching freshman medical students, residents, staff and practitioners of medicine and dentistry. This exposure has brought out the tremendous value of fresh specimens. The texture and flexibility of this tissue approximates closely that seen at the operating table. The color is good and fascial planes are well delineated. In addition, they provide a means by which surgical procedures may be introduced and practiced, as well as a method by which new techniques may be simulated.

SIGARAN, M. S. Universidad de El Salvador, San Salvador, C. A. Efecto de la hepatectomía parcial en ratas crónicamente intoxicadas con tetraclorudo de carbono Y/O Fósforo amarillo.

Este experimento se diseñó para conocer si una intoxicación combinada de Tetraclorudo de Carbono y Fósforo era más fibrogénica que cualquiera de ellos aisladamente, así como investigar la influencia de la hepatectomía parcial.

A tres grupos de ratas jóvenes Sprague-Dawley de ambos sexos con peso corporal al inicio del experimento entre 80-120 gr., se les administró por sonda gástrica los tóxicos, solos o alternadamente, tres veces semanales por unas 20 semanas. Siete días después de la última dosis a la mayoría se les hepatectomizó parcialmente sacrificándolas en horas matutinas 1, 2, 5, 15 y 40 días post-cirugía, y los mismos días a las no operadas. Timidina-H^3 intraperitoneal en dosis de 0.4 μ/gr. peso corporal 2 horas antes del sacrificio.

El conteo de células radioactivas fue mayor en el grupo de CCL4 y P, 18% a las 24 horas de 8 y 2% a los 2 y 5 días. Los animales de 15 y 40 días no tuvieron diferencias significativas.

A las 24 horas no se hallaron diferencias en el porcentaje de marcas en los hepatocitos de ratas intoxicadas con CCL4, con fósforo o en los controles. A las 48 horas el grupo que recibió fósforo fue más activo incorporando el isótopo con un 11%. Finalmente a los 40 días todos los grupos estaban en los límites normales.

La reticulina estaba aumentada, disecando claramente lobulillos hexagonales. Al comparar muestras pre y post-operatorias con animales controles hubo un claro retorno al aspecto normal en los animales hepatectomizados.

SOHAL, G. S., NARAYANAN, C. H. and MALLOY, R. B. Louisiana State University Medical Center, New Orleans, Louisiana. Heterotransplantation of embryonic borebrain region between chick and duck embryos and its effect on motility and hatching behavior.

This report presents observations on both quantitative and qualitative aspects of motility following heterotransplantation of embryonic forebrain region including optic vesicles from donor duck embryos of 55 hours of incubation to chick embryos of 40 hours incubation in which the forebrain region was previously excised *(DC* series) and vice versa *(CD* series). Spontaneous or type I motility which caracterizes the early motility of the embryo was recorded every day from day 6 through day 17 for the *DC* series and day 6 through day 21 for the *CD* series. The frequency of movements in the experimental embryos of both series did not differ significantly from those of control embryos at corresponding stages of development. The general trend of motility over the period recorded for the experimental embryos was similar to those of control embryos with activity reaching a peak on day 13 in the *DC* series and on day 14 in the *CD* series. The prehatching and hatching behavior of the experimental embryos were likewise identical to that reported earlier for the chick and duck embryos respectively. This is the first demonstration of motility in embryos with heterotransplantation of embryonic forebrain regions. The results are in accord with the observation that although the forebrain of avian embryos exhibit well developed electrical patterns towards the end of incubation its influence upon motor behavior presumably starts only with hatching.

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SOUSA, O. M., FURLANI, J. and BERZIN, S. Universidad de Sao Paulo, Sao Paulo Brasil. Electromiografía del músculo "Rectus Abdominis".

Pocos son los estudios electromiográficos del Músculo Recto Abdominal, lo que nos llevó a la pesquisa utilizando esa técnica de observación para intentar esclarecer las divergencias sobre las funciones que le son atribuidas a ese músculo.

Además de eso, estamos también intentando observar si los segmentos de ese músculo, separado por las intersecciones tendíneas aunque no completamente, funcionan o no sincrónicamente en los diversos movimientos en que el músculo participa.

Estamos verificando todavía más, sí existe o no simetría funcional, a semejanza de lo que ya se observó en los músculos del dorso.

Estamos utilizando en este estudio un electromiografo TECA, modelo TE 2-7 de dos canales a los cuales son ligados los electrodos de aguja coaxial simples. La calibración habitual es de 100 V por cm para avaluar la amplitud de los potenciales eléctrico y la velocidad de barredura de 1 milisegundo por pulgada. Los potenciales son registrados en cinta electromagnética para una fotografía ulterior.

En pacientes voluntarios, jóvenes del sexo masculino estudiantes de Medicina está siendo observado el comportamiento del Músculo Recto Abdominal en varios movimientos estando el paciente de pie o en decúbito dorsal.

Los resultados serán presentados y discutidos.

STANCIU, G. and IONESCU, M. Clinique de Radiologie et Chaire d'Anatomie, Tirgu-Mures, Roumanie. Sur quelques varietes d'os hyoide mises en evidence d'exam radiologique.

Nous avons analysé sur une série de 200 cas (20 à 75 ans), l'os hyoïde (100 cas de vivants et 100 cas de pièces anatomiques).

Les renseignements fournis par la radiographies de profil (le rayon est perpendiculaire au plan du film et vise le corp) sont complètés par les deux incidences obliques (le rayon étant incliné à 45° environ vers la tête, le point d'incidence restant le même); pour les pièces anatomiques, une seule incidence, perpendiculaire au plan du film, l'os étant horizontale.

L'étude détaille sera fait de préférence par la radiographie sans écrans, le film étant appliqué directement contre la face latérale du cou et respectivement parallèle à piece.

L'aspect normal et les variétés sont de grande importance en le diagnostic différentiel (décalage de le corn et de la grande corne et fractures).

Nos résultats dans ce domaine que nous présenterons: le corp et la grande corne n'ont été pas soudés en pourcentage de 52 % (76 % bilatéral); les petites cornes restant plus en le stade de cartilage, sans contraste radiologique.

SUCHESTON, M. E. and SAMUEL, C. M. The Ohio State University, Columbus, Ohio. Some developmental aspects of the adrenal gland of the mongolian gerbil *(Meriones unguicultus)*.

After injection of 80 mg/kg body weight of streptoztocin in male Charles River CD rats, permanent diabetes developed in all unoperated, hypophysectomized and adrenalectomized animals. In unoperated animals, diabetes was often accompanied by ketonuria of varying duration and time of appearance; some of the hypophysectomized, adrenalectomized and adrenomedullectomized animals showed transitory ketonuria for one or a few days after the injection. Hypertriglyceridemia and hypercholesterolemia of varying duration, degree and time of appearance were seen in all groups; however, they were absent in hypophysectomized long-term diabetics. After 40 to 60 days of diabetes, unoperated animals showed varying degrees of peripheral lipid depletion (from about 5 to 75 %); the loss was very severe in adrenalectomized rats (about 75 %), while hypophysectomized rats, with a very few exceptions, did not lose more than about 50 % of their peripheral lipids (in some cases even despite starvation). An initial phase of rapid breakdown of peripheral lipids was often accompanied by fatty liver and ketosis. However, all surviving animals corrected their liver lipids spontaneously to normal levels after 4-6 days, regardless of the severity of the ensuing diabetes. In normal controls and adrenalectomized rats, the ratio of the percentages of liver lipids to peripheral lipids was approximately 1:3, in hypophysectomized animals it changed in favor of the peripheral lipids. In some unoperated, and most adrenalectomized diabetics, it changed to $1:<1$.

The above data suggest that (a) in male rats, hypertriglyceridemia and hypercholesterolemia do not depend on the presence of the adrenal cortex, though the latter is involved in lipid mobilization; (b) the "economic" utilization of a large percentage of the peripheral lipids in B-cell deficient rats requires a pituitary factor which is not involved in the hypophysial-

adrenal axis; (c) adrenalin and glucagon, at least in hypophysectomized rats, cannot play a major role in the mobilization of peripheral lipids; (d) the prevention of a permanently fatty liver in *diabetic* rats does not depend on pituitary or adrenal factors.

(Supported by NIH Grant Am-12643).

TORRES, I. Universidad de Oriente, Ciudad Bolívar, Venezuela. Anatomía del oído interno del *Pseudis paradoxus.*

Una de las características del sapo neotropical *Pseudis paradoxus* es el gran tamaño de sus renacuajos (hasta 230 mm de longitud) y el relativamente pequeño de los adultos que resultan de la metamorfosis (65 a 75 mm), de manera que reviste interés el estudio de los cambios que se operan en los diferentes sistemas orgánicos durante el desarrollo y la determinación de si los mismos son en alguna forma regresivos. Se describe la constitución anatómica del oído interno en renacuajos de tres estadios diferentes, estudiados mediante cortes histológicos seriados de la cabeza, con particular referencia a la inervación de la cresta sensorial de la ampolla de los canales semicirculares y la mácula sensorial de sáculo, utrículo, lagena, y de las papilas basilar y anfibia. Se comparan las observaciones en los renacuajos, entre sí y con las realizadas en ejemplares adultos.

TORRES, I. Universidad de Oriente, Ciudad Bolívar, Venezuela. Nudos de Ranvier y ensanchamiento nodal en fibras nerviosas periféricas de *Iguana iguana.*

En el curso de la determinación de los parámetros normales referentes a longitud internodal y diámetro de neurofibras periféricas de *Iguana iguana,* llamó la atención del autor la notable anchura del istmo nodal y la palidez paranodal de un número considerable de dichas fibras; polarizándose la investigación en tal sentido, dado que el ensanchamiento del istmo nodal es considerado por varios autores como un estadio temprano de la desmielinización segmentaria que se observa en una serie de neuropatías clínicas y experimentales, y en este caso se trataba de animales aparentemente normales. Se estudió el nervio ciático mediante cortes histológicos seriados, en 15 iguanas diferentes en edad, longitud, peso y tiempo en cautiverio; e igualmente se hizo un estudio cualitativo y cuantitativo de los nudos de Ranvier en fibras aisladas de dicho nervio, previa tinción con tetróxido de osmio. En 9 de los 15 casos se observaron fibras con ensanchamiento del espacio nodal y desmielinización segmentaria. Se discuten posibles explicaciones para tales hallazgos, así como la conveniencia de utilizar estos animales en investigación neuroanatómica o en neuropatología experimental.

VAUGHN, M. K., VAUGHN, G. M. and REITER, R. J. Edgewood Arsenal, Maryland. Early critical period after unilateral ovariectomy for melatonin-induced delay of compensatory ovarian hypertrophy in mice.

The model of compensatory ovarian hypertrophy (COH) has recently been shown to yield quite consistent results in studying the pineal gland in adult animals, and is currently being developed by the authors and other investigators as a test system for this purpose. The present studies seek to elucidate the effects of the pineal indoleamine, melatonin, upon COH in one strain of mice.

In establishing the temporal pattern of COH after unilateral ovariectomy (Uo) for the Swiss-Webster strain, hypertrophy was observable by 4 days after Uo and complete by 30 days when the remaining ovary had attained a weight approximately double that of the removed ovary. One intraperitoneal injection of 100 μg melatonin on the day of Uo delayed CoH by permitting only 3/5 of the hypertrophy seen in controls by day 10 postoperatively and 4/5 by day 20. Late acceleration of hypertrophy continued thereafter with attainment of a CoH level slightly greater than control level by 30 days.

A single 100 μg dose of melatonin injected on the day of Uo produced the same degree of CoH block at ten days that was seen when this dose was repeated for up to 5 consecutive days. A critical period of one day following Uo during which melatonin inhibition of CoH is possible is further suggested by the failure of injections given later than the first 24 hours to inhibit CoH.

VITTI, M., FERRAZ CORREA, A. C., FORTINGUERRA, C. R. H., KONIG, JR., B. and BERZIN, F. Universidad Estadual de Campinas Piracicaba, Sao Paulo, Brasil. Electromyographic analysis of the musculus depressor anguli oris.

The musculus depressor anguli oris of 20 white male adults, ages ranging from 20 to 51, were analysed during several movements with a TECA electromyograph model TE 4*, using fine stainless steel wire (diameter of 80-180 μm) as electrodes. The electromyograph was set at 200 μV, sweep 1000 msec. and the electrical potentials which were observed on the screen, were heard through the loudspeaker and recorded at low speed.

The muscle was inactive: in the resting position; opening of the mouth; distension of the checks with air, swallowing and in the normal closing of the eyes.

On the other hand, the muscle showed activity during compression of the lips; when the angle of the mouth was drawn downward and laterally, in smiling; whistling; blowing without distension of the cheeks and also during some facial expressions as, sorrow; weeping and aversion.

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* Donated by the "Fundação de Amaparo à Pesquisa de São Paulo" (proc. méd. 70/511) and "Conselho Nacional de Pesquisas" (proc. 3834/70).

WEBSTER, R. M. and RUBY, J. R. Louisiana State University Medical Center, New Orleans, Louisiana. Morphological changes in the ovaries of the free-tailed bat during pregnancy.

Previous investigators have reported a virtual absence of embryonic implantation in the left uterine horn of *Tadarida brasiliensis* due to an absence of ovulation from the smaller left ovary. What role, if any, this ovary plays in the reproductive cycle is yet undetermined.

In this study of the non-migratory subspecies *(Tadarida brasiliensis cynocephala),* ovaries were collected from pregnant free-tailed bats throughout the gestation period between April and June and processed for

light microscopy (ten percent formalin or Spuler's formol-Zenker solutions) and electron microscopy (four percent gluteraldehyde in cacodylate buffer). Without exception, a single fetus was found in the right uterine horn and a single corpus luteum was located in the right ovary. In the right ovary several secondary follicles containing liquor folliculi persisted throughout pregnancy, while in the left ovary, those follicles observed during early gestation were virtually absent near term.

As pregnancy progressed there was, within the interstitium of both ovaries, a marked cellular hypertrophy paralleling an accumulation of lipid-like droplets similar to that seen in the cells of the corpus luteum. The similarity of this tissue to the hypertrophied interstitium of the pregnant rabbit ovary suggests a responsiveness and possible functionality of the left ovary of the free-tailed bat during the reproductive cycle.

WILLIAMS, T. W. and HIGGINBOTHAM, A. C. West Virginia University Medical Center, Morgantown, West Virginia. Selected demonstrations of the microanatomy and vascular architecture of the eye, visualized in three-dimension.

The selected fields comprise topographical views of the major structures of the eye and its adnexa including the vascular beds of the organ. Essential microanatomical relationships are visualized by means of carefully executed color stereophotomicrographs viewed with the aid of stereoscopes. A descriptive text accompanies each field. The preparations differ radically from routine histological slides and are designed to supplement such material in the microanatomical laboratory. The demonstrations presented here represent only a small part of similar demonstration material used in the teaching of microanatomy in our medical and dental classes.

The authors will have with them other fields of the eye should anyone be interested in viewing them. (Supported by National Science Foundation Grant No. G-12475).

WYNTER, H. H. and PERSAUD, P. V. N. University of the WEST Indies, Kingston, Jamaica. Studies in human teratogenesis: congenital abnormalities in 4,311 consecutive pregnancies.

This prospective report presents the congenital abnormalities detected at birth in 4,311 consecutive infants born at the University Hospital of the West Indies, Jamaica. The mothers were almost all of African origin and belonged to the lower socio-economic group. They were admitted for both normal and abnormal deliveries. 110 gross abnormalities were present in 97 infants (2.3 % of all births); 9 of these infants showed multiple abnormalities. 82 deliveries resulted in stillbirth. The incidence of congenital abnormalities in relation to stillbirth was 15.9 %. The distribution of abnormalities according to systems was as follows: musculo-skeletal (37.3 %), cardiovascular (20.9 %), central nervous (13.6 %), gastrointestinal (9.1 %), urogenital (3.6 %), respiratory (3.6 %), organ of special senses (5.4 %), and a miscellaneous group (adrenal hypoplasia, transposition of viscera and hiatus hernia) of 6.1 %. Minor abnormalities were very common in this series. More abnormalities were found in infants born to mothers below 15 and above 41 years of age. The highest incidence of malformed infants was born to mothers of para 6.

YOUNG, M. W. Howard University, Washington, D. C. Anatomical similarities in vision and audition.

Seeing and hearing are our most important senses, hence, audio-visual techniques provide the most usual and effective means of influencing the sensorium. In Functional Components, the optic and auditory nerves are each classified as 'Special Somatic Afferent' because of their basic similarities. They are both teloceptors that receive wave stimuli from afar off and then transduce this mechanical energy into nerve impulses through an intermediate electrical phase (retinograms and microphonics). Both afferent pathways synapse in geniculate bodies in the metathalamus and project to specific cortical centers, while other afferent fibers terminate in the collicular bodies of the tectum and synapse with descending motor fibers to make the mesencephalon a reflex center for light as well as sound. In the embryo, the eye and ear develop as ectodermal vesicles under the constant pressure of the amniotic fluid and after birth the cerebrospinal fluid pressure is transmitted through the endolymphatic sac and duct to the ear and through the cribiform optic disc to the eye. Our newly discovered gross structure, the 'Perilymphatic Sac', is an integral part of this pressure system. Pathologic hypertension in the eye (glaucoma) and in the ear (otosclerosis) is the most frequent cause of blindness and deafness. Surgical puncture of the retaining wall creates a new escape route for the hypertensive fluid, thus, reducing its volume and pressure with restoration of function. Our new needle-puncture technique simplifies the procedure and obviates all surgical incisions.

ZAKHARY, R. University of Southern California, Los Angeles, California. Hypothermia in dentistry: A review.

The wide use of hypothermia in the medical, biological, and experimental fields is well documented. The extent of the use of hypothermia in a variety of oral and dental problems is not known. This prompted a review of the literature which is presently under way. From the study completed thus far, it seems that this is a new and recent approach in dentistry. There seems to be excellent grounds for using hypothermia, in the form of cryosurgery, in the treament of periodontal diseases (Odrich and Kelman, 1967), in the treatment of cancer of the lip and the oral cavity (Gage, *et al*, 1965), and in the treatment of benign lesions of the oral cavity (Emmings, *et al*, 1965). According to Heitman and associates (1969), the rationale for this treatment is the fact that pathologically affected tissues can be destroyed or altered safely using the freezing techniques. Studies were carried out to determine the effect of freezing soft tissues on the tooth pulp (Heitman, *et al*, 1969).

This review will serve to introduce and disseminate information for practitioners as well as for research workers.

ZIMNY, M. L. and REDLER, I. Louisiana State University Medical Center, New Orleans, Louisiana. A comparative scanning electron microscope study of normal articular cartilage of upper and lower extremities in man.

The smooth, glistening, ball-bearing appearance of all diarthrotic joints has led the anatomist to believe that "a joint is a joint is a joint". Scanning electron microscopic study of articular surfaces from normal human joints has shown that this is not true. Joint surfaces are not only different from one joint to another but, in addition, joint surfaces may differ when central portions are compared with peripheral portions within the same joint. Samples of articular cartilage obtained at surgery were fixed in 0.1% glutaraldehyde in Ringer's solution, dehydrated in graded acetones, air dried, coated with carbon and gold palladium alloy and viewed with a Jeolco JSM-U3 scanning electron microscope. Surfaces vary from that of closely opposed, transversely oriented bundles of collagen fibers having a corrugated appearance on the distal end of the tibia; undulating fiber bundles, oriented linearly in the direction of movement of the patella, on the patellar groove of the femur; to the braided appearance of fiber bundles on the proximal end of the cuboid. Another observation was the presence of cells or the surface of articular cartilage. These cells are in lacunae, covered by small collagen fibers and enmeshed by the fibrous matrix to varying depths. The cells are randomly distributed over the articular surface. With aging, however, lacunae tend to disappear, the modulation of the cells change and the cells appear to clone. This may represent a predilection to degeneration. More study will aid in establishing surface patterns per joint in relationship to biomechanical functions. This will have importance in interpreting the morphological changes associated with bone and joint disease.

(Supported by the Arthritis Foundation, Louisiana Chapter).

ZWEMER. R. L. International Anatomical Nomenclature Committee, Bethesda, Maryland. Progress report on anatomical nomenclature.

The International Anatomical Nomenclature Commmittee was formed by action of the IV International Congress of Anatomists held in Oxford, England, in 1950. It first met in May 1952. Anatomists of many countries had concluded that the Basle Nomina Anatomica of 1895, although revised several times, now required a substantive international revision. A new Nomina Anatomica was approved by the VI Congress in Paris in 1955. Subsequent revisions were approved in New York 1960 and Wiesbaden 1965. The third edition of Nomina Anatomica with an index was printed in May 1968. At the IX International Congress of Anatomists held August 19, 1970 approval was given for Nomina Embryologica and Nomina Histologica which have been circulated internationally. Efforts are now in progress to revise all three nomina and to make them compatible with each other if possible. Hopefully, a combined publication will be available for presentation to the X Congress in Tokyo 1975. I will close by quoting two guiding principles which were unanimously adopted by IANC when it began its work nearly twenty years ago.

(a) That, with a very limited number of exceptions, each structure shall be designated by one term only.

(b) That every term in the official list shall be in Latin, each country to be at liberty to translate the official Latin Terms into its own vernacular for teaching purposes.

We must always keep in mind the continual enrichment of anatomy by research and that these new discoveries will require new terms.

SECTION II

Reports of Official Delegates to the Congress on the theme "The Future and Training of the Anatomist"

INSTITUTIONAL REPORTS

Official contributions to the main theme: "The Future and the Training of the Antomist"

ALBANESE, A. R. (Argentina)—THE TRAINING AND FUTURE OF THE ANATOMIST *(Gross Anatomy)*

Anatomy is one of surgery basic science and no surgeon can be a good one without knowing a great deal of anatomy, and probably the better he knows anatomy the skiller surgeon he will be. By other hand to be an anatomist is not sufficient for to be a surgeon, who needs to know some other basic sciences, but if he wants to be a good surgeon he must know anatomy first, and the more the better. The surgeon who knows the anatomy of the area he operates will do all things better, without stressing himself and less danger for the patient.

Anatomy is so intimately ligated to the surgery that new operations are always based on a better anatomical knowledge of the area as was in cardic surgery, and gross anatomical investigation put the basic of a more agressive surgery as was done in kidney, lung and hepatic segmentectomies.

Gross anatomy is essential and can't be omited and perphaps must be stressed its importance to the students. The embryology and histology of the area must accompany its study.

The Teacher of Gross Anatomy must teach the anatomy that is useful for present up to date surgical operation he must know. The best is when he knows the advances in surgery are taking place and teaches its particular anatomy.

Which elements are necessary for a good anatomical teaching?

1) A good book, the best it possible, taking the last most important progress in anatomy, embriology, and histology.

2) A cadaver and sometimes pieces of it and organs to be disected by the student.

3) A microscope with a collection of histologic and embriological cuts. And it possible waxes, moulages of differents embryos.

4) A senior teacher, who teaches:

a) directly to the students by lectures.

b) indirectly through his staff of assistents teaching them in a theoretical —practical way how to dissect the different areas of the body and how to find elements and organs. It must be stressed the tactic to be employed for each particular manouver and its embryological dependence.

c) in the same way as the senior teacher tought them, all each member of the staff has to teach a student group, repeating that same day the teaching. It must be stressed that they must repeat the same things when showing the same elements as was done by the senior teacher beforehand. If the lectures by the senior teacher could be more theoretical than practical, this indirect through the staff teaching must be more practical than tehoretical, and must teach how to do and how to find the different elements in the cadaver or pieces of it.

The functional mechanism of the INDIRECT TEACHING must be the following:

1) The senior teacher dissects a region, area, organ, while explaining it to his staff assistants. It might take an hour.

2) Soon after all each one of the staff assistant repeat in other cadaver or piece the matter to the students, speaking, while dissecting, and showing the different anatomical elements and explaining how to do it as they had lernt if from the senior, and repeating the same concepts and tactics he had employed.

3) The students will repeat the same dissection on the cadaver or organ whith the same tactic trying to repeat the dissection the assistant made for them professor had made for the assistants.

In anatomy is important to know what and and how many anatomical elements there are. But is also important to know where they are and how to make for finding and showing them for the right route, without destroying ofther possible important elements and giving the student (future surgeon) the capacity to do the same surgically finding when operating on the diseased element without disturbing other healthy important ones.

AGUILERA, M. A. (Guatemala)—ENTRENAMIENTO DE FUTUROS DOCENTES. ENSEÑANZA DE ANATOMIA.

El entrenamiento de futuros docentes está sujeto a cambios muy rápidos y substanciales.

Como la enseñanza ha sufrido modificaciones básicas en contenido y método a seguir, es necesario preparar en forma diferente a los maestros, siguiendo esencialmente las pautas siguientes:

1o.) El futuro docente de ciencias morfológicas debe ser preparado no solamente en una de las disciplinas, si no en todas en general.

Anatomía
Histología
Embriología
Anatomía Comparada etc.... incluyendo buena preparación en el área de Biología.
El objetivo es alternar y cooperar en la preparación de las áreas integradas.

2o.) Para recibir este entrenamiento del futuro docente debe asistir a todos los departamentos de Ciencias biológicas.

3o.) Es necesario integrar conocimientos de ciencias de la conducta y áreas clínicas por lo que necesitamos que el futuro docente haga estudios en estos sectores.

4o.) El futuro docente debe conocer y saber distinguir, la importancia de las ciencias biológicas dentro del curriculum; por lo que la noción de departamentalización debe mantenerse a través de los propios estudios integrados.

5o.) La vocación de maestro constituye el elemento principal para la docencia, siendo indispensable una selección previa y en el desempeño del trabajo de los candidatos.

6o.) La duración del entrenamiento y la profundidad de los conocimientos deben ser lo suficientemente amplios para garantizar una buena preparación.

7o.) La práctica integrada especialmente en áreas clínicas y hospitalarias es fundamental.

8o.) Los trabajos de investigación deben ocupar un lugar importante en la preparación de futuros docentes. Trabajos de investigación bien asesorados y dirigidos.

9o.) El entrenamiento debe ser constante, alcanzando en forma progresiva los grados recomendables para rendir una labor eficiente a través de cursos de post-grado: Bachillerato, Maestría, Doctorado.

La realización más completa de todas estas características serán factor determinante para impedir que la docencia anatómica, sea absorbida y aniquilada a corto plazo por otras disciplinas que a grandes pasos dominan el panorama de la enseñanza médica.

CONCLUSIONES

1o.) Se están efectuando cambios radicales en la enseñanza morfológica y en todas las materias de la carrera médica. Estos cambios exigen una modificación en la preparación en los futuros docentes de manera que, estos estén preparados para asumir las nuevas responsabilidades presentes y futuras.

2o.) Estos cambios exigen una preparación cada vez más completa de los futuros maestros, para actuar dentro de planes organizados dentro de la enseñanza integral.

RECOMENDACIONES

Es necesario profundizar cada vez más en el estudio de las Ciencias anatómicas, profundizando el conocimiento cada vez más por medio del estudio de todas las ciencias biológicas y medicina en general.

BUSTAMANTE, J. (Colombia)—CONSIDERACIONES SOBRE EL DESARROLLO DE LA ANATOMIA EN LA AMERICA LATINA

1—Existe, y seguirá existiendo con mayor urgencia cada vez, necesidad de personal idóneo para desarrollar la docencia en anatomía en las distintas áreas de las ciencias de la salud. La preparación de este personal es la responsabilidad de quienes cultivamos estas disciplinas en la actualidad y de la eficiencia con que esta preparación se logre, dependerá el éxito de la programación académica de nuestras universidades y el desarrollo de la anatomía en el futuro.

Características del profesor de anatomía en Norte y Sur américa.

Existen algunos hechos bien definidos cuando se comparan las características de los profesores de ciencias básicas en Sur y Norte América. En Norteamérica, el docente es un profesional preparado para este fin exclusivo; profundizar y dominar una rama exclusiva del conocimiento, a través de una programación coherente y definida. En América Latina esto es la excepción. La mayoría del personal docente, ha sido doctor en medicina que secundariamente dedica parte de su tiempo a la docencia de una ciencia básica.

Ambas orientaciones tiene evidentes ventajas y desventajas que no pretendo discutir en su totalidad y solo quiero mencionar ahora que debido a la duplicidad de funciones del docente en Latinoamérica, sus actividades académicas quedan muchas veces relegadas a un segundo término. Además la escasez de médicos y la situación desventajosa de la docencia desde el punto de vista económico en relación con el ejercicio de la medicina, resulta en una afluencia cada vez menor de médicos en los departamentos de anatomía.

Esfuerzos para superar esta situación

En algunas universidades de Latinoamérica se ha tratado entonces de formar anatomistas; esto es de crear personal especialmente entrenado para la docencia, la investigación y el cultivo de las disciplinas anatómicas. En especial me puedo referir a los programas que por varios años hemos adelantado en la Universidad de Antioquía y que, en resumen, consisten en dar estudios de postgrado en anatomía macroscópica, citología, histología, neuroanatomía y embriología, y en la revisión de los principios pedagógicos que habilitan al egresado para ejercer la docencia universitaria y que lo introducen en el estudio de la bibliografía y la investigación científica.

Creo que el resultado obtenido con tal programa ha sido satisfactorio y que ha logrado solucionar problemas locales urgentes de personal. Creo, sin embargo, que también adolecen de los defectos inherentes a una falta de tradición y a nuestra escasez de recursos tanto en la docencia, en lo que se refiere a personal suficientemente calificado en las distintas áreas, como de los implementos para adelantar investigación actualizada y fructífera.

2—*Bases para la determinación de los objetivos de la preparación de Anatomistas*

Hasta ahora me he referido someramente a una fase muy especial del problema, cual es la situación

de la formación del anatomista en países Latinoamericanos, pero quizá la intención del Dr. L. J. A. DiDio al proponer el tema del "futuro anatomista" fue más bien encarar otro aspecto más general y que toca en especial al contenido de los programas con que deberán formarse los futuros docentes. Como el tema es común, bien se trate de docentes de América del Norte como de América del Sur, voy a permitirme dar algunas opiniones sobre los temas que deben considerarse cuando se quiera establecer los objetivos de educacionales en la formación de anatomistas.

El desarrollo histórico de las disciplinas anatómicas se confunde con el desarrollo de la ciencia biológica como un todo. Fue inicialmente taxonómico y de descripción macroscópica; pasó luego a la descripción microscópica y a la interpretación funcional; pasa luego al estudio de la ontogania, la topoquímica y la descripción ultra estructural para desembocar al análisis de la organización molecular. Todos estos campos deben ser, evidentemente, objeto de la preparación del anatomista, aunque debemos reconocer que la amplitud de cada uno de ellos impide la completa revisión de sus desarrollos en ningún curso o programa docente y que debemos solo dar en ellos las bases y principios esenciales que habiliten al estudiante para la comprensión de hechos particulares.

Al lado de los temas esenciales y clásicos en los estudios anatómicos, crecen y se desarrollan nuevos campos que pudiéramos llamar relacionados, en los que el anatomista tiene una acción de la mayor importancia: mencionemos por ejemplo, la inmunología en donde el análisis citológico del fenómeno inmunológico representa de por sí un nuevo campo de especialización; la teratología tanto en la determinación y definición de la entidad nosológica, como en el campo experimental; la citologenética con sus variadas implicaciones comparativas y patológicas, etc., etc.

Todos estos datos nos dan la convicción de que en morfología como en cualquier otra rama de la ciencia, los límites de su competencia son imprecisos, y que hay tanta complementación con otras especialidades que sólo un esfuerzo conjugado de diversa disciplina puede ofrecer posibilidades para un resultado valedero.

Es entonces lógico pensar que en la preparación del futuro anatomista debe existir una gran elasticidad en la confección de un programa y que quizá más que las materias mismas, sea de mayor importancia crear en el estudiante la motivación o la intención de interpretación de los fenómenos biológicos en términos de estructura.

Además de estos requerimientos de carácter científico hay otro que se refiere a la labor de docente, que en la mayor parte de los casos le tocará desarrollar. Creemos entonces que en la preparación del anatomista deben considerarse los temas que habiliten al estudiante en el mejor desarrollo de sus labores docentes. En nuestra experiencia en la Universidad de Antioquía hemos programado con este fin, cursos de psicopedagogía, de evaluación y de ayudas audiovisuales.

3—*Acciones posibles de la APA*

Uno de los objetivos de la APA es según sus estatutos, "estimular el desarrollo y el mejoramiento de las prácticas de la morfología en el continente americano, facilitando el intercambio científico en todos sus aspectos". Tal ha sido la razón para que nuestro presidente, el Dr. L. J. A. DiDio haya propuesto el tema de la formación de anatomistas como punto central de la presente reunión, y por lo mismo creo que es un problema de interés de la Asociación la consideración de un posible patrocinio de los distintos programas que tienden a la formación de anatomistas donde ellos se adelantan con la debida seriedad.

Me permito por lo tanto poner a la consideración de la reunión los siguientes puntos con los que la APA pudiera influir beneficiosamente en la formación de los anatomistas del continente especialmente en América Latina.

1—Recomendar la creación de programas debidamente certificados de formación de anatomistas en los centros universitarios que cuenten con las condiciones necesarias.

2—Creación de comités evaluadores de los programas existentes y de aquellos que se creen en el futuro con el fin de dar recomendaciones a su continuo mejoramiento.

3—Creación de canales de comunicación entre los centros de formación de anatomistas (Departamentos de Anatomía), que permite el aprovechamiento de experiencias logradas en centros de mayor desarrollo.

4—Promover la creación de cursos o programas internacionales o multinacionales para la formación de docentes con la colaboración de personalidades eminentes en las distintas ramas de la morfología.

CARVALHO, C. A. FERRAZ de (Brasil)—FORMACION Y FUTURO DEL ANATOMISTA.

El grande progreso de la tecnología y las ilimitadas posibilidades decorrentes de su utilización en todos los campos del conocimiento humano, sea en la física, en la fisicoquímica, en electrónica o aún en el advento de la cibernética, están a exigir modificaciones de base destinadas a la formación del especialista en cualquier sector, lo que necesariamente se refleja en la formación en el nivel de graduación universitaria.

El desarrollo de ciencias más subjetivas como la psicología, la sociología y también en las técnicas de relaciones humanas piden una reformulación en bases más científicas y menos románticas de la estructuración intelectual del ser humano.

Cada día que pase, se ve más la necesidad de engranaje entre diferentes áreas de conocimiento, exigiendo al contrario de lo que se venía considerando hasta hace poco tiempo mayor necesidad de desarrollo del espíritu de trabajo en equipo.

No ha habido entretanto, desarrollo paralelo en el método de formación intelectual dentro de una sistemática precisamente pre-establecida. El morfólogo que de ninguna manera puede huir a esa evolución debe basar su formación básica en elementos que le permitan la estructuración del raciocinio científico, dentro de los límites más amplios posibles.

Una vez establecida la morfología como área escogida debe el futuro especialista ser colocado en un núcleo de conocimientos generales, compendiando las subdiviones fundamentales de las ciencias morfológicas tales como anatomía macroscópica, microscópica (mesoscópica), de desarrollo, histología, citología, cito e

histoquímica, biología celular y como áreas de soporte la radia y electrobiología, fisiología, patología general, bioquímica y bioestadística. La profundidad del estudio de estos campos debe ser medido por la capacitación que adquiere el investigador en planear y ejecutar trabajos científicos de alto nivel teniendo como complemento indispensable el concurso de otros morfólogos, que sean portadores del título de especialista en una de aquellas áreas.

El propio morfólogo al cual hacemos referencia además de los ya citados conocimientos básicos debe dominar con seguridad también uno de aquellos capítulos. No queremos con eso defender la formación de enciclopedistas y así seleccionar datos para el desarrollo de un raciocinio amplio y seguro.

El investigador no debe estar desligado de las grandes corrientes actuales de la investigación científica. El avance tecnológico podrá concentrar en corto plazo o dejar por tierra, años de trabajo del investigador que camina desinteresado de las necesidades más actuales, visando una aplicación remota de sus resultados.

El morfólogo, a nuestro modo de ver, debe ser incluido en esa línea de raciocinio. El número exiguo de ese especialista en todo el mundo exige que se aproveche de manera más racional y objetiva su potencial de trabajo.

Para el lado didáctico, debe ser el formado en nivel de graduación, preferentemente en el mismo curso en el cual enseña, trabajando en común con especialistas, no necesariamente morfólogos y que estén directamente relacionados con su materia.

La formación y permanencia del anatomista, en su profesión están como es obvio, directamente relacionados con la perspectiva económica y con la remuneración del profesional que ejerce actividades correspondientes en el mismo curso, donde el futuro anatomista es formado. En los países donde el médico, por ejemplo, tiene sueldo fijo, idéntico al de los médicos investigadores en áreas básicas el número de aquellos tiende a aumentar.

A no ser que se constituya la profesión de anatomista de nivel universitario desociándose de carreras como Medicina, Odontología o Veterinaria, tornase más difícil cada vez el drenaje de elementos de estas últimas carreras, ya que los sueldos de sus profesiones son en líneas generales superiores al investigador docente en morfología. Si estas condiciones continúan persistiendo tendremos que contentarnos solamente con anatomistas mal o incompletamente formados, dando preferencia al ejercicio de otra actividad como la práctica médica o entonces como anatomista sin cualquiera de aquellas graduaciones y que a pesar de que puedan estar capacitados para la investigación científica, difícilmente lo estarán, por completo, para la enseñanza universitaria profesional como medicina, odontología o veterinaria.

DIDIO, L. J. A. (United States of America)—The Future and Education of the Anatomist.

The future of the anatomist living in the Space Age is tentatively predicted on the basis of philosophical tendencies, perspectives, progress in the scientific and technologic world, societal demands, health education trends, developments in the field of anatomy and the potentials in the anatomical sciences.

1. Philosophical guidelines are sought in the doctrines of KIERKEGAARD's Existentialism, SCHLICK's neopositivism or logical positivism (WITTGENSTEIN), LEDERMANN's mechanistic materialism, SMUT's holism, and neo-metaphysics or spiritualism.

2. Historical perspectives are analyzed, the past sequence of events and the factors under which they occurred are considered in order to predict the reshaping of the anatomical sciences.

3. Progress in the scientific world has been extraordinary in the past few decades and has widened and deepened the scope of anatomists. Advanced technology in closely related fields to anatomy, and even in unrelated sciences, has made available instruments that have increased the exploring power of anatomists. Since there is no end in sight to this progress, the anatomist must be alert and ready to take advantage of these developments for the benefit of his scientific endeavours. For example, it was this alertness that took advantage of radiologic, pathologic and surgical data, and led to the concept of "anatomical and anatomicosurgical segments" of the lung, kidney, liver and spleen.

4. Societal demands, requirements and expectations are already having a strong influence on medical education since citizens have come to consider health care as a basic human right that is acquired at birth, or even at the time of fertilization, and less as an economic privilege. Responding to societal pressure, government is becoming more involved in health science education. It is providing funds and facilities but also directly or indirectly imposes rules and regulations which obviously aim at obtaining more, better and less expensive health and medical care for its constituents. This trend will continue; as education of the people reaches higher levels so will the demand for health care.

Government is also extremely sensitive to economic pressure that stems from the society and will attempt to force graduation of students in larger numbers, in shorter periods of time, and at a much lower cost. It will be the task or duty of medical educators to cooperate to the best of their ability in reaching these goals without lowering the standards for future physicians.

As a consequence, the anatomist of the near future should be concerned more than the present anatomist in preparing himself for "mass education." In other words he should be able to teach faster, better and shorter courses and still maintain the highest quality education in the anatomical sciences.

5. Health education trends indicate that medical, dental, and veterinary curricula, partially integrated for the most part, will be totally integrated in the near future. In spite of the natural diversification of curricula throughout the world, it seems that the following general features can be viewed as common denominators: 1. Flexibility; 2. reduced courses; 3. early exposure of patients to students; 4. preventive as well as curative approach; 5. health of the individual, of the family, of the community and its environment; 6. elimination of vacation; 7. scientific approach to medicine; 8. student-oriented schools instead of teacher-oriented schools; 9. teaching the "method of self-education" (more responsibility for students); 10. continuing medical education serving as a life-time extension of the medical course in the medical school.

The consequences in the anatomical sciences are the need for an early introduction to the broad principles of the organization of the human body, teaching living anatomy and the anatomical nomenclature from the subcellular structure to the level of man and the community. After a short introductory period, teaching will take place in a systemic approach by which the discussion of the anatomical features will be followed immediately by physiology, biochemistry, pathology, microbiology, pharmacology and by the related clinical aspects. The relevance of anatomy is already clearly understood and recognized, and the anatomist should be well aware of this and able to emphasize and connect his field with those of medical aspects.

Since this is a unique opportunity in a lifetime, dissection will be utilized although reduced to half a cadaver for a pair of students, to stress the importance of team work in medicine, to get the tridimensional idea of the anatomical structures and their close relationships. Eventually dissection will be utilized as a long, slow-paced necroscopy correlated with the clinical history.

6. Developments in the field of anatomy have brought changes from time to time in scientific interests, in methods of teaching and research, as well as having enhanced potentials in the anatomical sciences. Macroscopy was assisted by microscopy in improving knowledge of anatomical structure and improvement in photography provided better illustration and recordings for teaching and research. Audiovisual devices have changed from two-dimensional to three-dimensional projections and the addition of color has made available a remarkable means for stereoscopic teaching and learning.

Mesoscopy, study of anatomical structures between micro and macroscopy, has led to the concepts of "constructive systems" while functional units, as supracellular units, stemmed from neurons and were extended to nephrons, osteons, myons, hepatons, enterons, etc.

Anatomy of ethnic or racial groups, with the aid of genetics, anthropometry and biotypology (or somatotypology) is regaining importance as the interest in societal structure increases and establishes the natural link between anatomy and the community.

7. Potentials in the anatomical sciences reside in each level of organization if sought with a keen inquiring mind. Only a superficial knowledge has been obtained in most human structures which, for obvious reasons, cannot be studied under experimental conditions. However, it is not infrequent that nature, accidents or serendipity provides, although unpredictably, circumstances, conditions or data that the physician makes available to the anatomist, as it happened to obtain the proper morphophysiologic knowledge of the stomach and, more recently, of the terminal ileum, its ileal papilla and its ileal pylorus.

Other fields such as biophysics, by providing a higher resolution of both the transmission and scanning electron microscopes, an improvement in sectioning instruments and staining techniques, as well as in photographic equipment and supplies, will give to the anatomist essential tools to explore his field and to take advantage of the potentials existing in seeking knowledge of the structures and their proper or better functional interpretation under normal, experimental, and pathologic conditions.

Anatomists will seek the collaboration of other medical scientists such as biochemists, will understand their methods and interpretations, will apply them to anatomical fields, and in offering their results in return will offer the most plausible way to master molecular biology, and even beyond, to reach the ultimate goal of knowing "life."

The study of theoretical models, for teaching and research, with the assistance of experts in mathematical medicine, cybernetics and computers, is being more and more popular and fruitful for anatomy and medicine.

In short, the anatomist will be an important pebble in the mosaic of the medical sciences.

The education of the anatomist, if the future just predicted is correct, should aim at preparing a new Renaissance man in the field of biological structure.

The future anatomist, more than the present anatomist, should know all the disciplines of his field, some of which have returned to anatomy, others have been created, and others will be added. To be specific, the future anatomist will have to be trained in all disciplines of a modern single-headed, unified, Department of Anatomy, as follows:

Cytology (Cell Biology)

Embryology (Developmental Biology, Fetology, Neonatology, Nipiology)

Genetics

Histology (Tissue Biology)

History of Anatomy and Medicine

Macroscopy (Organ Biology, Systemic Biology, Human Biology, Gross Anatomy, Living Anatomy, Radiologic Anatomy, Clinical Anatomy, Surgical Anatomy, Artistic Anatomy)

Neuroanatomy (Neurobiology)

Medical Anthropology (Biology of Human Races)

As ancillary sciences for his education the future anatomist should be aware or familiar with the goals, principles and methods of biochemistry, biophysics, mathematical medicine (biostatistics, computers), microbiology, pathology, pharmacology and physiology, with which he must more often and more deeply interact in teamwork both teaching and research.

Besides understanding at least the language or technical jargon of these closely related fields in the so-called basic medical sciences, the future anatomist should at least have an introductory knowledge of the clinical sciences and a wider knowledge of the clinical aspects related to his particular field of interest.

Taking advantage of the more or less sophisticated means of communication and audiovisual devices, the future anatomist should be able to teach all or at least groups of the anatomical disciplines, such as those, for example, that more often employ microscopy (cytology, histology, embryology, genetics, and microscopic neuroanatomy).

He will be expected to teach with more and more efficient audiovisual devices, cinematography, cineradiology, stereoscopic projection, closed circuit television and to a larger and larger number of students, in integrated curricula at the introductory level or at the graduate level, or at both.

In order to gain in depth it is necessary that the anatomist devote his life to a specific discipline, eventually more than one in this field, where he will make scientific contributions for the progress of ana-

tomy in particular and medicine in general. Instruments and techniques have become so sophisticated that not many can be mastered successfully and simultaneously, and constitute another reason for multidisciplinary work.

A larger use of automated devices, scanning and transmission electron and polarization microscopy, electromyography, radioautography, tracers, tissue culture, x-ray defraction, fractioned ultra-centrifugation, cineradiography, telemetry, as well as microsurgery, experimental neurosurgery, programmed instruction and self-education is to be expected and anatomists should be prepared to understand their mechanisms and implications in order to take full advantage of them. On the other hand, biotypology and anthropology will play an increasing role in understanding biology of human races, man and his environment, and ultimately society; anatomists will have their share in contributing to the health of the community with the other medical sciences. The anatomists' headquarters will be the medical center for body donation and will assist physicians in providing fresh organs for transplants as well as organize or supervise organ banks.

Since more and more educated people are donating their bodies and clinical histories for medical scientific purposes, the dissection of cadavers will become a long detailed necroscopy; the students and the instructor (with or without the aid of a pathologist) will make anatomicoclinical correlation for every organ, and the anatomist will have to become more involved in pathology. Thus the anatomist will be the sole teacher of normal structures and normal variations, but he will be naturally led to understand and eventually to interpret pathologic phenomena more than he is doing at present.

In summary, the future of anatomits seems brighter than ever before. Most of the educational ingredients are now available to prepare them as the new Renaissance men in the health sciences.

FEDOROFF, S. (Canada)—TRAINING OF ANATOMISTS.

In view of the rapidly changing role of Anatomists in Medical Colleges, redesigning of the training programs for future Anatomist becomes urgent.

Graduate students in Anatomy should be given the choice of being trained for scientific careers in morphological sciences or for academic careers as teachers of Anatomy. Students deciding on scientific careers should have programs exposing them broadly to the morphological sciences and to a large variety of techniques, and giving them considerable insight into at least one aspect of the morphological sciences. Students selecting an academic career should have some basic training in all aspects of the anatomical sciences, should have at least a basic introduction to some clinical sciences, have experience in teaching, be given instruction in the methodology of student evaluation and be introduced to scientific methodology and research in some aspect of the morphological sciences.

GOMEZ ALVAREZ, S. (México).—"FUTURO DEL MAESTRO Y DE LA ENSEÑANZA DE LA ANATOMIA"

La consideración del futuro del Maestro y de la Enseñanza de la Anatomía como tema central del III Congreso Panamericano de Anatomía, nos obliga a referirnos a los cinco factores básicos que constituye la unidad pedagógica de todo sistema moderno:

1o.—Alumno,

2o.—Maestro,

3o.—Programación,

4o.—Metodología y

5o.—Medios didácticos.

El plantear la situación futura del maestro de anatomía no puede hacerse fraccionando estos factores, por estar correlacionados en un conjunto que bien puede llamarse "unidad situacional" donde el hombre que enseña y aprende, está formando la "unidad pedagógica" mencionada y que actualmente se le fragmenta y por ello resulta incoherente a toda reforma educacional.

El anatomista en la actualidad, ya en vísperas del mañana, frecuentemente carece del conocimiento sobre la situación socio-económica en que enseña. La pedagogía y la existencia del hombre evolucionan desde su base psicológica al ritmo de las mutaciones que surgen aceleradamente en el desarrollo de las estructuras de cada país y región.

El alumno elemento básico, siente, conoce y modela su presente y su porvenir, influenciado por la realidad socio-económica en que vive. De esta situación nacen las motivaciones inmediatas que deben servir para el aprendizaje del estudio anatómico que realizará el estudiante.

Al maestro corresponde situarse en el mundo de hoy y del futuro a medida que los programas de enseñanza tomen en cuenta la participación del alumno. Este concepto necesita de lo concreto y de lo diverso como materia funcional en el aprendizaje y sistematización del personal que enseña para que el estudiante encuentre un campo de observación, de experimentación y desarrolle su poder creativo científico y en el ejercicio constante de su creatividad, surja dicha motivación progresiva, que generalmente no encuentra por deficiencia de alguno de los factores de la unidad pedagógica.

Las posibilidades de acción para el estudiante, dependerán en gran parte de la actitud del maestro de anatomía; él es quien aceptará o rechazará el hacerse consciente de la situación socio-económica en que viven sus alumnos; él es quien podrá como profesionista e investigador, brindar firmeza en el enfoque conceptual y flexibilidad en la metodología en un sitio institucional con material adecuado, que permita el diálogo inquisitivo con signo de una nueva generación, llamada primordialmente a hacer ciencia que a recibir conceptos. Este es hoy, básicamente, el dilema del maestro y del alumno, frente a la enseñanza de la anatomía dentro del marco moderno de la pedagogía que se configura con proyección al futuro, expuesto en el trabajo que se presenta.

GONZALO-LEONARDI, P. L.; VELEZ-BOZA, F. y cols. (Venezuela)—Entrenamiento y futuro del anatomista.

TEMA DE LA PONENCIA

El tema de la Ponencia es: "EL ENTRENAMIENTO Y FUTURO DEL ANATOMISTA", según lo cual,

ésta comprende dos aspectos muy importantes que son: Entrenamiento del Profesor de Anatomía y además el futuro de esta Ciencia, de su enseñanza y del Profesorado de la misma.

A este propósito señalaremos su estado actual en el país y las posibles modificaciones que puedan llevarse a cabo.

EL ANATOMISTA O MORFOLOGO

Con el deseo de precisar lo más claramente el sentido que se le asigna al término Anatomista o Morfólogo, se admite que este incluye a todos los profesionales que trabajan en las diversas ramas de las Ciencias Morfológicas, es decir, que comprende la Anatomía, la Histología y la Embriología en todos sus aspectos.

ENTRENAMIENTO DEL ANATOMISTA

Para analizar lo relativo al entrenamiento de éste, consideramos conveniente exponer, primero, la situación actual del entrenamiento que adquieren y luego señalar las posibles mejoras que pueden introducirse.

SITUACION ACTUAL

El conjunto de Profesores que en nuestras Facultades de Medicina dictan las Cátedras de Morfología, está animado de una alta mística y espíritu de superación, los que ejercen estas actividades tienen una decidida vocación docente y han adquirido una gran experiencia a través de una labor de largos años dedicados a estas ciencias, siendo motivo de justa alabanza y reconocimiento para ellos, los esfuerzos que han realizado para adquirir su preparación en éstas a costa de múltiples sacrificios.

Junto a esta preparación debe tenerse en cuenta el hecho de que son ellos exponente de una gran elevación moral y verdaderos maestros que continúan la tradición de la Escuela Médica Venezolana, tales como fueron los doctores José Vargas, Luis Razetti, José Gregorio Hernández, el Dr. José Izquierdo y el recientemente fallecido Dr. Jesús Yerena, entre otros de los muchos que podríamos señalar y que son honra del gremio médico. Estas características del Profesor de Morfología, son similares a los que enseñan en otras Cátedras de los años básicos, que presentan puculiaridades muy marcadas, y se diferencia de los años superiores de la carrera en lo que respecta a la menor posibilidad de poder aplicar sus conocimientos en la práctica profesional; como en lo relativo a la mayor atención docente que deben tener con el elevado número de alumnos recién ingresados a la Universidad.

Esta gran dedicación que se exige del Profesor en los años de Ciencias Básicas que incluyen entre otras al Morfólogo, está solo compensada en la actualidad por su decidida vocación, pero cada vez se hace más claro el hecho de que algunos de nuestro Morfólogos son autodidactas y que el rápido progreso de las investigaciones en estos campos, han traído tal volumen de conocimientos, que si bien antes era posible a base de iniciativa personal el poder tratar de prepararse en forma eficiente, hoy día es muy difícil si no se siguen cursos que complementen su formación académica.

En la actualidad y en nuestro medio, aunque el Morfólogo recibe una cierta preparación en el transcurso de su carrera docente, al seguir el escalafón establecido, pero debido a que su entrenamiento lo recibe en una forma irregular e incompleta, solo le proporciona una experiencia parcial, pero existen diversos campos en los cuales no recibe preparación o ésta es desigual entre los distintos profesores; todo esto determina deficiencia en la docencia e investigación.

Esto también dificulta la integración entre sí de los estudios en Morfología y mucho más aún con las otras Cátedras en las cuales debe estar ligado.

La dificultad de adquirir una preparación eficiente y la falta de alicientes para la investigación, favorece en alto grado el éxodo de los Profesores de Morfología hacia otras Cátedras en las cuales encuentra una mayor relación con el ejercicio profesional, por lo cual estas Cátedras pierden personal y es urgente remediar esta situación.

SOLUCIONES AL PROBLEMA
OBTENCION DE PERSONAL

Se considera que el personal debe obtenerse en el país por concursos, como también es conveniente la posibilidad de invitar a profesores extranjeros, a fin de dictar cursos y entrenamiento técnicos.

Para solucionar el problema de la preparación del profesorado de Morfología debe procurar dársele a éste una capacitación y entrenamiento en todas sus ramas, que incluya:

a) Conocimientos y técnicas
b) Pedagogía y sistemas de evaluación
c) Entrenamiento en investigación

Dos fórmulas son posibles de utilizar para mejorar la preparación:

1) Cursos dictados a lo largo de la carrera profesoral
2) Realización de estudios de post-grado en Morfología Integral.

De estos dos sistemas, el más fácil de implantar son los cursos de Entrenamiento para el Profesor que ingrese en la categoría de Instructor, y Ciclos de Conferencias para el resto del Profesorado relativas a todas las ramas de la Morfología. Siendo preferible que el futuro Profesor sea obtenido de los Preparados de las Cátedras durante su carrera estudiantil, posteriormente someterlo a un plan de estudios y prácticas en el país y luego pueda perfeccionarse en el extranjero.

REMUNERACION DEL PERSONAL

Debido a la más ardua labor docente, debe asignarse una mayor remuneración al profesor de Ciencias Básicas, ante el éxodo a otras Cátedras.

CURSOS DE ENTRENAMIENTO

Estos cursos deben ser programados por el Departamento de Morfología y tramitados para su consideración y aprobación a los organismos correspondientes de la Facultad, quienes colaborarían y darían los créditos correspondientes y acumulativos a los profeso-

res que satisfactoriamente los realicen y solicitaría la contribución correspondiente de otras Facultades, Instituciones, Sociedades Científicas, etc.

Estos cursos se dictarían en forma programada y progresiva a lo largo de la carrera docente y comprenderían los aspectos Científicos, Docentes e Investigativos. Se planificarían en forma que fuesen lo suficientemente activos para participar, no sólo en Conferencias sino además en Mesas Redondas y prácticas o pasantías por servicios especializados.

Los Profesores que siguiesen estos Cursos se les podría descargar de la docencia o se programarán sin alterar ésta; para ello es necesario tener en cuenta el número de Profesores que tiene cada Cátedra y la relación alumno-profesor.

Para estos cursos podría aprovecharse la colaboración de otras Facultades donde se impartan temas relacionados a los mismos.

El programa de los cursos se realizaría en dos etapas:

a) Obtención de conocimientos de técnicas, preparación pedagógica.
b) Entrenamiento para conducir una investigación.

Los Profesores que hubiesen realizado estudios de este tipo, podrían solicitar sus créditos correspondientes a la Facultad, sometiendo a consideración sus credenciales.

MATERIAS DE LOS CURSOS DE ENTRENAMIENTO Y CONFERENCIAS DE ACTUALIZACION

En el aspecto científico:

1) Biología celular y citogenética
2) Embriología
3) Anatomía microscópica (Histología)
   Técnicas histológicas:
   - Citología
   - Cultivo de células
   - Histoquímica
   - Ultraestructura
4) Anatomía macroscópica:
   - Sistémica
   - Regional
   - De superficie, funcional y aplicada.
5) Anatomía del niño
6) Anatomía radiológica
7) Anatomía quirúrgica
8) Antropología

En el aspecto docente:

Dibujo anatómico
Sistema de educación audiovisual
Sistema de evaluación

En el campo de la investigación:

Entrenamiento con un investigador calificado en un trabajo específico.

Realización de trabajos dirigidos.
que le permita dominar a cabalidad sus diversas ra-

POST-GRADO EN MORFOLOGIA

El objetivo fundamental de éste, consiste en la formación del Morfólogo Integral con una preparación mas y con un entrenamiento completo tanto en los campos científicos como docentes.

En la actualidad, no existen cursos de este tipo en el país, y los pocos que se han hecho, han sido realizados en el exterior; la organización de un postgrado de esta naturaleza, exige una serie de requisitos mucho mayores para su creación y es la aspiración de que en un futuro próximo, puedan organizarse en el país.

Para remediar provisionalmente esta deficiencia, deben preverse becas con este fin y mantener conexiones con otras Universidades que dispongan de estos cursos, los cuales deben ser realizados como un requisito o credencial de los años superiores de la carrera docente del Profesorado.

Debe tenerse en cuenta la posibilidad de la especialización en determinada rama de la Morfología, en el Profesorado de alto nivel.

FUTURO DEL ANATOMISTA

Las ciencias anatómicas constituyen la base de la Medicina, por lo cual su conocimiento será siempre indispensable para la formación de los profesionales, y no puede ser sustituida por ninguna otra ciencia.

Hasta épocas relativamente recientes, las Ciencias Morfológicas se enseñaban en el país bajo un aspecto exclusivamente estructural y estático, ya sea en el cadáver o en las preparaciones; pero en los últimos tiempos ha tomado cada vez mayor incremento a considerar y enseñar la anatomía como una unidad morfofuncional, es decir, a estudiarla además en el vino, en su evolución durante el desarrollo embriológico, sus modificaciones durante el crecimiento y hasta en sus cambios involutivos de la senectud, como las características antropológicas de los diversos grupos humanos y en sus relaciones con la semiología clínica.

La aspiración actual es que el Anatomista sea integral, esto determina la necesidad de adquirir un entrenamiento especial y complejo durante años en diversas disciplinas, y hacen que el futuro Morfólogo sea un especialista altamente calificado que debe dedicarse con exclusividad a este campo, si se desea adquirir los numerosos conocimientos exigidos, por lo cual su especialización es una necesidad y la base de una carrera docente debidamente organizada.

Dado lo exigente de su campo, es necesario dar toda remuneración adecuada y las facilidades a sus aspirantes para que se pueda disponer del número suficiente de profesores calificados en esta rama, que hasta cierto punto ha sido menospreciada en comparación con otras y que es de absoluta necesidad.

Sólo en esta forma el futuro Morfólogo podrá dedicarse por entero a su labor, sin la apremiante necesidad de tener que ejercer como un complemento, otras especialidades que le restan eficiencia en su misión, por ello consideramos que al asegurarle al Morfólogo una carrera debidamente planificada, en la cual pueda adquirir conocimientos amplios para transmitirlos a sus alumnos y una debida seguridad económica que redundaría en beneficio evidente en la formación básica de los Médicos y de la Investigación.

PIRRO, A. F. (Panamá)—ACTITUD DEL ANATOMISTA

Hoy el hombre vive en la espera de la "época de oro" confiado en la ciencia, mientras una crisis profunda lo angustia y el porvenir lo inquieta.

El hombre de hoy está enfermo en sus relaciones con los demás y en su alma.

Las fuerzas poderosas del progreso aumentan la tristeza de la soledad humana.

El desarrollo de las ciencias sobre el hombre puede determinar peligrosas transferencias, generalizaciones, aplicaciones.

La morfología tradicional en el tiempo se ha vuelto estructural, funcional, restando a lo general, a la organización.

Las ciencias especiales ocultan la esencia del hombre el método estadístico lleva a la abstracción, el empirismo estático de los laboratorios de disección cristaliza nuestros impulsos.

El desarrollo de las comunicaciones sociales entraña la posibilidad de una anagenesis cerrada con reducción de las potencialidades del hombre.

El impacto del futuro nos induce a revisar nuestra ciencia, a buscar el verdadero objeto de la anatomía, a producir una nueva actitud nuestra, positiva, factiva.

El científico hoy en concreto, conciente en la sociedad, responsable de su dignidad, de su servicio para el desarrollo integral del hombre.

El anatomista entregado a la comunidad, realiza conocimiento vivo de la persona que se identifica mejor con la esencia de su naturaleza.

Al anatomista no le basta la concesión individualista necesita la dimensión social, no basta el sistema de la organización, él abre el vacío no organizado, indeterminado que no es parte aún de nuestra estructura y cultura terrenal.

RUIZ-LIARD, A. (Uruguay)—TRAINING AND FUTURE OF ANATOMISTS.

Anatomy is a pillar of medicine and surgery.

We shall here be concerned with macroscopic anatomy, which is at the basis of physiology, pathology and therapy. The study of these three disciplines cannot be attempted without a basic knowledge of anatomy.

To believe that it is enough to know that the liver, for example, is on the right and that the spleen is on the left makes a good nurse but not a good medical student.

Formation of Medical Thought. This requires an accurate judgment, prudence, precision, analysis and synthesis.

Projection into the Clinic. It is impossible to perform a clinical examination without previous anatomical knowledge. Physical diagnosis procedures have their basis in anatomy.

How to Acquire this Knowledge. This should be accomplished through firsthand experience, working, touching, analyzing a region or viscera. It requires daily, constant, diligent labor, where the elements involved in anatomical study are gradually seen one by one. This kind of work is not in accordance with the present era of gratification easily obtained.

Dissection develops a particular spirit of observation and method. The study and analysis of the dead lead to knowledge of the living individual.

Relating an anatomical fact with clinical repercussions awakens the interest of the student.

Anatomy must be integrated with the basic sciences and projected vertically through teaching into the clinical sciences.

The time allotted to anatomy must not be reduced.

Concepts to be Taught. Anatomy is one of the oldest sciences. It will be modern when nature places the liver in the thorax and the lungs in the abdomen.

It is a science of application that permits intentional focusing: descriptive, topographic, regional, clinical, surgical, radiological, surface, etc.

Teaching Personnel Information.

Candidate for Class Aid (Honorary)

Class Aid

Assistant

Adjunct Professor

Head Professor

Everyone must perform teaching and research activities.

Teaching Auxiliary Methods. Slides, cinematography, radiology and cine-radiography, plastic and injection-corrosion preparation, and closed-circuit television are some available methods. The latter has proved to be a great teaching value.

Future of the Anatomist. This implies the future of anatomy. Its importance in the clinic must be enhanced, without detriments.

Anatomy cannot be omitted. It has new aspects that should be studied. Its horizon becomes larger everyday.

There are several reasons that provoke a lack of interest in the teaching of anatomy.

Dedication to anatomy varies. If made obligatory, full-time work would be appealing because of:

1—economic assurance

2—certainty of work

3—retirement with a progressive scale of wages for future economic stability.

The participation of anatomy in the clinical departments must be obligatory. There must be anatomists in the clinic.

Wages must be comparable to those of the same level of expertise in other disciplines.

Medical teaching, without private practice, has never made a physician.

SIGARAN, M. F.; CASTRO-QUEZADA, A. y ALVARENGA, J. R. (El Salvador)—EL ENTRENAMIENTO Y FUTURO DEL ANATOMISTA

El ingreso masivo de estudiantes al área de Medicina está reorientando la evolución del departamento de Anatomía en El Salvador. Hasta hace dos años sólo se contemplaba la formación de Profesores, y a los Instructores no se les daba la atención necesaria experimentando la relación Profesor/Instructor, grandes variaciones.

Un aumento de más de 400 % en las admisiones ha sido registrado en los últimos dos años, con un futuro incremento anual del 33 %. Con una admisión tal, la objetización del departamento debe cambiar; el tratar de formar idealmente solo Profesores será imposible económicamente debiendo orientarse el departamento en la siguiente política para formación de personal.

1) Asistentes de docencia (Monitores) con requisitos básicos como ser estudiante activo del área Bio-Médica, 70 % de su carrera aprobada con calificaciones del 75 % o más.

Este personal "flotante" trabajará a tiempo parcial o completo; orientados por los Instructores, afrontarán la tutoría de los cursos pre-grado y podrán formar alrededor de un 40 % ó 60 % del personal.

2) Instructores graduados universitarios en el área Bio-Médica; con funciones fundamentales docentes: tutoría, clases teóricas dirigidas por los profesores. En los laboratorios desarrollarán proyectos de investigación supervisados, seminarios, revisiones bibliográficas, etc. Representarán el futuro del departamente con su ascenso potencial a Profesores. Trabajarán a tiempo parcial, completo o integral dependiendo del interés. Constituirán de 25 % a 35 % del personal.

3) Profesores. Esta categoría estará constituida por aquellos graduados con estudios de postgrado y de experiencia docente en el área.

Sus responsabilidades típicas serán: dirección en docencia pre-grado y participación activa en la de post-grado. Desarrollarán además labor administrativa y de planificación universitaria. Serán investigadores activos con proyecciones sociales. Este tipo de personal se propone que forme un 15 % al 25 % y que se le contrate con dedicación exclusiva.

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