

ZOOLOGY

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Abstracts

The Influence of Space Reduction and Behavioral Stress upon Plasma Corticoids Concentration in Dairy Cows. CLIVE W. ARAVE* and JACK L. ALBRIGHT, Department of Animal Sciences, Purdue University, West Lafayette, Indiana 47907.——Increased corticoid concentrations in the blood have been one of the end results of psychological or social stress in various experiments. One objective of this study was to determine whether reduction in living area to one-fourth that normally found in loose housed dairy cattle was a stress sufficient to affect plasma corticoids concentration. A second objective was to determine what effect isolation in an even smaller area, as generally practiced for artificial insemination or health problems, had on plasma corticoids concentration. A final objective was to determine whether social dominance rank (DR) was associated with corticoids concentration. Space was reduced from 100 to 25 ft²/cow during weeks 2 and 4 for one group of 17 cows in a 4 week study. A second 17 cow group was maintained at 100 ft² cow during the same period as a control. Plasma total corticoids were determined for 8 cows (4 from each group) at the 0, 24th and 72nd hour of each week and for 3 cows from each group following isolation. Corticoids were not increased but may have been lowered during space restriction. Average plasma corticoids were higher for the control group (11.0 vs. 5.7 ng/ml) than for the space restricted group. Social dominance appeared to have little relationship to corticoids concentration. Even though 5 of 6 cows experienced increased corticoids concentration in isolation one cow's corticoids decreased. Within cow differences between average and isolation corticoids were not significant.

Models for Gas Diffusion into Red Blood Cells. DUVALL A. JONES, Department of Biology, Saint Joseph's Colleges, Rennselaer, Indiana 47978.——Discoidal models of red cells have long been used to demonstrate that aspects of red cell shape, especially cell thickness and surface area to volume ratio, are important to rate of oxygen uptake by these cells. More recent theoretical and experimental studies, based upon spheres or infinitely thin sheets of hemoglobin, have concluded that red cell shape is not important to rate of gas uptake. Some suggest further that resistance to oxygen diffusion by the plasma membrane has an important limiting effect.

The present analysis, based upon experimental data and discoidal models, demonstrates the importance of thickness and surface area/volume ratios to rate of gas uptake. Shortcomings of models with extreme shapes are noted.

Circadian Rhythm of Movement in the Mexican Jumping-Bean Moth, *Laspeyresia saltitans* (Westwood). WILLIAM J. BRETT, Life Sciences

Department, Indiana State University, Terre Haute, Indiana 47809.—— Mexican jumping beans, *Sebastiania*, containing living larvae of the moth *Laspeyresia saltitans* were placed under a 12:12 light-dark regime and monitored for movement. This was accomplished by detection and amplification of audible clues, provided by movement of the seeds, which were fed into a physiograph. Data showed the larvae to have maximum movement during the period of light and very little movement during the peak period. The larvae anticipated the commencement of the dark period, but did not exhibit anticipatory behavior in relation to the commencement of the light period.

Reproduction of *Notropis spilopterus* and *Pimephales vigilax* in the lower White River, Pike County, Indiana. RAYMOND A. SCHLUETER, Division of Science and Mathematics, University of Tampa, Tampa, Florida.——Gonads of *Notropis spilopterus* develop from March to June and become ripe in June. Spawning peak occurs in late July and August. Females contained eggs of three different size groups in addition to large ripe eggs indicating fractional spawning.

Gonads of *Pimephales vigilax* develop in April and May and become ripe in June and July. Spawning occurs in June and early July. Ripe females had two egg sizes. Males were larger than females.

A Preliminary Study on the Effect of Vasectomy on the Biology of the Mouse Epididymis. LARRY R. GANION, Department of Physiology and Health Science, Ball State University, Muncie, Indiana 47306.——To examine the effect of vasectomy on the mammalian epididymis, a unilateral vasectomy was surgically performed on the left vas deferens of sexually mature white mice. The vas deferens was retracted through an abdominal incision, severed, ligated, and returned to the peritoneal cavity. The animals were sacrificed at intervals ranging from 2-17 months and the epididymides prepared for morphological and biochemical study. Those removed from the right side of the mice served as controls. The tissues were fixed in 3% glutaraldehyde, postfixed in 1% osmium tetroxide, embedded in epon 812, and viewed in an RCA EMU 3-C electron microscope. For histology study portions of the epididymides were fixed in Bouins. Vasectomy does not appear to drastically alter the histology or ultrastructure of the head of the epididymis, but a few morphological changes are observed within the tail of the epididymis. With time the tubules in the tail of the vasectomized epididymides became engorged with an amorphous substance, vacuoles developed in association with the epithelial wall, and large cells appeared within the lumina. The fine structure of the tubules in the epididymal tail is also altered by vasectomy. These alterations include a thickening of the basal lamina, shortening of epithelial cells, reduction in stereocilia and dissolution of luminal sperm. Biochemical analyses for acid phosphatase revealed that there are no clearly demonstrable differences between the acid phosphatase activity levels of the experimental and control epididymides. Histochemical studies indicated that the enzyme is primarily restricted to specific epithelial cells of the epididymal tubules. With the electron microscope the reaction product was seen to be especially concentrated over cytoplasmic vacuoles of these cells. The histological distribution of acid phosphatase in the vasectomized and non-vasectomized epididymides appeared to be similar.

Localization of Aminoglutethimide at the Cellular Level. BELINDA A. SHENK and WILLIAM J. BRETT, Life Sciences Department, Indiana State University, Terre Haute, Indiana 47809.——Previous studies have shown that there is a general tissue uptake of the anticonvulsant drug, aminoglutethimide (Elipten, Ciba) (AG). In this study, an attempt was made to determine the area(s) of AG localization within the cell. The liver was excised from a white rat which had been injected with tritiated AG one hour prior to sacrifice and a liver homogenate was prepared. Centrifugation was employed to separate cell organelles and membranes from the cytoplasm and to isolate mitochondria from the homogenate. Samples of the pellet and supernatant from both sets of experiments were counted in a liquid scintillation counter. Results from our study indicate that AG largely localizes in the cytoplasm, but that AG does become significantly associated with the mitochondria and other cell organelle(s).

The Fine Structure of the Nictitans Gland of the Dog with Particular Reference to the Formation and Release of its Secretory Product. MOHINDER S. JARIAL and LING S. JEN, Department of Physiology and Health Science, Muncie Center for Medical Education, Ball State University, Muncie, Indiana 47306.——The nictitans gland of mongrel dogs were studied grossly and by histological and electron microscopic techniques.

The nictitans gland is a yellowish pink, spatula shaped glandular mass that surrounds the basal part of a flat somewhat T-shaped hyaline cartilage embedded in the nictitating membrane. Paraffin sections stained with hematoxylin and eosin show that it is a tubuloacinar gland composed of randomly distributed acini and ducts. Based on the electron density of the cytoplasmic matrix, two cell types can be differentiated in different acini i.e. "dark" and "light" cells. The myoepithelial cells are often present in relation to both cell types. The more numerous dark cells contain abundant granular endoplasmic reticulum, Golgi apparatus, vacuoles and numerous electron dense PAS positive secretory granules in the cytoplasm. The endoplasmic reticulum and nuclei lie in the basal portion of the cells. The light cells which are mainly located in the peripheral portion of the gland contain large vesicles which give honeycomb-like appearance to these cells. Frozen sections of these cells stain positively for lipids with Sudan black B. Histochemical evidence shows that the dark cells secrete seromucoid material while the light cells are involved in lipid secretion.

Proximally the ducts are lined with secretory cells which appear structurally similar to the dark cells of acini. Distal portion of the ducts progressively become devoid of secretory cells.

In the acinar portion of the gland the granules of the dark cells are secreted in whole and retain their membranes after extrusion into the acinar lumina. In secretory portion of the ducts, the granules reach the ductal lumina by apical extensions of secretory cells. Cytoplasmic fragments containing granules are

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frequently present in the ductal lumina. A few free nuclei have also been observed in the ductal lumina.

In conclusion the nictitans gland has an apocrine form of secretions, although holocrine type of activity is exhibited by a portion of this gland.

A Distribution Study of the Blacktail Shiner (*Notropis venustus*) in the Clear Creek Basin. H. E. McREYNOLDS, U.S. Forest Service, Bedford, Indiana.——In 1974, a joint survey was undertaken to determine the present distribution of the blacktail shiner (*Notropis venustus*). Biologists of the Illinois Department of Conservation, U.S. Forest Service, and U.S. Fish and Wildlife Service sampled 12 sites in the Clear Creek basin. This stream, in Union and Alexander counties, is the only Illinois drainage basin from which this rare minnow has been recorded.

Food Habits of the Barn Owl *Tyto alba* in Clinton County, Ohio. GARY L. TIEBEN and JOHN S. HALTER, Department of Biological Sciences, St. Francis College, Fort Wayne, Indiana 46808.——The food of the Barn Owl, *Tyto alba* in Clinton County, Ohio, consisted of small mammals and birds. In a twenty-two month period from June 1975 to April 1977, 972 pellets were collected. Pellet analysis showed the general diet to consist of *Microtus pennsylvanicus* 81.1%, *Blarina brevicauda* 10.5%, birds .3% (*Agelaius phoeniceus* 40.0%, *Stunella magna* 4.0%, *Sturnus vulgaris* 4.0%, unidentified species 52.0%), *Peromyscus* sp. 1.3%, *Microtus ochrogaster* 0.6%, *Mus musculus* 0.4%, *Rattus norvegicus* 0.1%, *Mustela nivalis* 0.1% and unidentified microtines 4.7%. Owl pellets were collected for three seasons, summer 1975, fall 1975, and winter 1975-76. The summer diet consisted of: *M. pennsylvanicus* 73.9%, *B. brevicauda* 9.8%, birds 6.5%, *M. ochrogaster* 3.3%, *M. musculus* 1.1%, *M. nivalis* 1.1%, and unidentified microtines 4.3%. The fall diet consisted of: *M. pennsylvanicus* 88.6%, *B. brevicauda* 5.7% and, unidentified microtines 5.7%. The winter diet consisted of: *M. pennsylvanicus* 90.0%, *B. brevicauda* 3.3% and unidentified microtines 6.7%.

Mallophaga of Wild Mammals of Indiana. JOHN O. WHITAKER, JR., and REBECCA J. GOFF, Department of Life Sciences, Indiana State University, Terre Haute, Indiana 47809.——Mallophaga (biting lice) were found on wild mammals of Indiana as follows: *Geomydoecus illinoiensis* on *Geomys bursarius*, *Suricatoecus quadraticeps* on *Urocyon cinereoargenteus*, *Trichodectes octomaculatus* on *Procyon lotor*, *Stachiella kingi* on *Mustela nivalis*, *S. larseni* on *Mustela vison*, *Neotrichodectes minutus* on *Mustela frenata*, *N. interruptofasciatus* on *Taxidea taxus*, *N. mephitidis* on *Mephitis mephitis*, and *Tricholipeurus parallelus* and *T. lipeuroides* on *Odocoileus virginiana*. Not found to date were *Suricatoecus vulpis* (which could be synonymous with *S. quadraticeps*) from *Vulpes vulpes*, *Heterodoxus spiniger* and *Trichodectes canis* from *Canis latrans*, and *Felicola felis* from *Lynx rufus*.

Effects of Age on Blood Pressure in Female Rats. W. J. EVERSOLE, Life Sciences Department, Indiana State University, Terre Haute, Indiana 47809.——Ten female rats of the Charles River strain were studied from the age of 42 days (170 gm) until death by natural causes. They were fed Purina Laboratory Chow, had access at all times to tap water, and were housed in wire cages with five rats to a

large cage (18 x 35 x 42 cm). Weights and blood pressures were taken at intervals varying from one to three months, and more often at certain critical times such as when severe illness was present or when death seemed eminent. The average survival was 734 days (2 yrs.) but one rat died at 490 days (1.3 yrs.) and the longest survivor lived 985 days (2.7 yrs.). Seven of the ten animals developed rapidly growing soft tumors of the mammary glands with the first palpable tumor appearing at 481 days (1.3 yrs.). One rat did not develop an observable tumor until it was 835 days of age (2.3 yrs.). Four rats developed huge tumors that, at the time of death, weighed more than the rat carcass itself. The more interesting aspect of this study was that the blood pressure did not progressively increase with age and most rats were normotensive throughout the study. In elderly rats that survived beyond the average two-year span the pressures fluctuated considerably but hypertension was not consistently present. Two rats that survived the longest had tremors and poor tail pulses terminally, making it difficult to obtain blood pressure readings during the week preceding death.