ZOOLOGY

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ABSTRACTS

Deodorizing (Descenting) in the Male Common American Goat (*Capra hircus*). JACK L. ALBRIGHT, Department of Animal Sciences, Purdue University, West Lafayette, Indiana 47907.——Since ancient times the musky odor of the male (buck) goat has been proverbial as well as a nuisance and burden to goat keepers. The buck's odor seems to be stronger about the head. Earlier anatomical studies (Sar, M. and M. L. Calhoun. Am. J. Vet. Res., 27: 444-56. 1966) revealed two small patches of specialized glossy skin located adjacent to the horns, along the inner and rear margins. Called musk patches, these are large, branching alveolar sebaceous glands. Large branched alveolar glands are also found at junctions of the hoof with the skin, base of the ear, base of the horn and in the perianal region. After surgical removal of the large, branched, alveolar, sebaceous glands at the base of the horn and in the perianal region, the characteristic male goat odor returned in one male goat. The characteristic male goat odor did not appear in one male goat after the musk patches in the head region were burned away with an electric calf dehorner at disbudding. These two males and two other males serving as controls were all within the 4-6 months of age group. It is speculated that a difference in odor exists between breeds of goats. The Saanen male seems to have less of the characteristic male odor than the darker skinned breeds such as the French Alpine. It has been suggested (Hull, B. L. and M. C. Smith, Ext. Goat Hb., II (6): 1-12). 1983) that bucks with a high odor level are more stimulating to female goats. However, goat odor is very offensive to most people and makes the production of clean, pleasant tasting milk difficult. Therefore, it is advisable to descent goats during dehorning.

Osmotic Studies on the Holostean *Lepiosteus platostomus*. D. W. DUFF, Department of Biology, Indiana University at South Bend, South Bend, Indiana 46634.——Shortnose gar, *Lepisoteus platostomus*, were tested for salinity tolerance. These animals can survive in a hyperosmotic environment but are not able to maintain the osmotic concentration of their plasma at freshwater levels. Upon transfer from freshwater to saline solutions (16%, 30%, and 44% sea water) sodium efflux increased from 0.43 μM Na/gr/hr in freshwater to a high of only 1.16 μM Na/gr/hr in 30% and 44% sea water. This increase in sodium efflux is not sufficient to rid the animal of the impinging salt load which it absorbs from its external environment. Total body sodium levels remained essentially similar in all salinities. Thus, it would appear *L. platostomus* is not able to expand its sodium space as seen in several teleosts.

Developmental Temperature and Emydine Turtle Systematics. MICHAEL A. EWERT and CRAIG E. NELSON, Indiana University, Bloomington, Indiana 47405.——The normally viable incubation temperatures of 25° and 30° C result in hatchling turtles with significant morphological differences including differences in head size and in skin and shell

pigmentation. In some cases, the variation is sufficient to switch some "key characters" from those of one taxon to those of another. Cooler temperatures make the color patterns of some taxa lighter or more dispersed and make those of others darker or more localized. Sex of the study species is also known to be determined by incubation temperature: 25° C results in males, 30° C in females. Because both sex and morphometrics are affected by temperature, hatchlings emerge with a rudimentary secondary sexual dimorphism that may only casually be related to gonadal sex. A design of analyzing this system further also will be presented.

A Tooth-marked, Late Pleistocene-early Holocene Deer Antler (cf. *Cervalces scotti*) from Northwestern Allen County, Indiana. JAMES O. FARLOW, TIMOTHY J. NCNITT and DIANE E. BEYNON, Indiana University-Purdue University at Fort Wayne, 46805.——A fragmentary left antler of an extinct deer was found during dredging of a bog southeast of Churubusco, Indiana. Its precise stratigraphic context is uncertain. The burr, beam, and proximal portions of the posterior ascending tine and palmation of the antler are preserved. Maximum burr diameter is about 7 cm. Beam length from burr to posterior ascending tine is 27-28 cm; midshaft beam diameter is 4 ½- 5 cm. The antler is provisionally assigned to *Cervalces scotti*. Two prominent sets of tooth marks scar the specimen. The first consists of at least five shallow, transverse grooves on the dorsal mid-portion of the beam. Each groove is about 1 cm long and ½ cm wide, and separated by ½-1½ cm from neighboring tooth marks. The second set is located near the proximal end of the dorsal surface of the posterior ascending tine. These transverse marks are comparable in size to those on the beam, but immediately abut each other with no intervening gaps.

The Application of Chromosome Analysis for Breeding Management of Squirrel Monkeys. THOMAS A. FOGLE, CAROL E. CAHALAN, and MARY BETH FERSTEL, Department of Biology, Saint Mary's College, Notre Dame, Indiana 46556.——Differences in the number of acrocentric chromosomes characterize the three known geographic races of squirrel monkeys, *Saimiri sciureus*. Eight animals from the Potawatomi Zoo in South Bend, Indiana were analyzed cytogenetically from cultured lymphocytes. The colony includes two Peruvian females, one Colombian female, four Peruvian males, and one Peruvian-Colombian hybrid male. The hybrid, which contains a chromosome pair that differs by a pericentric inversion, has chromosomal segments distal to the inversion that are 1.0% and 0% of the total haploid autosomal length. When compared to similar sized segments from data derived from humans, it is likely that a single crossover within the inverted region would provide a severe congenital defect.

Detection and Preference of Conspecific Odor Cues among Female Hamster Conspecifics. BONNIE GRAY, ROBERT B. FISCHER and GARY F. MEUNIER, Department of Psychological Science, Ball State University, Muncie, Indiana 47306.——Female hamsters were tested in a four-choice olfactorium to determine if they could differentiate and demonstrate a preference for salivary cues as a function of the subjects dominance status and estrous state. Clear differences in responding were found for estrous as opposed to diestrous females. No differential responding was evident when subject status was examined. The estrous females detected the stimuli and exhibited a preference for male as opposed to female sample odors on the basis of the entry/approach scores. The subjects were found to exhibit sniffing preferences for male odors and possibly avoidance of female odors relative to the saline control. Unlike urinary odor cues, estrous females apparently are unable to distinguish between males on the basis of

their dominance status. These results expand the growing body of data concerning the salience of salivary odor cues in modifying the behavior of mammals.

Histological Investigation of Tannic Acid Detoxication of Hepatic and Renal Tissue of *Tamascrius hudsonicus*. M. J. HART AND E.D. MOULD, Department of Biology, Saint Mary's College, Notre Dame, Indiana 46556.——Red squirrels (*Tamascrius hudsonicus*) naturally consume forages of relatively high phenolic content, including tannins. Tannins are potentially toxic and can inhibit metabolic processes by bonding in hepatic and renal tissue as has been observed in laboratory animals. We sought to evaluate the potentialities of these processes in red squirrels. Captive red squirrels were fed tannic acid laced diets of up to 5.00% of dry matter. Hepatic and renal tissue sections were obtained and stained with 1) Hematoxylin and Eosin and 2) Periodic Acid-Schiff and Fast Green FCF counterstain. Normal hepatic and renal architecture was observed Extensive fatty metamorphosis and hepatocytes were noted in two experimental tannin diet subjects. Hepatic and renal tissues evidenced no notable changes in glycogen content between control and tannin consuming subjects.

Saliva as a Chemosignal in Intra-sexual Communication. CHANDRASHEKHAR KAPADNIS, ROBERT E. FRIEDLE, ROBERT B. FISCHER AND GARY F. MEUNIER, Department of Psychological Science, Ball State University, Muncie, Indiana 47306.——When Syrian hamster females encounter one another in a neutral arena, they engage in nasal-oral investigation which is followed by agonism which leads to the establishment of dominance relationships. This study investigates the possibility that saliva may convey a message concerning the sex and dominance status of one animal to the partner during the buccal investigation which precedes fighting.

Clean air was directed over saline and salivary samples obtained from pairs of dominant and submissive females and males. The female subjects were tested during estrous and diestrous in an open-field olfactorium. The estrous females were found to engage in a greater number of investigatory acts and to differentiate among the stimuli on the basis of sniffing frequency. These females directed the greatest amount of sniffing to the odors obtained from the dominant females. Diestrous females were either unable to differentiate among the stimuli or were not motivated to respond.

The data demonstrate that saliva is an effective social stimulus for estrous females. The apparent attraction to the odors of the dominant female is probably best explained as an effective long term fitness enhancing strategy. A desert dwelling, territorial female would do well to attend to conspecifics whose presence might threaten a reproductive females limited resources.

Specificity of the α-tocopherol (Vitamin E) Effect on the Lifespan of Bdelloid Rotifers. JAMES R. LITTON, JR., Department of Biology, Saint Mary's College, Notre Dame, Indiana 46556.——Clones of the bdelloid rotifers *Pleuretra, Rotaria, Habrotrocha*, and *Philodina* showed an extension of lifespan when *d*-α-tocopherol was added to their aqueous culture medium at concentrations of 10^{-4} to 10^{-6}M. The specificity of this response was tested by adding a variety of natural and synthetic tocopherol and antioxidant compounds to the aqueous culture media of these rotifers. Compounds tested, at concentrations of 10^{-3} to 10^{-8}M, include: β-tocopherol, λ-tocopherol, δ-tocopherol, α-tocotrienol, *l*-α-tocopherol, 2,5,7,8-tetramethyl-2-(4′,8′-dimethylnonyl)-6-hydroxy-chromane, *dl*-α-tocopheramine, 5,5′ βi-α-tocopherol, α-tocopherol quinone, tocopherolactone, ethoxyquin, menadione, sodium selenate, and *dl*-methionine. Only β- and λ-tocopherol resulted in a significantly larger lifespan in all

genera. While these two tocopherol compunds increased in lifespan slightly they were significantly less effective than *d*-α-tocopherol and showed only 20% of its activity, even a higher culture concentration. In addition the β- and λ-tocopherols did not show the increased fecundity or higher percentage of survival at a later age noted for *d*-α-tocopherol.

The Effect of Single and Divided Dose Administration on the Efficacy of Oxfendazole against *Trichinella spiralis*. R. O. McCracken, D. M. Nierste, J. Moss and A. Garcia. Department of Biology, Indiana University-Purdue University at Indianapolis, Indianapolis, Indiana 46223.——The effects of two different treatment regimens on the efficacy of oxfendazole against *Trichinella spiralis* in experimentally infected mice were studied. In the first set of experiments, mice infected with adult *T. spiralis* were used to compare the anthelmintic efficacy of oxfendazole given as a single oral dose or administered as a series of divided daily oral doses during the intestinal phase of infection. Given as a single oral dose of 100 mg/kg 72 hr after exposure to infection, oxfendazole reduced the worm burden by 65% as determined at necropsy on day 7 postinoculation. In contrast, twice-daily oral doses of oxfendazole at 12.5 mg/kg for 4 consecutive days during the intestinal phase (i.e., a total dose of 100 mg/kg body weight) was more effective against the drug-resistant adults; this treatment regimen reduced the worm burden by 85%. In the second set of experiments, oral administration of oxfendazole at 12.5 mg/kg twice-daily for 4 consecutive days during the invasive and encystment phases of trichinellosis significantly reduced (92 and 99%, respectively) the number of larvae subsequently recovered from the host musculature on day 56 postinoculation. The demonstrated role of the period of exposure to the anthelmintic as a determinant of its efficacy and spectrum of action has important therapeutic implications for extending the range of life cycle stages of *Trichinella* against which oxfendazole is effective, and for achieving efficacy with low dosage rates.

The Mating Behavior of the Tree Frog *Hyla versicolor*. Molly Morris, Department of Biology, Indiana University, Bloomington, Indiana, 47405.——The mating behavior of *Hyla versicolor* is described and compared to the behavior of other anurans. From field observations it is hypothesized that females are selecting mates based on a characteristic of the male's call and that females are stimulated to ovulate by the chorus. Calling males were not site specific but remained spaced and intolerant of other males calling in close proximity. Factors influencing a species breeding behavior are discussed.

Male Mating Strategies in Three Hylid Frogs. Stephen A. Perrill, Department of Zoology, Butler University, Indianapolis, Indiana 46208.——Populations of *Hyla cinerea* in Georgia, *Hyla regilla* in California and *Hyla versicolor* in Indiana were studied with regard to male mating strategies. To facilitate individual identification in the field, the dorsal surfaces of the frogs were freeze-branded. Some males of all three species call from stationary call sites throughout a given night, as well as on consecutive nights. Also, all three species have some calling males that move from one call site to another, often being chased away by the territorial males that call from fixed locations. *Hyla cinerea* and *Hyla regilla* have non-calling, satellite males that maintain a low posture close to calling males and attempt to intercept females on their way to calling males. Individual differences in mating success are based on a number of variables including mating strategy. Males employing each of the three strategies discussed here were successful in obtaining mates.

Comments on the Occurrence of Blanding's Turtle, *Emydoidea blandingi*, in LaPorte and Saint Joseph Counties, Indiana. David M. Sever, Department of Biology, Saint

Mary's College, Notre Dame, Indiana 46556.——Blanding's turtle is a Great Lakes endemic which has a spotty distribution, especially in the eastern end of its range. Minton (1972. *Amphibians and Reptiles of Indiana*) did not report any records from LaPorte and Saint Joseph Counties and stated that the species is apparently faced with extinction in Indiana. On 22 and 23 August, 1983, I collected adult male individuals in LaPorte and Saint Joseph Counties respectively. The LaPorte County specimen (carapace length 23.0 cm) was found in Breckinridge Ditch, Kingsbury State Fish and Wildlife Area, by seining. This individual is the largest Blanding's turtle ever reported from Indiana. The Saint Joseph County specimen (carapace length 19.5 cm) was found AOR on a road which borders a small swamp at the western edge of the city of South Bend. Both specimens have been deposited in the Carnegie Museum, Pittsburgh.

Quantitative Habitat Responses of *Peromyscus leucopus* and *Tamias striatus*: Results and Implications. DAVID P. VERNON, Department of Life Sciences, Indiana State University, Terre Haute, Indiana 47809.——Simple rapid techniques, using inexpensive instruments, were devised to collect quantitative data single-handed on habitat variables pertinent to small mammal distribution in forested communities. Sixteen separate variables were measured contemporaneously during five day live trapping periods (with twice daily marking and release of captures) concerning vertical and horizontal vegetation structure, vegetation composition, substrate and surface conditions, and illumination.

Simple correlations between 30 of 240 possible pairings of habitat variables from 125 trap stations were significant to very highly significant, though small. Though no measured variable correlated significantly with capture numbers including zeroes, *Peromyscus leucopus* captures correlated with soil moisture and *Tamias striatus* captures correlated significantly with foliage indices and illumination when respective zeroes were excluded.

Tests of descriptive statistics of variables show that animal occurrence in live traps is neither a Gaussian nor a uniform random process, in that differential use of sites can be shown for ground vegetation cover, shrub cover, tree basal area, and leaf litter cover and depth values, and that values for most variables for sites used were significantly skewed and significantly platykurtic, contradicting the "optimum habitat use" paradigm.

Implications of these findings for analysis and interpretation of multivariate habitat data about small mammals are discussed and a new explanatory paradigm using frequency distributions is proposed.

The Big Walnut Great Blue Herons. J. DAN WEBSTER and BRETT E. WHEELER, Hanover College, Hanover, Indiana 47243.——Great Blue Herons in 1982 occupied 31 nests at the Big Walnut Natural Area in Putnam County and fledged approximately 27 young. Observations indicated that during the period when they were incubating and caring for young in the nest, adults flew out and returned at varied times, not in groups, and in several directions. Evidently their feeding areas were dispersed.

Descriptive Study of the Response Pattern to Urinary Conspecific Odors by Female Golden Hamsters in a Home Cage Environment. CATHERINE ZMACHINSKI and ROBERT B. FISCHER, Department of Psychological Science, Ball State University, Muncie, Indiana 47306.——This study was conducted to determine the female hamsters (*Mesocricetus auratus*) response to potential intruder odors as a function of estrous state and dominance status in a home cage environment. Females were individually housed and tested in 24″ x 14″ x 9″ plastic cages. They were simultaneously presented with three airborne urinary oderants and saline control. Sources for urine samples were males differing

in dominance status and diestrous females. Results demonstrate that females' degree and pattern of response to conspecific urinary odors varies as a function of estrous state and dominance status. In general, dominant females are less active and apparently less attracted to strange conspecific odors on the day of estrous than diestrous. In contrast, submissive females do not show such changes in response to stimuli as a function of estrous state. To male odors, dominant females showed less attraction while in estrous than diestrous and demonstrated no preference for dominant or submissive male urinary cues. An opposite pattern was seen with submissive females. Dominant females would approach strange female urinary stimuli more frequently when in diestrous and did so more than submissive females. Submissive females showed no such changes in responding.

When in diestrous the dominant female approaches conspecific odors more frequently and for longer periods than does the submissive female. The submissive female appears to be more affected by the odors, showing greater activity towards all stimuli. Behavioral responses to male stimuli were contrary to previous findings on attractivity of female hamsters to urinary odors tested in small, novel enclosures. Dominant females showed less attractivity to male stimuli when in estrous than submissive females. And, there was little differentiation of male dominance status by either dominant or submissive subjects. Though preliminary, these results do suggest that response patterns to conspecific urinary odors may vary with the testing apparatus.