

## ZOOLOGY

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### ABSTRACTS

**Effects of Bee Pollen as the Sole Source of Nutrition on Survival of Laboratory Mice.** TIMOTHY J. BURKHOLDER AND VALARIE J. ENNIS, Department of Biology, Taylor University, Upland, Indiana 46989.—It has been proclaimed that bee pollen is the most complete food man has ever discovered. Some estimates indicate that tons of bee-collected pollen are processed annually and a significant portion is being used as a supplement food stuff for humans. Experimental animal studies in this country concerned with the physiological and pharmacological effects of bee pollen are almost non-existent.

Inbred laboratory mice of the ICR strain were placed ad libitum at twenty-one days of age on distilled water and three different forms of commercial bee pollen as the sole source of food intake. Many of the mice have survived in a healthy condition studied for periods of over one year.

It was not possible to determine whether the success or failure of the different forms of bee pollen was related to differences in nutritional value of each. Further studies are in progress and others are being planned for implementation in the near future.

**Evaluation of Endangered Fragile Heelsplitter Mussels (*Potamilus ohioensis*) Using Species/Time Visual Census Methods: Blue River, Southern Indiana, Ohio River Drainage.** WILLIAM D. EHRINGER, CLAUDE D. BAKER, AND BILL J. FORSYTH, Department of Biology, Indiana University Southeast, New Albany, Indiana 47150.—We evaluated the status of the endangered fragile heelsplitter (*Potamilus ohioensis*) using two species/time visual census methods (Rapid Visual Census—RVC and Visual Fast Count—VFC). Based on comparison with 5,000 shells collected at three sites, the VFC was found to provide a quick, reliable characterization of the mussel fauna. Of 25 species, fragile heelsplitters and eight other mussels were taken in very low numbers. However, the finding of eight fresh fragile heelsplitter shells suggests that this species is surviving in low numbers in the lower Blue River.

**The Interrelationship between the Renin-angiotensin System and Catecholamines in the Trunk Perfused Rainbow Trout.** R.J. FERLIC, Department of Biological Sciences K.R. OLSON, SBCME; University of Notre Dame, Notre Dame, Indiana 46556 and D.W. DUFF, Department of Biology, Indiana University at South Bend, South Bend, Indiana 46634.—Angiotensins I and II (AI and AII) and catecholamines (CAs) have profound effects on blood pressure regulation in bony fish; when injected *in vivo*, both increase blood pressure. Questions arise regarding the interaction of these two pressor substances and their sites (ie. vascular beds) of action. A dual perfused

trunk preparation in which the coeliacomesenteric artery (CM: perfusing the viscera) and dorsal aorta (DA: perfusing the kidney and skeletal muscle) were perfused separately was used to examine these questions. The two vascular beds responded differently to angiotensins: AI and AII were equipotent in increasing DA vascular resistance (VR) whereas only AII increases VR in the CM and then only at higher concentrations (10-6M). AI effects in the DA could be blocked by the angiotensin converting enzyme inhibitor captopril. The alpha-adrenergic blocker, phentolamine, inhibited the DA response to AII by 40% indicating that a portion of the response to AII is mediated by catecholamines. Phentolamine did not affect the response of CM to AII. Supported in part by NSF:PCM84-04897.

**Population Estimates of Spotted Darters (*Etheostoma maculatum*) and Bluebreast Darters (*Etheostoma camurum*) in the Lower Blue River, a Southern Indiana Tributary of the Ohio River.** TERRY E. GRIFFIS, CLAUDE D. BAKER, BILL J. FORSYTH, Department of Biology, Indiana University Southeast, New Albany, Indiana 47150.—We used a repeated stripping or Zippin method to evaluate spotted and bluebreast darter population in the Blue River. A total of 130 fishes were taken at four downstream sites. Of these, some 26 bluebreast darters and nine spotted darters were taken. Extrapolation to numbers per seven mile section of primary habitat yielded working ballpark estimates of 15,000 bluebreast darters and about 4,500 spotted darters. These data are to be regarded as working estimates which can be refined as we continue the work of mapping riffles and generating data from additional sites.

**Evidence for a Kallikrein-kinin System (KKS) in Rainbow Trout (*Salmo gairdneri*).** DAVID W. LIPKE AND KENNETH R. OLSON. SBCME, Indiana University School of Medicine, Notre Dame, Indiana 46556.—Few studies have examined the presence of a KKS in anamniotic vertebrates, though some components of this system are present in amphibians and fish. Our laboratory has been conducting research to identify a KKS in trout and we have now compiled evidence that these fish possess all functional components of a mammalian-like KKS. We determined that; 1) kallikrein-like activity was observed in both trout gills and kidney using three different assays for kallikrein, 2) bradykinin (BK) administered intra-arterially, caused dose-dependent increases in systemic blood pressure (BP) of chronically cannulated trout (CCT), 3) glandular kallikrein (GK) increased BP of CCT pre-treated with the angiotensin-converting enzyme inhibitor, captopril, 4) GK liberated a substance (T60K) from trout plasma *in vitro* that increased arterial BP of CCT and catheterized rats, 5) the isolated, perfused trout gill selectively extracted <sup>3</sup>H-BK from perfusate traversing the respiratory circulation, 6) homogenates of gill tissue were observed to metabolize BK and these tissue homogenates also inactivated T60K. This evidence supports the proposal that a KKS is present in salmonid gills.

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**Imidazo (1,2-  $\alpha$ ) pyridine Therapy of Enteral Trichinellosis.** RICHARD O. MCCracken AND ELIZABETH M. F. MERKLI, Department of Biology, Indiana University-Purdue University at Indianapolis, Indianapolis, Indiana 46223.—Mice experimentally infected with the parasite *Trichinella spiralis* were used to test the therapeutic effectiveness of a new anthelmintic, methyl 6-(phenylsulfinyl) imidazo (1,2-  $\alpha$ ) pyridine-2-carbamate, against the adult worms during the intestinal phase of infection. A single oral dose of 100 mg/kg of the drug on the third day after exposure to infection was totally ineffective against the adult worms as determined at necropsy on day 6. Furthermore, neither division of the daily oral dose nor increasing the length of the treat-

ment period from 1 to 4 days enhanced drug activity *in vivo*. In summary, the drug methyl 6-(phenylsulfinyl) imidazo (1,2- $\alpha$ ) pyridine-2-carbamate was totally inactive against adult *Trichinella spiralis* at any of the dosages tested in this study.

**Is the Meningeal Worm, *Parelaphostrongylus tenuis* (Nematoda: Metastrongyloidea), Present in White-tailed Deer in Indiana?** THOMAS R. PLATT, Department of Biology, Saint Mary's College, Notre Dame, Indiana 46556.—*Parelaphostrongylus tenuis*, a common parasite of white-tailed deer (*Odocoileus virginianus*) in eastern North America, has not been reported from Indiana. Fresh fecal samples were collected from 62 hunter-killed deer during the 1986 hunting season from the Kingsbury Fish and Wildlife Area, Laporte County. Feces were examined using a modified Baermann technique. Twenty nine samples (47%) were positive for larvae identical to those of *P. tenuis*. All age classes were infected. The number of larvae per gram of feces ranged from 0.2 to 498. Identification of *P. tenuis* was confirmed by finding the infective stage (L3) in field collected mollusks from Kingsbury during the summer of 1987. Three hundred and seventy one slugs and snails, representing 14 species, were examined by artificial digestion or pressing the animal between glass slides. *Cochlicopa* sp. (1/18), *Deroceras laeve* (1/32), and *Discus cronkhitei* (2/189) were positive for *P. tenuis* larvae. Deer have not been examined for the presence of the adult worm and the presence of related metastrongyloids at Kingsbury cannot be discounted.

**Skeletal Ossification as an Indicator of Teratogenic Exposure.** CHARISSA URBANO AND MONICA NORDENBROCK, Department of Biology, Ball State University, Muncie, Indiana 47306.—The toxic effects of drugs on fetal development may manifest themselves not only in terms of malformations but also in terms of retarded fetal development. Following exposure of the dam to acetazolamide and/or caffeine fetal C57BL/6J mice were stained with Alizarian red in preparation for skeletal examination of ossification centers in cervical and caudal vertebrae. At all teratogenic doses there was a significant decrease in the frequency of ossified caudal vertebrae. Cervical vertebrae also provided a sensitive index of teratogenic exposure with the first cervical vertebra (C1) being most often affected.

**Cytogenetics of Coatimundis from the Potawatomi Zoo.** DAWN M. VERLEYE, CHRISTINE DiDONATO AND THOMAS A. FOGLE. Department of Biology, Saint Mary's College, Notre Dame, Indiana 46556.—A G-banding analysis was conducted of *Nasua nasua* and *Nasua narica* to search for cytogenetic differences among members of a zoo colony. Peripheral lymphocytes were drawn by venipuncture and cultured for 72 hours in three different media to optimize cell growth. Karyotypes from five females revealed hybridization resulting from complex chromosome rearrangements. There are no previous reports of banding analysis or cytogenetic variability in either species. Application of the results from this study will be useful for improving breeding management and further characterization of the genus.

**Technique for Determining Nesting Success in the American Goldfinch.** DORIS J. WATT AND AMY M. DIMBERIO, Department of Biology, Saint Mary's College, Notre Dame, Indiana 46556.—We examined 21 nests of American Goldfinches collected in December 1986. Six qualitative characters (presence of excrement, feather sheaths, eggshells, insect remains, thistle down and nest lining) and nine quantitative measures (widest nest diameter, narrowest nest diameter, inner nest depth, total nest depth, circumference at rim, widest cup circumference, thickest rim thickness, thinnest rim thickness and

cup volume) were analyzed. Based on known success/failure of six of the nests, we determined that the presence of feather sheaths in the nest was the best predictor of nesting success.

**A Morphological and Behavioral Description of *Cercaria Sanguinicola* sp.** SCOTT P. WILEY AND DAVID L. DANIELL, Department of Biological Sciences, Butler University, Indianapolis, Indiana 46208.—An Apharyngeate Lophocercous cercaria which develops in *Pseudosuccinea columella* was discovered in lakes of Northern Indiana and Southern Michigan. It apparently is a new species belonging to the family Sanguinicolidae (blood flukes of fish). Morphological and behavioral aspects of the cercaria were studied over a 10 week period, and its morphology was compared with those of previously described *Sanguinicola* species. Measurements in micrometers of body, tail stem and furca averaged  $68.1 \mu\text{m} \times 22.7$ ,  $267.8 \times 20.4$ , and  $65.8 \times 9.0$  respectively. Incidence of infection varied from two percent in June to 30 percent in early August. Fish collected from lakes, as well as laboratory exposed fish were examined in an attempt to isolate adult worms and identify the definitive host.

**Insect Pathology—What's Happening?** HAROLD L. ZIMMACK, Department of Biology, Ball State University, Muncie, Indiana 47306.—In 1962, Rachel Carson wrote *The Silent Spring*, and alerted us to the indiscriminate and excessive use of pesticides. If insecticides killed insects they could also kill man and animals. DDT and non-biodegradable hydrocarbons were banned throughout the world. Steinhaus had provided a strong foundation in insect pathology that could enable scientists to select microorganisms as biological control agents against destructive insects. It was a "golden opportunity" for insect pathologists. Insect pathologists include specialists in virology, bacteriology, mycology or microsporidia but a coordinated team-effort is required to successfully select effective insect pathogens.

If man is infected by more than 100 disease organisms, there must be many microorganisms that can cause disease in any given destructive insect. Possible approaches to addressing this problem will be proposed.