correlation coefficient (.285), TC/HDL was 0.021 with correlation coefficient (0.283) and GLU was 0.00 with correlation coefficient (0.499). The data obtained through correlation analysis and linear regression supports the main idea of this study. The increased level of IL-8, IL-6, TNFa and C-peptide insulin are found in the patients with higher glucose, ALT and AST levels.

Natural History and Biodiversity

FREE-LIVING SOIL NEMATODE POPULATION DIVERSITY DYNAMICS AT AN *ASIMINA TILOBA* SITE IN VIRGINIA. <u>Sarah R. Marzec</u> & Theresa M. Grana, Department of Biological Sciences, Univ. of Mary Washington, Fredericksburg VA, 22401. Nematodes are microscopic roundworms that are highly successful in many environments. The model organism *Caenorhabditis elegans* is specifically a free-living nematode which can be found in soil but has been mostly isolated from anthropogenic habitats. Little is known about the environmental factors that affect *C. elegans* and where it is proliferate in nature. Information on ecological factors affecting *Caenorhabditis* species will be useful in identifying selective pressures that can influence genomic changes. The goals of this study are to find *C. elegans* and other *Caenorhabditis* species and shed light on relationships between the ecological factors and proliferating populations of nematodes. An *Asimina tiloba* site provides a natural Virginian habitat with a food source for *Caenorhabditis* species. This site is sampled every two weeks and any relevant ecological factors are recorded for the duration of a year. Nematodes are isolated from each soil sample and are separated based on morphology. The life stages of the nematodes from each sample are recorded and then the nematodes are sequenced for species identification. At present, five samples have been collected and several strains of nematodes have been isolated among and within the samples. All nematodes have shown to be in the dauer life-stage, a non-feeding migratory stage, showing that there are no established colonies. This is most likely due to the cold weather and we expect future results taken between the months of May through October to show proliferating populations.

INVENTORY AND CONSERVATION ASSESSMENT OF THE MOTH FAUNA OF VIRGINIA (LEPIDOPTERA). Steven M. Roble, Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA 23219. The insect order Lepidoptera includes the butterflies, skippers, and moths. Virginia's butterfly and skipper fauna of some 170 species has been well-studied for more than a century and continues to attract interest from biologists and amateur naturalists alike. In contrast, the much larger moth fauna of the Commonwealth remains poorly studied with the exception of a few pest species such as the Gypsy moth (*Lymantria dispar*). No formal compilation of the Virginia moth fauna exists, although survey efforts by staff of the Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH), during the past quarter century have begun to elucidate the composition, distribution, and conservation status of the "macro-moth" component of this fauna. Nearly 1,200 species of macromoths have been documented in Virginia, with a comparable number of "micro-moths" also expected to occur in the state, for a total

fauna of about 2,400-2,500 species. A number of these species have not been formally described in the scientific literature. Currently, the DCR-DNH rare animal list includes 95 species of moths (92 macro-moths and 3 micro-moths), 11 of which have not been recorded in the state in more than 50 years. None of these species is formally listed as threatened or endangered in Virginia. The DCR-DNH animal "watchlist" contains 123 additional species of macro-moths that may warrant conservation attention. With funding via a State Wildlife Grant from the Virginia Department of Game and Inland Fisheries and the U.S. Fish and Wildlife Service, DCR-DNH has recently developed a web-based atlas of Virginia's rare Lepidoptera (butterflies, skippers, and moths) and Odonata (dragonflies and damselflies) that will debut in June 2013 at http://www.vararespecies.org.

DEVELOPMENTA TOLERANCE TO NICOTINE DIFFERS BETWEEN INCIPIENT SPECIES OF A PARADITIC WASP WITH RESPECT TO HOST FOOD-PLANT. Justin P. Bredlau & Karen M. Kester, Dept. of Biology, Virginia Commonwealth University, Richmond VA 23284. Nicotine evolved as a defense against insect herbivores. In response, tobacco-feeding insects as well as parasitic wasps that attack and develop within tobacco-feeding insects evolved counter defenses to nicotine. We tested the hypothesis that two incipient species of the braconid wasp, *Cotesia congregata* Say, and their reciprocal hybrids would differ in developmental responses to nicotine dosage level in the host diet. "MsT wasps" originated from the solanaceous specialist, *Manduca sexta* L. ("tobacco hornworm") on tobacco, and "CcC wasps" from the catalpa specialist, *Ceratomia catalpae* Boisduval ("catalpa sphinx") on catalpa. Reciprocal crosses (MsT♂ x CcC♀, CcC♂ x Ms♀) were established by pairing unmated males and females. Females were permitted a single oviposition into a 3rd-instar larva of *M. sexta.* Parasitized caterpillars were fed on a laboratory diet with 0%, 0.1%, or 0.3% (wet weight) nicotine until wasp larvae egressed from the host and spun cocoons. For each hornworm host, we counted the number of egressed and unegressed larvae, cocoons, and emergent adult wasps. Results demonstrate that MsT wasps are highly adapted to nicotine and responded to nicotine in a dosage-dependent manner. In contrast, exposure to 0.1% nicotine resulted in high mortality of CcC wasps. Responses of the hybrid crosses varied with respect to maternal wasp type (MsT or CcC) and sex. For example, most haploid males with CcC mothers failed to egress, whereas hybrid females from either cross did, suggesting that nicotine tolerance is a dominant heritable trait or suite of traits.

HABITAT CHARACTERISTICS INFLUENCING HIBERNATION SITE SELECTION BY WOOD TURTLES (*GLYPTEMYS INSCULPTA* LE CONTE), A THREATENED SPECIES IN THE SHENANDOAH VALLEY, VIRGINIA. J. A. Miller & W. S. Bousquet, Envtl. Studies Program, Shenandoah Univ., Winchester VA 22601 & T. S. B. Akre, Dept. of Bio. Longwood Univ., Farmville VA 23909. In November 2012, researchers captured hibernating wood turtles, *Glyptemys insculpta* Le Conte, and recorded habitat data twice along two stream reaches of a tributary to the Shenandoah River. Hand capture techniques followed the standardized protocol used by the Wood Turtle Study Group, which required three researchers to search for turtles in 50-meter segments of 1.0-Kilometer stream reaches. Stream habitat variables for each 50-meter segment and descriptive data for each turtle captured were recorded.

Most turtles occurred within 5 to 10 meters of the stream banks, demonstrating preference for shallow, slow-moving stream segments with abundant leaf packs. Statistical analysis revealed a positive correlation between the number of root masses and the number of wood turtles ($r = 0.268$). Stream depth and number of turtles showed a negative correlation ($r = -0.215$). Root masses had a stronger correlation at the first site ($r = 0.428$) than at the second site ($r = -0.029$). Although the first site and overall creek data showed low correlations between stream width and number of turtles found, the second site exhibited a high correlation ($r = 0.5$). Further study at these and other sites in the Shenandoah Valley region will help identify the stream variables that have the greatest influence on wood turtle hibernation site selection, allowing priorities to be set for stream protection and rehabilitation.

DEPOSITIONAL HISTORY OF THE CARMEL CHURCH BONEBED, A MIOCENE (14 Ma) MARINE VERTEBRATE SITE IN CAROLINE COUNTY, VIRGINIA. Alton C. Dooley, Jr., VA Museum of Natural History, Martinsville, VA 24112. The Carmel Church Quarry in eastern Virginia includes at least eight disconformity-bound Tertiary marine units. One of these units contains a dense fossil vertebrate bonebed, consisting primarily of cetaceans, chondrichthyans, osteichthyans, and turtles, with smaller numbers of other marine and terrestrial mammals. Previous studies of terrestrial mammals and diatoms indicate that the bonebed correlates to the uppermost part (Bed 15) of the Plum Point Member of the Calvert Formation, with an age of 13.7-14.7 Ma (middle Miocene), and that it disconformably overlies the early Eocene Nanjemoy Formation. Yet the bonebed contains large numbers of reworked fossils, including taxa with little or no temporal overlap, such as *Carcharocles megalodon*, *Carcharocles* cf. *C. angustidens*, and *Otodus obliquus*. Most reworked fossils in the bonebed show extensive evidence of abrasion, but some Eocene taxa (such as *O. obliquus*) are occasionally found in pristine condition. The presence of these specimens suggests that the Nanjemoy-Calvert disconformity included at least two transgressions between the late Eocene and middle Miocene that were completely removed by erosion prior to deposition of the Calvert Formation, and that pristine Eocene fossils have been reworked from the Nanjemoy into the Calvert through bioturbation.

Posters

HABITAT USE AND SWIMMING BEHAVIOR OF LONGNOSE DACE (*RHINICHTHYS CATARACTAE*) FROM A MERCURY CONTAMINATED RIVER. Kimberly J. Bolyard & Joelle E. Bennett, Dept. of Biol., Bridgewater College, Bridgewater VA 22812. Mercury in the environment has the potential to negatively affect the behavior of aquatic organisms through impacts on the nervous system and other physiological functions. We investigated the habitat use and swimming performance of longnose dace (*Rhinichthys cataractae*) from a river with mercury contamination and from a non-contaminated river in the Shenandoah Valley. Laboratory studies showed that dace from the non-mercury river spent significantly more time in areas containing large sticks than in areas with pine brush, pallet wood, or nothing. Dace from the mercury contaminated river did not spend significantly more time in any particular section of the test pool. In a second test, dace from the mercury

contaminated river spent more time swimming in a current over a five minute test period than did dace from the uncontaminated river but the difference was not significant. Finally, tested fish from the uncontaminated river were significantly longer than fish from the mercury contaminated river though they were not significantly heavier. As a result of spending less time in cover and possibly more time swimming in a current, longnose dace in mercury contaminated rivers may experience higher risk of predation than dace in uncontaminated rivers.

DESCRIBING NEMATODE DIVERSITY. Jessica A. Dochney, Thy N. Mai, & Theresa M. Grana, Department of Biological Sciences, University of Mary Washington, Fredericksburg, VA 22401. Nematodes play important roles in nutrient cycling and decomposition. The nematode phylum is one of the most diverse and abundant groups of animals, with a projected 1 million species. However, fewer then 29,000 nematode species have been described and only a few species have been studied in laboratories. The nematode, *Caenorhabditis elegans* has been well studied as a genetic and developmental model organism. Such studies have contributed to our understanding of basic cell biology, genetics, and neurobiology. Our goal is to find and describe new species of nematodes, particularly those that could build upon our understanding of Caenorhabditids. Since 2005, the number Caenorhabdtids known to researchers has doubled from 22 to nearly 50. A representative of one of these new species was found on the UMW campus on the northwest side of Seacobeck Hall. Our work is part of the formal description of this new species, which will help other researchers in understanding the life history of Caenorhabditids. To describe the new species, we are taking high-resolution images, measuring identifying body features, and comparing these data to described species.

LEARNED RESPONSES TO HERBIVORE-INDUCED PHYTOCHEMICALS IN THE PARASITIC WASP, *COTESIA CONGREGATA* (SAY) (HYMENOPTERA: BRACONIDAE). Christopher Crockett & Karen M. Kester, Dept. of Biology, Virginia Commonwealth University, Richmond VA 23284. Volatile phytochemicals, produced in response to herbivore feeding, aid parasitic wasps in the location of suitable herbivore hosts for reproduction. Several studies have demonstrated that wasps learn these host-induced volatiles (HIVs) in association with oviposition ("ovipositional learning") but whether wasps also can learn these cues within a critical period following adult emergence (" post-emergence learning") is not known. We tested the hypothesis that *Cotesia congregata*, an endoparasioid of the tobacco hornworm (*Manduca sexta* L.) learns to recognize HIVs from tomato (var. 'Castlemart') through post-emergence learning. Inexpensive two- and four-way choice olfactometers were built and evaluated for use with this species, and a behavioral assay was developed. To test our hypothesis, newly-emerged wasps were given a post-emergence experience with leaves from a plant on which a hornworm had fed ("induced leaves") or a control plant ("non-induced leaves"). After a refractory period of 48 hours, orientation preferences of wasps to induced or non-induced leaves were assayed using a two-way T-tube olfactometer. More wasps experienced with non-induced leaves chose volatiles from non-induced leaves ($X2 = 3.92$, df=1, N = 50, $p < .0477$), and more wasps experienced with induced leaves chose volatiles from induced leaves ($X2 = 6.48$, df=1, N = 50, $p < .0109$). Results suggest that parasitic wasps can learn HIVs though post-

emergence experience. Continuing work will compare wasp responses to 'Castlemart' mutants with two levels of HIV silencing.

MIGRATION DYNAMICS OF NORTHERN SAW-WHET OWLS IN THE INNER PIEDMONT OF CENTRAL VIRGINIA. Esther Stine & Gene D. Sattler, Dept. of Biology & Chemistry, Liberty Univ., Lynchburg, VA 24502. Northern Saw-whet Owls (*Aegolius acadicus*) were mist netted during fall migration in Campbell County, Virginia in 2002-2007 and in 2012 using an audiolure of the male advertisement call. Birds were aged using feather molt criteria and sexed using a wing-mass discriminate function. The number of owl captured ranged from a low of 7 to a high of 101. The majority of birds were encountered during the first two weeks of November, with a median capture date of November 9th. In most years adults predominated, making up at least 68% of captures. However, both 2007 and 2012 were invasion years in which higher than normal numbers were netted and hatch year birds predominated (59% in both years). Females predominated in each year, making up at least 61% of captures. The inner Piedmont of central Virginia was established as an important corridor for Northern Saw-whet Owl migration, and capture rates exceeding those found on the Coastal Plain where the species' migration in Virginia has previously been investigated.

AGE AND PALEO-ENVIRONMENTAL SIGNIFICANCE OF UPPER PALEOZOIC OSTRACODES FROM THE APPALACHIAN AND EASTERN ILLINOIS BASINS. Shelby C. Sanders & Neil E. Tibert , Department of Earth and Environmental Sciences, University of Mary Washington, Fredericksburg, VA 22401. Ostracodes recovered from eastern North American coal measures in the Appalachian and Illinois Basins have the potential to resolve the temporal and spatial relationships of the strata deposited during the Pennsylvanian-Permian boundary interval. The Greene Formation of the Dunkard Group is the youngest Paleozoic stratigraphic unit in the Appalachian Basin that contains plant fossils of uncertain age. Fossil ostracodes from the GIL 30 core in western Kentucky (Illinois Basin) are comparable to the nonmarine ostracode assemblages from the Dunkard and can be used to constrain the age of the youngest sedimentary rocks in the Appalachian Basin. The GIL30 core was recovered from a down-faulted block located near Sturgis, KY and contains strata deposited during the latest Pennsylvanian and earliest Permian. We observed three ostracode assemblages in the GIL 30 core: (A) a marine assemblage dominated by *Hollinella cushmani*; (B) a brackish assemblage dominated by *Geisina upsoni*, *Cavellina nebrascensis*, and *Velatomorpha fittsi*; and (C) a freshwater assemblage dominated by *Whipplella cuneiformis* and *Haworthina bulletta*. The freshwater assemblage in the GIL 30 can be correlated with confidence to the uppermost units of the Greene Formation (e.g., Windy Gap Limestone) of the Dunkard Group in the stratotype area of northeastern West Virginia and southwestern Pennsylvania. These findings confirm an Early Permian age for at least the uppermost Dunkard Group strata.

TURTLES OF THE FREDERICKSBURG CANAL: INTRODUCED SPECIES AND ESTIMATES OF POPULATION SIZES. Y. Takeda & W. Wieland, Department of Biological Sciences, Univ. of Mary Washington.   The yellow-bellied slider (*Trachemys scripta scripta*), a non-native to the Fredericksburg area, were found in the

Fredericksburg canal in the spring of 2011. The objectives for summer 2012 was to determine if this species has established a population, and in addition which species of turtles live in the canal and obtain life history information on these species, including estimates of population size. Hoop nets were placed along a 150 m stretch of the canal in the general area of where the single specimen of the yellow-bellied slider was found. Length and weight were taken for each individual and we attempted to determine age by counting the ridges on the plastron. Population size was determined using open population mark-recapture models. Turtles captured in the canal were red-bellied cooters (*Pseudemys rubriventris*), painted turtles (*Chrysemys picta*), eastern snapping turtles (*Chelydra serpentina serpentina*), stinkpots (*Sternotherus odoratus*), and the red-eared slider (*Trachemys scripta elegans*). The yellow-bellied slider was not found. The single specimen found in 2011 was likely introduced as these are common in the pet trade. However, the red-eared slider is also a non-native. The population size estimates of species for which we had a sufficient sample size are given by the Jolly-Seber model (open population) for the area of focus (roughly 150m). Estimates include population size and 95% confidence interval: red-bellied cooters, 35 (24-74); painted turtles, 9 (9-12); red-eared slider, 23 (10-114). Age determination proved to be problematic. Estimates for growth rates were determined for red-bellied cooters. However, due to small sample size and the short time span over which the study was conducted (29 capture days) these estimates are suspect.

Psychology

STORIES OF BYSTANDER INTERVENTION FROM ACROSS THE GLOBE. S.Y. Teie, P. Randall, R. Wallace & B. Rivero, Center for Applied Behavior Systems, Department of Psychology, Virginia Tech, Blacksburg VA 24060. Actively Caring for People (AC4P) wristbands are used to recognize others for performing prosocial behavior. In 2011, the website AC4P.org was launched to provide a public space for individuals to share their experiences around AC4P wristband recognition. 74.4% of wristbands were passed by beneficiaries of kind acts who reciprocated with the wristband (Reciprocators), and 24.6% of wristbands were passed by observers of kind acts who intervened with the wristband (Bystanders). The qualitative analysis of AC4P stories revealed a differentiation between stories about wristbands passed by Reciprocators and those passed by Bystanders. Future research will explore gender interactions using larger sample sizes.

A BEHAVIOR-BASED INTERVENTION TO INCREASE PROSOCIAL RECOGNITION IN AN ORGANIZATION. K. M. Pacque, S. M. McCarty, S. Butterworth & C. Holmes, Department of Psychology, Va. Polytechnic Inst. & State Univ., Blacksburg VA 24061. Today's fraternal culture needs more caring, compassionate, and interpersonal relationships. News reports document problems from binge drinking and sexual assault charges, to the death of organization members from hazing. 73 students in a Greek fraternity received an Actively Caring for People (AC4P) intervention and used Twitter to recognize prosocial behavior. Students self-reported frequency data and relational data on behaviors and relational ties, respectively. Social network analysis (SNA) and multiple regression analyses assessed