

VIRGINIA MUSEUM OF NATURAL HISTORY
Board of Trustees Research and Collections Committee

Saturday, May 20, 2022

9:00-9:45 a.m.

A G E N D A

- Call to order
- Roll Call: Dr. Art Evans, Dr. Tom Benzing, Dr. Carole Nash, Melany Stowe, Mark Buss.
- Nov. 2022 Research and Collections Committee meeting minutes (action item)
- October 2022 – March 2023 acquisitions (action item)
- Other business
- Adjourn

The mission of the Virginia Museum of Natural History:

To interpret Virginia's natural heritage within a global context in ways that are relevant to all citizens of the Commonwealth.

**VIRGINIA MUSEUM OF NATURAL HISTORY BOARD OF TRUSTEES
MINUTES OF THE RESEARCH AND COLLECTIONS COMMITTEE MEETING
Nov. 12, 2022**

Present at the meeting were Dr. Art Evans, Dr. Tom Benzing, Mark Buss, Dr. Carole Nash, Dr. Kal Ivanov, Dr. Nancy Moncrief, and Ben Williams

Committee Chairman Dr. Art Evans called the meeting to order. The minutes of the May 20, 2022 meeting were unanimously approved; the committee did not meet in August. The committee signed off on the museum's recent acquisitions.

The committee began discussing the museum's collections policy and live animals policy. These two policies must be updated, approved by the committee, and then submitted to the full board for approval as part of the museum's re-accreditation process with the American Alliance of Museums (AAM) in 2025.

Dr. Tom Benzing inquired about the process of deaccessioning museum specimens. Dr. Nancy Moncrief said that it has been many years since any materials were deaccessioned, but if it happened, it would have to go before the full board for approval.

Dr. Art Evans said that the collections policy has not been updated since 2013 and that initial updates to the policy include edits needed due to changes within the museum's hierarchy. Dr. Nancy Moncrief added that the policies had already been submitted to the State Attorney General's Office and that they reviewed the policies and made comments which had already been incorporated into the documents.

Dr. Art Evans suggested a deadline of Jan. 1 for any changes to the policies, which would be submitted to Ben Williams by committee members. Williams would then pass any changes on to Dr. Nancy Moncrief, who will incorporate the changes into final documents that would be presented to the committee and then recommended to the full board for approval at its February meeting.

Dr. Carole Nash said that the collections policy uses the word "specimens," a word that generally isn't used in archaeology given that archaeology collections also incorporate documents, maps, and photos. Dr. Art Evans said he was unaware of a collective term that would incorporate all of the items in the museum's collections. After some discussion, it was recommended that the final document refer to specimens under the umbrella term "collections" and include a glossary defining the term.

Dr. Carole Nash said that James Madison University had recently had an incident in which an employee from the marketing department brought their service dog into a biosecurity lab. After discussion with various departments, it was determined that service animals in biosecurity labs must adhere to the same regulations as humans; goggles, masks, booties, etc. This raised the question of whether the lab should be required to provide these items. Dr. Art Evans said that since the live animals policy doesn't address public behavior, that discussion could be had at a later date.

Mark Buss said that he would appreciate a way of knowing how much space is in museum collections given that the committee approves acquisitions without taking into account how much space the items will occupy. Dr. Art Evans and Dr. Kal Ivanov noted that specimens would

not be listed on the accessions sheet for committee signatures unless the responsible curator was prepared to properly care for the specimens or artifacts.

Dr. Tom Benzing inquired about the process of deaccessioning taxidermied mounts in storage at the museum's Douglas Avenue space. Dr. Nancy Moncrief said that such decisions would have to be made on a case-by-case basis and a comprehensive assessment of the collections at Douglas would be required. Dr. Art Evans said that since the board was taking a field trip to Douglas Avenue later that day, it would be a good idea to look at the mounts and get a general idea of their condition. Dr. Kal Ivanov said that many of the mounts are impossible to obtain today and have value, although some are deteriorating.

Dr. Art Evans said that when he was using the wi-fi on the Research and Collections side of the building the day prior, the connection was terrible. Dr. Kal Ivanov said that the curators and research techs frequently rely on the wi-fi because they cannot use their hardline connected state computers since VITA doesn't allow many important programs to be loaded onto state computers. Dr. Tom Benzing said that VITA is historically poor and many universities have managed to get away from it, a potential possibility since VMNH now operates within the Department of Education. Dr. Carole Nash said that it might be possible for JMU facilities management to inspect the situation and determine how to make VMNH wi-fi faster and more reliable. Dr. Tom Benzing added that it should be possible to have the VMNH internet service provider come to the museum and assess the situation.

Dr. Art Evans briefly discussed VMNH's new Assistant Curator of Herpetology Dr. Arianna Kuhn, saying that she's an excellent addition to the museum.

Dr. Kal Ivanov said that three potential biology research techs will be arriving in December for in-person interviews.

Dr. Art Evans adjourned the meeting.

OCTOBER 2023-MARCH 2023 VMNH ACQUISITIONS FOR APPROVAL BY BOARD OF TRUSTEES RESEARCH AND COLLECTIONS COMMITTEE

RIM* #	Collector/Donor	Date at VMNH	VMNH Dept.	QTY	Description	Method	To Be Accessioned (Y/N)
RIM 18-2022	Liberty Hightower	9/26/2022	MAMMALOGY	1	Coyote (<i>Canis latrans</i>)	SALVAGE	Y
RIM 19-2022	Nancy D. Moncrief	10/11/2022	MAMMALOGY	1	Eastern Mole (<i>Scalopus aquaticus</i>)	SALVAGE	Y
RIM 20-2022	Miami University (Tom Crist, PhD)	5/19/2022	RECENT INVERTEBRATES	23,525	dry, pinned insect specimens	Gift	Y
RIM 21-2022	Liberty Hightower	10/22/2022	MAMMALOGY	1	Gray Fox (<i>Urocyon cinereoargenteus</i>)	SALVAGE	Y
RIM 22-2022	Michael Folmer	6/13/2022	PALEONTOLOGY	9	vertebrae, <i>Palaeophis</i> (snake)	Gift	Y
RIM 23-2022	Marco Gullotta	6/13/2022	PALEONTOLOGY	100+	vertebrae, <i>Palaeophis</i> (snake)	Gift	Y
RIM 24-2022	Christopher Kerr	6/13/2022	PALEONTOLOGY	13	13 slabs (reptiles, sharks, invertebrate trace)	Gift	Y
RIM 25-2022	Robert Weems	6/13/2022	PALEONTOLOGY	20+	slabs and gastroliths 2 slabs mudstone (fish); 9+ gastroliths (trace fossils); 8 slabs shale (fish); 1 fish skull plate	Gift	Y
RIM 26-2022	William F. Schmachtenberg	7/20/2022	PALEONTOLOGY	4	<i>Cryptolithus</i> trilobites and a slab with <i>Cincinnati</i> brachiopods	Gift	Y
RIM 27-2022	William F. Schmachtenberg	7/29/2022	PALEONTOLOGY	3	<i>Cryptolithus</i> trilobites and bulk sample Butonite (no fossils)	Gift	Y
RIM 28-2022	Ryan S. Collins	7/21/2022	PALEONTOLOGY	1	<i>Callistoma</i> sp. (possibly <i>Callistoma mitchelli</i>)	Gift	Y
RIM 29-2022	Ryan S. Collins	7/21/2022	PALEONTOLOGY	40	3 Olive Shell, Pectin, Oyster Drill, 24 Turritella Snail, 5 Clam, 2 Cats Paw Oyster, 2 matrix w/add'l material, 1 Moon Snail, 1 Tusk Shell	Gift	Y
RIM 30-2022	Adam Pritchard	8/4/2022	PALEONTOLOGY	21	stones with fossil inclusions (reptiles, fish, plants)	Field Collection	Y
RIM 31-2022	Nancy D. Moncrief	12/5/2022	MAMMALOGY	1	Gray Fox (<i>Urocyon cinereoargenteus</i>)	SALVAGE	Y
RIM 32-2022	Dr. Kal Ivanov	12/16/2022	MAMMALOGY	1	Gray Squirrel (<i>Sciurus carolinensis</i>)	SALVAGE	Y
RIM 33-2022	Kathy Rucker	11/12/2021	DEPP-EXHIBITS	30+	various specimens (geology, paleo, archaeology, etc. and three books)	Gift	No – potential exhibit use
RIM 34-2022	Kathy Rucker	11/12/2021	ANTHROPOLOGY	2+	1 box of ceramic sherds, 1 ceramic pipe	Gift	No
RIM 35-2022	Kathy Rucker	11/12/2021	HERPETOLOGY	2	rattlesnake rattles	Gift	No – program use
RIM 36-2022	Kathy Rucker	11/12/2021	PALEONTOLOGY	10+	fern fossils, fairystones, Green River fish fossil, small bag of crynoid stems	Gift	Y

* RIM is an acronym for the Record of Incoming Material form

OCTOBER 2023-MARCH 2023 VMNH ACQUISITIONS FOR APPROVAL BY BOARD OF TRUSTEES RESEARCH AND COLLECTIONS COMMITTEE

RIM* #	Collector/Donor	Date at VMNH	VMNH Dept.	QTY	Description	Method	To Be Accessioned (Y/N)
RIM 37-2022	Adam Pritchard	9/24/2022	PALEONTOLOGY	62+	20 sandstone rocks w/vertebrates, clam, shrimp, plants; 30+ shale samples; 12 siltstone samples w/ root traces	Field Collection	Y
RIM 38-2022	Ben Kligman	12/21/2022	PALEONTOLOGY	1	isolated reptile tooth collection	Gift	Y
RIM 01-2023	Joe B. Keiper	12/10/2022	DEPP-Exhibits	2	Black Vulture (<i>Coragyps atratus</i>) and Muskrat (<i>Ondatra zibethicus</i>)	SALVAGE	N
RIM 02-2023	Nancy D. Moncrief	1/7/2023	MAMMALOLOGY	1	Coyote (<i>Canis latrans</i>)	SALVAGE	Y
RIM 03-2023	Adam Pritchard	1/11/2023	PALEONTOLOGY	20+	15 shale specimens w/fish, inverts and 12 sandstone rocks w/fish and bone frags	Field Collection	Y
RIM 04-2023	Gerald Reel	1/25/2023	PALEONTOLOGY	1	theropod tooth	Gift	Y
RIM 05-2023	BLM WY dig via Brooke Haiar	7/20/2022	PALEONTOLOGY	25	19 bags of small bones (Dinosauria), 2 stratigraphic samples, 3 bags of gastroliths, 1 phalanx bone (Dinosauria, Sauropoda)	Field Collection	No-BLM property
RIM 06-2023	Liberty Hightower	1/25/2023	MAMMALOLOGY	1	Gray Squirrel (<i>Sciurus carolinensis</i>)	SALVAGE	Y
RIM 07-2023	Arthur V. Evans	11/10/2022	RECENT INVERTEBRATES	1891	dry, pinned insect specimens	Gift	Y
RIM 08-2023	Jason Gibson	1/30/2023	HERPETOLOGY	14	herp specimens: <i>Lithobates</i> , <i>Hyla</i> , <i>Anaxyrus</i> , <i>Pseudacris</i> , <i>Farancia</i> , <i>Lampropeltis</i> , <i>Pantherophis</i> , <i>Storeria</i> , <i>Plestiodon</i>	Gift	Y
RIM 09-2023	Curt W. Harden	2/15/2023	RECENT INVERTEBRATES	216	39 Vials with unknown number of unidentified invertebrates and 177 dry pinned specimens	Gift	Y
RIM 10-2023	Derek Hennen	2/22/2023	RECENT INVERTEBRATES	216	21 vials of arthropods in 70% isopropanol	Gift	Y
RIM 11-2023	Adam Pritchard	2/23/2023	PALEONTOLOGY	52	44 bags of shale (brachiopods, clams) and 8 large shale slabs (trace burrows, tracks)	Field Collection	Y
RIM 12-2023	Mike Fies (VA DWR)	2/15/2023	MAMMALOLOGY	1	<i>Pekania pennanti</i> (Fisher)	Transfer	Y
RIM 13-2023	Radford University (Karen Powers)	3/10/2023	ORNITHOLOGY	69	American Robin (whole study skins)	Transfer	To Be Determined
RIM 14-2023	Kathryn Helms (via C. Deatherage)	3/17/2023	DEPP	2	bird nests	Salvaged	No – education program use
RIM 15-2023	Adam Pritchard	3/17/2023	PALEONTOLOGY	19	2 vertebrae, rib, bone frag., partial fish, tooth in shale, slab w/plant fossils, 12 shale pcs. w/clam shrimp	Field Collection	Y

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VMNH Collections Committee and Executive Director have Approved Recent Acquisitions: RIM 18-2022 through RIM 15-2023

VMNH Board of Trustees Research & Collections Committee Review of Acquisitions: RIM 18-2022 through RIM 15-2023

Arthur V. Evans, Chair

(signature) Arthur V. Evans, Chair

Date

Thomas R. Benzing

(signature) Thomas R. Benzing

Date

Mark J. Buss

(signature) Mark J. Buss

Date

Carole L. Nash

(signature) Carole L. Nash

Date

Melany Stowe

(signature) Melany Stowe

Date

(signature)

Date

Calendar Year 2023 Acquisition Plans

Research and Collections

Archaeology Dr. Hayden Bassett

The main impediment to collections care and accessibility in 2022-2023 is storage space. Several large collections were accepted between 2017-2019, putting the Archaeological collections room at capacity (98% filled). This makes accessibility of the collection difficult, as we will increasingly have to rely on opportunistic or off-site storage. In 2022, the archaeology curator and staff archaeologist continued to reorganize collections to maximize limited space. All available general-use storage space outside of designated archaeological storage has now been filled by other curatorial departments. Because of this, acquisition of new archaeological collections is currently on hold. The remaining space will be reserved for VMNH-generated archaeological collections from the Smith River Survey and Leatherwood projects.

- Priority 1.** Collections from local/regional archaeological sites, generated by VMNH Archaeological fieldwork. The VMNH Archaeology department has received two major grants for fieldwork in Henry County, to be conducted between 2022-2024: 1.) the Smith River Survey, and 2.) the Patrick Henry Leatherwood project. Fieldwork has begun, involving targeted phase I and phase II excavations, which are now generating new collections. Because the Archaeological storage room is at capacity, these new collections will be stored in Room 130 for in-processing, accessioning, active study, reporting, new exhibit creation, and specialized analyses.

- Priority 2.** Collections related to published research, with high research potential, currently housed elsewhere. A special emphasis will be placed on acquisition of local/regional collections.

- Priority 3.** Collections currently held by other state agencies, colleges or universities, or companies/organizations participating in cultural resource management projects.

- Priority 4.** Salvage and opportunistic. Archaeological specimens recovered through opportunistic site visits or through donations. This includes unsolicited donations that may contain research quality or exhibit/educational quality specimens.

- Priority 5.** Collections from non-academic or research-based sources, *i.e.*, private collections.
These collections tend to be large and have little to no research value. Few of these collections are accepted and then only if they have exceptional exhibit or education value or include a rare artifact type with some provenience information.

Earth Sciences

There is currently no Earth Sciences curator and no plan to acquire new materials; however, there may be some opportunistic acquisitions. These will be handled on a case by case basis and existing storage space should be sufficient to store them. It is possible that education and/or exhibits material may be added to the collections. If this includes mineral specimens, these may be accessioned.

Paleontology Dr. Adam C. Pritchard

The following materials are expected to be acquired within the next year and can be accommodated in existing paleontology storage areas. This does not preclude the possibility of acquisition of additional material that becomes available because of orphaned collections or new discoveries.

- Priority 1. Triassic fossils of Virginia.** Multiple one day to one week excavations in Ashland, VA and the circum-Richmond area. Acquisitions will include multiple types of rock containing plants, invertebrates (clam shrimp, insects), and vertebrates. Likely to total two to three double-wide cabinet drawers full of specimens.
- Priority 2. Wyoming dinosaur project, Two Sisters Quarry.** One three-week excavation planned for Summer of 2023, headed by Brooke Haiar (U Lynchburg), Lucy Treado, and myself. Work will recover 10+ plaster jackets and isolated bones of dinosaurs. Likely to total two to three double-wide cabinet drawers full of specimens. Specimens owned by BLM, but managed by VMNH Paleontology.
- Priority 3. Cultivated Relationships with Private Collectors.** After cultivating relationships w/ private collectors, specimens will be through donations. This will concentrate on northern VA fossils. Recent donations have included Atlantic Coastal Plain reptiles and invertebrates, and Triassic vertebrates and invertebrates.
- Priority 4. Atlantic Coastal Plain Vertebrates/Carmel Church Quarry.** One to two two-week excavations in Spring 2023, targeted at excavation of

baleen whale from the St. Marys Formation. Opportunistic discoveries will almost certainly occur as well. Likely to bring in one large plaster jacket and one double-wide cabinet drawer's worth of material.

Invertebrate Zoology

Dr. Kaloyan Ivanov

The following materials are expected to be acquired within the next year. Wet and dry storage space is adequate to accommodate any new specimens acquired.

Terrestrial Invertebrates

- Priority 1.** Specimens generated by ongoing research activities, with primary focus on material from Virginia and the southeastern USA. Specimens from other areas in the USA and/or other countries may also be included.
- a. Hymenoptera (ants, bees, and wasps) as pinned/pointed and alcohol-preserved specimens.
 - b. Millipedes, especially in the orders Polydesmida and Chordeumatida as alcohol-preserved specimens.
 - c. Terrestrial isopods (Isopoda: Oniscidea) as alcohol-preserved specimens.
 - d. Cicadas (Hemiptera: Cicadidae) as pinned specimens.
 - e. Dragonflies and damselflies, true bugs, earwigs, walkingsticks, mantids, cockroaches, and beetles as pinned specimens.
 - f. Leaf-litter and soil invertebrates as alcohol-preserved (annelids, pseudoscorpions, spiders, myriapods, and non-insect hexapods) and pinned (true bugs and beetles) specimens.
- Priority 2.** Opportunistic acquisitions of specimens obtained through site visits, salvage, or through donations (prepared to handle if such material becomes available).
- a. Alcohol-preserved Embioptera (webspinners) (M. Bertone, NCSU).
 - b. Pinned Formicidae (ants) and alcohol-preserved Zoraptera (angel insects) (S. Dash, Hampton University).
 - c. Various pinned and alcohol-preserved arthropods from Virginia and adjacent areas (A. Evans, S. Roble, C. Harden, D. Hennen, others).
- Priority 3.** Specimens to support exhibits and/or education programs (as needed or become available).

Aquatic Invertebrates

There is currently no plan to acquire new materials. If such materials become available (opportunistic acquisitions), they will be handled on a case-by-case basis.

Forensic Work

There is currently no plan to acquire new materials. If such materials become available (casework and teaching efforts), they will be handled on a case-by-case basis.

Vertebrate Biology (except Reptiles and Amphibians) **Dr. Nancy D. Moncrief**

No large quantities of specimens are anticipated in the next year, and existing storage space is sufficient to house any new specimens acquired. Priorities for individual vertebrate biology departments are listed below.

Ichthyology

- Priority 1.** Research-quality specimens of taxa present in Virginia. These will be obtained through salvage and collaborations with colleagues.
- Priority 2.** Specimens to support exhibits and education programs. These will be obtained through salvage, purchase, and/or collaborations with colleagues.

Mammalogy

- Priority 1.** Specimens to support my research projects or generated by my research activities. These would include 1) mammals from eastern North America, especially those from Virginia, and 2) comparative material related to those projects and activities.
- Priority 2.** Research-quality specimens of taxa present in Virginia. These will be obtained through salvage, opportunistic collecting and collaborations with colleagues most of whom are in Virginia (e.g., VDWR, DCR-VNHP).
- Priority 3.** Specimens to support exhibits and education programs. These will be obtained through salvage, opportunistic collecting, purchase, and/or collaborations with colleagues.

Ornithology

- Priority 1.** Research-quality specimens of taxa present in Virginia. These will be obtained through salvage and collaborations with colleagues.
- Priority 2.** Specimens to support exhibits and education programs. These will be obtained through salvage, purchase, and/or collaborations with colleagues.

Ancillary Collections (Especially Frozen Tissues)

- Priority 1.** Specimens to support my research projects or generated by my research activities. These would include 1) mammals from eastern North America,

especially those from Virginia, and 2) comparative material related to those projects and activities.

- Priority 2.** Research-quality specimens of vertebrate taxa present in Virginia. These will be obtained through salvage, opportunistic collecting, and collaborations with colleagues most of whom are in Virginia (e.g., VDWR, DCR-VNHP).

Vertebrate Biology (Reptiles and Amphibians)

Arianna Kuhn

- Priority 1. Opportunistic Acquisitions.** Reptile and amphibian specimens and tissues will be obtained through salvage events and donations when appropriate to augment the herpetology collection. At present, no large donations are anticipated for 2022–2023.
- Priority 2. Research-targeted Acquisitions.** Through focused, research-driven efforts, reptile and amphibian specimens and tissues will be added to the collections as current permitting allows to (1) fill gaps in regional species representation and (2) facilitate regional and international research and collaborations (e.g., Spring 2023 collaboration with University of Florida).
- Priority 3. Educational and Outreach Acquisitions.** Reptile and amphibian specimens (wet, osteological, taxidermy), particularly those with no associated data/captive bred, will be added to the collection to elevate outreach and education events as well as in-house exhibits.

Education and Public Programs

Christy Deatherage

There is currently no plan to acquire new materials in the DEPP. However, we will report materials that would enhance current exhibits or programs if offered to the Department.

**VIRGINIA MUSEUM OF NATURAL HISTORY
RESEARCH AND COLLECTIONS ACTIVITIES**

**Report to the Board of Trustees
Jan.-March 2023**

**Kaloyan Ivanov, Ph.D.
Associate Curator of Invertebrate Zoology**

- Drs. Ivanov and Means, and colleagues' manuscript "Where are they from and where are they going? Detecting areas of endemism, distribution patterns and conservation status of the order Spirostreptida in Brazil (Diplopoda, Juliformia)" was recently published at *Biodiversity and Conservation*.
- Drs. Ivanov and Means, and colleagues have a manuscript in press at *European Journal of Taxonomy*.
- Dr. Ivanov and colleagues from Virginia Tech have a manuscript in revision at *Ecosphere*.
- Drs. Ivanov and Means, and colleagues submitted a manuscript to the *Proceedings of the Entomological Society of Washington*.
- Dr. Ivanov and colleagues from Virginia Tech presented research findings at the annual meeting of the Entomological Society of America – Eastern Branch in Providence, Rhode Island.
- Dr. Ivanov participated in VMNH's BugFest and interacted with 1,500+ visitors.
- Dr. Ivanov joined the Editorial Board of the Bulgarian National Museum of Natural History's periodical *Historia Naturalis Bulgarica*.
- Drs. Ivanov and Means joined the non-marine invertebrates Taxonomy Advisory Committee of the 2025 Virginia Wildlife Action Plan.

Research & Collections

Drs. Ivanov and Means (VMNH), R. Bouzan, Drs. L. F. M. Iniesta and A. D. Brescovit (Instituto Butantan, Brazil) paper "Where are they from and where are they going? Detecting areas of endemism, distribution patterns and conservation status of the order Spirostreptida in Brazil (Diplopoda, Juliformia)" was published at *Biodiversity and Conservation*.

[Iniesta, L. F.M., R. S. Bouzan, J. C. Means, K. Ivanov, and A. D. Brescovit. 2023. Where are they from and where are they going? Detecting areas of endemism, distribution patterns and conservation status of the order Spirostreptida in Brazil (Diplopoda, Juliformia). *Biodiversity and Conservation* 32(5): 1591-1615. <https://doi.org/10.1007/s10531-023-02566-2>]

Drs. Means and Ivanov, R. Bouzan, Drs. L. F. M. Iniesta and A. D. Brescovit, D. Martinez-Torres (Universidad Nacional de Colombia, Colombia), and L. F. Vasquez-Valverde (Virginia Tech, Virginia) have a manuscript in press at the *European Journal of Taxonomy*. The work reviews the previously monotypic South American millipede genus *Dibolostethus* (Polydesmida: Chelodesmidae), and includes the description of two new species (one of which from VMNH's invertebrate collection), and a summary of the Chelodesmidae taxa known from the Tropical Andes Biodiversity Hotspot.

Dr. Ivanov and Virginia Tech colleagues (former graduate student M. Malone, Drs. R. Schurch and S. Taylor) have a manuscript in revision at *Ecosphere*. The work focuses on the range expansion of the invasive Red Imported Fire Ant, *Solenopsis invicta* Buren, in Virginia. The manuscript also explores the potential spread of this notorious invasive species across the United States using predictive distribution modelling.

Drs. Ivanov and Means, R. Bouzan, Drs. L. F. M. Iniesta and A. D. Brescovit, and G. B. Pupin (Instituto Butantan, Brazil) submitted a manuscript to the *Proceedings of the Entomological Society of Washington*. The paper reports the first case of mass occurrence in the millipede family Chelodesmidae and includes the description of the heretofore unknown female of *Sandalodesmus araujo* (Schubart, 1946), previously known only from the male holotype collected in the state of São Paulo, Brazil in 1943. In addition, the paper discusses the utility of female genitalic characters for species delineation in *Sandalodesmus*.

Drs. Ivanov, S. Yang (Virginia Tech), B. Guénard (U Hong Kong), and E. P. Economo (Okinawa Institute of Science and Technology) are working on a manuscript focused on the exotic ant fauna of North America (north of Mexico). When completed, the paper will offer a comprehensive list of all non-native ant taxa recorded from North America along with known distributions, and ecological notes. Preliminary list of taxa was completed in late March.

Dr. Ivanov and colleagues (Dr. J. Means, L. Hightower, C. Deatherage, J. Brim, and C. Harden) along with members of the Southwestern Piedmont Chapter of the Virginia Master Naturalist (D. Haley, C. Boran, B. Phillips, and J. Phillips) initiated a project focused on the arthropod diversity associated with the nests of cavity-nesting birds utilizing Eastern bluebird boxes. The work is conducted in conjunction with a Citizen Science bluebird monitoring project conducted by the Southwestern Piedmont Chapter of the Virginia Master Naturalist.

Dr. Ivanov and colleagues from Virginia Tech (R. Schürch, M. Malone, S. Pinar, J. Hurley, G. I. Van Wertz, S. Yang, and S. Taylor) presented research findings at the annual meeting of the Entomological Society of America – Eastern Branch in Providence, Rhode Island. The work focuses on the distribution and recent range expansion of the invasive red imported fire ant, *Solenopsis invicta* Buren 1972, in Virginia and on investigating novel methods for its detection.

In early February, Drs Ivanov and Means, and L. Hightower completed the penultimate round of sampling for a project focused on the leaf-litter and soil arthropod fauna of a private property located at the foothills of the Blue Ridge Mountains in Stuart, VA. The study, which employs a variety of arthropod collecting techniques including pitfall traps, subterranean traps, litter sifting, Malaise traps, and hand collecting, will allow for a rigorous comparison of the local arthropod above ground and below ground diversity as well as for testing hypotheses regarding the efficiency of these techniques for targeting specific components of the local ecosystem. The work is partly funded by the property's owner and longtime museum supporter L. Reagan.

This quarter, Dr. Ivanov and colleagues conducted fieldwork in Patrick Co. and the cities of Norfolk, and Virginia Beach in support of ongoing research projects.

L. Hightower, with help from Dr. Ivanov, labeled, organized, and transferred VMNH's ethanol-preserved Formicidae (ants) collection (35,285 specimens) from the Recent Invertebrates Lab to the museum's wet biology collection.

As part of a long-term inventory, updating, reorganization, and databasing of the VMNH's invertebrate holdings, Dr. Ivanov and L. Hightower, with help from C. Harden and Dr. A. Evans, completed the update, reorganization, and curation of a substantial portion (96 families) of the museum's Coleoptera (beetles) holdings. A total of 5,543 backlogged specimens were added to the collection including 35 specimens of the family Glaresidae (enigmatic scarab beetles), which is new to the collection. The only remaining groups in need of curation are Staphylinidae, Elateridae, Tenebrionidae, Cerambycidae, and Chrysomelidae.

Dr. Ivanov completed the identification and curation of 950+ backlogged specimens (ants, wasps, cockroaches, earwigs, et alia), which were incorporated into VMNH's invertebrate holdings.

VMNH Collections Manager H. Cartmell, with help from Dr. Ivanov, is continuing work on inventorying and cataloging VMNH's Mollusca (mollusks) holdings. Work included the curation and digitization of 2,000+ backlogged unionid specimens recently transferred from the museum's storage facility at Douglas Ave.

Visiting researchers C. Harden (Clemson U; February 14-15), Dr. D. Hennen (VMNH Research Associate; February 22), Dr. M. Milne (U Indianapolis; February 22), C. Verdone (NCDWR; February 23), and Dr. A. Evans (VMNH Research Associate; March 9-11) used VMNH's invertebrate collection to capture data and study beetle, centipede, spider, and stonefly taxa from Virginia and eastern US.

Dr. Ivanov oversaw the acquisition of 1891 pinned/pointed identified and unidentified insects donated to VMNH by Dr. A. Evans (VMNH Research Associate; RIM2023-07); 39 lots of ethanol-preserved unidentified invertebrates (mainly Diplopoda, Isopoda, and Hymenoptera) and 177 pinned/pointed largely identified insects (chiefly Coleoptera) donated to VMNH by C. Harden (Clemson U; RIM2023-09); and 21 lots of ethanol-preserved ants and bulk invertebrates from litter samples donated to VMNH by Dr. D. Hennen (VMNH Research Associate; RIM2023-10).

Dr. Ivanov responded to information requests regarding VMNH's invertebrate holdings: *Melanocanthon* (Scarabaeidae: Scarabaeinae; dung beetles) (Dr. D. W. Edmonds; California State Polytechnic University-Pomona, retired).

Dr. Ivanov satisfied a loan requests regarding VMNH's invertebrate holdings: 3 alcohol-preserved *Sphodros coylei* Gertsch & Platnick, 1980 (Atypidae; purseweb spiders) (Dr. M. L. Ferro; Clemson U); 29 lots of alcohol-preserved unidentified Linyphiidae (sheetweb and dwarf spiders) (Dr. M. Milne; U Indianapolis); 80 lots of alcohol-preserved unidentified Lithobiomorpha (stone centipedes) (Dr. D. Hennen; VMNH Research Associate); 41 alcohol-preserved identified *Fallicambarus* (Cambaridae; crayfish) (Dr. Z. Loughman; West Liberty U)

Education & Outreach

Dr. Ivanov and museum staff participated in VMNH's BugFest, which offered a variety of one-day-only displays and activities that ranged from preserved extant arthropod (arachnids, crustacean, insects and allies), fossil invertebrates, and insectivorous vertebrates from the museum's collections to live arthropods and reptiles, edible bugs, and bug-themed children activities and crafts. The event attracted over 1,500 children and adults from Virginia, North Carolina, and five additional states (Georgia, Kentucky, New Mexico, Tennessee, and West Virginia). (January 28)

Dr. Ivanov and VMNH Curator of Mammals Dr. N. Moncrief gave a tour of VMNH's biology collections to members of the Virginia Chapter of the Wildlife Society, during the society's annual meeting in Martinsville. (February 17)

Dr. Ivanov, VMNH Executive Director Dr. J. Keiper, and VMNH Education Manager C. Deatherage, and VMNH Educator J. Brim led a birding trip for museum patrons in Botetourt Co., Virginia. (February 18)

University of Lynchburg student J. Laprad visited the Department of Recent Invertebrates where, with the help of Dr. Ivanov, she studied invertebrate microfossils from the mounds of the harvester ant *Pogonomyrmex salinus* Olsen, 1934. The materials were collected by Drs. Ivanov and Hastings during the 2016 VMNH Dinosaur Dig in Wyoming. Josie's research will focus on the diversity and abundance of these microfossils and the biases associated with the largely unexplored ant fossil-collecting behavior. (March 21-22).

Media

"Previewing Saturday's Bug Festival at the Virginia Museum of Natural History". WDBJ7 @four with M. Gaona. Roanoke, Virginia. (with Z. Ryder) (January 23)

Professional Service

Dr. Ivanov copy edited two articles for the Virginia Natural History Society's periodical *Banisteria* (Volume 57, 2023). (completed January 20, and March 17)

Drs. Ivanov and Means are serving as co-editors of VMNH's *Memoirs* series for a manuscript titled "The groundwater isopods of Virginia (Isopoda: Asellidae and Cirolanidae)" by Dr. J. J. Lewis and colleagues. The manuscript, which was accepted for publication in mid-November 2022, is currently at the proofs stage.

Dr. Ivanov joined the Editorial Board of *Historia Naturalis Bulgarica*, an international journal published by the National Museum of Natural History, Bulgarian Academy of Sciences. Founded in 1989, the journal publishes scientific contributions in mineralogy, palaeontology, botany, zoology, as well as original articles on history of natural sciences and natural history institutions.

Drs. Ivanov and Means joined the non-marine invertebrates Taxonomy Advisory Committee of the 2025 Virginia Wildlife Action Plan (WAP) revision which is being prepared by the Virginia Department of Wildlife Resources (VDWR). The goal of the committee is to create a list of potential species of greatest conservation need (SGCN),

using available resources and expert judgements on species threats and conservation status, to be integrated into the body of the 2025 WAP.

Nancy D. Moncrief, Ph.D.
Curator of Mammalogy

- Dr. Moncrief presented her research on fishers, porcupines, and armadillos during the annual conference of the Virginia Chapter of the Wildlife Society, which was held in Martinsville at VMNH and New College Institute.
- At that conference, Dr. Moncrief received the 2023 Dr. Henry S. Mosby Professional Award, which is presented to an individual for “significant professional contributions to wildlife species and their habitats, and to the citizens of Virginia”.
- Dr. Moncrief co-authored a poster that was presented at the Colloquium on Mammals in the Southeast.

Research and Collections

In February, Dr. Moncrief presented her research on fishers, porcupines, and armadillos (“*Recent Changes in Species Composition of Virginia’s Land Mammals*”) as part of a Special Session (“*Virginia’s Changing Natural History Landscape – Pleistocene to the Present*”) during the annual conference of the Virginia Chapter of the Wildlife Society. At that meeting, Dr. Moncrief received the 2023 Dr. Henry S. Mosby Professional Award, which is presented to an individual for “significant professional contributions to wildlife species and their habitats, and to the citizens of Virginia”.

In March, Ms. Lisa Gatens, Mammal Collections Manager at the North Carolina Museum of Natural Sciences presented the poster “*Using museum specimens to study geographic expansion of Lyme disease in the southeastern United States*” at a conference (Colloquium on Mammals in the Southeast), which was held at Arkansas State University. It described her work with Dr. Moncrief and their collaborators at the University of Richmond.

Throughout the quarter, Dr. Moncrief continued her collaboration with Dr. John Scheibe (Professor Emeritus of Biology at Southeast Missouri State University). They are using the extensive collection of squirrel specimens in the VMNH Mammal Collection to study geographic variation in eastern gray squirrels and eastern fox squirrels.

She also met several times with collaborators and VMNH Research Associates Drs. John Porter and Ray Dueser. They are developing and plan to test digital camera traps for small mammals. This will allow them to perform surveys without live-trapping, which can be very labor-intensive and time-consuming.

Also, throughout the quarter, Dr. Moncrief worked extensively with the new Research Technician, Mr. Marshall Boyd to orient him in state policies for employees and VMNH policies and procedures for the mammal and bird collections. She also continued working with Mr. Boyd and Mss. Hightower, Cartmell, and Harris to prepare, install, document, and organize specimens of mammals and birds and their accompanying museum documents (electronic and hardcopies). They inventoried storage details and

made numerous edits to electronic databases for the mammal and bird research collections.

Dr. Moncrief also worked with Mss. Harris and Cartmell to inventory and update documentation for all the taxidermy mounts and other exhibit specimens of vertebrates (e.g., articulated skeletons) housed at VMNH.

Professional Service and Other Duties

In January and early February, Dr. Moncrief met numerous times with members of the Virginia Chapter of The Wildlife Society Program Committee to plan the Chapter's annual conference, which took place 15-17 February 2023 in Martinsville. Workshops and technical presentations were hosted at New College Institute, and the annual dinner was held at VMNH. About 100 members attended, including professionals from multiple state and federal agencies as well as faculty members and students from several Virginia colleges and universities (Radford, George Mason, Virginia Tech, Bridgewater, and Randolph Macon).

In January Dr. Moncrief met with other members of the Virginia Chapter of The Wildlife Society's Awards Committee to discuss applications and select a winner for a student professional development scholarship

Dr. Moncrief continued serving on the Council of the Virginia Natural History Society (VNHS). She also continued serving (with Dr. Ivanov) as Co-Treasurer of this organization.

Scientific Programs, Exhibits, and Other Activities

In January, Dr. Moncrief participated in VMNH's Bugfest. Along with Mr. Marshall Boyd and Ms. Jenna Benzing, she assembled numerous skulls of insect-eating mammals, as well as a display table that featured taxidermy mounts of mammals and birds that eat insects. She also worked at the admissions table for VMNH and ASTC members with Ms. Charlotte Harter.

In January, Dr. Moncrief worked with other staff to de-install the Flight Exhibit and return all the bird and mammal specimens to collections storage.

Also in January, Dr. Moncrief worked with Ms. Madeleine Gunter-Bassett to write text for and install mammal specimens in the Pliny the Elder exhibit.

In March, an article by Ian Rose that featured quotes from Dr. Moncrief about the value of natural history collections was published in *The Scientist* (<https://www.the-scientist.com/notebook/ecologists-use-museum-specimens-to-dig-into-the-parasitic-past-70954>). Mr. Rose contacted Dr. Moncrief last Fall, after reading her article in *Ticks and Tick-borne Diseases* (<https://doi.org/10.1016/j.ttbdis.2022.102018>) about the history of Lyme disease emergence in Virginia and North Carolina.

Hayden Bassett, Ph.D.
Assistant Curator of Archaeology

The VMNH Archaeology Department is currently staffed by 19 personnel as of May 2022. This includes the Department Head VMNH Assistant Curator of Archaeology Dr. Hayden Bassett, VMNH Senior Staff Archaeologist Madeleine Gunter-Bassett, the four core staff of the Cultural Heritage Monitoring Lab (William Welsh, Kaitlyn Fitzgerald, Sonia Dixon, and Abigail Maher), two in-person Archaeology Lab technicians, and 12 interns (11 virtual, 1 in person).

VMNH Archaeology Department: FEB-MAY 2023

- Full-time:
 - Hayden Bassett, PhD. (Dept. Head: Assistant Curator of Archaeology & CHML Director)
 - Madeline Gunter-Bassett, M.A. (Senior Staff Archaeologist & CHML Senior Analyst)
 - William Welsh, M.M.A. (CHML Director of Operations)
- Part-Time:
 - Sonia Dixon, M.A. (CHML Senior Analyst)
 - Kaitlyn Fitzgerald, M.A. (CHML Analyst)
 - Abigail Maher (CHML Analyst)
 - Samantha Wall (Archaeology Lab Tech)
 - Aiden Lawrence (Archaeology Lab Tech)

This quarter, Dr. Bassett focused his teams' efforts on publications, building Virginia's database of cultural property, VMNH Cultural Heritage Monitoring Lab's response to the war in Ukraine, continuing archaeological research for the Smith River Survey, continued focus on VMNH's digital and physical collections, and LiDAR surveys for the Patrick Henry Leatherwood project.

Research and collections

This quarter, the VMNH Archaeology Department established the museum's newest lab, the VMNH Soils Lab. The Soils Lab will be dedicated to curating and analyzing scientific soil samples from Virginia and beyond. VMNH Archaeology staff are in the process of securing USDA soils permits, which will allow the soils lab to curate Virginia's federally quarantined soils and soils from outside of Virginia's borders. The establishment of this lab acknowledges the growing importance of soil science for Virginia's archaeology, agriculture, geology, entomology, and conservation efforts. The development of this lab with existing agency resources at no additional cost adds to the VMNH's portfolio of efforts to adapt and keep pace with the Commonwealth's applied science needs.

From February to May, the VMNH Archaeology Department continued synthesis research ahead of the summer field season for the Smith River Survey – a two-year archaeological survey of sites associated with Virginia's First Peoples along the Smith River in Henry County, VA. Bassett and his team brought together published and unpublished data on Late Woodland archaeological sites in the region to identify the range of species recorded in the archaeological record for this area during that period. This ongoing effort included the digitization of hundreds of archaeological sites records

for previous archaeology along the Smith River. So far, the archaeology team has synthesized the full range of fish species identified on archaeological sites along the Smith, Dan, Mayo, and Roanoke Rivers. They intend to complete this type of synthesis for birds, small mammals, reptiles and amphibians, and mollusks next quarter. This effort will contribute to the lab's research objective to understand the full range of subsistence practices for this region in Virginia's Late Woodland period.

The archaeology department also continued research on the Patrick Henry Leatherwood project, a funded effort to locate the Henry County home of Patrick Henry, and other Revolutionary War sites in the area. While the driver of this fieldwork is to identify sites for interpretation for the upcoming 250th Revolutionary War anniversary, the VMNH archaeology team is taking this opportunity to use archaeology to learn more on life in what was Virginia's western frontier in the 18th century. This quarter, the VMNH Archaeology spent time surveying existing LiDAR data for the known property boundaries of Patrick Henry's landholdings. This allowed the archaeology team to identify anomalies beneath the tree canopy for further field investigation.

As a producer and curatorial repository of digital collections, the VMNH Archaeology Department has expanded its digital collections holdings by nearly 245,000 "objects" since February 2023, and anticipates further growth in digital collections with each new quarter. The new objects include cultural heritage site location datasets for Virginia and Columbia. A total of 19,500 digital objects in the VMNH's digital collections were requested/accessed by outside researchers between February and May 2023. Through the hard work of the archaeology lab's new lab techs, the team digitized over 300 pages of archaeological field notes for sites surveyed in Henry County, VA in the 1980s. With the current physical storage space limitations at the VMNH, the Archaeology Dept will continue to focus on development and growth of its digital collections for public benefit. In late March, the VMNH Archaeology staff presented their research at the Society for American Archaeology's (SAA) annual conference in Portland, OR. They presented two academic posters: a methods and findings-focused poster on the CHML's work in Ukraine, and the lab's archaeological predictive modeling work in East Africa.

In collaboration with the Smithsonian Institution, the VMNH's Cultural Heritage Monitoring Lab (CHML) under the direction of Dr. Bassett made significant progress this quarter on projects in Virginia, Guatemala, and Ukraine. Through the CHML at VMNH, Dr. Bassett continues to lead a team of 5 cultural heritage professionals and 11 virtual interns in data production and satellite imagery analysis.

A part Dr. Bassett's research efforts this quarter were dedicated to the leading role played by the VMNH's Cultural Heritage Monitoring Lab (CHML) in the US response to the destruction of museums, archaeological sites, and other cultural heritage sites in Ukraine. Since February 2022, the VMNH-CHML team has been monitoring over 28,000 cultural heritage sites, identified potential damage to over 1,800 and confirmed damage at 350. Dr. Bassett serves as the Co-PI on a multi-year project with the Smithsonian, in which the VMNH plays an important role. This work has resulted in three published reports this quarter and international recognition of the VMNH as a leading research institution at the nexus of archaeology and international affairs.

Publications

Dr. Bassett and his team continued to move through the peer-reviewed process this quarter. Two of their publications passed peer review in March and April, and are now in press:

Bassett, Hayden F. (2023, *in press*): "Archaeology of Enslavement," in *Encyclopedia of Archaeology*. 2nd edition, edited by Thilo Rehren and Efthymia Nikita. Elsevier Press.

Bassett, Hayden F., Harrell, K., Koropecykj, D., Gunter-Bassett, M., & Welsh, W. (2023, *in press*). "Partners as Stakeholders in Cultural Property Protection (CPP): Bridging the Intrinsic and Instrumental Value of Cultural Heritage." *PER: Preservation Education and Research*.

Dr. Bassett's team and their collaborators also published two reports this quarter:

Bassett, H. F., Aronson, J., Cil, D., Hanson, K., Meharry, J. E., Narimanova, N., Averyt, K., Carroll, C., Harrell, K., Fitzgerald, K., Maher, A., Mints, E., Welsh, W., Wegener, C., and Daniels, B. I. (2023). "Potential Damage to Ukrainian Cultural Heritage Sites, 24 February 2022 to 31 January 2023." Virginia Museum of Natural History, Cultural Heritage Monitoring Lab; University of Maryland, Center for International Development and Conflict Management; and Smithsonian Institution, Smithsonian Cultural Rescue Initiative. Available at:

<https://hub.conflictobservatory.org/portal/sharing/rest/content/items/56776560f5a94c1c88d361e3dd1aef59/data>

Harrell, K., Koropecykj, D., Fitzgerald, K., Maher, A., Mints, E., Gunter-Bassett, M., Welsh, W., and Bassett H. F.. (2023). "Impacts to Cultural Heritage in Ukraine: September 01, 2022 to January 31, 2023" *Tearline*. Available at:

https://www.tearline.mil/public_page/impacts-to-cultural-heritage-in-ukraine-01-september-2022-through-31-january-2023/

Education and outreach

The VMNH Archaeology department worked with several colleges and universities this quarter. This included continued work with 11 virtual interns, and one in-person intern. Current student interns in the department represent 10 different universities. This year-long internship began September 2022 and will run through the end of May 2023. The virtual volunteers each contribute 10 hrs/week to the CHML at VMNH for the entire academic school year for credit through their respective colleges and universities. The Archaeology department also engaged with colleges/universities through their research. Dr. Bassett gave a lecture at West Point Academy in NY in March on cultural heritage and international relations, and the archaeology lab began discussing potential collaborations with William & Mary.

In April, the VMNH Archaeology Department established the VMNH Archaeology Lab scholarship at Patrick & Henry Community College. The lab accomplished this with matching funds from the P&HCC Foundation. This financial aid covers the full tuition cost for one semester at P&HCC for a student who has worked in the VMNH Archaeology Lab as a volunteer, intern, or employee. The first scholarship will be awarded for the summer 2023 semester.

In March, the VMNH Archaeology Lab and CHML were invited by the cultural rescue non-profit Casa K'ojom to serve as instructors for a workshop on natural disaster preparedness for cultural heritage sites in Guatemala. CHML Director of Operations Bill

Welsh provided field and classroom instruction to participants over the course of week, while Dr. Bassett provided remote support and a lecture from the VMNH. In early May, this training was deployed to rapidly respond to an eminent volcanic eruption in Columbia. Partnership with the non-profit Casa K'ojom will continue through 2023 to lend technical specialty unique to the VMNH to those who request assistance and to build relationships for upcoming VMNH repatriation efforts.

In early May, Dr. Bassett gave an archaeology workshop to a local Scout troop in Martinsville during one of their regular Wednesday night meetings. VMNH Archaeologist Madeleine Gunter-Bassett responded to six public requests for identification of artifacts, all from Virginia. Four artifact identifications were made in-person, and two were made virtually.

Professional service

Dr. Bassett continued his duties as Vice President of the Board of Trustees for Falmouth Heritage Renewal, an international historic preservation non-profit. He also continued his appointment as a Research Associate at the Smithsonian Institution to support international efforts and contributions made through VMNH's new Cultural Heritage Monitoring Lab.

This quarter, Dr. Bassett and VMNH staff archaeologist Madeleine Gunter Bassett continued to fulfill their duties in the Archaeological Society of Virginia (ASV) and Council for Virginia Archaeologists (CoVA). In their roles on committees in these organizations, VMNH Archaeology staff provide direction, technical review, grant approvals, among other tasks for state-wide archaeological research for the foreseeable future. In October, they attended the quarterly meeting of the CoVA, representing the VMNH in Virginia Archaeology.

From February to May, Dr. Bassett was consulted on 4 occasions by VA state agencies, US federal agencies and law enforcement entities, and international institutions to implement his technical methods for using satellite imaging and remote sensing to document ground disturbance, and/or destruction of cultural heritage in conflict zones and after natural disasters. The consultations included contributions of technical and policy-related expertise, as well as virtual delivery of training. This included technical consulting for cultural emergency response with FEMA.

Adam Pritchard, Ph.D.
Assistant Curator of Paleontology

- Dr. Pritchard published a paper in press with the journal *Anatomical Record*, describing new fossil limb bones and the comparative anatomy of reptile thighs. The project is a collaboration with scientists from Virginia Tech, Stony Brook University, SUNY Oswego, University of Utah, and the Natural History Museum of Los Angeles.
- Dr. Pritchard was awarded lab grant funds for a collaboration led by Dr. DB Poli of Roanoke College. The funds come from the Wonder Universe foundation and will fund development of coal forest fossil casts and laboratory supplies.
- Dr. Pritchard presented on VMNH Paleontology collections to the Virginia Tech Natural History Collections course led by Dr. Michelle Stocker.
- Dr. Pritchard led two volunteer-drive field trips to the Ashland Triassic Site. The trips produced multiple fish skeletons, previously unrecognized plant taxa, and associated reptile vertebrae and ribs. The reptile specimens belong to a species new to the Virginia fossil record.

Research & Collections

Dr. Pritchard published his paper in the *Anatomical Record* providing the first detailed comparisons of thigh anatomy in many primitive reptile groups. The project was a collaboration with co-authors Sterling Nesbitt, Michelle Stocker, Alan Turner, Jennifer Olori, Nathan Smith, and Randall Irmis.

Dr. Pritchard oversaw research visits from paleontologist Donna Surge from UNC Greensboro and two students, who came to study Cenozoic mollusc specimens.

Dr. Pritchard continued developing three-dimensional renderings of the early pterosaur *Arcticodactylus* for a collaboration with scientists at Virginia Tech and Yale.

Dr. Pritchard collaborated with Drs. Matthew Borths and Steven Heritage on CT scanning of the skull of Petra the cave cat. The scans were obtained from the microCT scanner at the Duke University Shared Materials & Instrumentation facility. The scans provide an incredibly high-resolution study of the interior of the skull.

Dr. Pritchard coordinated with Drs. Chris Widga and Blaine Schubert of Eastern Tennessee State University on new avenues for dating and obtaining DNA from the Petra cave cat specimen. The two will serve as collaborators on the ongoing project.

Dr. Pritchard led two volunteer-driven field trips to the Ashland Triassic Site, a major new locality for understanding the early Age of Dinosaurs in Virginia. Discoveries from the trips include new fish, plant, and reptile specimens. The latter specimens represent an as-yet unknown species, but one distinct from any others discovered in Virginia.

Dr. Pritchard and paleontology technician Lucy Treado led a field trip with VMNH staff and board member Dr. Tom Benzing to a new, 350-million-year-old marine locality in Augusta County, Virginia. The roadcut site was discovered by Dr. Joe Keiper and preserves a large number of marine invertebrates. Dr. Pritchard, research associate Dr.

Bill Schmacenberg, and intern Kayleigh Long are collaborating on identifying the species discovered.

Education & Outreach

Dr. Pritchard collaborated with Mariah Green, the head of the Virginia Tech Museum of Geosciences to develop loans and content for a special exhibit on whale evolution. He loaned several VMNH whale and shark specimens that will be on display until late 2024 at the Virginia Tech Museum of Geosciences.

Dr. Pritchard coordinated with the owners and staff of new Martinsville-based 3D Print Shop on a plan for printing a 4+ foot replica of an 300+ million-year-old tree trunk for the Wonder Universe grant led by Dr. DB Poli (see below).

Dr. Pritchard, paleontology technician Lucy Treado, and intern Kayleigh Long organized and presented a table display on fossil invertebrates for the 2023 Bug Festival at the VMNH.

Dr. Pritchard was interviewed about his ongoing research on Triassic reptiles for the VMNHCast and a student-led, science-based podcast by College of William & Mary students.

Dr. Pritchard presented collections tours to donors to the fossil collections and a private tour for museum guests.

Dr. Pritchard assisted in the identification of seven fossil discoveries made by Virginia residents.

Grants & Funding

Dr. Pritchard collaborated on and was awarded funds from the Wonder Universe Foundation for a project focused on educational displays on ancient coal forests. The project is led by Dr. DB Poli, and the paleontology lab will be providing replicas of ancient fossil trees and educational panel content for the displays.

Exhibits

Dr. Pritchard collaborated with the Dinosaur Discoveries exhibit development team to create a small exhibit dedicated to dinosaur-age fossils discovered in the mid-Atlantic region. The VMNH specimens include dinosaurs, crocodylians, and sharks from approximately 70 million years ago, and they will be on display until January 2024.

Dr. Pritchard worked with Research Associate Bill Schmacenberg on a animations and 3D models for the ongoing game-based simulation of a Jurassic ecosystem. The display is intended for presentation as part of the 2023 Dinosaur Festival.

Professional Service

Dr. Pritchard reviewed a manuscript on the anatomy of Triassic reptiles for the journal *Rivista Italiana di Paleontologia e Stratigrafia*.

Arianna Kuhn, Ph.D.
Assistant Curator of Herpetology

- Dr. Kuhn and colleagues gave a workshop at the Society for Systematic Biologists standalone meeting.
- Dr. Kuhn gave a conference presentation at The Wildlife Society - Virginia Chapter.
- Dr. Kuhn was featured in two news articles and live television interview
- Dr. Kuhn and colleagues had a paper published in the *Biological Journal of the Linnean Society*.
- Drs Kuhn had abstracts accepted at the Joint Meeting for Ichthyologists and Herpetologists and the Society for the Preservation of Natural History.
- Dr Kuhn and colleagues submitted a grant application to the Feays Foundation through the Field Museum of Natural History to conduct fieldwork in Madagascar.
- Dr. Kuhn gave invited seminars at the Field Museum of Natural History, James Madison University and Radford University.
- Dr. Kuhn is serving as the Associate Editor for *Herpetological Journal* and has handled three manuscripts this quarter.
- Dr. Kuhn is serving on the organization committee for the Charles Camp 2023 Meetings to be held at the American Museum of Natural History.
- Dr. Kuhn gave VMNH collections tours to several university and agency professionals.
- Dr. Kuhn designed collection-based booths and educational activities for the VMNH Bug and Reptile festivals and interacted with 1400+ visitors.
- Dr. Kuhn was appointed Research Affiliate at the North Carolina State Museum of Natural Sciences.

Peer reviewed publications

Drs Kuhn (VMNH), Burbrink FT (AMNH), Ruane S (FMNH), Raxworthy C (AMNH), Rabibisoa NHC (UAntananarivo, Madagascar), and Achille R (UAntananarivo, Madagascar) re-submitted a paper for review at *Evolution*. The paper uses genomic data and evolutionary modeling to explore the relationship between Speciation rates and formation of population structure using Malagasy Gemsnakes as a case study.

Drs Kuhn (VMNH), Kizirian D (AMNH), Campbell G, Donnelly MA (Florida International University), Overcast I (UMaine), Padiá JM, Povenika R, Quitian M, Saporito R, and Segall M (Natural History Museum in London) have a paper in publication in *Biological Journal of the Linnean Society* entitled "Feedback in Batesian mimetic systems". The review discusses the autocatalytic evolution of mimetic trophic systems.

Drs Kuhn (VMNH), Schiebelhut LM, Guillaume AS, Schweizer RM, Armstrong EE, Beaumont MA, Byrne M, Cosart T, Hand BK, Howard L, Mussmann SM, Narum S, Rasteiro R, Rivera-Colón AG, Saarman N, Sethuraman A, Taylor HR, Thomas GWC, Wellenreuther M, and Luikart G. re-submitted a paper for review at *Molecular Ecology Resources* entitled "Practical guidance in conservation genomics: from study design to application" that reviews best practices for conservation biologists using genomic data in their research.

Ongoing research

Drs Kuhn (VMNH), Burbrink FT (AMNH), Ruane S (FMNH), Raxworthy C (AMNH), Rabibisoa NHC (UAntananarivo, Madagascar), Achille R (UAntananarivo, Madagascar) and Overcast I (UMaine) are working on a manuscript that uses genomic data to examine the co-demographic history of snake assemblages on Madagascar using newly developed phylogeographic methods. The target journal for this manuscript submission is *Molecular Ecology*.

Drs Kuhn (VMNH), Lee-Yaw J (UOttawa) and Weisrock D (UKentucky) are analyzing data and preparing a manuscript and provincial report resulting from Dr Kuhn's postdoctoral research that uses genomic data to provide critical insights in the guidance of successful amphibian reintroductions. This work integrates spatial, ecological, and genomic data with careful study design to provide the best opportunity for successful protected species' reintroductions. The target journal for this manuscript is *Biological Conservation*. Weekly zoom meetings are conducted to support progress on this project.

Drs Kuhn (VMNH), Lee-Yaw J (UOttawa), and Weisrock D (UKentucky) along with Master's student Hunter D (ULethbridge) are working data analysis and manuscript are analyzing data and preparing a manuscript and provincial report resulting from Dr Kuhn and D Hunter's field and laboratory work at the University of Lethbridge and Waterton Lakes National Park in southwest Alberta, Canada. This research uses genomic data and occupancy modeling to investigate the impact of an extreme fire in a national park on genetic diversity over space and time for small terrestrial vertebrates. The target journal for this manuscript is *Conservation Biology*.

Drs Kuhn (VMNH), Lee-Yaw J (UOttawa) and Weisrock D (UKentucky) are analyzing data and preparing a manuscript resulting from Dr Kuhn's postdoctoral research that uses genomic data to understand the role of refugial dynamics in driving intraspecific amphibian divergence in the Pacific northwest. The results of this study will underscore the importance of wide-ranging taxa to understanding the role of LGM dynamics in promoting amphibian diversity in this region which has been understudied from a phylogeographic perspective. The target journal for this manuscript is *Journal of Biogeography*.

Drs Kuhn (VMNH), Bauer AM (VillanovaU), Jackman T (VillanovaU), and Brennan I (Natural History Museum in London) are finalizing a manuscript entitled "*Rhoptropus* day geckos support the antiquity of the Namib". This study identified several new species from Angola and Namibia, and estimates the diversification history and speciation of endemic terrestrial Namib day geckos from the pro-Namib region. The diversification of this group provides insight into the role of historical climate change in shaping regional biodiversity in the Namib Desert. The target journal for this manuscript is the *Biological Journal of the Linnean Society*.

Dr. Kuhn visited the American Museum of Natural History (AMNH) on March 18 2023 to examine 126 salamander specimens of the *Plethodon wehrlei* complex. Dr. Kuhn is currently working with Dr. B. Stuart from the North Carolina State Museum of Natural

Sciences on a project to delimit two putatively new species within this complex endemic to southwest VA and NW North Carolina using molecular and morphological data. Dr. Kuhn visited the North Carolina State Museum of Natural Science (NCMNS) on March 14 2023 for collaborative research. Dr. Kuhn is currently working with Dr. B. Stuart from the North Carolina State Museum of Natural Sciences on a project to delimit two putatively new species within this complex endemic to southwest VA and NW North Carolina using molecular and morphological data. During this visit, they examined and photographed available specimens in the collection and generated a field collection plan for North Carolina and Virginia this spring.

Dr. Kuhn visited the Field Museum of Natural History (FMNH) on April 6 2023 to examine 148 salamander specimens of the *Plethodon wehrlei* complex. Dr. Kuhn is currently working with Dr. B. Stuart from the North Carolina State Museum of Natural Sciences on a project to delimit two putatively new species within this complex endemic to southwest VA using molecular and morphological data.

Field work

Dr. Kuhn (VMNH) and collaborator N. Claunch (University of Florida) completed the initial phase of field survey work and data collection for their NSF funded collaborative project conducting spatial analyses to assess which species, genera, or families may be most at risk of contracting *fungal infections* based on local thermal environment. This field work involved testing equipment, collecting salamanders, running thermal trials, collecting skin swabs and body measurements, taking photographs, recording habitat thermal data, and training 4 undergraduate and graduate students from the University of Florida. Over 100 salamanders and 20 different species were added to the data collection. In collaboration with this project, informational salamander coloring sheets were made to document threats to salamanders to be distributed freely at the VMNH at the "Salamander Saturday" event.

Drs Kuhn (VMNH) and B. Stuart (NCMNS) and M. Boyd (VMNH) secured collection permits in North Carolina and Virginia and began fieldwork to collect putatively new species of Plethodontid salamanders from several counties in NW North Carolina and SW Virginia. These collections will serve as vouchers for molecular and morphological analyses to determine the evolutionary uniqueness of these populations in an ongoing study.

Professional presentations

Dr. Kuhn gave an invited seminar at James Madison University in Harrisonburg, VA on March 31, 2023. Her talk entitled "*Global Change Insights from Reptile and Amphibian Genomes*" presented results from her doctoral and postdoctoral work that incorporates genomic, morphological, and ecological data from museum tissue and specimen collections across spatial, temporal, and taxonomic levels to document and describe biodiversity in Madagascar. Her seminar also proposed new collaborative opportunities between JMU and the VMNH, and shared information on exciting new opportunities in the VMNH Herpetology Lab for students. The seminar was attended by faculty, graduate, and undergraduate students in the biology department and resulted in exciting discussions about her new position and research program. During her invited stay, she visited potential field survey sites at Shenandoah Mountain with collaborator

Dr. B. Flint and met one-on-one with several students and faculty to talk about collaboration opportunities.

Dr. Kuhn gave the A. Watson Armour III Seminar at the Field Museum of Natural History (FMNH) in Chicago, IL on April 5, 2023. This invited speaker seminar series aims to highlight the research of science professionals across a broad spectrum of scientific interests, disciplines, and lived experiences. The goal of this seminar is to connect the Field Museum's research, collections, conservation, and associated community with professionals at the forefront of life, geophysical, and social sciences. Her talk entitled "*Global change insights from reptile and amphibian genomes*" explored some of her ongoing research done in collaboration with her seminar host and Curator of Herpetology at the FMNH, Dr. S. Ruane. which integrates genomic, morphological, and ecological data from museum tissue and specimen collections across spatial, temporal, and taxonomic levels to document and describe snake colonization, evolution and diversification, on Madagascar. The seminar also highlighted previous and ongoing connections and collaborations between the FMNH. This talk was advertised widely on several social media platforms in addition to an instagram live recording and a permanent recording on the FMNH Armour Series Youtube Channel. The lecture was attended by both the public as well as Field Museum staff and affiliates and Dr. Kuhn met one-on-one with several curators, research staff, and students to discuss her research and new opportunities through the VMNH.

Dr. Kuhn participated in a Women in STEM panel at Radford University, Radford, VA on March 17, 2023. Many graduate and undergraduate students attended, and this discussion provided space for support alongside open discussions about obstacles encountered by female-identifying scientists and how these obstacles were overcome.

Dr. Kuhn gave a conference talk at the Virginia Chapter of The Wildlife Society meeting hosted at the Virginia Museum of Natural History in Martinsville, VA on February 15. Her talk entitled "*Understanding historical change to predict the future of biological communities*" introduced her ongoing research exploring the practical use of genomic data in providing critical insights to guide successful amphibian reintroductions in North America to a highly applicable audience of wildlife and conservation biologists.

Dr. Kuhn attended a conference at Universidad Nacional Autónoma de México (UNAM) in México City, México for the annual standalone meetings for the Society of Systematic Biologists (SSB) January 11–17. At this conference, she was able to network internationally with researchers in her field and disseminated her research program and new position with the VMNH. Sessions included exciting research at the forefront of systematic research, model development and evolution.

Dr. Kuhn had an abstract accepted to the Joint Meeting of Ichthyologists and Herpetologists (JMIH) 2023 in Norfolk, VA (July 12–16). Her talk, entitled "*Historical climate change structures contemporary patterns of diversity in widespread insular snakes*" will discuss her postdoctoral work that uses genomic data to model speciation and co-demographic scenarios. The goals of this conference will be networking, disseminating her research program and the programs of the VMNH, and attending conference talks on relevant research in herpetological phylogenetics and phylogeography.

Dr. Kuhn had an abstract accepted to the Joint 2023 Annual Evolution Meeting in Albuquerque, NM that will take place June 26–30. The goals of this conference will be networking, disseminating her research program at the VMNH, and attending conference talks on relevant research in evolutionary genomics, comparative phylogeography and biogeography.

Dr. Kuhn had an abstract accepted to the Annual Meeting for the Society for the Preservation of Natural History Collections (SPNHC) in San Francisco, CA for a talk entitled *“How a small state Natural History Museum is making big strides to meet the educational needs of rural Virginia”*. The goals of this conference will be networking with other museum professionals, enhancing visibility of the VMNH and its collections, and participating in training workshops to bolster collections management resources at the VMNH.

Professional development

Drs Kuhn, Moncrief and Hightower (VMNH) completed training of the new Biology Research Technician (M. Boyd) to facilitate the curation, mobilization and digitization of the vertebrate biology collections.

Dr. Kuhn and M. Boyd received on-site training in best practices for state herpetology collection management and curation by Herpetology Curator B. Stuart and ichthyology Collections Manager G. Hougue at the North Carolina State Museum of Natural Sciences (NCMNS). This meeting is part of an ongoing and new collaboration between the herpetology departments of the VMNH and the NCSM for research and training.

Dr. Kuhn was appointed Research Adjunct at the North Carolina State Museum of Natural Sciences which will be valid until April 1, 2026 and is renewable upon agreement.

Collections growth and management

Dr. Kuhn is overseeing the acquisition of 25 locally collected herpetological specimens and tissue donations from colleague and research associate J. Gibson (Patrick and Henry County Community College) to the VMNH. The specimen materials will be processed by Dr. Kuhn and M. Boyd, and will contribute to the recently launched Herpetology Frozen Tissue Collection of the VMNH.

M. Boyd is documenting, organizing, and integrating the educational specimens of J. Mitchell into the VMNH collections as a permanent education and outreach resource regarding species uncommon or absent from Virginia. This project will continue to expand the VMNH collections beyond the borders of VA and even include globally distributed species.

Dr. Kuhn and M. Boyd secured educational specimen donations from several institutions that will augment M. Boyd’s project in expanding the educational collections to highlight reptile and amphibians with unique ecological and evolutionary attributes for use in public education and outreach. Currently, these specimens are still being processed and donation paperwork being filed. These donations include both wet, cleared and stained and osteological specimens.

M. Boyd designed and is in the process of executing a new workflow in the Herpetology department to sort, identify, digitize and map unidentified herpetological specimens from former pitfall trap studies to be cataloged in the VMNH collections database. This work will add data for 900+ specimens to the Herpetology collections and produce maps to identify regional strengths and sampling gaps to guide future collection efforts.

Dr. Kuhn and M. Boyd launched the first ever herpetology frozen tissue collection at the VMNH. The collection will serve as a repository for all specimen-associated tissues for use in future studies that utilize molecular resources. Kuhn and Boyd will continue to build this collection through targeted specimen collecting and salvage of DOR individuals.

Grants

Dr. Kuhn and undergraduate student D. Wisniewski (University of Lethbridge) submitted a proposal that was successfully awarded to the Undergraduate Diversity at Evolution Fund to support D. Wisniewski in receiving full funding (\$2,000) to attend the Joint Evolution 2023 Meeting to present their work on amphibian community assembly in North America.

Drs. Kuhn (VMNH) and B. Stuart (NCSM) submitted a Daniel M. Digiacommo Research Fund proposal to the Foundation for the Conservation of Salamanders for funds to support regional work on the systematics of salamanders. The proposal, entitled "*Integrating molecular and morphological data to investigate the enigmatic "southern lineage" of Wehrlei's salamander from the North Carolina-Virginia border*" requested \$5,000 for support of molecular data collection.

Dr. Kuhn submitted a proposal to the Fitzgerald Travel Fund to sponsor her attendance and conference talk at the 2023 Society for the Preservation of Natural History Meetings in San Francisco, CA.

Dr. Kuhn submitted a proposal to the Christine Allen Travel Award to sponsor her attendance and conference talk at the 2023 Society for the Preservation of Natural History Meetings in San Francisco, CA.

Drs. Kuhn and S. Ruane submitted a proposal to the Feay Field Research Fund at the Field Museum of Natural History to sponsor their joint work entitled "*Documenting the Diversity of Reptiles and Amphibians in Madagascar*".

Drs Kuhn (VMNH) and Stuart B (NCSM) are in the process of writing The Herpetologists' League Raymond D. Semlitsch Research Award for funds to support regional work on the systematics of salamanders. The proposal, entitled "*Integrating molecular and morphological data to investigate the enigmatic "southern lineage" of Wehrlei's salamander from the North Carolina-Virginia border*" will request \$5,000 for support of molecular data collection and will be submitted on May 31, 2023.

VMNH education and outreach

Dr. Kuhn gave a VMNH collection and laboratory tour to J. D. Kleopfer, the State Herpetologist of the Department of Wildlife Resources. This meeting also involved a meeting to discuss future collaboration opportunities.

Dr. Kuhn gave a VMNH collection and laboratory tour to AMNH Scientific Herpetology Specialist L. Vonnahme for feedback on organization and best practices for herpetology collection spaces and specimens.

Dr. Kuhn gave a VMNH collection and laboratory tour to four students and a visiting postdoctoral fellow from the University of Florida who will be collaborating with the VMNH to conduct fieldwork in southwest VA on salamander thermal preferences. Dr. Kuhn gave a VMNH collection and laboratory tour to G. Vaconsellos, an Anatomy professor at Virginia Commonwealth University. The tour and future collaboration will explore ways the teaching collections at VMNH can be used in his anatomy courses at VCU.

Drs. Kuhn and Moncrief and M. Boyd gave collections and laboratory tours to The Wildlife Society - Virginia Chapter Conference attendees. Tour groups included students and professors from local Universities as well as state agency employees.

Dr. Kuhn and M. Boyd participated in designing and hosting Herpetology tables at VMNH's Bug Festival. Dr. Kuhn and M. Boyd designed education materials for a herpetology-focused booth, which highlighted species that prey upon invertebrates as well as biological representation of regional herpetofauna. The event, which brought a new audience of both young and adult individuals to the museum and attracted over 1,000+ visitors.

Dr. Kuhn and M. Boyd participated in designing and hosting tables at VMNH's Reptile Festival. Dr. Kuhn and M. Boyd designed education materials for six brand new herpetology booths: frogs & salamanders, snakes (2), lizards, crocodylians, and turtles. These booths highlighted both regional and global diversity in reptiles and amphibians, never before seen high impact specimens from the Herpetology collections, and newly designed educational activities. The two-day event, which brought a new audience of both young and adult individuals to the museum, attracted over 3,000+ visitors. Additionally, M. Boyd established new relationships with regional organizations, such as the the Museum of Science and the Box Turtle Sanctuary, to bring new booth materials and personnel to this event.

Dr. Kuhn gave a talk at the 2023 Reptile Festival Members Reception entitled "*Discovering new species overseas and in Virginia*" to highlight her ongoing work in Madagascar as well as new projects commencing in southwest Virginia.

M. Boyd designed 6 unique podium exhibits for the 2023 Reptile Festival Members Reception. These exhibits included large and never before displayed items from the Herpetology Collections, such as a taxidermy black tree monitor and a Galapagos tortoise shell.

Dr. Kuhn gave two public lectures entitled "*Secrets of Salamanders*" at the April 2023 Reptile Festival at the VMNH. Audience members included adults, K-12 and grades 13+ students.

M. Boyd gave a public lecture entitled “*What do Museums DO?*” at the April 2023 Reptile Festival at the VMNH. Audience members included adults, K-12 and grades 13+ students.

Non-VMNH education and outreach

Dr. Kuhn and M. Boyd hosted a Herpetology table at North Carolina State Museum of Natural History (NCMNS) for Reptile and Amphibian Day. Dr. Kuhn and M. Boyd designed education materials for a herpetology-focused booth, which focused on venomous lizards. The event, which brought both young and adult individuals to the museum and attracted over 16,000+ visitors.

Dr. Kuhn participated in a Meet the Scientist zoom interview with Indianapolis Public Schools - New-Comer Program students. These students prepared questions for Dr. Kuhn after reading her online article from Newsela entitled “*Dream Job: Herpetologist*”.

Media

Dr. Kuhn was interviewed on WDBJ7 about the upcoming Reptile Festival at the VMNH. Dr. Kuhn had an article written about her new herpetology program at the VMNH in the Henry County Enterprise about her work at the VMNH as the new Assistant Curator of Herpetology.

Professional Service

Dr. Kuhn served as Associate Editor for the *Herpetological Journal* (the journal of the British Herpetological Society) for an article entitled “*The Natural habitats and impact of human activities on the spatial distribution of Lygodactylus mirabilis (Pasteur, 1962, Geckonidae), an endemic species of the Ankaratra Massif (Madagascar Highlands)*”. Dr. Kuhn served as Associate Editor for the *Herpetological Journal* (the journal of the British Herpetological Society) for an article entitled “*Comparative ecology of Amerotyphlops brongersmianus and Amerotyphlops paucisquamus in the Atlantic Forest northeast Brazil*”.

Dr. Kuhn served as Associate Editor for the *Herpetological Journal* (the journal of the British Herpetological Society) for an article entitled “*Eastern Black Kingsnake (Lampropeltis nigra) dorsal scale coloration is optimized for thermoregulation*”.

Dr. Kuhn reviewed grant proposals for the 2023 Society of Systematic Biologists Graduate Student Research Award.

Dr. Kuhn reviewed a paper for *Heredity* entitled “*A reference genome assembly for the continentally-distributed ring-necked snake, Diadophis punctatus*”.

Dr. Kuhn is serving on the organization committee for the Charles Camp 2023 Meetings to be held at the American Museum of Natural History November 2023.

Dr. Kuhn is serving as counselor for the Virginia Natural History Society.

Teaching

Dr. Kuhn gave a workshop entitled "Phylogeographic Temporal Analysis (PTA): Model based comparative phylogeography with machine learning" at the fifth standalone meeting of the Society of Systematic Biologists (SSB) at the Universidad Nacional Autónoma de México (UNAM) in México City, México with collaborators Isaac Overcast (University of Maine, primary developer) and Ella Vázquez-Domínguez (Instituto de Ecología, UNAM). The workshop was attended by 30 students, postdoctoral fellows, and professionals interested in learning about our new methodological approach developed for application in the field of comparative phylogeography using genomic data.

Dr. Kuhn and M. Boyd designed a new teaching workflow in the Herpetology department to sort, identify, digitize and map unidentified herpetological specimens from former pitfall trap studies that will be taught to two interns summer 2023 to facilitate a hands-on educational experience in the VMNH collections aimed at expanding the Herpetology Database and Record Files. This work will add data for 900+ specimens to the Herpetology collections and produce maps to identify regional strengths and sampling gaps to guide future collection efforts.

Dr. Kuhn gave an invited talk to the student chapter of The Wildlife Society at Radford University, Radford, VA on March 17, 2023. Her talk entitled "*A window into the past informs species preservation in the future – lessons from reptile and amphibian genomes*" explored some of her previous research that documented and described herpetological biodiversity in Madagascar, as well as a discussion of her career, advice for students interested in careers in biology, and her research journey. The talk was attended by graduate and undergraduate students across several departments with several students following up with Dr. Kuhn via email for career advice.

Dr. Kuhn gave a lecture to the local chapter of the Virginia Master Naturalists on regional herpetofauna and snake identification on February 21. This webinar, entitled "*Life is short but Virginia snakes are long*" was attended virtually by 60+ Master Naturalists.

Dr. Kuhn is designing a hands-on educational activity for the Lynchburg Governor's School that shows how dichotomous keys can be used in species identification using real specimens from the Herpetology Collections. This activity will take place on July 19th, 2023.

Research and Collections

Jill K. Harris, Registrar

Fifteen (15) collections acquisitions were recorded for 60 vials and over 2,098 specimens. These specimens were added to the invertebrate zoology, paleontology, archaeology, and mammal collections.

Five (5) outgoing loans were recorded this quarter from the paleontology and invertebrate zoology collections. Loans were made to: Clemson University, University of Indianapolis, Virginia Tech, and West Liberty University.

This quarter, Ms. Harris has concentrated on an assessment/inventory of taxidermy specimens, including researching, maintaining, and updating the spreadsheet data for said inventory.

Haley Cartmell, Collections Manager

Curators and staff modified/updated 578 existing records and added 458 new records to the VMNH collections databases Proficio (all museum collections) and EGEMS (paleontological collections only).

Ms. Cartmell and Ms. Harris completed taxidermy inventory in February 2023. Ms. Harris is working with Dr. Moncrief to compile a report on the status of taxidermy mounts both at Starling Ave. and Douglas Ave. sites.

**VIRGINIA MUSEUM OF NATURAL HISTORY
RESEARCH AND COLLECTIONS ACTIVITIES**

**Report to the Board of Trustees
October-December 2022**

**Kaloyan Ivanov, Ph.D.
Associate Curator of Invertebrate Zoology**

- Drs. Ivanov and Means, and colleagues' manuscript "Three new species of the Amazonian millipede genus *Leptherpum* (Polydesmida: Chelodesmidae)" was recently published at *Zoologia*.
- Drs. Ivanov and Means, and colleagues' manuscript "Worldwide distribution of cave-dwelling Chelodesmidae (Diplopoda, Polydesmida)" was recently published at *International Journal of Speleology*.
- Dr. Ivanov and colleagues from Virginia Tech have a manuscript in review at *Ecosphere*.
- Drs. Ivanov and Means, and colleagues have manuscripts in review at *European Journal of Taxonomy* and *Biodiversity and Conservation*.
- Using recently awarded funds from the Institute of Museum and Library Services, Dr. Ivanov, Curator of Mammals Dr. Nancy Moncrief, Deputy Director Ryan Babrber, and Education Manager Christy Deatherage spearheaded efforts in establishing VMNH's new multidisciplinary Microscopy Lab.
- Dr. Ivanov participated in VMNH's Bonez & Booz Halloween and Fall Festival and interacted with 500+ visitors.

Research & Collections

Drs. Ivanov and Means (VMNH), R. Bouzan, Drs. A. D. Brescovit and L. F. M. Iniesta (Instituto Butantan, Brazil) and T. M. Almeida's (Instituto Nacional de Pesquisas da Amazônia, Brazil) paper "Three new species of the Amazonian millipede genus *Leptherpum* (Polydesmida: Chelodesmidae)" was published in the Sociedade Brasileira de Zoologia journal *Zoologia*.

[Bouzan, R. S., J. C. Means, K. Ivanov, T. M. de Almeida, A. D. Brescovit, and L. F. M. Iniesta 2022. Three new species of the Amazonian millipede genus *Leptherpum* (Polydesmida: Chelodesmidae). *Zoologia* 39(2): 222020. <https://doi.org/10.1590/S1984-4689.v39.e22020>]

Drs. Ivanov and Means, R. Bouzan, Drs. A. D. Brescovit and L. F. M. Iniesta, and Dr. R. L. Ferreira's (Universidade Federal de Lavras, Brazil) paper "Worldwide distribution of cave-dwelling Chelodesmidae (Diplopoda, Polydesmida)" was published in the *International Journal of Speleology*.

[Bouzan, R. S., J. C. Means, K. Ivanov, R. L. Ferreira, A. D. Brescovit, and L. F. M. Iniesta. 2022. Worldwide distribution of cave-dwelling Chelodesmidae (Diplopoda, Polydesmida). *International Journal of Speleology* 51(3): 235-248. <http://dx.doi.org/10.5038/1827-806X.51.3.2448>]

Dr. Ivanov and Virginia Tech colleagues (former graduate student M. Malone, Drs. R. Schurch and S. Taylor) have a manuscript in review at *Ecosphere*. The work focuses on

the range expansion of the invasive Red Imported Fire Ant, *Solenopsis invicta* Buren, in Virginia. The manuscript also explores the potential spread of this notorious invasive species across the United States using predictive distribution modelling.

Drs. Means and Ivanov, R. Bouzan, Drs. L. F. M. Iniesta and A. D. Brescovit, D. Martinez-Torres (Universidad Nacional de Colombia, Colombia), and L. F. Vasquez-Valverde (Virginia Tech, Virginia) have a manuscript in review at the *European Journal of Taxonomy*. The work reviews the monotypic South American millipede genus *Dibolostethus* (Polydesmida: Chelodesmidae) and includes the description of two new species (one of which from VMNH's invertebrate collections), and a summary of the Chelodesmidae taxa known from the Tropical Andes Biodiversity Hotspot.

Drs. Ivanov and Means, R. Bouzan, Drs. A. D. Brescovit and L. F. M. Iniesta have a manuscript in review at *Biodiversity and Conservation*. The work is the first study to focus on the biogeography of Neotropical Spirostreptida and employs a multi-approach analysis to detect areas of endemism and patterns of distribution of the members of the order in Brazil.

VMNH Research Associate and Clemson University graduate student C. Harden, VMNH Biology Technician L Hightower, and Dr. Ivanov are completing a manuscript (to be submitted to *Subterranean Biology*) on the efficiency of two subterranean trap designs for targeting endogaeic invertebrate taxa in the Appalachian Highlands of the eastern US.

Drs. Ivanov and Yang (Virginia Tech) are working on a manuscript focused on recent additions to Virginia's exotic ant fauna and range expansions of several major invasive ants in the state. The work will also include an annotated checklist of the non-native ant taxa of eastern North America. In support of this project, Drs. Ivanov and Yang conducted fieldwork in the City of Danville, VA, the westernmost known occurrence of the invasive Red Imported Fire Ant, *Solenopsis invicta* Buren, in Virginia.

Drs. Ivanov, Means, Evans, and C. Harden submitted annual reports to the Virginia Department of Conservation and Recreation (incl. Division of Natural Heritage) regarding research activities during the 2022 field season.

This quarter, Dr. Ivanov and colleagues (primarily Dr. Means) conducted fieldwork in Halifax, Mecklenburg, Patrick, Pittsylvania, and Scott Cos in support of ongoing research projects.

VMNH Collections Manager H. Cartmell, with help from Dr. Ivanov, is continuing work on inventorying and cataloging VMNH's Mollusca (mollusks) holdings. Recent work also included the transfer of a large number of dry-preserved unionid (freshwater mussels) specimens from the museum's storage facility at Douglas Ave. Upon processing in the museum's disinfestation chamber, the specimens are currently temporarily stored in VMNH's Dry Biology awaiting curation and incorporation into the museum's holdings.

Dr. Ivanov completed the identification and curation of 690+ backlogged specimens (primarily ants and terrestrial isopods, few cockroaches, crickets, earwigs, et alia), which were (or will be) incorporated into VMNH's invertebrate holdings.

Dr. Ivanov oversaw the acquisition of Diptera expert Dr. B. Steinly insect collection (Miami U, Ohio). The collection, which comprises 23,525 pinned/pointed insects (primarily Ephydriidae and Formicidae), is currently temporarily stored in VMNH's Dry Biology awaiting curation and incorporation into the museum's holdings.

Dr. Ivanov responded to information requests regarding VMNH's invertebrate holdings: Myrmeleontini (Myrmeleontidae; Pit-trapping Antlions) (Yu-Hsiu Lin; Texas A&M U); *Apacheiulus* (Parajulidae; millipedes) (V. Zhuang; U Texas, El Paso)

Dr. Ivanov satisfied a loan request regarding VMNH's invertebrate holdings: 6 lots of Spirostreptida millipedes from Tanzania (Dr. H. Enghoff; Natural History Museum of Denmark)

Using recently awarded funds from the Institute of Museum and Library Services, Dr. Ivanov and museum staff converted an existing, underutilized museum space into a modern multidisciplinary research and education microscopy laboratory. The now fully operational facility welcomed its first students in early December, when a school group of 9-12th graders from Fieldale, VA visited the VMNH to learn more about the microscopic life of the Commonwealth's freshwater habitats.

Education & Outreach

Dr. Ivanov and museum staff participated in VMNH's first-ever Bonez & Booz Halloween and Fall Festival, which offered a variety of one-day-only displays and activities that ranged from invertebrate and vertebrate materials from the museum's collections to live performances, magic shows, and costume contests. The event, which brought a generally new audience to the museum, attracted 2,100 children and adults, including 1,000 EBT card-holders as part of the *Museums for All* program, from Virginia, North Carolina, and four additional states (Florida, Minnesota, South Carolina, and West Virginia). (October 29)

Dr. Ivanov gave a tour of VMNH's exhibits and collections to a group of 25 visitors from Martinsville, VA. (October 22)

Professional Service

Dr. Ivanov and museum staff completed interviews of applicants for the position of Biology Research Technician at VMNH and made final selection in mid-December.

Dr. Ivanov (President and co-Treasurer) and Dr. Moncrief (co-Treasurer and past President) participated in the [virtual] Virginia Natural History Society Executive Committee meeting on 17 December 2022. Among the discussed topics were the election of new officers, construction of new Society website, membership incentives, and time and location of the next general meeting of the Society. (December 17)

Dr. Ivanov copy edited four articles for the Virginia Natural History Society's periodical *Banisteria* (Volume 56, 2022). (completed November 21, 22 and December 30)

Drs. Ivanov and Means are serving as co-editors of VMNH's *Memoirs* series for a manuscript titled "The groundwater isopods of Virginia (Isopoda: Asellidae and

Cirolanidae)" by Dr. J. J. Lewis and colleagues. The manuscript, which was accepted for publication in mid-November, is currently at the copy editing stage.

Nancy D. Moncrief, Ph.D.
Curator of Mammalogy

- A manuscript about Lyme disease emergence in Virginia co-authored by Dr. Moncrief was published by the peer-reviewed journal *Ticks and Tick-borne Diseases*.
- Dr. Moncrief made arrangements to host the Virginia Chapter of The Wildlife Society's annual conference in Martinsville 15-17 February 2023.

Research and Collections

Dr. Moncrief's article about recent patterns of Lyme disease emergence in Virginia and North Carolina was published in the peer-reviewed journal *Ticks and Tick-borne Diseases* in November 2022. The full citation is: Leber, M., N.D. Moncrief, L.J. Gatens, M. Michel, and R. J. Brinkerhoff. 2022. Use of mammalian museum specimens to test hypotheses about the geographic expansion of Lyme disease in the southeastern United States. *Ticks and Tick-borne Diseases*: 13(6), 102018.

[.https://doi.org/10.1016/j.ttbdis.2022.102018](https://doi.org/10.1016/j.ttbdis.2022.102018) For this study, Dr. Moncrief and her colleagues used museum specimens to document the recent pattern of Lyme disease emergence in Virginia and North Carolina. Specifically, they screened ear clips from study skins of white-footed deermice (housed at VMNH and NCMNS) for DNA from the Lyme disease pathogen.

Throughout the quarter, Dr. Moncrief continued her collaboration with Dr. John Scheibe (Professor Emeritus of Biology at Southeast Missouri State University). They previously published an article describing geometric morphometric comparisons of the jaws of several tree squirrel species. For the current work, they are using the extensive collection of squirrel specimens in the VMNH Mammal Collection to study geographic variation in eastern gray squirrels and eastern fox squirrels. Ms. Liberty Hightower photographed hundreds of squirrel jaws for Drs. Moncrief and Scheibe, and she will participate in the analyses.

Also, throughout the quarter, Dr. Moncrief continued working with Mss. Hightower, Cartmell, and Harris to prepare, install, document, and organize traditional specimens and frozen tissues of mammals and birds and their accompanying museum documents (electronic and hardcopies). In particular, they made numerous edits to electronic databases for the mammal and bird collections.

Professional Service and Other Duties

Throughout the quarter, Dr. Moncrief met with several members of the Virginia Chapter of The Wildlife Society to plan the Chapter's annual conference, which will take place 15-17 February 2023 in Martinsville. Workshops and technical presentations will occur at New College Institute, and the annual dinner will be held at VMNH on 16 Feb 2023. Attendance for this conference averages 125 members and includes professionals from multiple state and federal agencies as well as faculty members and students from

several Virginia colleges and universities (including Radford, George Mason, Virginia Tech, Bridgewater, Randolph Macon, and Richmond).

Dr. Moncrief continued serving on the Council of the Virginia Natural History Society (VNHS). She also continued serving (with Dr. Ivanov) a four-year term (ends December 2022) as Co-Treasurer.

Scientific Programs, Exhibits, and Other Activities

In October, Dr. Moncrief participated in VMNH's Bonez and Booz Festival. She worked at the admissions table for VMNH and ASTC members with Ms. Charlotte Harter.

Also in October, Dr. Moncrief recorded a VMNHcast episode with VMNH Science Administrator Mr. Ben Williams. She discussed findings of her study of Lyme disease emergence in Virginia and North Carolina. This research was possible because several hundred specimens of white-footed mice in the VMNH mammal collection were collected before 1990, which is the year Lyme disease was first reported in Virginia. The recording can be found here:

https://open.spotify.com/show/39SacT3Cby9kOowL0XIW2C?go=1&sp_cid=10b2e99f5053c5c5b15408e0f63f480d&utm_source=embed_player_p&utm_medium=desktop&nd=1

Throughout the quarter, Dr. Moncrief worked with other VMNH R&C staff to screen applications and interview candidates for the new Biology Research Technician position.

Hayden Bassett, Ph.D.
Assistant Curator of Archaeology

NOTE: Dr. Hayden Bassett was suddenly called up for six weeks of Army Reserve training and did not have time to submit a summary for this quarter. His summary will be included in the next quarter's board report.

Adam Pritchard, Ph.D.
Assistant Curator of Paleontology

- Dr. Pritchard submitted to and now has a paper in press with the journal *Anatomical Record*, describing new fossil limb bones and the comparative anatomy of reptile thighs. The project is a collaboration with scientists from Virginia Tech, Stony Brook University, SUNY Oswego, University of Utah, and the Natural History Museum of Los Angeles.
- Dr. Pritchard submitted a grant to the National Science Foundation in collaboration with Dr. Ray Bernor, a professor at Howard University and a VMNH Research Associate. The grant would focus on development of horse-centered collections development, educational program, and a fully funded special exhibit in 2026.
- Dr. Pritchard presented on his research and VMNH reptile fossil collections as part of the Virginia Tech Department of Geosciences seminar series. The audiences included a large number of undergraduate students, graduate students, and faculty.
- Dr. Pritchard provided collections tours to a wide array of audiences including university students from the University of Lynchburg and Virginia Tech, an elementary school group from the Pamunkey Regional Library, and the board of directors of the New College Institute. He also provided specimen-based displays for hundreds of museum visitors at the “Bonez and Booz” festival event in October.

Research & Collections

Dr. Pritchard collaborated with co-authors Sterling Nesbitt, Michelle Stocker, Alan Turner, Jennifer Olori, Nathan Smith, and Randall Irmis on a scientific paper describing the first thigh bones of drepanosaurs, an enigmatic group of extinct, chameleon-like reptiles. The paper provided the first detailed comparisons of thigh anatomy in many primitive reptile groups. It has been accepted for publication in the journal *Anatomical Record* in Q1 2023.

Dr. Pritchard appointed a new research and collections intern. She is currently working on cataloging plant fossils for the EGEMS collections database. They have also collaborated on a new research project, studying variation in the backbones of an extinct sea snake species from Virginia, *Palaeophis*.

Dr. Pritchard oversaw research visits from an amateur paleontologist studying the ancient reptile collections and a Howard University professor studying the ancient mammal holdings.

Dr. Pritchard developed a new collections workstation for paleontology. The workstation includes a new, high-powered HP computer setup, the Filemaker Pro software for collections databasing, and a RAID array for constant backups of the database.

Dr. Pritchard continued developing three-dimensional renderings of the early pterosaur *Arcticodactylus* for a collaboration with scientists at Virginia Tech and Yale.

Dr. Pritchard worked with Drs. Nancy Moncrief and Alex Hastings on the Petra the Cave Cat project. He did extensive comparative study with modern and fossil cat species to help refine the species identity of Petra. He also worked with technician Lucy Treado on the continued preparation of the fossil and the identification of a bone fragment for carbon dating. They submitted the fragment to the Beta Analytics corporation, which is performing the dating.

In coordination with the Calvert Marine Museum, Dr. Pritchard prospected a newly identified Permian (290 million year old) fossil site in Allegany County, Maryland.

Education & Outreach

As part of the Virginia Tech Geosciences Seminar Series, Dr. Pritchard presented on his research on ancient reptiles and ongoing field projects run by the VMNH.

Dr. Pritchard presented collections tours to classes from the University of Lynchburg, Virginia Tech, and the Pamunkey Regional Library. He also presented a hybrid collections/exhibits tour for the board of the New College Institute.

Dr. Pritchard and Paleontology Technician Lucy Treado developed the “Frankensaurus” display for the “Bonez and Booz” festival hosted by the VMNH for the Halloween season. The display focused mistakes by early scientists, who combined the bones of many animals into hybrid creatures that never actually existed. The display is intended to show the process and progress of science to a general audience.

Dr. Pritchard assisted in the identification of over a dozen fossils found by Virginia residents.

Grants & Funding

Dr. Pritchard submitted a National Science Foundation Excellence-in-Research grant in collaboration with a Howard University team including Drs. Ray Bernor, Salman Rahmat, and Omar Cirili. The grant would provide a subaward of over \$70,000 for the VMNH to develop a fossil horse comparative collection (3D-printed) and a fully-funded special exhibit on horse evolution.

Dr. Pritchard continued the molding and casting program by VMNH paleontology, selling cast specimens of Virginia fossil vertebrates to the Museum of York County in Rock Hill, SC.

Exhibits

Dr. Pritchard worked with Research Associate Bill Schmacenberg on a computer game-based simulation of a Jurassic ecosystem, featuring a wide range of accurate dinosaurs, other animals, and plants. The display is intended for presentation as part of 2023 events at the VMNH.

Arianna Kuhn, Ph.D.
Assistant Curator of Herpetology

- Dr. Kuhn and colleagues submitted a paper for review at Ecology and Evolution.
- Dr. Kuhn and colleagues had a paper accepted in the Biological Journal of the Linnean Society.
- Drs Kuhn and colleagues have a manuscript in review at Molecular Ecology Resources.
- Dr Kuhn and colleagues submitted a grant application to the Foundation for the Conservation of Salamanders
- Dr. Kuhn gave an invited seminar at Villanova University for the Biology Departmental Fall Seminar Series.
- Dr. Kuhn gave an invited talk at the Fall 2022 Virginia Herpetological Society meeting.
- Dr. Kuhn is serving as the Associate Editor for Herpetological Journal.
- Dr. Kuhn is serving as counselor for the Virginia Society of Naturalists.
- Dr. Kuhn gave a VMNH collections tour to Averett University students in Dr. Herberts' Fall 2022 herpetology class.
- Dr. Kuhn participated in the VMNH festival "Bones and Boos" and interacted with 700+ visitors.

Research & Collections

Drs Kuhn (VMNH), Burbrink FT (AMNH), Ruane S (FMNH), Raxworthy C (AMNH), Rabibisoa NHC (UAntananarivo, Madagascar), and Achille R (UAntananarivo, Madagascar) submitted a paper for review at Ecology and Evolution. The paper uses genomic data and evolutionary modeling to explore the relationship between Speciation rates and formation of population structure using Malagasy Gernsnakes as a case study.

Drs Kuhn (VMNH), Kizirian D (AMNH), Campbell G, Donnelly MA (Florida International University), Overcast I (UMaine), Padijal JM, Povenika R, Quitian M, Saporito R, and Segall M (Natural History Museum in London) had a paper accepted pending minor revision in Biological Journal of the Linnean Society. The review discusses the autocatalytic evolution of mimetic trophic systems.

Drs Kuhn (VMNH), Schiebelhut LM, Guillaume AS, Schweizer RM, Armstrong EE, Beaumont MA, Byrne M, Cosart T, Hand BK, Howard L, Mussmann SM, Narum S, Rasteiro R, Rivera-Colón AG, Saarman N, Sethuraman A, Taylor HR, Thomas GWC, Wellenreuther M, and Luikart G. are working on revisions for a manuscript accepted pending revision at Molecular Ecology Resources that reviews practical guidance in conservation genomics from study design to application.

Drs Kuhn (VMNH), Burbrink FT (AMNH), Ruane S (FMNH), Raxworthy C (AMNH), Rabibisoa NHC (UAntananarivo, Madagascar), Achille R (UAntananarivo, Madagascar) and Overcast I (UMaine) are working on a manuscript that uses genomic data to examine the co-demographic history of snake assemblages on Madagascar using newly developed phylogeographic methods developed by Overcast. The target journal for this manuscript submission is Molecular Ecology.

Drs Kuhn (VMNH), Lee-Yaw J (UOttawa) and Weisrock D (UKentucky) are analyzing data and preparing a manuscript and provincial report resulting from Dr Kuhn's postdoctoral research that uses genomic data to provide critical insights in the guidance of successful amphibian reintroductions. This work integrates spatial, ecological, and genomic data with careful study design to provide the best opportunity for successful protected species' reintroductions. The target journal for this manuscript is Biological Conservation.

Drs Kuhn (VMNH), Lee-Yaw J (UOttawa), and Weisrock D (UKentucky) along with Master's student Hunter D (ULethbridge) are working data analysis and manuscript are analyzing data and preparing a manuscript and provincial report resulting from Dr Kuhn and D Hunter's field and laboratory work at the University of Lethbridge and Waterton Lakes National Park in southwest Alberta, Canada. This research uses genomic data and occupancy modeling to investigate the impact of an extreme fire in a national park on genetic diversity over space and time for small terrestrial vertebrates. The target journal for this manuscript is Conservation Biology.

Drs Kuhn (VMNH), Lee-Yaw J (UOttawa) and Weisrock D (UKentucky) are analyzing data and preparing a manuscript resulting from Dr Kuhn's postdoctoral research that uses genomic data to understand the role of refugial dynamics in driving intraspecific amphibian divergence in the Pacific northwest. The results of this study will underscore the importance of wide-ranging taxa to understanding the role of LGM dynamics in promoting amphibian diversity in this region which has been understudied from a phylogeographic perspective. The target journal for this manuscript is Journal of Biogeography.

Drs Kuhn (VMNH), Bauer AM (VillanovaU), Jackman T (VillanovaU), and Brennan I (Natural History Museum in London) are working to finalize a manuscript entitled "Rhoptropus day geckos support the antiquity of the Namib". This study identified several new species from Angola and Namibia, and estimates the diversification history and speciation of endemic terrestrial Namib day geckos from the pro-Namib region. The diversification of this group provides insight into the role of historical climate change in shaping regional biodiversity in the Namib Desert. The target journal for this manuscript is the Biological Journal of the Linnean Society.

Dr. Kuhn gave an invited seminar at Villanova University in southeast Pennsylvania. Her talk entitled "A window into the past informs species preservation in the future – lessons from reptile and amphibian genomes" explored some of her previous research which integrates genomic, morphological, and ecological data from museum tissue and specimen collections across spatial, temporal, and taxonomic levels to document and describe biodiversity in Madagascar, and discussed how these techniques will apply to her new research program in southwest VA. The seminar was attended by faculty, graduate, and undergraduate students in the biology department and was well-received and sparked many exciting discussions about her new position.

Dr. Kuhn was invited to give the departmental seminar at the Field Museum of Natural History in Chicago to disseminate her work on the conservation genomics of Long-Toed Salamanders in the Pacific Northwest. The seminar is scheduled for April 3rd, 2023.

Dr. Kuhn was invited to give the departmental seminar on April 3, 2023 at James Madison University to disseminate her work on the conservation genomics of long-toed salamanders in the Pacific Northwest and applications to this design for Appalachian salamanders. The seminar is scheduled for March 31.

Dr. Kuhn gave an invited talk at the Virginia Herpetological Society Fall meeting in Richmond VA. Her talk entitled “Understanding historical change to predict the future of biological communities” discussed her postdoctoral and doctoral work that uses genomic data to model speciation and co-demographic scenarios. At this meeting, she had the opportunity to network with prominent herpetologists involved in regional research from the Department of Wildlife Resources, Virginia Tech, Liberty University and James Madison University.

Dr. Kuhn attended the North Carolina Herpetology Society (NCHS) Fall meeting. The goals of this conference are networking, disseminating her research program and the VMNH, and attending conference talks on relevant research in phylogenetics and phylogeography. Dr. Kuhn registered to attend a conference at the Universidad Nacional Autónoma de México (UNAM) in México City, México for the Annual standalone meetings for the Society of Systematic Biologists (SSB). The goals of this conference are networking, disseminating her research program and the VMNH, and attending conference talks on relevant research in phylogenetics and phylogeography.

Dr. Kuhn submitted an abstract to Wildlife Society – Virginia Chapter Meetings that will take place at the VMNH on February 14–16, 2023. This presentation will introduce her research on the practical use of genomic data to provide critical insights in the guidance of successful amphibian reintroductions in North America to a highly applicable audience of wildlife and conservation biologists.

Drs Kuhn, Ivanov, Means, Moncrief and Hightower (VMNH) interviewed and hired a new biology research technician to facilitate the curation, mobilization and digitization of the vertebrate biology collections. The technician, M. Boyd, has extensive expertise in collections based management and research at the Smithsonian National Museum of Natural History (NMNH). He will begin training for this position on Jan. 9, 2023.

Dr. Kuhn visited the North Carolina State Museum of Natural History (NCSM) in Nov, 2023 for training in best practices of state herpetology collections management and curation by B. Stuart. This meeting also served to launch a collaboration between the herpetology departments of the VMNH and the NCSM. Dr. Kuhn visited the American Museum of Natural History (AMNH) in Nov, 2023 to attend a meeting on ancient DNA methods and discuss ongoing projects that investigate snake biodiversity and evolution and future collaborations with curator F. Burbrink on North American snake evolution.

Dr. Kuhn is overseeing the acquisition of locally collected herpetological specimens and tissue donations from colleague and research associate J. Gibson (Patrick and Henry County Community College) to the VMNH. The specimen materials will be processed by Dr. Kuhn and new biology research technician M. Boyd, and will represent the first herpetological tissues accessioned in the VMNH collection.

Dr. Kuhn (VMNH) and collaborator N. Claunch (University of Florida) will be launching a new project aimed at conduct spatial analyses to assess which species, genera, or

families may be most at risk of contracting fungal infections based on local thermal environment, similarity of thermal preferences to the pathogen's documented optimal thermal environment and susceptibility to Bsal in laboratory infection trials. In this study, comparative methods will be used to assess whether plasticity may drive diversification through thermal niche partitioning among species. Data collection and training for field methodologies will commence in late February, with targeted field work taking place in mid-March of 2023. When completed, this publicly available data will be used for other studies, such as responses to climate change, responses to different diseases, or evolutionary relationships driving thermal niches.

Education & Outreach

Dr. Kuhn, along with M. Gunter-Basset and L. Treado gave a VMNH collections tour to 18 Averett University students in Dr. Herberts' Fall 2022 herpetology class. This is the first time this yearly course has been connected with the VMNH, and several students expressed interest in future internships with the collections.

Dr. Kuhn and museum staff participated in VMNH's Bonez and Booz Festival, which offered a variety of one-night-only displays that ranged from invertebrate to vertebrate materials from the museum collections.

Dr. Kuhn designed education materials for a herpetology focused booth, which highlighted skeletal adaptations and biological representation of regional herpetofauna. The event, which brought a new audience of both young and adult individuals to the museum and attracted over 2,000+ visitors.

Dr. Kuhn is working to prepare new herpetology signage and displays for the annual Bug Fest at the VMNH taking place Jan. 28, 2023. This display will highlight both global diversity in reptiles and amphibians of interest and explore invertebrate dietary specialization in regional reptile and amphibian taxa.

Dr. Kuhn is preparing a lecture and workshop on regional herpetofauna and snake identification for the local chapter of the Virginia Master Naturalists. This webinar will take place on zoom this February. Dr. Kuhn visited the North Carolina State Museum of Natural History (NCSM) in Nov, 2023 to acquire a donation of herpetological education specimens to use in her outreach program at the VMNH. These donations include both wet and osteological specimens.

Dr. Kuhn and collaborator N. Claunch (University of Florida) are preparing materials to use illustration to bring awareness to the conservation threats of southwest Appalachian salamanders by creating downloadable coloring pages with lesson plans for use in early education courses in English and Spanish, publicized and made accessible to educators through the Florida Museum's online Learning Resources and the VMNH education program. The illustrations will be integrated into informational posters and brochures that will be made available for public use by nature centers, parks, and science classrooms.

Media

Dr. Kuhn was interviewed and had an article written about her new herpetology program at the VMNH in the Martinsville Bulletin.

Dr. Kuhn was interviewed by Research and Collections administrator B. Williams to prepare a herpetology-focused podcast for the VMNHcast.

Dr. Kuhn was interviewed by the Henry County Enterprise newspaper for an article about her work at the VMNH as the new Assistant Curator of Herpetology.

Dr. Kuhn presented the goals of the new Herpetology lab at the VMNH to the VMNH Board of Trustees in October 2022.

Professional service

Dr. Kuhn has accepted a position as Associate Editor for the Herpetological Journal (the journal of the British Herpetological Society). Together with the board of editors, she is helping to increase focus on leading female academics as well as overall increased diversity and representation in the herpetological sciences.

Dr. Kuhn has accepted a new role serving as counselor for the Virginia Natural History Society.

Dr. Kuhn reviewed a paper for Molecular Phylogenetics and Evolution on the evolution of scincid diversity and speciation on Madagascar. The publication is now available online.

Dr. Kuhn has helped to prepare a workshop she will be co-presenting entitled "Phylogeographic Temporal Analysis (PTA): Model based comparative phylogeography with machine learning" at the fifth standalone meeting of the Society of Systematic Biologists (SSB) at the Universidad Nacional Autónoma de México (UNAM) in México City, México with collaborators Isaac Overcast (University of Maine, primary developer) and Ella Vázquez-Domínguez (Instituto de Ecología, UNAM). The workshop will be attended by students, postdoctoral fellows, and professionals interested in learning about our new methodological approach developed for application in the field of comparative phylogeography using genomic data

Research and Collections

Jill K. Harris, Registrar

Eighteen (18) collections acquisitions were recorded for over 23,850 specimens. These specimens were added to the invertebrate zoology, paleontology, archaeology, and mammal collections.

Three (3) outgoing loans were recorded this quarter from the department of education, paleontology, and invertebrate zoology collections. Loans were made to: Reynolds Homestead Forest Research Center, Duke University Lemur Center, and the Natural History Museum of Denmark (University of Copenhagen).

In efforts to standardize electronic data within the collections management database, Ms. Harris modified one or more fields in approximately 2,730 electronic records.

Haley Cartmell, Collections Manager

Curators and staff modified/updated 5,394 existing records and added 1,225 new records to the VMNH collections databases Proficio (all museum collections) and EGEMS (paleontological collections only).

Ms. Cartmell and Ms. Harris began taxidermy inventory in December 2022 and will continue this inventory in 2023.

# of Activities	TYPE OF ACTIVITY	PROFESSIONALS AND 13+ STUDENTS	K-12 STUDENTS	K-12 TEACHERS	PUBLIC			TOTAL #	
7	Conference presentations (A)	1124	0	0	0			1124	
2	Meetings chaired (B)	6	0	0	0			6	
14	Review documents/manuscripts (B)	43	0	0	0			43	
7	Requests for information about collections (C)	65	0	0	0			65	
13	Visiting researcher (C)	13	0	0	0			13	
4	Collections tours (D)	12	0	0	0			12	
1	Lab Tours (D)	8	0	0	0			8	
1	Receptions	7	5	0	25			37	
7	Responses to requests for information about specimens at VMNH (D)	1	0	0	6			7	
4	Lectures and presentations at VMNH (D)	9	28	0	110			147	
0	Technical consultations (B, D, & E)	0	0	0	0			0	
9	Display table with specimens	155	334	20	453			962	
3	Off-site education programs	135	100	10	151			396	
1	Lectures Not at VMNH (E)	25	0	0	0			25	
3	Off-site presentations (E)	114	0	0	20			134	
6	Field trips/Field Work	6	0	0	8			14	
82	TOTALS							2993	

TOTAL # INDIVIDUALS SERVED

2993

PEOPLE SERVED DATABASE printed 1/13/2023
Summary

# of Activities	TYPE OF ACTIVITY	PROFESSIONALS AND 13+ STUDENTS	K-12 STUDENTS	K-12 TEACHERS	PUBLIC			TOTAL #	
0	Conference presentations (A)	0	0	0	0			0	
1	Meetings chaired (B)	8	0	0	0			8	
3	Review documents/manuscripts (B)	4	0	0	0			0	
2	Requests for information about collections (C)	2	0	0	0			2	
0	Visiting researcher (C)	0	0	0	0			0	
0	Collections tours (D)	0	0	0	0			0	
1	Lab Tours (D)	0	0	0	25			25	
0	Receptions	0	0	0	0			0	
0	Responses to requests for information about specimens at VMNH (D)	0	0	0	0			0	
0	Lectures and presentations at VMNH (D)	0	0	0	0			0	
0	Technical consultations (B, D, & E)	0	0	0	0			0	
6	Display table with specimens	0	0	0	2100			2100	
0	Off-site education programs	0	0	0	0			0	
0	Lectures Not at VMNH (E)	0	0	0	0			0	
1	Off-site presentations (E)	0	0	0	1125			1125	
0	Field trips/Field Work	0	0	0	0			0	
0	TOTALS							3260	

TOTAL # INDIVIDUALS SERVED

3260