News

NEW STUDY VALIDATES FOUR SPECIES DESIGNATIONS AND DESCRIBES THREE NEW SPECIES OF *CYCLOPES*

The taxonomy of *Cyclopes didactylus* is marked by a confusing history of new names, with few or no references to types, and new subspecies without any verified geographic correspondence. Our Specialist Group member Flávia Miranda and colleagues reviewed the taxonomy of the genus *Cyclopes* using an integrative approach that combines morphological, morphometric and molecular data.

In their paper entitled “Taxonomic review of the genus *Cyclopes* Gray, 1821 (Xenarthra: Pilosa), with the revalidation and description of new species”, which was published online on December 11, 2017 in the Zoological Journal of the Linnean Society, they aim to clarify many issues concerning the taxonomy, distribution and conservation status of the valid taxa and describe new previously unrecognized species for the genus.

The authors of this very detailed study examined a total of 287 specimens of *Cyclopes*, including skins and skulls, housed in 20 natural history collections and 33 samples for molecular analyses. Based on evidence provided by molecular phylogenetics using mitochondrial and nuclear DNA, allied with coalescent species delimitation analyses, diagnostic characters of the skull, color patterns and structures of pelage, they suggest that the genus *Cyclopes* comprises at least seven species. Four previous species designations are considered valid: *Cyclopes didactylus* (Linnaeus, 1758); *C. ida* Thomas, 1900; *C. catellus* Thomas, 1928; and *C. dorsalis* (Gray, 1865). In addition, three new species are described: *Cyclopes thomasi*, *C. rufus*, and *C. xinguensis*. The results presented in this

paper increase the number of extant Xenarthra species from 30 to 36. They have large implications for the conservation status and management practices of silky anteaters.

Miranda, F. R., D. M. Casali, F. A. Perini, F. A. Machado & F. R. Santos (in press). Taxonomic review of the genus *Cyclopes* Gray, 1821 (Xenarthra: Pilosa), with the revalidation and description of new species. Zoological Journal of the Linnean Society. <https://doi.org/10.1093/zoolinnean/zlx079>.

MANUAL DE MANEJO, MEDICINA Y REHABILITACIÓN DE LOS PEREZOSOS

El objetivo del trabajo en común en América Latina debería ser el de compartir experiencias y habilidades con el fin de mejorar un área profesional. Las contribuciones del extranjero, en inglés y basadas en experiencias zoológicas y ambientes controlados, hacen poco por contribuir a nuestro conocimiento de la problemática Latinoamericana y sus posibles soluciones. Esto es particularmente cierto en el caso de la medicina zoológica.

Con la publicación y distribución gratuita y desinteresada del Manual de Manejo, Medicina y Rehabilitación de los Perezosos, los Drs. Camila

Dünner Oliger y Gabriel Pastor Nicolai se colocan dentro de un grupo selecto y pequeño de contribuidores al campo de la medicina y cuidado de xenartros; aquellos que en realidad desean contribuir y avanzar el campo profesional sin aspavientos ni interés personal.

El manual es sumamente completo, actualizado, y ha sido revisado extensamente por miembros del grupo de especialistas en hormigueros, perezosos y armadillos de la IUCN SSC, así como por otros expertos en medicina de perezosos. Las abundantes gráficas e imágenes son nítidas, claras y ayudan a entender los diferentes temas a profundidad. A la fecha este es el primer manual de su clase para este Orden, y una magnífica y generosa contribución al medio.

El manual tiene los siguientes capítulos: Taxonomía y distribución; características anatómicas y biológicas; rehabilitación; mantenimiento en cautiverio; alimentación en cautiverio; inmovilización y anestesia; medicina preventiva; hematología y patología clínica; enfermedades; y terapéutica. Los capítulos son de fácil lectura y presentan la información esencial de una manera práctica, directa y útil. El clínico que utilice el manual en práctica lo encontrará esencial en el apoyo de su trabajo con estas especies.

Los doctores Dünner y Pastor han logrado una excelente y generosa contribución que avanza el desarrollo del área de la medicina de xenartros.

Dünner Oliger, C. & G. Pastor Nicolai (2017): Manual de manejo, medicina y rehabilitación de perezosos. Fundación Huálamó, Chile (<http://www.hualamo.org>). 154 pp. Disponible en: <<https://www.hualamo.org/produccion-cientifica-scientific-pr>> y <<http://xenarthrans.org/bibliography/manuals>>

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THE BRAZILIAN THREE-BANDED ARMADILLO FOSTERS THE CREATION OF A STATE PARK IN BRAZIL

In October, the Brazilian three-banded armadillo Conservation Program signed the creation of the Poti Canyon State Park together with the Brazilian government. It is the first time that an endangered species has led to the creation of a Conservation Unit

in the country. This new protected area is located in the municipality of Buriti dos Montes, in Piauí state, and encompasses 6,872 hectares. Here, the Poti river flows along a canyon with walls up to 60 meters high that has its origin in a geological fault cut down over millions of years. In 2016, Associação Caatinga produced a documentary about an expedition to the Poti Canyon in search of the Brazilian three-banded armadillo (<https://youtu.be/6bT8UNfih8Y>).

The three-banded armadillo conservation program is in its second year of execution and has had success in its work and expeditions along the Caatinga. *Tolypeutes tricinctus* is the only cingulate endemic to Brazil, occurring mainly in the semi-arid scrub forests and savannas of the northeastern and central regions of the country. Its congener *T. matacus* is found in western Brazil, Bolivia, Paraguay, and northern and central Argentina.

TALLER DE ACTUALIZACIÓN DE LA LISTA ROJA DE MAMÍFEROS DEL PARAGUAY

Del 20 al 24 de marzo de 2017 se llevó a cabo el Taller de actualización de la Lista Roja de mamíferos del Paraguay. La reunión fue organizada por la Asociación Paraguaya de Mastozoología con el apoyo de la Secretaría del Ambiente y de Itaipu Binacional. Al taller asistieron 25 especialistas de unas 14 instituciones y se contó con la participación y asesoramiento de Arturo Mora, Oficial Senior de Programa en la Oficina Regional para América del Sur de la UICN.

El Taller se desarrolló en la Reserva Biológica Itabo, en Alto Paraná. Durante cuatro días los asistentes disfrutaron de charlas, reuniones de trabajo y muy rica comida que les permitieron actualizar los estatus de conservación de los mamíferos del Paraguay. La dinámica del taller consistió en varias reuniones nucleadas según el grupo taxonómico, las cuales consistían de dos o tres coordinadores y un número variable de especialistas. Para establecer los estatus de conservación se siguieron los lineamientos para evaluaciones regionales propuestos por UICN.

Agustín M. Abba, Autoridad de Lista Roja del Grupo de Especialistas en Hormigueros, Perezosos y Armadillos de la IUCN SSC, fue invitado a participar en el Taller debido a su amplia experiencia en la aplicación de las categorías y criterios de la Lista Roja de Especies Amenazadas de la UICN. Coordinó los

grupos de micromamíferos (roedores, marsupiales y quirópteros), dio una charla general sobre los xenartros del Paraguay y participó como especialista en la reunión donde se evaluaron las 13–14 especies de armadillos y osos hormigueros presentes en el nombrado país.

Luego de la evaluación de los xenartros, 11 de las 13 especies quedaron fuera de las categorías de amenaza propuestas por la UICN (10 Preocupación Menor -LC- y una Datos Insuficientes -DD-), pero es de destacar que casi todas tienen problemas para su supervivencia en estado silvestre que las puede llevar a extinciones locales en corto o mediano plazo. Las dos especies amenazadas fueron el oso hormiguero (*Myrmecophaga tridactyla*) que fue categorizado como Vulnerable (VU A4ac) y el tatú carreta (*Priodontes maximus*) que quedó como En Peligro (EN A4c). *Dasypus septemcinctus* no fue evaluada ya que hay dudas sobre su presencia en el Paraguay.

Las principales amenazas que están sufriendo gran parte de las poblaciones de xenartros del Paraguay son la pérdida, degradación y fragmentación del hábitat principalmente por las actividades agroganaderas, la caza y los atropellamientos en rutas. Asimismo, quedó en evidencia que existe aún mucho desconocimiento de la situación de sus poblaciones y de aspectos básicos de su biología en el país, como su dieta, distribución o su ámbito de vida, siendo estos datos vitales a la hora de analizar de manera ajustada su estado de conservación y plantear estrategias de conservación.

En estos momentos se está editando un libro con los resultados del taller y fichas de todas las especies que fueron incluidas en una categoría de amenaza.

Para más información visitar <http://asociacion-mastozoologiapy.weebly.com/lista-roja-de-mamiacuteferos-del-paraguay.html> o contactarse con Silvia Saldívar Bellassai (silviass@itaipu.gov.py).

TALLER SOBRE MEDICINA, MANEJO Y CONSERVACIÓN DE XENARTROS

En Córdoba (Argentina), entre el 17-19 de noviembre de 2017, las XXXVI Jornadas de Actualización en Ciencias Veterinarias albergaron el taller sobre medicina, manejo y conservación de xenartros, con énfasis en hormigueros: *Tamandua tetradactyla* y

Myrmecophaga tridactyla. La actualización de los veterinarios tiene un rol fundamental en la valoración del cuidado animal como en la transferencia de nuevos conocimientos y tecnologías al servicio de salud animal, lo cual es un desafío también para los que trabajan con fauna silvestre. Este taller fue coordinado por los directores técnicos del Zoológico de Córdoba Biol. Daniel Villarreal y Med. Vet. David Ortiz, y el Dr. Juan Manuel Busso del Consejo Nacional de Investigaciones Científicas y Técnicas y Universidad Nacional de Córdoba. Por un lado, el taller se relaciona con el trabajo del Zoológico Córdoba para asegurar el cuidado animal por medio de los altos estándares de bienestar animal y favorecer la conservación *ex situ*. Por el otro, el taller constituyó una actividad de transferencia de resultados de la investigación y comunicación pública de la ciencia del Ministerio de Ciencia y Tecnología de la provincia de Córdoba, que procura afianzar el proceso de innovación en la sociedad. En el Zoo de Córdoba, se vienen realizando investigaciones científicas sobre el monitoreo hormonal no invasivo de respuestas de estrés en *T. tetradactyla*. Estos avances se presentaron junto a otros temas en las dos jornadas de presentaciones realizadas por disertantes especialistas: “La importancia de la conservación de los xenartros” por la Dra. Mariella Superina (Mendoza, Argentina), “El proyecto Tamandua: historia, presente y perspectiva en 10 años de trabajo” por la Dra. Flavia Miranda (Belo Horizonte, Brasil), “Contención química y anestesia en xenartros” por el Med. Vet. Gianmarco Rojas (Lima, Perú) y “Proyecto de reintroducción del oso hormiguero gigante en el Parque Iberá” por el Med. Vet. Jorge Peña (Corrientes, Argentina). El taller finalizó con una puesta en común, en la que se procuró que disertantes y asistentes junto a los organizadores discutieran sobre cómo los avances presentados puedan contribuir en la conservación de *T. tetradactyla*, particularmente en Córdoba dado que la administración de fauna silvestre depende de normativas locales. Algunos de los aspectos conversados y consensuados fueron: a) afianzar la comunicación entre las personas que trabajan con la especie en la provincia de Córdoba, para fortalecer los esfuerzos y mejorar la visibilidad de los trabajos (ejemplo: actualizar mapa de distribución de la especie) para la comunidad y para los responsables de la política y la gestión local de la fauna silvestre; b) fortalecer los trabajos en ciencias veterinarias, considerando que los ejemplares alojados en el zoológico pueden ser sujetos de nuevas investigaciones para afianzar la generación de nuevos conocimientos y el entrenamiento de futuros profesionales; y c) trabajar para integrar esfuerzos regionales (a nivel nacional y a nivel Sudamérica) de investigadores que trabajan en diversos aspectos de la biología y medicina de hormigueros para fortalecer la conservación de las especies. Finalmente, los organizadores planean desarrollar una guía de buenas prácticas de manejo *ex situ* para la especie *T. tetradactyla*.

Contacto: Dr. Juan Manuel Busso. IIByT-CONICET y UNC, Córdoba, Argentina. E-mail: jm-busso@conicet.gov.ar y/o Biol. Daniel Villarreal, Director del Zoo Córdoba, Argentina. E-mail: dvillarreal@zoo-cordoba.com.ar

TRACY SUSAN CARTER (1948–2017)

Dr. Tracy Carter died on 4 October 2017 following a long illness. Tracy earned her B.S. in Biology in 1969 from Iowa State University and her M.S. in Zoology in 1972 and Ph.D. in Animal Behavior in 1975 from Michigan State University.

Following a post-doctorate at Michigan State studying American bison, Tracy entered the Peace Corps' Smithsonian Program and served 2 years in Brazil, during which time she taught wildlife conservation at the Federal University of Viçosa. She married Jim Shaw on 28 December 1977, and they returned to Brazil in 1979 to survey wild mammals in the newly established Parque Nacional da Serra da Canastra, with support from the National Geographic Society and Instituto Brasileiro do Desenvolvimento Florestal of Minas Gerais.

Tracy was widely admired for her bold and pioneering research on the giant armadillo in Serra da Canastra, during which she successfully captured, anesthetized, and radio-marked the first adult female—many know the widely published iconic picture of a young, very blonde woman holding this huge female armadillo. Her 1983 publications on burrow use of giant armadillos and three other armadillo species are well known. In 2015, she was the lead author on a comprehensive synthesis on the biology and conservation status of the giant armadillo in *Mammalian Species*. While in Serra da Canastra, Tracy also assisted her husband with early work on the giant anteater, coauthoring several publications on its ecology and behavior.

Tracy served for 38 years as an adjunct faculty member at Oklahoma State University (OSU) in the departments of Zoology and Natural Resource Ecology and Management. She also was the Director of the OSU Museum of Cultural and Natural History for 8 years. Her graduate students often worked at the Tulsa and Oklahoma City zoos on species such as chimpanzees, mandrills, and tapirs. Outside of academia, she particularly valued her 14 years as a Court Appointed Special Advocate (CASA) on behalf of abused and neglected children.

Despite her illness, Tracy and family fulfilled big dreams by traveling to New Zealand, Australia, Alaska, and mostly recently, Madagascar and

Uganda to encounter lemurs and gorillas in the wild. She was an avid reader of biographies and very fond of carousels and bandanas (her collection was given away to the many who attended her memorial service). Tracy had a remarkable sense of humor and an endless storehouse of jokes and puns. We all heard thousands, such as "What did the buffalo mom say to her son? Bye-son!"

Family and friends will sorely miss her radiant and cheerful personality and try to carry forward her deep sense of care for our natural world and global community.

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Thesis abstracts

TAXONOMY OF *CYCLOPES*

Flávia Miranda

The taxonomy of *Cyclopes didactylus* is marked by a confusing history of new names with few or no reference to types, and new subspecies without any verified geographic correspondence. Here we review the taxonomy of the genus *Cyclopes*, using an integrative approach that combines morphological, morphometric, and molecular data. We therefore aim to clarify many issues concerning the taxonomy, distribution and conservation status of the valid taxa, and describe new previously unrecognized species for the genus. We examined a total of 355 specimens of *Cyclopes*, including skins and skulls, housed in 20 Natural History Collections and 33 samples for molecular analyses. Based on evidences provided by molecular phylogenetics using mitochondrial and nuclear DNA allied with coalescent species delimitation analyses, diagnostic characters of the skull, color patterns, and structure of pelage we describe the new species of Silky anteater. The results presented here have huge implications for the conservation status and management practices of the Silky Anteaters. We extended the distribution of *Cyclopes didactylus* southwards to the central Brazilian shield, based on extensive searches for the animal in the wild over the last 13 years and provide an updated distribution map for *Cyclopes* also based on published records.

Miranda, F. 2017. Taxonomia integrativa do gênero *Cyclopes* Gray 1821 (Xenarthra, Pilosa). Doctoral thesis, Dept. Zoologia – Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil. Advisor: Fabrício Rodrigues dos Santos. E-mail: flavia@tamandua.org

SYSTEMATICS OF THE GENUS *DASYPUS*

Anderson Feijó

Dasypus is the most speciose genus of the order Cingulata, including approximately 40% of known living armadillos. Nine species are currently recognized, although comprehensive analyses of the entire genus have never been done. Among the long-nosed armadillos, *Dasypus novemcinctus* exhibits the widest distribution of all living and fossil species, distributed from Argentina to the United States. Despite the broad geographic distribution, it is surprising that its phenotypic variation at a broad geographic scale is poorly known. In fact, studies of spatial and environmental effects are lacking for any xenarthran species. In this thesis, I revise the taxonomy of the genus and explore the spatial and environmental effects on phenotypic variation in the nine-banded armadillo. Three complementary methods were applied to explore morphological datasets obtained from 2126 specimens. The phenotypic variation in *D. novemcinctus* was assessed through size and shape of 705 skulls. The results converge on the recognition of eight living species and three subspecies of *D. septemcinctus*. Size and shape variation in *D. novemcinctus* follows a complex pattern affected by both climate and geography. Spatial variables have stronger effects over the size of the skull, whereas the environmental dataset explains a larger proportion of the shape variation.

Feijó, A. 2017. Sistemática do Gênero *Dasypus* Linnaeus, 1758 (Cingulata). PhD thesis, Universidade Federal da Paraíba, Brasil. Doctorate in Biological Sciences, Universidade Federal da Paraíba, Brasil. Advisor: Dr. Pedro Cordeiro-Estrela.

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SPATIAL AND POPULATION ECOLOGY OF GIANT ANTEATERS

Alessandra Bertassoni

Giant anteaters (*Myrmecophaga tridactyla*) are mammals with a wide range and their populations are threatened by several causes, which have led to the inclusion of the species in international, national and regional Red Lists. This large-sized species feeds exclusively on social insects, thus contributing to ecosystem dynamics. Despite its importance, the species is poorly known, mainly in what concerns the ecological understanding of populations in areas with anthropogenic influence. In this research, the aims were to (i) estimate the home range and core areas of giant anteaters at an Ecological Station with Cerrado habitat influenced by anthropogenic

actions, as well as to investigate the spatial organization of the individuals; (ii) identify the habitats that compose their home ranges and to evaluate multi-scale habitat selection; (iii) test a method of individual identification using camera traps, and use it to analyze population trends. Eight giant anteaters were tracked by GPS-Iridium, seven of them concomitantly from May to September 2015 at Santa Bárbara Ecological Station - SBES. The size of home ranges and core areas were estimated by Minimum Convex Polygon, Kernel and Brownian Bridges. Males had a larger home range and were more active than females. The home ranges of males and females overlapped, however, in low proportions. Males and females were in spatial proximity, recurrently. Savanna was the most used habitat, while *Pinus* and *Eucalyptus* forestry were avoided. To test a method of individual identification, fur marks were used as diagnostic characters in photos taken by 18 camera traps. The population was estimated at 16 giant anteaters and its density at 0.4 ind. / km². The trends of the estimated population were simulated under different scenarios (road-kills, fire, poaching, and a mix of them) that are in the region; and the results were a drastic future to giant anteaters of SBES. The species is, probably, incapable to persist in areas composed only by altered habitats. The low probability of survival of the population calls special attention. Measures to mitigate anthropogenic impacts on the giant anteater should be established and suggestions are given.

Bertassoni, A. 2017. Ecologia espacial e populacional de tamanduá-bandeira (*Myrmecophaga tridactyla*) em Estação Ecológica de domínio Cerrado, São Paulo, Brasil. Doctoral thesis in Animal Biology, Graduate Program in Animal Biology, São Paulo State University (UNESP), Brazil. Advisor: Rita Bianchi. E-mail: alebertassoni@gmail.com

SPATIAL AND TEMPORAL ECOLOGY OF TWO ARMADILLO SPECIES IN MIDWESTERN BRAZIL

Nina Attias

Critical contemporary ecological problems (e.g. predicting how animals might respond to habitat alteration or climate change) require factual knowledge on species biology and ecology. Biological characteristics and ecological functions of elusive burrowing species can be inferred through the study of spatial ecology. Furthermore, even though armadillo behavior is little studied, these imperfect homeotherms provide valuable models for understanding how physiology affects mammalian behavior in response to environmental changes. Here I aim to characterize the biology of two poorly known armadillo species, understand aspects of their ecology and how they respond to environmental changes. Camera traps, VHF and GPS telemetry were used to monitor two species of armadillo (yellow armadillos,

Euphractus sexcinctus, n = 17; and southern three-banded armadillos, *Tolypeutes matacus*, n = 26), at three sites of the Pantanal wetlands, Brazil. In the first section of this dissertation, I used direct observations and footage from camera traps placed in front of shelter locations to describe the sheltering habits of *T. matacus* and compared them to the habits of *T. tricinctus* in northeastern Brazil. I dedicated the second section to exploring the spatial and temporal ecology and the social biology of the little known *T. matacus*. Co-authors and I characterized its activity patterns using a non-parametric model of a conditional circular kernel function. Its habitat selection, in relation to vegetation features and distance to paths, was assessed using Step Selection Functions. Home range areas were estimated through Kernel probabilistic non-parametric models and Minimum Convex Polygon. The static interaction between pairs of individuals was characterized using the Utilization Distribution Overlap Index and the relationship between the movements of these pairs was explored using a Proximity analysis. In the third section, co-authors and I evaluate how variations in activity patterns and habitat selection by *T. matacus* and *E. sexcinctus* correlate with air temperature. This was done using linear mixed-effects models to evaluate the variation in timing of activity and activity duration according to changes in air temperature and fitting Step Selection Functions to evaluate the effects of the cover type, circadian cycle, and air temperature on armadillo resource selection. To my knowledge, this is the first study of free-ranging *T. matacus* in Brazil and the most comprehensive study on its ecology anywhere. *Tolypeutes* sp. used four types of shelter, which were used and reused with different frequencies by individuals of different sexes and age classes. Direct observations and indirect evidence showed that *Tolypeutes* dig their own burrows, contradicting previous belief. The spacing and home range patterns of *T. matacus* point to a generally asocial behavior and a promiscuous mating system. The burrow's reduced depth suggests that the use of burrows by *Tolypeutes* is more likely to be related to parental care and thermoregulation strategies than to defense mechanisms. *Tolypeutes matacus* can be characterized as a mainly nocturnal species that selects preferentially areas close to paths and forested areas, but is also able to occupy modified landscapes. However, our specific examples of the dynamic nature of activity patterns and habitat selection as functions of the air temperature illustrate how both studied species can alter their behavior. *Tolypeutes matacus* has been classified as Data Deficient in Brazil and as Near Threatened at the international level and I hope that the data generated here will contribute to this species conservation. Furthermore, these results highlight the importance of habitat heterogeneity for the long-term conservation of animal species that rely on behaviour to achieve adequate thermoregulation.

Attias, N. 2017. Ecologia espacial e temporal de duas espécies de tatu (Cingulata: Mammalia) no Pantanal. Doctorate in Ecology, Graduate Program in Ecology and Conservation, Federal University of Mato Grosso do Sul, Brazil. Advisor: Guilherme Mourão. E-mail: nina.attias@gmail.com

ZOONOTIC PATHOGENS IN WILD ARMADILLOS

Danilo Kluyber

Over the years mankind has contributed to the emergence of several diseases, while becoming victims of those passed among humans and other animals, known as zoonosis. Armadillos are primitive wild mammals who present peculiar anatomical and physiological characteristics, and can be considered susceptible and potential reservoirs for zoonotic pathogens, relevant to public health. The goal of the present study was to evaluate the prevalence of five zoonotic pathogens (*Toxoplasma gondii*, *Trypanosoma cruzi*, *Leishmania* spp., *Mycobacterium leprae* and *Paracoccidioides brasiliensis*) in four armadillo species (*Priodontes maximus*, *Euphractus sexcinctus*, *Dasypus novemcinctus* and *Cabassous unicinctus*) found in Pantanal and Mato-Grosso-do-Sul tropical savanna ecoregion, the Cerrado. A total of 50 armadillos were sampled: 43 free living individuals from Pantanal (16 *P. maximus*; 17 *E. sexcinctus*; 2 *D. novemcinctus* and 8 *C. unicinctus*) and 7 individuals found dead on three different roads of the Cerrado. Of the 43 individuals sampled in Pantanal, 13 (30.23%) presented *T. gondii* antibodies; 1 (2.32%) showed antibodies anti-*T. cruzi*; and 4 (9.30%) showed anti-*Leishmania* (L.) *infantum chagasi* antibodies. All 50 samples were also analyzed by molecular biology based on the polymerase chain reaction (PCR). None of the samples tested positive for *M. leprae* and *Leishmania* spp. All seven (100%) individuals from the Cerrado were tested positive for *P. brasiliensis*. The results suggest that the armadillos have been exposed to these pathogens, either by contact with other species, including humans, or by their own environmental conditions in certain ecosystems. The armadillo species studied may have a greater susceptibility to these pathogens in the natural environment where they occur. Armadillos are key species in understanding disease transmission cycles, especially regarding zoonotic pathogens, and they can strategically act as an indicator of ecosystem health for research programs and zoonotic diseases monitoring.

Kluyber, D. & E. J. A. Luna. 2016. Avaliação da prevalência de patógenos zoonóticos de importância para saúde pública em tatus de vida livre: Mato Grosso do Sul, Brasil. Masters thesis, Instituto de Medicina Tropical de São Paulo da Universidade de São Paulo, São Paulo, Brazil. E-mail: dkluyber@live.com