

CROCODILE SPECIALIST GROUP NEWSLETTER

VOLUME 45 No. 2 • APRIL 2026 - JUNE 2026



CROCODILE

SPECIALIST

GROUP

NEWSLETTER

VOLUME 45 Number 2
APRIL 2026 - JUNE 2026

IUCN Species Survival Commission

CO-CHAIRS:

Alejandro Larriera and Charlie Manolis
PO Box 530, Karama, NT 0813, Australia

EDITORIAL AND EXECUTIVE OFFICE:

PO Box 530, Karama, NT 0813, Australia

Cover: Participants of 28th CSG Working Meeting, at
Crocoparc Agadir, Morocco. Photograph: Design Studio.

EDITORIAL POLICY: All news on crocodilian conservation, research, management, captive propagation, trade, laws and regulations is welcome. Photographs and other graphic materials are particularly welcome. Information is usually published, as submitted, over the author's name and mailing address. The editors also extract material from correspondence or other sources and these items are attributed to the source. If inaccuracies do appear, please call them to the attention of the editors so that corrections can be published in later issues. The opinions expressed herein are those of the individuals identified and are not the opinions of CSG, the SSC or the IUCN unless so indicated.

CSG Newsletter

The CSG Newsletter is produced and distributed by the Crocodile Specialist Group of the Species Survival Commission (SSC) of the IUCN (International Union for Conservation of Nature). The CSG Newsletter provides information on the conservation, status, news and current events concerning crocodilians, and on the activities of the CSG. It is available as a free electronic, downloadable copy from <http://www.iucncsg.org/pages/Publications.html>

All CSG communications should be addressed to:
CSG Executive Office (csg@wmi.com.au)

PATRONS

We thank all patrons who have donated to the CSG and its conservation program over many years, and especially to donors in 2024-2025.

Big Bull Crocs! (\$15,000 or more annually or in aggregate donations)

Japan Leather & Leather Goods Industries Association,
CITES Promotion Committee & Japan Reptile Leather
Industries Association, Tokyo, Japan.

Heng Long Leather Co. Pte. Ltd., Singapore.

Louisiana Alligators Farmers and Ranchers Association,
Abbeville, Louisiana, USA.

Hermes Cuir Precieux, Paris, France.

Singapore Reptile Skin Trade Association, Singapore.

United Leather Products Co., Ltd. and Nakorn Sawan
Crocodile Farm, Thailand.

Wall's Gator Farms LLC, Louisiana, USA.

Wall's Gator Farm II LLC, Louisiana, USA.

Friends (\$3000 - \$15,000)

Centre for Crocodile Research/Crocodilian Academy,
Darwin, Australia

Christy Plott, American Leather and Tanning Company LLC,
Georgia, USA.

Coral Agri-Venture Farm, Philippines.

CrocFest, USA.

Crocodile Conservation Centre of Florida, USA.

Crocodile Farmers Association of the Northern Territory,
Darwin, Australia.

Donald Farms, Louisiana, USA.

Dresden Zoo, Dresden, Germany.

Enrico Chiesa, Italhide, Italy.

Jake Puglia, Barefoot Zoological Gardens, South Carolina,
USA.

Mainland Holdings, Lae, Papua New Guinea.

Matthew Brien/SPREP Solomon Islands, Queensland,
Australia.

Sam Seashole, Crocodile Conservation Institute, USA.

Vermilion Gator Farm, Louisiana, USA.

Virginia Aquarium and Marine Science Center Foundation,
Virginia Beach, Virginia, USA.

Supporters (\$1000 - \$3000)

Simone Comparini, Pantera S.R.L., S. Croce s/Arno, Italy.

Ebey family, New Mexico, USA.

Paolo Martelli, Hong Kong.
J.K. Mercado & Sons Agricultural Enterprises, Philippines.

Contributors (\$250 - \$1000)

James Hennessy, The National Reptile Zoo, Ireland.
Cathy Shilton, Darwin, Australia.

Editorial

The 28th CSG Working Meeting hosted by Crocoparc in Agadir, Morocco, was under the High Patronage of His Highness King Mohammed VI, reflecting the significance attributed to this meeting in the country. The Working Meeting was preceded by a Veterinary Workshop, an element of CSG meetings which continues to be well attended. Despite the impact of the ongoing Middle East conflict on the ability of some people to travel to Morocco, some 200 participants from 45 countries were able to attend in person or online. Various side events exposed participants to the diverse culture of Morocco, and the meeting itself put a spotlight on the significant conservation challenges facing the West African region generally. A more detailed summary is provided on pages 16-22.

The CSG Steering Committee also met prior to the Working Meeting, and discussed a range of issues. Identifying focal points within many countries remains a challenge in the African region, and the uncertainty of the taxonomic status of *Crocodylus halli* in Papua New Guinea and Indonesia has raised some potential issues in those countries. However, steps are now underway to collect additional samples of known provenance through the range, and to finally address the question of whether it is a distinct species or not. It is also hoped that the three *Osteolaemus* species will be formally recognised by the end of the year. Minutes of the SC meeting are included on pages 5-16.

Congratulations are extended to CSG member Subir Chowfin, who was recently recognised as an “Other Effective Area-Based Conservation Measures” (OECM) Champion, for his work through the [Gadoli and Manda Khal Wildlife Conservation Trust](#). The Gadoli and Manda Khal Fee Simple Estates are located in the Pauri Garhwal district of Uttarakhand, lying within the biodiversity hotspot and endemic bird area of the western Himalayas.

Yosapong Temsiripong, Chairman of the Thai Crocodile Farmers Association (TCFA), reported that a meeting was held on 6 July as a first step towards the development of a National Management Plan for Siamese crocodile recovery in protected areas in Thailand. With support of the Thai Department of National Parks, Wildlife, and Plants Conservation, Thai Department of Fisheries, Wildlife Conservation Society Thailand Program, and Kasetsart University, the meeting was comprehensive and productive, and developed an action plan for all *in-situ* conservation sites around the country. Representatives from 12 protected areas participated in the meeting, as well as Dr. Steve Platt, CSG Chair for East & Southeast Asia. There are currently around

80 Siamese crocodiles in 6 protected areas, and three releases are planned in 2026 in three protected areas. Industry has urged government agencies to gather all stakeholders to draft a national management program.

The IUCN SSC launched its [Species Impact Microgrants](#) (SIM) in June 2026, to support short-term conservation projects and activities that deliver immediate and direct impact on the conservation of species in the wild and in captivity. The grant is open to members of IUCN SSC specialist groups, with a grant amount of up to \$US5000. If you are considering to submitting a proposal, please contact the Executive Officer (csg@wmi.com.au) in advance to ensure it meets the criteria.

A new study published in Nature has concluded that for most traded reptile species, international trade in skins is sustainable and not a primary driver of extinction risk [Colston *et al.* (2026). A global assessment of reptiles in the skin trade. [Scientific Reports](#) 16(1): 19621; see page 49]. Authored by 40 specialists, including CSG members, the study examined trade data from various sources, including CITES and Red List assessments, for 46 reptile species, between 2000 and 2020. The study also provides evidence that well-regulated international trade can support both conservation and trade, and provide tangible benefits for communities and livelihoods. Habitat loss, climate change and emerging diseases are identified as principal threats to reptile populations globally, and conservation efforts should prioritise these threats.

Since its inception in 2017, World Crocodile Day (WCD) has been celebrated on 17 June each year. Various groups/organisations have used WCD to promote awareness on the conservation of crocodilians, and the threats that they may face. Articles in this Newsletter exemplify some of the activities undertaken in India, the Dominican Republic, Papua New Guinea and Indonesia. Similarly, since 2016, World Tomistoma Day has been celebrated on 5 August each year, to highlight and raise awareness about the conservation needs of *Tomistoma schlegelii*.

Alejandro Larriera and Charlie Manolis, *CSG Co-Chairs*.

CSG Student Research Assistance Scheme

The Student Research Assistance Scheme (SRAS) and Fritz Huchzermeyer Veterinary Science Student Research Assistance Scheme (FHVS-SRAS) provided funding to three students in the April-June 2026 quarter (see below), and one application is currently under review.

1. Adewole Yinka (Nigeria; Project 26/4): Sero-prevalence of West Nile Virus in captive Nile crocodiles in southwestern Nigeria.
2. Jessica Yates (USA: 26/5): Stable isotopes for determining trophic niche overlap between native and invasive crocodylians in southern Florida.

3. Esther de la Cruz Santos (Mexico; 26/6): Genomic evaluation of hybridization between *Crocodylus moreletii* and *C. acutus* through whole genome sequencing.

The following SRAS reports were submitted in April-July 2026, and have been posted on the CSG website:

1. Ariel Espinosa-Blanco (Venezuela; 15/6): Evaluating the effects of reintroduction on population viability and genetic diversity of the Orinoco crocodile (*Crocodylus intermedius*) in Venezuela. [Download](#).
2. Yaoua Christine Kouman (Côte d'Ivoire; 17/5): Dynamics of habitat use by *Mecistops cataphractus* in areas in Tai National Park, Côte d'Ivoire. [Download](#).
3. Sofía Karen Pérez Cruz (Mexico; 18/13): Acoustic characterization of the alarm calls of Morelet's crocodile (*Crocodylus moreletii*) in acoustically contrasting environments in southeastern Mexico. [Download](#).
4. Melciellyne Del C. Aguilar-M. (Panama; 18/22): Molecular detection of *Trypanosoma* sp. in crocodilian populations of Panama and their relationship with habitat and health status. [Download](#).
5. Kayla du Plooy (South Africa; 18/23): Electroencephalogram (EEG) assessment of brain activity before and after electrical stunning in the Nile crocodile (*Crocodylus niloticus*). [Download](#).
6. Terry Mougner (France; 19/6): Study of scale patterns of *Crocodylus acutus* and *Crocodylus moreletii* in the southeast of Mexico. [Download](#).
7. Akpénin Mariano J.E. Aloukpe (Benin; 20/22): Conservation of crocodile species in agro-pastoral dams in Benin. [Download](#).
8. Caleb Gordon (USA; 21/2): Limb morphometry tracks aquatic habits in archosaurs. [Download](#).
9. Albert Myburgh (South Africa; 21/5): Population demographics of Nile crocodile (*Crocodylus niloticus*) populations in southern Africa. [Download](#).
10. Gonzalo Pighin (Argentina; 21/8): New methods for detecting *Caiman latirostris* using deep learning. [Download](#).
11. Yu Umeki (USA; 22/5): The hepatic biotransformation capability and occurrence of emerging contaminants in American alligators (*Alligator mississippiensis*). [Download](#).
12. Giovanni Herrera Pachon (Colombia; 22/6): Biogeography of the genus *Paleosuchus* (Alligatoridae): Implications for its conservation. [Download](#).
13. Leonardo Lima Gorza (Brazil; 22/7): Pathological, parasitological, hematological and biometrical findings of wild caimans (*Caiman yacare*) in the Brazilian Pantanal. [Download](#).
14. Muneer Ahmed Mengal (Pakistan; 22/11): Population status, habitat occupancy and threats to Marsh crocodiles (*Crocodylus palustris*) in Balochistan, Pakistan. [Download](#).
15. Micaela Mazaratti (Argentina; 23/2): Effects of temperature fluctuations on the genital histomorphology of *Alligator mississippiensis*. [Download](#).
16. Gerardo Gabriel Vega (Argentina; 24/2): Effect of fire on populations of *Caiman yacare* in Iberá National Park, Corrientes, Argentina. [Download](#).
17. Yairen Alonso Jiménez (Cuba; 24/4): Monitoring and investigation of abiotic factors in the reproductive ecology and current population status of the American crocodile (*Crocodylus acutus*) in Monte Cabaniguán, Cuba. [Download](#).
18. Murilo dos Reis (Brazil; 24/8): Parental care in *Caiman latirostris* (Crocodylia: Alligatoridae) in coastal populations of Brazil. [Download](#).
19. Ryan Johnstone (Australia; 24/10): Penside detection of anti-Kunjin Virus antibodies in farmed Saltwater crocodiles using the ChimerDx Lateral Flow Test Platform. [Download](#).
20. Carlos Fernando Rodrigues de Souza Neto (Brazil; 24/15): Parasitic ecology and ecotoxicology of *Caiman latirostris* (Daudin, 1802) in the Capibaribe River basin, northeast Brazil. [Download](#).
21. Stefany Reyes (Mexico; 25/3): Endoparasites of Crocodylia in the Encrucijada Biosphere Reserve, Chiapas, Mexico. [Download](#).
22. Aabhash Kaphle (Nepal; 25/4): Nesting ecology and hatching success of Mugger crocodile (*Crocodylus palustris*) in Ghodaghodi Lake Complex, Nepal. [Download](#).
23. Raziel Saez Euan (Mexico; 25/5): Pure head shape of crocodiles in the Yucatan Peninsula, Mexico. [Download](#).
24. María Tinoco Galeana (Mexico; 25/7): Relationship between egg biometrics and hatchling size in a wild population of *Crocodylus acutus* in Guatemala. [Download](#).
25. Jorge López Hernández (Mexico; 25/10): Nesting ecology of nesting of Morelet's crocodile (*Crocodylus moreletii*) in relation to eco-hydrology in the Catzajá Lagoon system, Chiapas, México. [Download](#).
26. Brayan Andre Pérez-Ortiz (Colombia; 25/11): Abundance

and characterization of habitat of *Crocodylus acutus* and *Caiman crocodilus fuscus* in the lower sub-basin of the Bogota River, Cundinamarca. [Download](#).

27. Santiago Pérez Galvis (Colombia; 25/12): Hematological, biochemical reference intervals and morphological blood cell characterization of *Crocodylus acutus* in Colombia. [Download](#).

28. Abhishu Neupane (Nepal; 25/16) Assessment of the status of Gharials (*Gavialis gangeticus*) in West-Rapti River within Banke National Park. [Download](#).

Dr. Sally Isberg, CSG Executive Officer (csg@wmi.com.au).

Minutes of CSG Steering Committee Meeting (Agadir, 12 May 2026)

The CSG Steering Committee (SC) meeting was held on 12 May 2026.

The meeting began at 0800 h.

Minutes of the meeting are:

Participants

SC members present in person: Charlie Manolis, Alejandro Larriera, Christine Lippai, Christy Plott, Colette Adams, Curt Harbsmeier, Enrico Chiesa, Fabian Schmidt, Luis Bassetti, Matthew Shirley, Paolo Martelli, Venetia Briggs-Gonzalez, Laura Porras-Murrillo, Pablo Siroski, Marisa Tellez, Simon Pooley, Xander Combrink, George Melancon, Phoebe Griffith, Nathalie Kpera, Carlos Piña, Melina Simoncini, Sarah Maria Gutierrez, Sergio Balaguera-Reina, Bruce Shwedick, Sally Isberg

SC members present by Zoom: Kevin van Jaarsveldt, Allan Woodward, Valentine Lance, John Caldwell, Kent Vliet, Raju Vyas, Christopher Brochu, Alvaro Velasco, Cathy Shilton, Rainier Manalo, Rom Whitaker, Jeremy Lemaire, Brinky Desai, Domingo Panterani, Gabriela Lopez (on behalf of Hesiquio Benítez), Alfonso Llobet Querejazu

Observers present in person: Vivek Menon, Cristian Pizzigalli, Joe Wasilewski, Katharina Meurer, Alexander Meurer, Joseph Brown, Csaba Géczy, Paul Reilly, Emily Moyes, Brahim Haddane, Grahame Webb, Alba Imhof, Pamela Leiva, Maria Virginia Parachu Marco, Lucia Fernandez, Patricia Amavet, Gisela Poletta, Iri Gill, Gonzalo Fernandez Hoyo, Shaun Foggett, Mashudu Mahada, Susan Ann Bouchard, Raul Amaral, James Szewczyk, Mitsuko Takehara

SC member apologies: : Simone Comparini, Alison Leslie, Rosanna Mangione, Babu Ram Lamichhane, Valerie Garcia, Izwan Gani, Yosapong Temsiripong, Matthew Brien, Lonnie McCaskill, Thomas Rainwater, Steve Platt, Eric Langelet, Yusuke Fukuda, Emmanuel Amoah, Sen Rith

Other apologies: Angela Freeman, Jeff Lang

Agenda: Agenda papers are included with these Minutes on the [CSG website](#).

1. Executive Reports

1.1. Chairs' Report

Alejandro Larriera and Charlie Manolis welcomed attendees and the SSC Chair, Dr. Vivek Menon, as well as thanking the host/organizers.

The Chairs highlighted the following:

- No crocodile proposals were presented at the last CITES CoP.
- 2025 was the 50th anniversary of the Indian crocodile conservation program and congratulated all that have been involved with this program.
- The Executive Advisory Group (EAG) was established at the last SC meeting to replace the Future Leaders Program. Three tasks were assigned which has worked well overall, but requires continual development.
- A press release by Collective Fashion Justice has been taken very seriously by the IUCN, SSC and the CSG. An investigation is currently underway by the SSC and CSG is awaiting information regarding the process that the investigation committee will take.
- The African continent still presents challenges with regards to country focal points in order to understand and communicate the situation with species at a country level.
- The Co-Chair structure is working well in particular by allowing the CSG to be represented at more events than what would be possible otherwise.
- The global crocodilian skin industry has been going through a downturn, which is negatively impacting conservation programs in many areas.

A minute's silence was observed for CSG members and colleagues who have passed since the last working meeting.

1.1.1. Dr. Vivek Menon addressed the SC, providing some background to the SSC and specialist groups, of which there are currently 220, as well as providing some information about his experience with wildlife conservation and within the IUCN particularly around governance processes.

He identified that the CSG is clearly well organized with Co-Chairs, a Steering Committee and financial solvency. However, he identified that the CSG has similar issues to many other organisations around the

engagement of people in Asia and Africa, which, particularly through language barriers, are under-represented in these types of forums.

1.2. Minutes from SC Meeting, Chetumal

Sally Isberg introduced the item.

Action items from the Darwin Steering Committee meeting were:

Action 1: EO/EC to finalise and distribute: Terms of Reference for Regional and Thematic Group Chairs; and, revised CSG Membership Nomination Form.

- Revised CSG Membership Contact Details Form was sent to membership in May 2024.
- Terms of Reference for Regional and Thematic Group Chairs were finalized in January 2025, but distribution was withheld until the beginning of the new IUCN quadrennium.

Action 2: EC to ensure Communication Strategy considers: review and re-design of the CSG website; better defined goals for social media platforms; inclusion of SRAS students in CSG communications; and, development of a list of interested people to receive CSG communications.

- Venetia Briggs-Gonzalez led development of the Communications Strategy which was disseminated to SC members in March 2025 for comment. The final Strategy was endorsed by the EC in April 2025 after incorporating SC feedback. An action plan was developed in October 2025. Terms of Reference for the Communications Working Group were endorsed in October 2025 and Venetia Briggs-Gonzalez was appointed Chair of the Working Group.
- A Website Committee was formed in November 2025, and it is currently developing the framework for the new CSG website.
- Goals for the social media platforms are under consideration by the Communications Working Group.
- SRAS recipients and interested people are included in all CSG correspondence. Inclusion of a “subscribe” option on the new website will be included to expand on existing distribution lists.

Action 3: Discussions to be held to determine the utility of continuing the Drone Working Group or whether it should be reframed and, if so, in what form.

- After discussions with Lonnie McCaskill, it was decided to keep the group active as there are field trips planned for upcoming meetings. Reassess at the next SC meeting.

Action 4: Discussions to be held to determine the utility of forming a human-crocodile conflict (HCC) Working Group, including the development of a draft terms of reference and the outputs to be developed.

- HCC Working Group, renamed the Living with Crocodilians Working Group, was formed with Simon Pooley as Chair. Terms of Reference were developed.

1.3. Executive Officer Report

Sally Isberg introduced the item.

SI confirmed that under the current arrangement, her annual remuneration is \$AUD35,000 which includes all statutory on-costs including superannuation, workers compensation and other insurances, as well as office equipment.

With regard to CSG membership, as of 12 May 2026 there are 751 CSG members from 88 countries listed in the CSG database, comprising a net increase of 23 members and 8 countries since the last SC report. A review of the membership was undertaken in 2024 by sending all existing members a form requesting them to update their contact details. Of the members who did not respond to this request, we conducted a review with each of the Regional Chairs and vice-Chairs as well as Thematic Group chairs where appropriate. Nineteen (19) members voluntarily requested to be removed through this process and another 53 members were considered to be inactive. These 72 people were therefore removed from the CSG membership list but maintained on the mailing list.

SI informed members that from the advice received from the IUCN, all existing members will automatically transfer into the new quadrennium. There are still issues with new members registering on the IUCN portal, perhaps indicating a lack of understanding in the role of the IUCN within the CSG. SI will continue to work with the IUCN SSC team to ensure contiguity between the CSG database and the IUCN portal.

SI reiterated that any CSG member can nominate anyone for CSG membership. CSG membership does require certain criteria to be met, as outlined on the CSG website, and nominations need to be recommended through the Regional Chairs, even if the nomination is from a Thematic or Working Group Chair. This recommendation is then provided to the Co-Chairs for final endorsement. Lists of people thought to be not yet suitable for membership are maintained on a list for future evaluation and are added to the CSG mailing list. SRAS students once they have completed their projects are asked if they are continuing their work in crocodilians and if so

a recommendation is requested through a supporting CSG member. SI reminded the group that CSG membership does not need to be a fixed state and people can leave and be renominated as appropriate depending on their career trajectory.

The current SC comprises 80 members. Each was requested to formally accept the new Terms of Reference (ToR) for which sets out minimum expectations when accepting a role on the Steering Committee including keeping the Executive Committee informed about potential, upcoming or on-going crocodilian issues within the region, nominating new members and generally responding to email requests.

New working groups (WG) have agreed ToR to achieve specific objectives within a given timeframe. The ToR for each WG is developed by the WG chair according to what they believe can be realistically achieved and does not require approval from the SC. As the WG begins to achieve its goals and objectives, the ToR can be reviewed and updated as required. Each ToR is endorsed by the EC.

The Student Research Assistance Scheme supported 16 projects in 2024, 16 in 2025 and there have been 6 applications so far in 2026. We continue to improve our processes with regard to the SRAS application and review processes.

A Fundraising Strategy has been drafted and will be circulated to the SC before the end of June 2026 for comment.

Carlos Piña enquired about the potential to develop a list of countries that do not currently have CSG membership/focal points so that we can more strategically identify people to assist with the CSG mission.

Matt Shirley asked whether there was an intention to develop a more heterogeneous approach to SRAS project reviews given the inherent regional differences. CM noted that there has been some considerable effort to streamline the SRAS review process to incorporate differences between regions, educational level, etc., and recommended that another review be undertaken. SI offered that there have been multiple iterations to the forms and processes that should be properly documented first after which a review could be orchestrated. SI also noted that for Nepalese students, Phoebe Griffith is now acting to assist these students in optimising their applications before being sent for review and has increased acceptance rates as well as quality of the outcomes. This process may be expanded into other regions as identified.

The report was noted.

Action 1: Develop a list of crocodilian range states without focal point representation and send to Regional Chairs. Dr. Menon offered his Regional Chairs to assist in identifying contacts in those countries.

Action 2: EO to formalise the continual improvements that has been implemented in the SRAS process. EO/EC to enact a formal review.

1.4. CSG/IACS Financial Reports

Charlie Manolis presented the financial reports since the last SC meeting. The EO distributes the financial reports each quarter to the SC. It is important to note that most funds received by the CSG are unconditional, and there are currently two donors who donate for specific species projects.

Reports were noted and accepted.

2. Regional Reports

2.1. East and Southern Africa

Xander Combrink introduced the item, highlighting:

- Biggest challenge is acquiring information from range states. Conservation management and conservation research is not considered a priority although HCC is a growing challenge.
- Kenya: Two crocodile ranches have closed in the last few years, removing livelihood incentives for cohabitation.
- South Africa:
 - No work is being done actively in Kruger National Park, including aerial surveys.
 - A hypothesis has been proposed that a lack of basking sites allowing crocodiles to thermoregulate appropriately may have been an possible cause of the pansteatitis deaths that occurred in 2008.
 - A not-for-profit (Crocodile Conservation of South Africa) has been established to encourage communication between institutions as well as act as a donation source to assist with funding of crocodile conservation activities. Farms are actively trying to financially support crocodile research and monitoring and this will provide a collective avenue to make funding available. A strategic plan has been developed and will be made available for public comment shortly.
 - Ecotoxicology research is on-going.
 - Jan Myburg has retired and wishes everyone well.
- Zambia:
 - Continues to maintain generally stable populations of Nile crocodiles across its major river systems, although human-crocodile conflict remains a significant management

challenge.

- The crocodile farming sector continues to strengthen its contribution to conservation, livelihoods and animal welfare, with 85% of farms now third-party certified or progressing toward certification and full certification expected by 2027.
- Limited resources continue to constrain national population monitoring and research, particularly to determine the status of the African Slender-snouted crocodile (*Mecistops leptorhynchus*) within its historical range.
- Zimbabwe: Some farms have closed.

Matt Shirley noted that Namibia has an active group working with crocodiles and will provide contact details to XC when he has permission to do so. However, there is distrust with IUCN, not just in Namibia but Zimbabwe as well, and most likely others. Simon Pooley confirmed this to be the case. Dr. Menon suggested that the Regional Councillor or Chair of the National Committee representatives can assist but they need to understand what the issues are.

The report was noted.

Action 3: Matt Shirley to request permission from, and share contact details for, people working with crocodiles in Namibia.

Action 4: Develop a list of issues within regions to provide to SSC Chair to request assistance from the Regional Councillor or Chair of the National Committee.

2.2. West and Central Africa

Matt Shirley introduced the item, highlighting:

- Michele Ahizi has joined the SC as the Regional Vice-Chair for Cote d'Ivoire.
- Red list and Action Plans continue to be developed, but local knowledge is often limited to specific areas, and without recent publications and reporting, this process is slower than desirable.
- In the Congo, WCS has adopted the dwarf crocodile as one of their focal species, which is particularly important as 100,000s of crocodiles are harvested annually from Lac Tele Community Reserve.
- Emmanuel Amoah (THRESCOAL) has secured a community-based conservation area for slender-snouted crocodiles in Ghana, which is the only gazetted area in Africa for the primary purpose of a crocodilian species. The cultural commitments of protecting the river system have been somewhat easier than avoiding the degradation of the surrounding land.

The report was noted.

2.3. East and Southeast Asia

Charlie Manolis introduced the item on behalf of Steve Platt, highlighting:

- Cambodia (*Crocodylus siamensis*): Industry has contributed breeding animals to Phnom Tamao Zoo providing an opportunity to reintroduce larger numbers of purebred animals.
- Indonesia:
 - *Crocodylus halli* has been recognised as a new species according to a government decree. As there is no skin harvest in the region where this "species" occurs, there should not be any issue with CITES or trade at this stage, but this species is still not recognised by CSG.
 - Ministry of Marine Affairs and Fisheries became the management authority for crocodilians in January 2026.
 - CSG continues to support a tracking and monitoring project in Sumatra on *Tomistoma*.
- Thailand (*C. siamensis*): Reintroduction progress has been slow but there is progress with some recent releases. Land availability remains the largest impediment with what can be achieved.
- China (*Alligator sinensis*): Habitat continues to be reclaimed for reintroduction.
- Malaysia (Sarawak and Sabah):
 - HCC remains a large issue for governments and management programs are being developed.
 - Industry is restricted so incorporating sustainable use is problematic although still being explored.

Sally Isberg noted the requirement of proving purebred status for reintroduction is unclear in some circumstances leading to larger financial and technical requirements which is detrimental to the reintroduction goals. Discussions with the Taxonomy and Identification Thematic Group Chair, Kent Vliet, have taken place around developing a CSG position statement to provide non-prescriptive guidance to governments on what the minimum requirements should be with regard to determining purebreds. Similarly, developing some guidance on what disease-free status for reintroduced animals should be by consulting the Veterinary Science group.

The report was noted.

Action 5: Taxonomy and Identification Group to develop a position statement on the minimum requirements that should be met when determining purebred status of *C. siamensis* for reintroduction.

Action 6: Veterinary Science Group to develop a guidance document on what testing should be completed to determine "disease-free" status of *C. siamensis* for reintroduction.

2.4. Latin America and the Caribbean

Pablo Siroski introduced the item, highlighting:

- Given the political unrest currently in Haiti, the only CSG member has been unresponsive, so the current population status of *C. acutus* is unable to be confirmed.
- Informal discussions between Panama and Mexico have been held about a possible CITES amendment proposal for *C. acutus*. Hesiquio Benitez Diaz requested that CSG be aware of this possible proposal. [Note: Gabriela Lopez informed the SC that the Mexican Government has announced a second year of monitoring of *C. acutus* for inclusion in a proposal. This will hopefully be achieved during 2026 and the results will be shared in due course.]
- A captive-breeding farm in Honduras has around 5000 *C. acutus* that it can no longer maintain. Owners have requested assistance from CSG as their efforts to work with Government to reintroduce them have not been successful at this stage.
- El Salvador workshop was a success in identifying people working with crocodilians.
- There are approximately 200 *C. intermedius* being held at an institution in Columbia whose ownership is in question and, therefore the husbandry responsibilities are not being upheld. CSG has been contacted for advice.

Marisa Tellez brought the following to the attention of the meeting:

- That she has been approached by a film producer to do a “Crocodiles of the Caribbean” series. This will highlight the work of various crocodilian researchers with the ultimate goal to develop a “Croc Week” similar to (Nat Geo, Discovery) “Shark Week”.
- The she is occasionally contacted by indigenous and rural communities from various countries seeking involvement in crocodilian research and management. Notwithstanding the complexities between different countries and communities, there could be a need to find ways to engage and (financially) support such “on the ground” work.

Alvaro Velasco asked for a correction to be made to the Venezuela report. The correct sentence should read “Unofficially, there are reports of a shipment, with CITES permits, of 38 live *Ca. crocodilus* and 24 *C. intermedius* specimens to a zoo in India.”

Charlie Manolis briefed the meeting on an individual *C. acutus* found in Bonaire, which unfortunately died soon after capture. The animal was deemed by officials to be a vagrant, as no historical or paleontological records of crocodiles have been

previously reported for Bonaire.

The reports were noted.

2.5. South Asia and Iran

Charlie Manolis introduced the item on behalf of Anslem de Silva, highlighting:

- Saltwater crocodiles (*C. porosus*): Andaman Islands continues to have large HCC issues, and the Bhitarkanika National Park/Wildlife Sanctuary population appears to be reaching stability.
- Mugger crocodiles (*C. palustris*): Population numbers continue to increase due to the adaptability of the species. Latest Red List assessment is currently underway.
- Gharial (*G. gangeticus*):
 - Government of India announced a national Gharial project in 2025. Details are yet to be provided but funding has been committed.
 - Habitat protection appears to be the key factor for populations to sustain themselves.
 - Recent research has confirmed that the size at sexual maturity for females (3 m TL) is larger than previously thought.

Phoebe Griffith addressed a lack of monitoring to assess the success of head-starting programs. A review of Gharial head-starting is recommended as well as assessing variations of the program which are proving more successful, including animal age, sex ratios, habitat types, etc. Such reviews have been conducted in Nepal and have proven useful in directing valuable resources appropriately.

The report was noted.

2.6. Australia and Oceania

Charlie Manolis introduced the item on behalf of Matt Brien, highlighting:

- Australia:
 - Review of the “Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles” has been completed and is awaiting the sign off from the Federal Minister for the Environment.
- Northern Territory:
 - Monitoring program continues, confirming the sustainability of the program and recovery of the population since the 1970s. The problem crocodile removal program for Darwin Harbour continues.
 - The “Management Program for the Saltwater Crocodile in the Northern Territory (2024-2034)” now has a 10-year lifespan compared to the previous 5-yearly updates.

- Updated “Wildlife Trade Management Plan (WTMP) for *C. porosus* in the Northern Territory of Australia 2026-2030” has been released.
- Engagement of local and indigenous communities has continued to be successful with satellite farms and egg incubation strategies being employed to provide employment and financial benefits to those traditional owners.
- Western Australia:
 - Saltwater crocodile population continues to increase.
 - The effect of cane toads on *C. johnstoni* does not appear to be as dramatic as anticipated compared to populations elsewhere.
- Queensland:
 - In 2025, a Bill was put forward to establish a Crocodile Authority to manage crocodiles in the State, including culling and safari-style hunting. This was met by strong opposition from scientists, conservationists and local councils, and was rejected.
- Palau: small, stable population (~1000 individuals) with rare HCC incidents.
- Papua New Guinea:
 - The harvest of wild *C. novaeguineae* for the purpose of skin exports has now completely ceased. Some animals are still being hunted for either the local “meat market” or for cultural purposes (traditional “boys to manhood” initiation ceremonies, payment of bride prices, funerals, peace ceremonies after tribal conflicts, traditional ornaments for singsing gatherings).
 - The export of wild *C. porosus* skins is still drastically in decline.
 - The annual commercial harvest of wild *C. porosus* eggs in the Middle Sepik River - organized by MHL Crocodile Farm in Lae and monitored by the PNG Conservation & Environment Protection Authority - is still very well supported by the local stakeholders.
 - Amendments to the Crocodile Trade Protection Act (1974) have been finalised, but it has yet to be sent to the Department of Justice and Attorney General for final submission to the legislative council.
- Timor-Leste: Northern Territory Government is working with the Timor-Leste Government to assist in capacity building as well as developing a management program as HCC continues to be a serious issue in the country.
- Solomon Islands: CM added that consideration could be given to submission of a CITES proposal to allow sustainable harvesting of *C. porosus* after developing a management program. HCC is a serious concern. However, the demand for wild skins is limited so the success of this program is uncertain.

The report was noted.

2.7. Europe

Fabian Schmidt introduced the item, highlighting:

- EAZA runs nine programs for crocodilians. A restructure of the Taxonomic Advisory Groups (TAG) will create a specific crocodilian TAG rather than being included in the reptile TAG.
- A concern was raised that many European Zoos only consider conservation as release efforts and not alternative forms such as sustainable use. Indeed, this is also illustrated in the signage within zoos which often still refer to the leather industry as being the sole cause of the endangered status of crocodilians. Fabian has compiled and delivered a lecture showing that crocodiles are in danger by other causes and that the leather industry can actually help supporting conservation.
- Gonzalo Fernandez Hoyo and Shaun Foggett are EEPs for *C. siamensis* but face challenges of a lack of interest in the species, small zoo-based populations as well as purebred status of those in the zoo population. They are also in contact with those researchers in the field trying to find ways to expand the recognition of this species.
- Colin Stevenson contributes in multiple ways within the European region including developing and delivering a husbandry course, research into vitamin D as well as assisting the CSG Red List team.
- Jérémy Lemaire and Rosanna Mangione received funding from several sources including CrocFEST to continue their work on caiman ecotoxicology in French Guiana which has enabled a PhD project to be funded.
- ECNM meeting was held in Berlin, Germany, in October 2025 with 58 attendees.
- An article to honour the career and 90th birthday of CSG founding member René Honegger is being written.

Matt Shirley asked whether there was a more strategic way to co-ordinate with zoos on *ex-situ* conservation. Fabian provided some clarification around what pathways are currently active. EEP (*Ex situ* Programmes) co-ordinators can define the goals of each group. The RCPs (Regional Collection Plan) define programs for each species where they exist and are reviewed every 5 years.

The reports were noted

Action 7: Zoo Group to include the topic of promoting sustainable use in its strategy as a positive conservation change tool. This can be distributed to European Zoos as well as zoos in other regions.

Action 8: Zoo Group to develop a list of crocodilian RCPs,

or similar, within all WAZA-affiliated organisations outlining their current goals and directions.

2.8. North America

Venetia Briggs-Gonzalez introduced the item on behalf of Thomas Rainwater and Jeb Linscombe, highlighting:

- All States where American alligators exist are maintaining stable populations. Lower skin prices in the market are causing economic issues for farms.
- Alabama and Arkansas have widened their management areas to enable better monitoring and removal of alligators as required.
- Florida:
 - there were 19,000 phone calls received with alligator complaints, with 9000 nuisance alligators being harvested.
 - *C. acutus* population is stable with ~2000 individuals. Monitoring program has been ongoing for over 50 years with an expansion in nesting locations, including the northwesternmost nest recorded to date (Sanibel Island) and the furthest inland nest ever recorded in Florida (Shark Valley).
 - One case of lead toxicosis in *C. acutus* was documented, which has initiated discussions about the use of lead in hunting activities.
 - In the Everglades, Spectacled caiman monitoring has begun to understand the extent and impact of this introduced species.
 - Two Nile crocodiles (*C. niloticus*) were removed from Florida approximately 10 years ago, and are not considered an introduced or invasive species of concern at this stage.
- American alligators are facing drought conditions in many areas, which is reflected through observed body condition in these animals.

The report was noted.

3. Thematic Group Reports

3.1. Industry

Christy Gilmore introduced the item, highlighting:

- There is currently a shrinking customer base for crocodilian skins. Combined with this, there is an overproduction of skins across all species. Furthermore, the industry is changing away from high volume products and moving towards higher exclusivity, higher quality, better traceability, transparency, animal welfare, etc. This is forcing some farms to close.
- Restructuring of the industry group is currently underway.

- One item on the list of items for the industry group to address is the development of a position statement on the use of wild skins to encourage the brands to utilise these.

The report was noted.

3.2. Trade Monitoring

Sally Isberg introduced the item on behalf of John Caldwell, highlighting:

- The International Alligator and Crocodile Trade Study (IACTS) continue to be produced annually and the latest report has been posted on the CSG website.
- CITES reports from Parties are still lagging for some key countries. If a country fails to produce an annual report for three years, it can face a trade ban.

The report was noted.

3.3. Veterinary Science

Paolo Martelli introduced the item, highlighting:

- Five FHVS-SRAS projects have been funded since the last working meeting.
- Presentations from the Darwin veterinary workshop were uploaded onto the website.
- Another workshop was conducted as part of this meeting, with good feedback received.
- Engagement still remains the key issue.
- Cathy Shilton has stepped down as co-Chair of the group, and we welcome Luis Bassetti as the new co-Chair.

Luis Bassetti thanked the SC for having faith in installing him as co-Chair of the Veterinary Science group.

The report was noted.

3.4. Zoos

Colette Adams introduced the item, highlighting:

- Various zoos and zoo-led groups continue to raise funds to support crocodile conservation programs around the world, but overall the CSG is unaware of many of these programs. Despite this, there is cooperation when people are asked directly about these initiatives so requires some thought about how to better encapsulate the on-goings. Highlights include:
 - Gaterland Global has distributed over \$US50,000, including to Jamaica after the recent hurricane.
 - In late-2024, CrocFEST surpassed

\$US1million in funds since its inception. Latest funds have been distributed to *C. rhombifer* and *C. acutus* (Cuba), *C. siamensis* (Laos), *Melanosuchus niger* (French Guiana), *Tomistoma schlegelii* (Borneo) and *Gavialis gangeticus* (India and Nepal).

- The Hope Zoo (Jamaica) is now assisting Government with HCC and rescue efforts.
- Ocean Park (Hong Kong) now has a Siamese x Cuban hybrid that was received from the local authorities.
- Australia:
 - Zoos Victoria continues its longstanding conservation partnership with the Mabuwaya Foundation with the Philippine crocodile.
 - Australia Zoo continues its 18th year of telemetry work in collaboration with The University of Queensland.
- American Zoological Association (AZA):
 - has developed a SAFE Committee for Cuban crocodiles as they are no longer part of a SSP (Species Survival Plan) because they do not meet the criteria of having 15 zoos with them in their collection (only 13). Commendations to Lauren Augustine for this initiative.
 - Crocodile Advisory Group (CAG) began as a group of keepers with an interest in crocodilians and in 2009, the mission statement was “To enhance and promote the conservation and understanding of the world’s crocodilians and their habitats through education, animal management and scientific endeavor”.
 - The mandated mission statement for all advisory groups (since 2023) is “The mission of the Crocodilian Advisory Group (CAG) is to support the sustainable management of crocodilian populations in partnership with AZA facilities, advance husbandry and welfare programs for these species, and support zoo and aquarium initiatives related to these taxa”.
- Discussion on how the Zoo Group can begin to better understand the programs around the world and how to better align these with the goals and mission of the CSG is underway.

The report was noted.

3.5. Taxonomy

Chris Brochu introduced the item, highlighting:

- Caiman paleontological literature has reassigned some of the non-modern caiman.
- Consensus is that there are now three *Osteolaemus* species. The taxonomic review and systematic revision is underway with the manuscript expected to be submitted by the end of 2026.

- Avila-Cervantes *et al.* (2025) paper suggested that there might be a taxonomic split between *C. acutus* individuals on islands off the coast of Mexico but there was limited sampling from this analysis so is being interpreted with caution at this stage.
- Agne *et al.* (2025) published a paper on *C. porosus* throughout its range as well as some individuals from the recently extinct Seychelles population which they conclude is the former. The authors also argue that *C. halli* is not a valid species. Further, they propose that there is no need to develop subspecies within either *C. porosus* or *C. palustris*. However, sampling again was an issue with only one sample representative of a potential *C. halli* and did not indicate how it was designated as such and while it was from southern New Guinea, the locality information is vague. Similarly, only four *C. palustris* samples were available with two of unknown provenance. As such, this paper is again being interpreted with caution.

Sergio Balaguera-Reina noted that Pierre Charruau is collecting the relevant data now to try to resolve the *C. acutus* item above. Ana María Saldarriaga is taking a phylogenomic approach on this issue as part of her PhD project. Chris Brochu added that he hopes that samples from the Pacific coast of South America will also be included.

Matt Shirley clarified that species should not be named on morphology alone such as in the case of *C. halli* and while the original genetic data from Jake Gratten’s thesis were compelling, this data is more a genealogy rather than a phylogeny.

Matt Shirley also illustrated that wherever a systematic or phylogenetic paper is published and there are “problematic” samples, they are invariably and almost universally captive or museum specimens as these samples get traded, moved, etc. It is highly recommended in studies of this nature that wild samples are taken to ensure provenance. Chris Brochu proposed that museum samples submitted after the 20th century are less dubious in origin but agreed wild samples are always the gold standard.

Sally Isberg added that the downstream effect of literature being published with unideal samples is that it is creating issues of a regulatory nature. For instance, with *C. halli* the Indonesian Government has now decreed it as a separate species despite the CSG not formally recognising it. The Reptile Database, which the IUCN Red List unit was using as the crocodilian taxonomy source, recognizes *C. halli*. Multiple requests have had to be made to the Red List unit to remove *C. halli* from its list of crocodilian species. So resolving these issues with the correct sample numbers and provenance is in

everyone's best interest.

The report was noted.

3.6. Legal Affairs

Curt Harbsmeier introduced the item, highlighting:

- No major litigation action has been required by the CSG since the last working meeting.
- The creation of a database where legal issues are encountered or was protracted due to getting permits, etc., which may be able to assist other CSG members.
- Australia:
 - "Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles" review has been completed but still requires Federal Minister sign off.
 - The "Northern Territory Saltwater Crocodile (*Crocodylus porosus*) Risk Management Framework 2021-2026" is currently under review.
- Timor-Leste: the first exploratory steps into developing a Saltwater crocodile management program, particularly aimed to reduce HCC, are being discussed.
- Latin America:
 - Brazil: regulatory inconsistencies exist within the country.
 - Panama: renewed interest in *C. acutus* population densities along with HCC issues as well as creating active breeding and ranching activities and community education.
 - Guatemala: Government is interested in management programs for both *C. acutus* and *C. moreletii*.
- USA:
 - Florida Fish and Wildlife Conservation Commission, which regulates wildlife, have created a herpeto-fauna working group (Curt Harbsmeier is a member). One item under consideration is a revision of the administrative roles to clarify the legal possession, transfer and transport of *C. acutus* within the state of Florida. There are currently some grey areas between the US Federal guidelines and State regulations on threatened species so removing discrepancies will allow easier regulation.
 - All caimans listed on Appendix II of CITES have also been included in the ruling under the Supremacy Clause of the United States Constitution (Article VI, Clause 2), California Penal Code Sections 653o and 653r were declared unenforceable and unconstitutional as applied to the importation, possession or sale of the bodies, parts or products of broad-snouted

caimans, brown caimans, common caimans, and Yacare caimans subject to 50 C.F.R. § 17.42.

- CrocDocs have been charged with removing feral caimans from Florida, and when large specimens are received, their skulls are donated to CrocFEST as part of fund-raising efforts for crocodilian conservation projects.

The report was noted.

Action 9: Curt Harbsmeier to explore the possibility of creating a database of legal issues and propose to the Executive Committee.

3.7. IUCN Red List Authority (RLA)

Sally Isberg introduced the item, highlighting:

- One Red List (RL) has been published since the last SC meeting (*Melanosuchus niger*, Least Concern).
- Drafts for six African species, including *Crocodylus suchus*, *Osteolaemus* spp., *Mecistops cataphractus* and *M. leptorhynchus* are at various stages of completion with Matt Shirley as project lead.
- The Action Plan for *C. palustris* was finalised in 2025 and has been used to draft the global RL re-assessment document led by Colin Stevenson. The assessment will likely recommend a downlisting from Vulnerable to Least Concern. Geolocations are required to develop the distribution map.
- Claire Wilkie has joined the RL team and has been assigned to lead the *C. mindorensis* re-assessment. Claire has drafted this document and an assessment team has been identified but is yet to be formally appointed.
- Recently, the largest limitation which has hampered the progression of RL assessments has been the lack of mapping capacity within the CSG RL team. We gratefully welcome Sergio Balaguera-Reina back to the team as the Deputy RLA coordinator, and whilst we appreciate all his efforts, it really does show our weakness when it comes to completing RL assessments. Mapping is the bottleneck for most RLAs and is well recognised by the Red List unit but no workable solutions were presented outside of train a volunteer. If anyone has the required GIS skills, please reach out.
- The recent press release from the Collective Fashion Justice speculated that industry funds raised by the CSG may have been used to determine RL status. A recent article in the CSG newsletter showed the number of authors and reviewers for each RL assessment which has always included a Steering Committee member as well as often the CSG Chair. For clarity, all

CSG Red List assessments, including the CSG RLA and team, are done on a voluntary basis either as individuals or as representatives of the organisations they are employed by. However, up until now, no formal documentation has been collected about whether every author agrees with the determination, although everyone has been provided with an opportunity and vigorous discussions have occurred, as well as in what capacity they have undertaken the assessment (eg private, as part of job role, etc). As such, a declaration statement will be required to be completed by each individual involved in all future assessments, including the RLA, declaring any perceived or real conflicts of interest as well as if they agree (or not) with the final RL category determination to be submitted to the IUCN Red List unit.

- Since the last meeting, a Green Status assessment for *Gavialis gangeticus* has been published and another is underway for *Tomistoma*.
- Sally Isberg is currently undergoing Green Status training as organised by the IUCN SSC Australian Species Specialist Group. Once accredited, Sally will work with the appointed *C. mindorensis* RL assessment team to update the Green Status concurrently and become familiar with this process.
- While the submission process around the Green Status has yet to be integrated within the SIS platform and not governance has been formalised within the SGs, what has been released implies that the RLA will be responsible for these moving forward.

Matt Shirley questioned the approach of the CSG RLA to mapping as a capacity problem as opposed to a firm idea of how we want to approach mapping for crocodilians. Sergio Balaguera-Reina responded that meetings have been held between the IUCN Red List and CSG RLA team where we proposed solutions in the context of the crocodilian RL assessments that were accepted and have been used since. Sally Isberg added that the lack of mapping points around particularly the Africa species has created extra difficulties with adding alternative solutions needing to be creatively developed whilst meeting the RL mapping criteria.

Phoebe Griffith suggested that mapping might be an item with which the IUCN SSC Young Professionals Task Force could assist.

Charlie Manolis sought to clarify that in response to the Collective Fashion Justice press release, the CSG and RL team have nothing to answer to and that the development of the declaration statement by the RLA is a proactive governance step to further protect the CSG and the RL authors and contributors from future allegations.

The report was noted.

Action 11: Sally Isberg, Sergio Balaguera-Reina and Phoebe Griffith to discuss ways to recruit assistance with RL mapping.

Action 12: RLA to liaise with team working on *Tomistoma* Green Status assessments.

4. Task Force/Working Groups

4.1. Drone Working Group

Carlos Piña introduced the item, highlighting:

- Two training courses have been held since the last meeting: Mexico (November 2025) and Global Conservation Tech and Drone Forum in Nairobi, Kenya (throughout 2025).
- In Argentina, the National Parks team are testing strategies to monitor crocodiles using thermal cameras at different times of the day.

The report was noted.

4.2. Living with Crocodilians Working Group

Simon Pooley introduced the item, highlighting that:

- A human-wildlife coexistence definition has been defined by the IUCN Human-Wildlife Conflict and Coexistence Specialist Group. An upcoming conference is to be held with this group in Thailand in March 2027.
- Preliminary survey requesting data from people with experience in the field has been distributed in English, Spanish and Indonesian. Initial results are being collated and will be sent to the Regional Chairs for comment. Recommendations and strategies will then be presented.

The report was noted.

Action 13: Summary of survey results to be distributed to Regional Chairs and after incorporating their feedback, to be provided to the Executive Committee.

4.3. Communications EAG and Communications Working Group

Venetia Briggs-Gonzalez introduced the item, highlighting:

- The Communications Strategy was finalised in May 2025
- A Communications Working Group was formulated with the primary focus on the re-design of the website. Input from SC members will be requested, particularly regarding the thematic and working group.

- The website will initially be paired down rather than being the existing repository. No content will be lost but rather it will be re-organised into a more user-friendly format so it can be better utilised.
- A contractor has been engaged to begin designing the website which is due for delivery at the end of August.

SC members raised concerns about losing the content that currently exists. Reassurance was provided that no information will be lost but the existing content will be evaluated and re-arranged into a more attractive presentation.

The report was noted.

4.4. Ecotoxicology Working Group

Sally Isberg introduced the item, highlighting:

- Terms of Reference for the Ecotoxicology Working Group have been endorsed.
- An Expressions of Interest process was used to develop the members of the Working Group.
- Others who expressed interest were asked if they could review the documents being developed by the WG.
- The first objective is to develop the wording for the group on the website and the second is to develop a list of protocols to be drafted for standardisation of sample handling.

The report was noted.

4.5. Fundraising EAG

Sally Isberg noted that a Fundraising Strategy has been drafted and will be circulated to SC members by the end of June for comment. Once finalized, a Fundraising Committee will be formed to develop an Action List to define the opportunities, and chaired by Christine Lippai.

The report was noted.

4.6. IUCN SSC Young Professionals Task Force

Phoebe Griffith introduced the item, highlighting:

- The Young Professionals Task Force was set up by the IUCN to engage, encourage and develop young persons (18-35 years) expertise as part of the IUCN Youth Strategy.
- It is suggested that this is a time-limited role and that new focal points be installed before the SC meeting in 2030.
- According to the IUCN Youth Strategy, young professionals should be engaged at every level of decision making and be working in every

commission offering opportunities in leadership roles and capacity building. The CSG already has many strategies to engage young professionals including membership and the SRAS program as well as in the past the Future Leaders Working Group.

- Early Career Crocodile Network (ECCN) meets quarterly. This is an informal group that meets online to discuss various items. Approximately 50% are already CSG members but there is an opportunity to continue to develop intergenerational dialogue.
- One challenge identified was about attending CSG meetings from a financial standpoint including considering another tier for students and early career researchers from lower- and middle-income countries.
- Hands-on workshops were also identified to develop entry level skills for young people working with crocodilians. A recent workshop was held at Clemson University with Miriam Boucher.

Sally Isberg enquired about how the YPTF is engaging with the focal points. Phoebe informed the group that the Task Force is still developing its goals and objectives but has met twice in the last ten months and then there is a general communications e-mail list. At this point, many of the other SGs are trying to get young professionals involved and develop some form of capacity building within group. The CSG already has many of these systems established so there is a little bit of a disconnect between that the Task Force is trying to achieve and how that will translate to the CSG at this stage. Sally Isberg noted that there may be opportunities for CSG young professionals to assist other SGs in informing them about the initiatives that the CSG has and continues to undertake in this area.

Marisa Tellez noted that when she hosted the Regional Meeting in Belize, she contacted various zoos and obtained support to sponsor a student to attend the meeting. Matt Shirley noted that having an option on the registration website to assist students to attend was an option at previous CSG meetings. Sally Isberg noted that this is mentioned within the guidelines to host a CSG meeting but it is up to the organizers to manage their own website and registration process. The CSG did support the attendance of one early career researcher to this meeting using existing travel funds obtained through the last two CSG meetings (Mexico and Australia). The organizers of this meeting were able to obtain funding to support 17 African attendees, with 10 of those early career researchers, with Crocoparc waiving their registration fee and another sponsor paying for travel and accommodation.

Sally Isberg enquired about how the CSG and Early Career Crocodile Network (ECCN) could maximize the integration of young people between the two

entities whilst recognizing that the ECCN is an outside initiative. For example, could SRAS recipients be introduced to the ECCN to assist them in their support, should ECCN members be on the CSG mailing list to ensure they are getting CSG communications, etc.

The report was noted.

Action 14: Before 2030, current YPTF focal points to nominate potential successors for the role to the EC.

Action 15: EO to liaise with Phoebe Griffith and Brinky Desai about the ECCN to identify ways of maximizing the engagement with the group in CSG activities.

Action 16: EO to liaise with Phoebe Griffith and Brinky Desai about ways to better coordinate financial assistance for attending meetings.

5. General Business

5.1. CITES (CoP20)

Alejandro Larriera introduced the CoP item, highlighting:

- there were no crocodile proposals presented at the meeting, but there were CSG members present in their “non-crocodilian” capacities.
- it is anticipated that there may be crocodilian amendment proposals at CoP21.

The report was noted.

6. 29th CSG Working Meeting

The Chairs informed the SC that one proposal had been received to host the 29th CSG Working Meeting (2028), from Caimasul (Corumbá, Pantanal, Brazil).

The meeting closed at 1613 h.

28th CSG Working Meeting

The 28th CSG Working Meeting was held in Agadir, Morocco, on 13-16 May 2026, with the theme “Crocodilians in an Anthropized World: Conservation Challenges and Solutions”. It was attended by 194 participants from 44 countries (Argentina, Australia, Austria, Belize, Benin, Brazil, Burkina Faso, Cambodia, Cameroon, Canada, Republic of the Congo, Costa Rica, Côte D’Ivoire, Denmark, Dominican Republic, France, Germany, Ghana, Hong Kong SAR, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Liberia, Morocco, Nepal, Netherlands, Niger, Nigeria, Portugal, Senegal, South Africa, Spain, Sweden, Switzerland, Taiwan, United Arab Emirates, United Kingdom, USA, Venezuela, Zambia).

Crocoparc Agadir hosted the Working Meeting, with many sponsors and local businesses providing financial and in-kind support. Of particular significance, the meeting was under the High Patronage of His Highness King Mohammed VI.

It was unfortunate that the conflict in the Middle East impacted on the ability of some people to travel to Morocco, resulting in a number of cancellations and subsequent changes to the program in the lead up to the meeting. The Organising Committee (Luc Fougérol, Ariane Marinetti, Hamza Atlas Aatiq, Leila Sdigui Brunet) and Scientific Committee (Matthew Shirley, Nathalie Kpera, Xander Combrink, Nicolas Mathevon, Abdellah Bouazza, Luc Fougérol) are to be commended for their considerable efforts over the last two years in pulling together the meeting, but also in adapting the program to account for the effect of cancellations.

Meeting organisers are also to be commended for their ability to raise funds to fully support the attendance of 11 African participants to the Working Meeting, as well as partial support for three additional participants. In addition, CSG travel funds left over from the Chetumal (2022) and Darwin (2024) meetings were awarded to Joanna Batalha, to support her attendance.

Veterinary Workshop

A Veterinary Workshop was held on 11 May at Crocoparc, with 58 participants from 17 countries. Topics covered included: blood collection sites in crocodilians (Lionel Schilliger); restraint/anesthesia (Paolo Martelli); crocs, contaminants and creepy crawlies (Marisa Tellez and Jonathan Trimino); necropsy samples and ecotoxicology diagnostics (Brandon Moore); post-release monitoring (Matthew Shirley); and, pancuronium bromide as an immobilizing agent for Nile crocodiles (Lionel Schilliger). Each of these presentations is available on the CSG Veterinary Science Group’s [webpage](#).

As with all previous Veterinary Workshops, this one created a good deal of interest and participants were able to get practical hands-on experiences through the workshop

That evening, workshop and meeting participants enjoyed a cocktail reception at “La Table du Croco” at Crocoparc, at which time they were able to walk around and observe the fantastic facilities, including viewing Nile and West African crocodiles.





Steering Committee Meeting

The CSG Steering Committee (SC) meeting, held on 12 May, was attended by 26 SC members in person and 16 online. There were also 27 observers who participated.

The meeting opened with one minute of silence in memory of the 6 current and past CSG members who had passed away since the previous Working Meeting in 2024 (Ivan Palacios Rubio, Bed Khadka, Tony Tucker, Ramandimbison, Gustavo Casas-Andreu, Rachmat Wiradinata). A wide range of issues was discussed at the meeting, and we were pleased to have the newly-appointed SSC Chair, Dr. Vivek Menon, join the meeting.

Minutes of the SC meeting are included on pages 5-16 of this Newsletter, and the Minutes together with the various documents submitted to the meeting are available on the [CSG website](#).

The SC meeting was followed by a dinner at Le Sofitel Thalassa Hotel.



Working Meeting

The Working Meeting was officially opened on 13 May, with addresses from Mr. Said Amzazi (Wali of the Souss Massa Region), Mr. Issam Ahabri (Secretary General, National Agency for Water and Forests), Mr. Luc Fougierol (Crocoparc Agadir), Mr. Philippe Alleon (Crocoparc Agadir), Dr. Vivek Menon (SSC Chair) and the CSG Co-Chairs, Alejandro Larriera and Charlie Manolis.



Participants at welcome ceremony.

The Chairs reiterated that the decision for Morocco to host the Working Meeting was in part influenced by a desire to highlight the situation in the West and Central African region, in which 7 crocodilian species are distributed. In addition, CSG was also aware of efforts that were being made by Morocco to re-establish the West African crocodile (*Crocodylus suchus*) into the wild, from which it was extirpated since the 1950s. Long-term water dynamics will be a key variable to consider moving forward with assessment of potential habitats. If successful, it will represent the second re-establishment of a crocodilian species in a range state in which it had become extinct.

Oral presentations were organised within discrete thematic sessions: Crocodilians in Extreme and Dynamic Environments; Threatened Species; Head-starting and Reintroductions; Veterinary Sciences; Ecotoxicology; Human-Crocodile Coexistence; Management; Crocodilian Cognition; Phylogenetics, Systematics and Evolution; Crocodilians in Zoos; Community-based and Urban Crocodile Conservation; Population Monitoring; and, Crocodilian Ecology and Biology. Interspersed between the meeting sessions, working groups and thematic and working groups met (IUCN Red List Authority; Veterinary Science; Taxonomy and Identification; Zoos; Conservation Priorities).

Given the importance of head-starting and reintroductions in conservation programs for many crocodilian species, the session on this topic was of particular interest. It is clear that for some species, the ability to monitor the success of reintroductions, particularly survivorship, is constrained for different reasons. It is often “easier” for authorities to simply continue with institutionalised actions rather than to effect changes. It was thus encouraging to see recent research

results from the Gharial Ecology Project, which presented an innovative strategy that minimizes captive rearing of Gharial (*Gavialis gangeticus*) to only 4-6 months (cf conventional norm of 2-4 years). Other presenters stressed the need to address anthropogenic variables that may be operating (eg harvesting, mortality, habitat loss, etc.) in order for headstarting to improve population outcomes.

Female Gharials have been considered to begin breeding at a minimum of 2.6 m TL, a figure which is considered unsubstantiated and anecdotal. Thus, population surveys have included individuals of that size as “adults”. However, recent findings, also from the Gharial Ecology Project, confirm that female Gharial begin breeding at a minimum of 3.0 m TL, a result that will allow more accurate estimates of adult abundance and potential reproductive output.

Ecotoxicology featured prominently at this Working Meeting, with various presentations dealing with ingestion/bioaccumulation of lead, mercury, plastics, microplastics, antiparasitic drugs, PFAS, etc. The session on crocodilian cognition provided information on how targeted research on animals in captivity is improving our understanding of this topic.

The ability of participants, especially students, to present their work is very important. Working Meetings provide this opportunity, but more importantly they provide direct face-to-face contact between researchers, colleagues, friends, etc. to discuss the various aspects of crocodilians that are of interest to us all. It is anticipated that the Proceedings will be compiled and available around the end of August 2026.

The “traditional” dinner on the night of 13 May at Medina d’Agadir provided participants to enjoy some of the culinary delights of Moroccan cuisine, whilst enjoying the traditional music and dancing on display.

Live and silent auctions were held at the Sofitel Royal Bay on 15 May, with auctioneers Shawn Heflick and Joe Wasilewski working the crowd to raise funds for crocodilian conservation projects. Assisted by a team of hard-working volunteers, they managed to raise \$US6595. Gatorland Global kindly topped up the amount with an additional \$US2000, bring total funds to \$US8595. Thanks are extended to everyone who donated and participated, and especially to those people who organised what was a very smooth event.

On the final night (16 May), following dinner at “La Table du Croco” at Crocoparc, prizes and awards were presented by the CSG Co-Chairs. Student prizes were awarded for oral presentations:

- 1st Sachin Bhardwaj Lock: From Caribbean apex predator to Cuban remnant anthropogenic Holocene range collapse dynamics of *Crocodylus rhombifer*.
- 2nd Lona Lalić: Investigating vicarious trial and error in the American alligator: Implications for the evolution of planning.

3rd Patrick Hennessey: 3D analysis of shape change in the skull of *Gavialis gangeticus* through ontogeny.

and poster presentations:

1st Ana Clara Dova: Biocompatibility and biomaterial potential of a hydroxyapatite like ceramic derived from *Caiman latirostris* eggshells.

2nd Cristian Pizzigalli: Dietary assessment of Chadian *Crocodylus suchus* (West African crocodile) populations based on metabarcoding of faecal samples.

3rd Florencia Valli: Different fatty acid-supplemented diets modulate the intestinal tissues of *Caiman latirostris* hatchlings.

It was encouraging to see that the youngest contributor was 10-year-old Maia Tellez Kohlman, who reported the first known case of a Brown Basilisk as a prey item in a crocodilian (*C. acutus*). The CSG Chairs provided Maia with a special Chair's Encouragement Award for her efforts.



Maia Tellez Kohlman at her poster.

The CSG "Chairs' Encouragement Award" was presented to Mohamadou Awalou Aboubakar, a young scientist from Cameroon.



Mohamadou Awalou Aboubakar receives the Chairs' Encouragement Award from the CSG Chairs.

Funds raised through the auction were committed to the [BIODESERTS Research Group](#), represented by Cristian Pizzigalli and José Carlos, to establish the first long-term tagging and monitoring program for *Crocodylus suchus* in Diawling National Park, Mauritania.



From left, Matt Shirley, Alejandro Larriera, Jose Brito, Charlie Manolis, Cristian Pizzigalli, Sally Isberg, Christine Lippai, Grahame Webb.

The [Castillo Award for Crocodile Conservation](#) was presented to CrocFest, represented at the Working Meeting by core organisers Colette Adams, Curt Harbsmeier and Flavio Morrissiey. Since its inception, the CrocFest initiative has raised over \$US1 million for various crocodilian conservation and research projects around the world - its contribution to crocodilian conservation has been extraordinary.



Curt Harbsmeier and Colette Adams receiving the Castillo Award on behalf of CrocFest. Note: Falvio Morrissiey had already departed Morocco.

Overall, it was a successful meeting that allowed those present to envisage successful crocodilian conservation into the future.

All photographs from the Veterinary Workshop, Steering Committee meeting and Working Meeting are provided courtesy of "Design Studio".

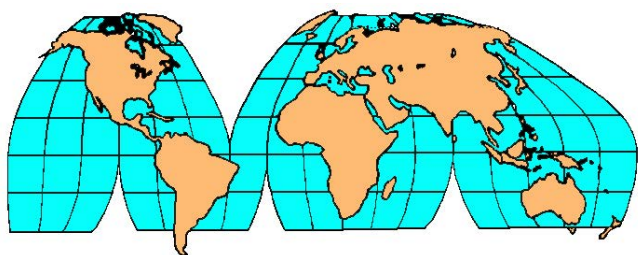
Charlie Manolis and Alejandro Larriera, *CSG Co-Chairs*.







Regional Reports



South Asia & Iran

India

WORLD CROCODILE DAY CELEBRATED ON GHAGHRA RIVER, A PRIME GHARIAL HABITAT IN UTTAR PRADESH, INDIA. The Ghaghra (Saryu) River is home to the Gharial (*Gavialis gangeticus*), and serves as marginal habitat for the Mugger (*Crocodylus palustris*). The Ghaghra also serves as aquatic corridor between Geruwa and Ganga populations of crocodilians. Considering habitat suitability, there is an active restocking program being conducted by the Uttar Pradesh Forest Department (UPFD) in the middle reaches of the Ghaghra River in Bahraich and Barabanki Districts of Uttar Pradesh. More than 800 Gharial yearlings from Kukrail Gharial Centre have been released since 2014, with ongoing monitoring by the project team.

To mark World Crocodile Day (17 June), an awareness event for Human-Crocodile Coexistence was organised by the TSA Foundation India, Lucknow, in association with Bahraich Forest Division of UPFD. Forty-five active fishermen from 6 villages/riparian settlements along the Ghaghra River were invited to our research station in Tappesipah village. Since most of the river is unprotected, recently there have been some conflicts recorded in this stretch of the river, primarily due to myths associated with the crocodiles.

This event was organised to educate the fishermen about crocodilians and to dispel myths associated with them. Mr. Sundresha (Divisional Forest Officer; DFO) presided over the event as Chief Guest, in the presence of the project team (Dr. Shailendra Singh, Mr. Onkar Yadav, Ms. Sreeparna Dutta, Ms. Neera Chaudhary, Mr. Harshit Singh, Mr. Pawan Pareek, Mr. Santram Nishad) and local UPFD personnel (Fig. 1).



Figure 1. Mr. Sundresha, DFO, Bahraich (UP Forest Department) addressing the audience. Photograph: Sreeparna Dutta.

The audience was informed that Gharial were completely harmless through a 10-minute video about the recovery of this iconic species (Fig. 2). Mr. Sundresha appealed to the fishermen to not harm Gharial yearlings if they are accidentally caught in nets, and to report any net damage to the project team to discuss the possibility of compensation. Dr. Shailendra Singh informed the audience that the Government has no plan to create any protected areas on the river, even if the restocking program results in higher numbers of Gharial.



Figure 2. Screening of film on Gharial plight and conservation efforts. Photograph: Arun Rawat.

Additionally, 50 children from local fishing villages were engaged to colour an activity sheet developed by the World Crocodile Day team (Fig. 3). Gharial and Mugger replicas were used to educate children about the differences between the two species and safe behaviours around crocodilians. Ten fishermen who were members of the Gangetic Dolphin and Crocodile Rescue team were awarded certificates of appreciation by the DFO (Fig. 4).



Figure 3. Children participating in colouring activity. Photograph: Shailendra Singh.



Figure 4. Fishermen awarded certificates of appreciation and uniforms for their participation as part of the rescue team for dolphins and Gharials. Photograph: Arun Rawat.

Shailendra Singh and Sreeparna Dutta, *TSA Foundation India, D1/317 Sector F, Jankipuram, Lucknow 226021, India (shailendrasingh.phd@gmail.com)*.

Latin America & the Caribbean

Belize

CROC RUN 2026. Throughout the year, the Crocodile Research Coalition (CRC) organizes fundraising events that not only support crocodilian conservation and wildlife research, but also strengthen community engagement and conservation awareness across Belize. Some of CRC's signature events are the Cupid's Croc Tail Gala in February, the Battle of the Paddle (organized in collaboration with Barefoot Services) in September and the annual Croc Run in October. All these events provide valuable opportunities for residents, visitors, and international supporters to become familiar with and support the CRC's work.

The Croc Run 2026 will take place on 25 October on the Placencia Peninsula in the Stann Creek District of Belize. It will feature both a 5-km fun run (with an added costume challenge) and a half marathon for more experienced runners. Participants of all ages, from across Belize and abroad, are encouraged to join this event in support of local wildlife education and conservation. Funds raised will go towards the Next Gen Croc program: CRC's youth education initiative designed to inspire the next generation of conservation leaders.

Any international runners joining the run will also be invited to participate in a research activity, offering them a unique opportunity to engage directly with the CRC's fieldwork and gain a deeper understanding of crocodile conservation efforts in Belize. The Croc Run combines community engagement, fundraising and conservation outreach to raise awareness and generate support for CRC's mission.

Sarah Aly, *CRC Program Coordinator*.

Dominican Republic

CONSERVATION IN ACTION: AMERICAN CROCODILE NESTING RESULTS, WILDLIFE ENFORCEMENT AND WORLD CROCODILE DAY CELEBRATIONS. On 17 March 2026, a juvenile American crocodile (*Crocodylus acutus*) was found in Laguna Gri-Gri, Nagua (Fig. 1). The individual was transferred to the National Zoological Park and subsequently handed over to the technical team responsible for monitoring the American crocodile population in Lago Enriquillo on 24 March 2026.



Figure 1. Marked juvenile *C. acutus* (#453) found in Laguna Gri-Gri, Nagua.

This crocodile had been marked (#453) as a hatchling on 20 June 2024 by the crocodile monitoring team in Lago Enriquillo and released in the Los Borbollones area as part of conservation program. Following its rescue, the individual was measured, weighed, sexed and released. The specimen was identified as a male and measured 78 cm TL, indicating a considerably slower growth rate than expected.

Of particular interest is that Laguna Gri-Gri is located approximately 210 km (straight-line distance) from Lago Enriquillo, currently the only area in the Dominican Republic known to support a resident wild *C. acutus* population. This considerable distance strongly suggests human interference rather than natural dispersal.

This case is of particular concern because it represents the second confiscation of a previously marked crocodile, indicating that wild crocodiles are being removed from their natural habitat. There are no details available regarding the circumstances under which this specimen was found, other than it was delivered to the National Zoo by a member of the military. Situations such as this highlight a critical conservation challenge: regardless of the effectiveness of a conservation program, continued removal of individuals from the wild will undermine population recovery efforts. Strengthening surveillance, law enforcement, and protection measures in and around Lago Enriquillo is therefore an urgent priority to ensure the effective conservation of this species.

Nesting Season 2026

The 2026 *C. acutus* nesting season in Lago Enriquillo concluded on 17 June, when the last nest was opened by the monitoring team. In all, 38 nests were located across six

nesting beaches (Fig. 2). La Azufrada was the most heavily used nesting site, with 16 nests recorded, followed by Playita (9 nests) and Punta Oeste (6 nests). Four nests were recorded at Km 5, making it the least utilized of the communal nesting beaches. In addition, one nest was recorded at each of the following solitary nesting sites: El Arenazo, Los Briganes, and Km 7.



Figure 2. Nesting beaches in Lago Enriquillo, 2026.

Maternal Care

Analysis of video and photograph footage obtained from camera traps installed in nesting areas allowed the hatching event of nest LC2607 at Azufrada-La Charca to be documented (Fig. 3). The nest was located approximately 40 m from the water, on a 5° slope, in substrate composed of sand with shell and coral fragments.

Based on the footage obtained, the hatching process was considered to begin on 5 April 2026 at 2148 h, when a female started excavating the nest using both front and hind-legs. The process was considered to have ended at 0425 h on 6 April 2026, when the female did not return to the nest. The entire hatching event is thus considered to have lasted around 6.6 hours.

The female made at least six trips from the nest to the water, presumably carrying hatchlings each time (Fig. 3). At 0758 h on 6 April 2026, the monitoring team arrived to examine the nest site and to collect the camera trap data. Eighteen eggshells (= 18 hatchlings) were counted, and the nest (30 cm depth, 70 cm excavated width) was found to contain 3 unhatched eggs and 4 dead hatchlings (ie clutch size of 25 eggs). The female returned to the nest at 1948 h on 6 April, about 15.5 h later, but just sat over the nest.



Figure 3. Female *C. acutus* assisting in the hatching process at nest LC2607.

Headstarting Initiative through Zoo Partnership

Fifteen hatchlings from nests LC2608 (La Charca-La Azufrada) and PL2603 (Playita), which hatched on 16 May

and 19 May 2026, respectively, were transferred to the National Zoological Park of Santo Domingo on 22 May 2026, as part of the American crocodile headstarting program (Fig. 4). Average TL was 28.06 ± 1.23 cm (range 25-29 cm; N= 15) and average bodyweight was 61.4 ± 2.43 g (range 57-63 g; N= 15).



Figure 4. Hatchlings at National Zoological Park facilities.

These individuals will be maintained under managed care until they reach a TL of 60-70 cm, at which point they are expected to have a greater likelihood of survival following release into Lago Enriquillo. The participation of the National Zoological Park in this project is of great importance for the conservation of this species in the Dominican Republic. In addition to directly contributing to the recovery of the wild *C. acutus* population, this collaboration strengthens the ties between institutions dedicated to biodiversity conservation in the country.

Celebration of World Crocodile Day

As part of World Crocodile Day (WCD) celebrations, an educational outreach activity was conducted on 20 June 2026 at the National Zoological Park. This event provided an opportunity to raise awareness and educate the public about the importance of conserving the *C. acutus*, a native species that is currently listed as Critically Endangered in the Dominican Republic.

A dedicated exhibition area was established in the Jaguar Plaza of the National Zoological Park, featuring two informational posters about *C. acutus*, along with several specimens, including skulls, skin samples and eggs. Two activity tables with colouring materials and educational worksheets were provided for children, and visitors were given the opportunity to interact with hatchlings from the headstarting program (Fig 5). As in the previous year, the WCD event was attended by Marisa Tellez (Crocodile Research Coalition), Robert Greco Jr. (Clemson University), Shawn Heflick, Halli Cowan and Mike Spain.

During the event, technical staff from the Ministry of Environment and Natural Resources, including Ms. Andrys Gómez (Biodiversity Technician) and Mr. Ramón Joel Espinal (Head of Fauna Division), were present to provide information and answer questions from visitors regarding the headstarting program implemented by the Ministry, as well as other conservation initiatives focused on the species.



Figure 5. Children interacting with *C. acutus* hatchlings from the headstarting program on WCD.

Thanks to the Dominican Ministry of Environment and Natural Resources and to Marisa Tellez, Shawn Heflick, Halli Cowan and Mike Spain for all the efforts they made to make it possible, and to all collaborating organizations, including Ecotopia, for their continued for this project. Our deepest gratitude The ZOODOM and the crocodile monitoring team at Lago Enriquillo for their invaluable work monitoring the crocodiles year-round and assistance with this project.

Ramon Joel Espinal¹, Andrys Gómez¹ and Bobby Greco²; ¹Ministry of the Environment and Natural Resources, Santo Domingo, Dominican Republic (ramon.espinal@ambiente.gob.do; andgomez@ambiente.go.do); ²266 Lehotsky Hall Room 270, Clemson, SC 29634, USA (grecobobby@gmail.com).



WORLD CROCODILE DAY 17th JUNE 2026

Crocodiles are REPTILES.
They have been around for **more than 200 million years.**
They are **cold-blooded** animals.
They bask in the sun (and keep their mouth wide open – called **gaping**) or cool down in the water for regulating their body temperature.
Crocodiles live in **Africa, Asia, Australia and the Americas.**

Many species of crocodilians that were overhunted for their valuable skin are now protected by the CITES treaty. The destruction of wetlands and climate change are however still threatening their survival.

Crocodiles are **semi-aquatic** and live in lakes, rivers, wetlands and saltwater estuaries in the tropical and sub-tropical regions.

Crocodiles are **carnivores.**
They stalk their prey by hiding in the water.
They eat fish, birds and other animals.
Because of their slow metabolism, **crocodiles can stay alive for many months without feeding.**

Crocodiles can run fast over a short distance.



They are faster in the water than on land.



Crocodiles have **sharp teeth.** They replace them regularly. No cavities, no dentist...

The saltwater crocodile has the **strongest bite** of all the animal kingdom.




There are 26 recognized species of crocodilians, divided in 3 families - Alligatoridae (8 species; alligators and caimans), Crocodylidae (16 species; "true" crocodiles) and Gavialidae (2 species; Gharial and Tomistoma).

A CROCODILE	AN ALLIGATOR	CROCODILE	ALLIGATOR	GHARIAL
				
V-shaped snout	U-shaped snout			
Lower teeth are visible	Lower teeth are hidden			

Crocodiles lay **eggs.** The female crocodile guards her nest and protects her babies.



The **saltwater crocodile** is the largest living reptile in the world.

The males can grow over **6 m long** with a body mass of **over 1,000 kg.**
The Nile crocodile and the Indian gharial are also large species.







Mainland Holdings Ltd is proudly supporting the crocodile conservation program and the protection of the wetlands habitats in PNG by adopting world standard sustainable and ethical farming practices.

Poster developed as part of World Crocodile Day by Mainland Holdings Crocodile Farm, Papua New Guinea. Submitted by Eric Langelet (MHCF).

Education and Competition for Elementary School Students 08 Nanga Lauk

 June 17, 2026

 Location SD Negeri 08 Nanga Lauk, Nanga Lauk Village, Kapuas Hulu Regency, West Kalimantan Province - Indonesia

 Organized by PRCF Indonesia and LPHD Lauk Bersatu

 Participants Male and female students of SD Negeri 08 Nanga Lauk Village

BACKGROUND

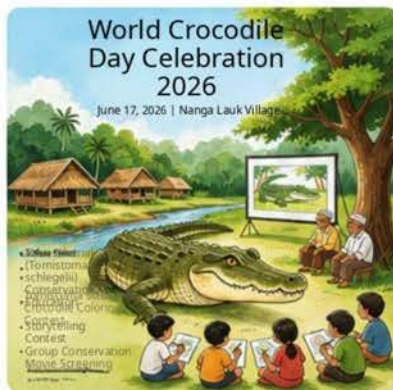
World Crocodile Day is commemorated every June 17 to raise public awareness about the importance of crocodile conservation worldwide, including the False Gharial (*Tomistoma schlegelii*) that lives in the waters around Nanga Lauk Village. This species is listed as Endangered and faces various threats, such as habitat loss, human disturbance, and low public understanding of the importance of its existence in nature.

To commemorate World Crocodile Day 2026, PRCF Indonesia in collaboration with LPHD Lauk Bersatu organized educational activities and a competition for the students of SD Negeri 08 Nanga Lauk as an effort to foster young people's concern for the protection of the False Gharial and its habitat.

ACTIVITY OBJECTIVES

- Increase students' knowledge about the False Gharial.
- Foster early awareness of the importance of wildlife conservation.
- Introduce the role of the community in ensuring the survival of the False Gharial.
- Encourage youth participation in environmental protection efforts.

ACTIVITY DOCUMENTATION



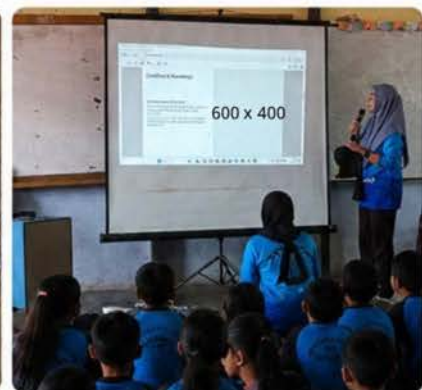
1 World Crocodile Day 2026 Commemorative Poster

The World Crocodile Day activity poster serves as a medium for socialization and a call to increase awareness for the conservation of the False Gharial and its habitat.



2 Crocodile Coloring Competition

A participant is coloring a picture of a False Gharial in the coloring competition held as a means of education and introduction to wildlife for children.



3 Delivery of Conservation Material

A representative from LPHD Lauk Bersatu delivered material on the habitat, behavior, and importance of protecting the False Gharial to the male and female students of SD Negeri 08 Nanga Lauk.



4 Awarding Prizes to Winners Awarding prizes to competition winners as a form of appreciation for the students' participation and creativity in the World Crocodile Day 2026 commemoration activities.



5 Participants' Enthusiasm in the Coloring Competition

Dozens of students from SD Negeri 08 Nanga Lauk participated in a coloring competition themed around the False Gharial. This activity served as an enjoyable learning medium while introducing the importance of protecting wildlife and its habitat.



6 Group Photo with Participants and Activity Supervisors Male and female student participants with supervising teachers, representatives from LPHD Lauk Bersatu, and the PRCF Indonesia team after completing the series of World Crocodile Day 2026 commemoration activities.

ACTIVITY RESULTS SUMMARY

The activity ran smoothly and received high enthusiasm from the students. Through the delivery of material, interactive discussions, and the coloring competition, students gained new knowledge about the False Gharial (*Tomistoma schlegelii*), the important role of crocodiles in aquatic ecosystems, and the threats it faces. This activity is expected to foster early awareness to protect wildlife and its habitat in the surrounding environment.

 Number of Participants
68 students
(31 male, 37 female)

 Classes Involved
1-6 SD

6 Competition Category
Crocodile Coloring Contest
(*Tomistoma*)

 Prizes
6 winners received attractive prizes

ABOUT THE FALSE GHARIAL (*Tomistoma schlegelii*)

- One of the largest freshwater crocodile species in the world. Lives in large rivers, lakes, swamps, and swamp forests. Plays an important role in maintaining the balance of aquatic ecosystems. Listed as Endangered according to the IUCN Red List. Protected under Government Regulation No. 7 of 1999 concerning the Preservation of Plant and Animal Species.



Thank you to SD Negeri 08 Nanga Lauk, the teachers, students, and all parties who supported the implementation of the World Crocodile Day 2026 activities.

Activities undertaken on as World Crocodile Day at Nanga Lauk Village, West Kalimantan, Indonesia. Submitted by People Resources and Conservation Foundation.



Recent Publications

Yarnpakdee, S., Senphan, T., Benjakul, S. and Sriket, C. (2026). Sequential extraction protocol for bio-calcium from saltwater crocodile (*Crocodylus porosus*) bone: Physicochemical and molecular studies. [Journal of Agriculture and Food Research](#).

Abstract: Saltwater crocodile (*Crocodylus porosus*; SC) farming generates 45% bone waste, creating environmental challenges but also representing an underutilized source of calcium. This study presents the first comprehensive protocol for extracting bio-calcium from SC bone through sequential processing: autoclaving, alkaline soaking, ethanol extraction, and hydrogen peroxide bleaching. The extraction process yielded 16.74% bio-calcium with a high mineral density (26.37% Ca and 13.83% P) and an average particle size of 6.77 μm . XRD confirmed the preserved hydroxyapatite structure, whilst FTIR revealed the complete elimination of the organic matrix in the resulting bio-calcium. SEM-EDS demonstrated uniform elemental distribution with no detectable heavy metals. Remarkably, in vitro calcium bioavailability reached 15.24%, representing a 78% enhancement over fish bone bio-calcium and doubling synthetic supplement performance. Preserved collagen-derived amino acids facilitate calcium-peptide chelation, explaining the superior absorption. The developed valorization process converts aquaculture waste into high-value ingredients with potential applications in food and pharmaceuticals.

Sung, H., Reed, F. and Tellez, M. (2026). Ancient and recent introgression in hybridizing Mesoamerican crocodiles (*Crocodylus acutus* x *Crocodylus moreletii*) from Belize. [Research Square](#).

Abstract: A central aim of conservation is to preserve existing biodiversity and understand the ecological and evolutionary processes that support it. Inter- and intra-specific hybridization in wildlife has been recognized as a common and naturally occurring phenomenon that facilitates species adaptation and evolution. However, hybridization still constitutes one of the most challenging problems for legal protection and species management due to its perceived biological risk, lack of regulatory oversight, and different case-by-case impacts. When considering rare or threatened hybridizing species with unequal legal protection, management strategies risk being inaccurate or unsuccessful unless contextualized with an informed understanding of the species' genetic and evolutionary backgrounds. We investigated hybridization dynamics and genetic diversity of American crocodiles (*Crocodylus acutus*) and Morelet's crocodiles (*Crocodylus moreletii*) from Belize to ascertain whether genetic exchange through admixture displayed signs of evolutionary significance. Using genome-wide SNP data from 242 wild crocodile samples, we found evidence of population structure among *C. acutus*, as well as ancient bidirectional gene flow that had occurred between *C. acutus* and *C. moreletii*. Notably, we also found evidence of high levels of recent admixture along the coastal *Crocodylus* populations in areas with extensive habitat modification due to human impact. These findings, as well as a discovered disconnect between morphological and genetic species assignments used to identify populations, have implications for conservation management practices and suggest a range of additional genetic investigations to understand the natural and anthropogenic role of hybridization in large, long-lived tropical predators that span marine and terrestrial ecosystems.

Margulis-Ohnuma, M., Ruebenstahl, A.A., Meyer, D.L. and Bhullar, B.-A.S. (2026). A short-snouted 'sphenosuchian' with unusual feeding anatomy demonstrates that ecological specialization occurred early in crocodylomorph evolution. *Proceedings of the*

Royal Society B: Biological Sciences 293(2069): 20260130.

Abstract: The early evolution and diversification of Crocodylomorpha is a key component of vertebrate evolution on land but is somewhat poorly understood as a result of limited data. We describe *Eosphorosuchus lacrimosa* gen. et sp. nov., an early crocodylomorph from the Late Triassic of Ghost Ranch, New Mexico, whose cranial anatomy is divergent from that of other early crocodylomorphs (including *Hesperosuchus agilis*, to which it had been tentatively assigned), featuring an unusually short and osteologically reinforced facial region. A robust upper temporal arch and prominent surangular ridge indicate the presence of well-developed superficial external adductor musculature, which is divergent relative to pseudosuchians generally. These autapomorphies suggest specialization for a powerful bite. Bayesian and maximum parsimony phylogenetic analyses find *E. lacrimosa* outside of an *H. agilis* clade, near the base of Crocodylomorpha. The specializations of *E. lacrimosa* therefore represent the beginnings of ecological diversification within Crocodylomorpha among animals of a similar size, predating the Late Triassic appearance of Crocodyliformes and the Jurassic radiation of mesoeucrocodylians. Coexistence in the same single-event death assemblage of *E. lacrimosa* and *H. agilis* - two small early crocodylomorphs with functionally significant anatomical differences - suggests partitioning of terrestrial carnivorous niches within the 'sphenosuchian' grade.

Biácsi, A., Bacsadi, A., Endre Ákos Papp, E.A., Gál, J. and Rónai, Z. (2026). *Mycobacterium ulcerans* ecovar Liflandii infection in new host in a Cuban crocodile (*Crocodylus rhombifer*). [Acta Veterinaria Hungarica](#).

Abstract: *Mycobacterium ulcerans* ecovar Liflandii has recently been described as the causative agent of fatal disease in different frog species. This is the first report of this pathogen in a Cuban crocodile (*Crocodylus rhombifer*), which died suddenly in a Hungarian zoo. The authors' findings suggest that *M. ulcerans* ecovar Liflandii does not exclusively infects anurans and highlights the zoonotic risk posed by this emerging pathogen.

Retraction Note: Utele, M., Gebeyehu, A. and Kaba, T. (2026). Gastrointestinal helminth of Nile crocodiles (*Crocodylus niloticus*), in Arba Minch Crocodile Ranch, Ethiopia. *Scientific Reports* 16: Article number 12199.

Retraction of: [Scientific Reports](#) (see above) published online 30 January 2025

The Editors have retracted this Article. After publication, it was brought to the Editors' attention that *Trichinella* nematodes cannot be identified following the methods as described in the Article. The Authors were unable to provide their raw microscopy data upon request. Additionally, Fig. 1 in the Supplementary Material appears to be very similar to Fig. 16 in another article with no shared authors. The Editors therefore have lost confidence in the claims of this Article.

The Authors have not responded to any correspondence from the Editors about this retraction.

Benítez-Moreno, J.A., Jean-Paul Lachaud, J-P., Hénaut, Y. and Charreau, P. (2026). Predation by the native tropical fire ant *Solenopsis geminata* on live hatchlings and eggs of the vulnerable American crocodile *Crocodylus acutus*. *Journal of Natural History* 60(17-20): 949-961.

Abstract: Due to their wide distribution, American crocodiles (*Crocodylus acutus*) interact with a large number of species, mainly as predators. However, in their early life stages, they are vulnerable as prey to numerous organisms. This study identifies tropical fire

ants (*Solenopsis geminata*) as predators of the eggs and hatchlings of American crocodiles in Guatemala. We recorded acts of predation by ants in 19, 10 and 13% of crocodile nests during 2023, 2024 and 2025, respectively. The ants were found consuming cracked and broken eggs. In 2023, they also preyed on two hatchlings that had just broken the shell, completely consuming the skin and muscle tissue of the nares and the front and rear limbs. The egg/neonate predation rate was 1.6% in 2024 and 0.7% in 2025. This is the first report of *S. geminata* preying on *C. acutus* clutches in the wild.

Resumen: Debido a su amplia distribución el Cocodrilo Americano (*Crocodylus acutus*) interactúa con un gran número de especies, principalmente como depredador. Sin embargo, en las etapas tempranas, es vulnerable como presa ante numerosos organismos. En este estudio se identifica a la Hormiga de Fuego Tropical (*Solenopsis geminata*) como depredador de huevos y neonatos del Cocodrilo Americano, en Guatemala. Se registraron 19%, 10% and 13% de nidos de cocodrilos con actos de depredación por hormigas durante 2023, 2024, y 2025, respectivamente. Las hormigas fueron encontradas consumiendo huevos agrietados y rotos. En 2023 depredaron también a dos neonatos que recién rompían el cascaron, consumiendo por completo el tejido cutáneo y muscular de las extremidades anteriores, posteriores y las narinas. La tasa de depredación de huevos/neonatos observada fue de 1.6% en 2024 y de 0.7% en 2025. Este es el primer reporte de *S. geminata* depredando en nidadas de *C. acutus* en vida silvestre.

De Castro, A., Boucher, M., Bauer, B., Rainwater, T.R. and Anderson, J.T. (2026). From box to belly: Recovery of Wood duck (*Aix sponsa*) duckling web tags in American alligators (*Alligator mississippiensis*). *Southeastern Naturalist* 25(1): N20-N28.

Abstract: *Alligator mississippiensis* (American alligator) commonly feed on birds, but due to rapid digestion, consumption of birds by alligators may be underreported when determined through examination of stomach contents. However, on occasion, some bird species consumed by alligators have been identified from recoveries of external marks (eg avian leg bands and radio transmitters) from stomachs. Here, we report novel observations of web tags from *Aix sponsa* (Wood duck) ducklings recovered from hunter-harvested alligator stomachs as part of a regional alligator-diet study. We recovered 6 duckling web tags from 2 alligators: 1 in South Carolina (5 tags) and 1 in Florida (1 tag). We also provide information (eg hatching location) on ducklings from which web tags were recovered, as these birds were marked during a regional study of box-nesting Wood duck reproductive ecology. Our observations may have implications for waterfowl management, as the effects of alligator predation on Wood duck ducklings may be underreported where these species are sympatric.

Pooley, S. (2026). A beautiful, bioculturally important Game Reserve is dying in plain sight. *Oryx*.

Charruau, P., Mañon-González, J.R., González-Desales, G.A., Caro-Martínez, D.M. and González-Cortés, H. (2026). Dietary assessment of *Crocodylus acutus* on Cozumel Island, Mexico. *Revista Latinoamericana de Herpetología* 9(2): 253-266.

Abstract: *Crocodylus acutus* is considered one of the most widely distributed crocodilians in the world and within the Mexican Republic, including Caribbean islands such as Cozumel. In Mexico, there is information on the feeding habits of *C. acutus* from mainland populations but not from island populations. Thus, we conducted the first evaluation of the diet of *C. acutus* in the Punta Sur Ecological Reserve, located on the island of Cozumel. Eighteen individuals of five size classes were captured in June 2024, and stomach contents were obtained using the stomach flushing method. The Jacop-II index was used to analyze the use of food resources, categorizing the components into nutritional intake, incidental intake, ecological

interactions, and grinding aids. Hatchlings showed a moderate selection towards fish ($D=0.4$), juveniles showed a strong selection towards mammals ($D=1$) and amphibians ($D=1$), while subadults showed indifferent selection with preference towards fish ($D=0.1$), and adults showed a strong selection towards birds ($D=0.8$) and reptiles ($D=0.6$). We recorded 5 new prey species for *C. acutus* and also found vegetal matter, plastic residues, parasites and gastroliths. Ingestion of vegetation and gastroliths are likely accidental during prey capture or from secondary intake from prey guts. It is important to highlight the presence of plastic residues as a potential threat to the health of crocodiles.

Resumen: *Crocodylus acutus* se considera uno de los cocodrilos con mayor distribución en el mundo y dentro de la República Mexicana, incluyendo islas del Caribe como Cozumel. En México, existe información sobre los hábitos alimenticios de las poblaciones continentales de *C. acutus*, pero no sobre las poblaciones insulares. Por lo tanto, realizamos una primera evaluación de la dieta de *C. acutus* en la Reserva Ecológica Punta Sur, en la isla de Cozumel. En junio de 2024 se capturaron 18 individuos de cinco clases de tamaño y se obtuvo su contenido estomacal utilizando el método de lavado gástrico. Se utilizó el índice Jacop-II para analizar el uso de los recursos alimenticios, clasificando los componentes en ingesta nutricional, ingesta incidental, interacciones ecológicas y ayuda para la trituración. Las crías mostraron una selección moderada hacia los peces ($D=0.4$), los juveniles mostraron una fuerte selección hacia los mamíferos ($D=1$) y los anfibios ($D=1$), mientras que los subadultos mostraron una selección indiferente con preferencia hacia los peces ($D=0.1$) y los adultos mostraron una fuerte selección hacia las aves ($D=0.8$) y los reptiles ($D=0.6$). Registramos cinco nuevas especies de presas para *C. acutus* y también encontramos materia vegetal, residuos plásticos, parásitos y gastrolitos. La ingestión de vegetación y gastrolitos es probablemente incidental durante la captura de presas o por ingestión secundaria de los intestinos de las presas. Es importante destacar la presencia de residuos plásticos como una amenaza potencial para la salud de los cocodrilos.

Rehorek, S.J., Hillenius, W.J. and Smith, T.D. (2026). Inception and organogenesis of the nasal glands in the embryonic Laysan albatross (*Phoebastria immutabilis*) and American alligator (*Alligator mississippiensis*), and a re-evaluation of their homology. *Anatomical Record (Hoboken)*.

Abstract: Although diverse manifestations of nasal glands occur within Tetrapoda, most studies have focused on those with ductal openings in the nasal vestibular ductal opening. Historically, comparative studies of adult animals often concentrated on specific clades, resulting in taxon-specific terminology (eg external nasal gland [ENG] in squamates and “Steno’s gland” or “salt gland” in birds). The few embryological studies that exist are descriptions of individual unstaged embryonic specimens. In this study we examined two series of stage embryonic specimens of two archosaurs: Laysan Albatross (*Phoebastria immutabilis*: Aves) and the American alligator (*Alligator mississippiensis*: Crocodylia). Serial histological sections of mid to late embryonic staged specimens of both species were examined. *A. mississippiensis* possesses a single large gland, with a medial vestibular opening whereas *P. immutabilis* has two ducts (inner and outer in reference to their origin from the vestibulum). In comparison to other tetrapods, the alligator condition most closely resembles that of an ENG, which is typical of amphibians and many amniotes. Dual glands exist in many birds, echidna, turtles and *Sphenodon*. We argue that the inner one corresponds to the ENG and the outer one to Steno’s gland; the entire complex can appropriately be called the dual nasal gland (dNG). Unique features of timing (earlier in birds and alligators, in comparison to rodents), nasal rotation (dual late embryonic nasal rotation in alligators) and the impact of ductal morphogenesis (and the putative role of signaling pathways in ductal development) reveal a hitherto underappreciated complexity of nasal gland evolutionary history.

Rao, R.J., Rajesh, G. and Yogesh, S. (2026). Perceptions of local Communities on Gharial conservation in the National Chambal Sanctuary, India. *Journal of Environmental Science and Agricultural Research* 4(2): 1-5.

Abstract: The Indian Government has sanctioned a conservation initiative for the critically endangered Gharial crocodile species, which includes the establishment of designated sanctuaries to safeguard key Gharial habitats. The National Chambal Sanctuary (NCS) has been established along the Chambal River, a significant tributary of the Ganges River system in northern India. Three State Government (Madhya Pradesh, Rajasthan and Uttar Pradesh) Forest Departments jointly manage the NCS. Rehabilitation efforts targeting the critically endangered Gharial have been ongoing since 1983. The Chambal River serves as a vital resource for local communities, supporting activities such as drinking water provision, washing, sand and stone mining, irrigation, transportation, Agriculture and livestock husbandry. This research aims to understand the human-Gharial interactions within the NCS. Observations indicate that Gharials exhibit harmonious behaviour and habitat utilisation alongside minimal human conflict in the Sanctuary. Current research on the long-term survival of Gharials underscores the successful cohabitation of humans and Gharials within the sanctuary.

Fermo, L., Yu, L., Nossa, D., Falqueto, G., Nobrega, Y. and Mascarenhas-Junior, P. (2025). Monitoramento de jacare-do-papo-amarelo na bacia do Rio Doce: Papel de áreas protegidas na Manutencao populacional. *ARS Veterinaria* 41(4): 168.

Abstract: The broad-snouted caiman (*Caiman latirostris*) is a medium-sized crocodilian widely distributed in South America; however, its populations have suffered fragmentation and decline due to habitat loss and degradation. This study aimed to investigate the distribution and age structure of *C. latirostris* along the Rio Doce basin, a region heavily impacted by human activities and the rupture of a mining tailings dam. Surveys were conducted in 49 water bodies distributed across 14 municipalities, totaling 108 visits between March 2024 and July 2025. Sampling occurred through nocturnal observations with flashlights, both by boat and on foot along the banks. *C. latirostris* was detected in 14 visits (12.9%), with individuals associated with solid waste and sewage on three occasions. Outside the Rio Doce State Park (PERD) protected area, 20 individuals were recorded (25% juveniles, 50% subadults, and 25% adults), while inside the PERD, an average of 43.5% of caimans were observed per visited location. The presence of individuals of different age classes indicates active reproduction and survival in the early life stages. The comparison between protected and unprotected areas highlights the importance of habitat conservation for the maintenance of the species. It is concluded that *C. latirostris* exhibits ecological resilience, but the preservation of aquatic habitats, especially in impacted areas, is essential to guarantee the persistence of this species in the Rio Doce basin.

Pereyra, M.E. and Chinsamy, A. (2026). Developmental plasticity highlighted in *Crocodylus niloticus* through *in vivo* fluorochrome labelling. *Royal Society Open Science* 13: 260040.

Abstract: *In vivo* fluorescent labelling has been widely used in osteohistological studies for age estimation, and to measure the daily/annual bone depositional rates. Here, we conducted a detailed microstructural study of limb bones of captive *Crocodylus niloticus*. We studied two male and two female specimens which were *in vivo* labelled three times over a period of approximately 14 months to evaluate the nature of their bone tissues, daily bone depositional rates and the periodicity of growth marks in their bones. We identified different types of embryonic bone tissues, and the widespread occurrence of woven parallel complex bone in several of the limb bones. Notably, we determined substantial intraskeletal and intraspecific variability in bone microstructure and bone depositional rates among the four individuals. The bone depositional

rates calculated are within the range expected of reptiles and lower than those of birds and mammals. The labelling administered permitted the identification of stochastic and seasonal growth marks. Unexpectedly, we documented temporal differences in periosteal bone deposition and growth in length, which raises pertinent questions concerning the regulation of these growth processes. We propose that additional carefully constrained osteohistological *in vivo* labelling studies are warranted to expand our understanding of the factors affecting crocodilian growth.

Binah, O., Shalev, G., Maor, G., Reiter, I., Ziv, I. and Ciechanover, A. (2026). Sera from phylogenetically related alligators, crocodiles and domestic chickens exhibit comparable anti-cancer activity. *Cells* 15: 749.

Abstract: Crocodilians rarely develop cancer despite long lifespans and continuous exposure to environmental carcinogens, suggesting robust natural anti-tumor defense mechanisms. We investigated the anti-cancer activity of sera derived from the phylogenetically related species - alligators, crocodiles, and chickens, and studied their underlying immune mechanisms. The anti-tumor activity of alligator serum was tested in murine models of melanoma and lymphoma. Alligator serum (AS) and its $(\text{NH}_4)_2\text{SO}_4$ -precipitated fraction (ASa) showed rapid and potent cytotoxicity toward multiple murine and human cancer cell lines while sparing non-malignant human cells. Importantly, ASa attenuated melanoma and lymphoma tumor growth in mice. Electrophysiological analyses in PN71 cancer cells treated with ASa revealed rapid membrane depolarization and formation of high-conductance pores consistent with Complement-mediated membrane attack complex (MAC) activity. Proteomic analyses identified the Complement component C5 as a major protein enriched in active fractions, implicating the Complement system in cancer cell killing. Based on phylogenetic similarity of C5, crocodile and chicken sera exhibit alligator-like comparable anti-cancer activity. Mechanistic studies in chicken serum showed that the anti-cancer activity depends on Ca^{2+} and Mg^{2+} ions, terminal Complement components (C5-C8), and IgM antibodies that initiate Complement activation. Immunodepletion of IgM from CSa significantly reduced cytotoxicity, whereas purified chicken IgM activated human Complement to induce cancer cell death. These findings identify a conserved IgM-Complement immune mechanism capable of selectively targeting malignant cells. The evolutionary conservation and cross-species functionality of this pathway highlight its potential as a bio-inspired strategy for developing novel Complement-based cancer immunotherapies.

Lu, H., Meaza, I., Wise, R.M., Wise, J.T.F., Diven, S.S., Croom-Pérez, T.J., Toyoda, J.H. and Wise Sr., J.P. (2026). A survey of DNA damage in American alligators (*Alligator mississippiensis*) in Florida. *Environmental and Molecular Mutagenesis* 67(3): e70047.

Abstract: The scientific concept of One Environmental Health is a research strategy focused on the study of toxicants, aiming to incorporate human, wildlife, and ecosystem health to establish a more comprehensive understanding of health. A One Environmental Health approach, studying the responses of American alligators (*Alligator mississippiensis*) that are considered apex sentinel organisms to environmental toxicants, is crucial. Due to their long-lived lifestyle on land and water, including a wide range of prey items in their diet and their ability to bioaccumulate metals, alligators serve as effective indicators of heavy metal pollution, which poses risks to aquatic ecosystems and human health. In this study, we examined DNA damage in American alligators from three locations in Florida using comet assay. We found alligators in Merritt Island National Wildlife Refuge had significantly higher DNA damage levels compared to those in Lake Apopka and Lake Woodruff. This trend was consistent across both sexes, with no observed sex differences. Similarly, DNA damage levels were significantly higher in both adult and juvenile alligators from Merritt Island compared to the other locations. Notably, juvenile alligators exhibited higher DNA

damage than adults, with animals from Merritt Island exhibiting particularly elevated levels.

Colston, T.J., Rosado-Ramos, E.L., Pirro, S., Pyron, R.A. and Puente-Rolón, A.R. (2026). The complete genome sequences of 5 species of reptiles invasive in Puerto Rico. *Biodiversity Genomes* <https://doi.org/10.56179/001c.161013>.

Abstract: We present complete genome sequences of 5 species of reptiles invasive in Puerto Rico. Individuals were collected in the wild and represent species known to be established and reproducing (*Caiman crocodilus*, *Gymnophthalmus underwoodi*, *Malayopython reticulatus*) or first verified reports of species that could become established (*Chlamydosaurus kingii*, *Python bivittatus*).

Cotts, L., Gonçalves Achutti, M.R., Veit, L. and Pires, J. (2026). First record of leucism in broad-snouted caiman (*Caiman latirostris*) with morphological, clinical and conservation insights in white crocodilians. *Amphibia-Reptilia*.

Abstract: *Caiman latirostris* is a neotropical crocodilian widely distributed in Brazil, marked by a greenish-brown body, except by a yellowish-cream venter. Chromatic disorders remain unreported for *C. latirostris*. Here, we describe the first case of leucism in a *C. latirostris* and provide clinical, biometric and morphological data on this individual, including body condition index (BCI), body condition scores (qBCS and BCS), and haematological, biochemical and parasitological analyses. Additionally, we discuss the historical occurrence of the white phenotype in crocodilians and its potential as a bioindicator of environmental stress and ecosystem health.

Miranda, G., Ríos, N. and Hubert, N. (2026). New mitogenomic resources for the *Caiman yacare* (Daudin, 1802) from Bolivia. *Ecology and Evolution* 16(4): e73336.

Abstract: This study addresses the evolutionary state of a newly discovered population of *Caiman yacare* outside the western edge of its range in Bolivia by providing new mitochondrial genomic resources. Despite their conservation importance, few complete mitochondrial genomes have been generated for South American crocodilians, and most of those available originate from captive individuals, thereby limiting their utility for conservation and taxonomic applications. To bridge this gap, we generated complete mitochondrial genomes for six wild individuals from this newly discovered population in Bolivia. These data complement previously available sequences and provide essential resources for conservation and forensic applications. Mitogenomes were assembled and annotated using MEGAHIT and MitoZ. Species delimitation analyses using five independent methods revealed seven mitochondrial lineages (MOTUs) within the genus *Caiman*, while *C. yacare* itself formed a single MOTU with two phylogroups of distinct geographic distributions. All six new genomes clustered within the Madeira phylogroup. Phylogenetic and coalescent analyses suggest that this newly documented population retains high haplotypic diversity despite being located at the margin of the species range distribution. This study provides the first mitogenomes of wild *C. yacare* and contributes valuable data for understanding population structure, lineage divergence, and for informing management strategies.

Pheasey, H., Diawara, M., Duonamou, L., Konate, A., Barry, F., Beavogui, D., Delamou, S., Gomou, L., Guilavogui, J., Kolamou, N-E., Loua, M., Sanoh, N., Yoh, N., Bauld, J.T., McMillan, L., Humle, T. and Ingram, D.J. (2026). Wild meat purchasing and consumption behaviours in three urban centres in the Republic of Guinea. *Ecosystems and People* 22(1): 2661200.

Abstract: West Africa is experiencing rapid population growth and urbanisation which is putting pressure on food systems, including

wild-sourced animal meat. Urban demand for wild meat has been identified as a key factor driving wildlife hunting, yet has been little explored in West Africa. To understand the wild meat consumption and purchasing behaviours of urban residents and the sociodemographic factors that influence these behaviours, we conducted a questionnaire survey with 2935 people in three urban centres (Conakry, Faranah, Nzérékoré) in the Republic of Guinea. Bars/restaurants were important eateries for wild meat, and markets were the most utilised points of sale, however we found differences between urban centres. The greatest wild meat purchasing frequency was among residents living in the smallest urban centre (Faranah) and the lowest in the coastal capital (Conakry). The minority non-Muslim population typically purchased wild meat more frequently than the Muslim population. We found no effect of gender or age on purchasing behaviours surrounding wild meat. Our results suggest that religious identity is an important consideration for initiatives seeking to reduce demand for wild meat, where deemed ethical and necessary, and we highlight the potential importance of engaging with religious leaders and teachers. Caution should be taken when suggesting alternatives to wild meat, which likely have environmental impacts of their own. Our work contributes to improved understanding of urban wild meat consumption patterns and is relevant to policymaking on the sustainable use of wildlife, such as the Convention on Biological Diversity and the United Nations Sustainable Development Goals.

Gonwouo, N.L. and Doherty-Bone, T.M. (2026). Reptile trading in Cameroon: Setting baselines for monitoring and interventions. *Herpetological Conservation and Biology* 21(1): 213-225.

Abstract: Trade in wildlife, including reptiles, represents an important component of the livelihoods of many indigenous people globally. Characterizing the extent of this trade and its relationship to livelihoods is necessary to understand its sustainability. We report on the trade of reptiles for food, traditional medicine, and crafts in Yaoundé, the capital of Cameroon, for which data has been lacking compared to elsewhere in the country. We interviewed 28 people, including 13 from craft stalls, 5 traditional healers, 7 from restaurants, and 3 wildmeat traders on the origin, acquisition and use of reptiles. We documented 16 species, including 9 CITES-listed species, of which 69% were used for meat, 38% in traditional medicine, and 69% for leather products. The most harvested species for meat included the Gaboon Viper (*Bitis gabonica*), Nile Monitor (*Varanus niloticus*), Dwarf Crocodile (*Osteolaemus tetraspis*), Rock Python (*Python sebae*), and forest tortoises (*Kinixys* sp.). Species sold for traditional medicines included the Rock Python and two chameleon species. There was at least one incidence of a critically endangered African Slender Snouted Crocodile (*Mecistops cataphractus*) being traded for its meat and skin. Crocodiles, pythons, vipers, cobras, and monitor lizards were predominately utilized for clothing products. The demand for reptiles in these multiple uses requires further documentation, with only anecdotal reports from traders of reductions in availability of certain species traded; notably vipers and crocodylians. We discuss possible measures to improve monitoring of this trade network to determine its sustainability and requirements for sustainable management.

Li, P., Ni, Y., Wen, Y., Cao, X., Li, J., Zhou, Y., Yi, P., Wu, X. and Nie, H. (2026). Dynamic changes in chromatin accessibility reveal the role of NF-Y targeting AURKB in mediating cell cycle during asynchronous oogenesis in the Chinese Alligator (*Alligator sinensis*). *Frontiers in Zoology*.

Abstract: The dynamics of chromatin accessibility that regulate oogenesis for the establishment of the female ovarian reserve in mammals have not been explored in reptiles with lifelong continuous oogenesis. Assays for transposase-accessible chromatin with high-throughput sequencing (ATAC-seq) were conducted to generate a chromatin accessibility landscape from gonadal samples from three critical stages of oogenesis in female Chinese alligators, which

revealed a pronounced global decrease in chromatin accessibility across these developmental stages. Functional enrichment analysis demonstrated that differentially accessible regions were associated with genes involved in cell cycle regulation, meiosis, RNA binding, and cellular metabolism. Transcription factor footprinting identified krüppel-like factor (KLF) and specificity protein (SP) family members, POZ/BTB and AT-hook containing zinc finger protein 1 (PATZ1), and the nuclear transcription factor Y (NF-Y) complex (including subunits NFYA, NFYB, and NFYC) as core regulatory factors, with NF-Y binding sites exhibiting marked dynamic changes during development. Further analysis showed that NF-Y target genes are significantly enriched in critical processes such as cell cycle, mitosis, and meiosis, including key regulators Aurora Kinase A (AURKA) and AURKB. Experimental validation confirmed widespread ovarian expression of NFYA, NFYB, and NFYC, with AURKB expression strongly correlated with NF-Y protein levels. Dual-luciferase reporter assays demonstrated that NFYA significantly enhances AURKB promoter activity through two CCAAT-box elements near the transcription start site. This research depicts the chromatin accessibility dynamics during oogenesis of the Chinese alligator and pinpoints NF-Y as a crucial regulator of AURKB, thereby providing a mechanistic foundation for understanding reproduction and advancing conservation in this endangered species.

Ezat, M.A., Van Langevelde, F. and Naguib, M. (2026). What do fishermen think? Local perspectives on human crocodile co-existence in Lake Nasser. [bioRxiv](#).

Abstract: The increasing impact of humans on natural habitats leads to an increase in human wildlife conflict (HWC), specifically when there is competition for shared resources. In freshwater systems such as Lake Nasser, Egypt, co-occurrence of local fishermen communities with Nile crocodiles (*Crocodylus niloticus*) poses critical challenges for both livelihoods and biodiversity conservation. Understanding local perception of crocodiles by local fishermen is therefore essential for developing effective and socially accepted management responses. We used a structured questionnaire to assess how fishermen perceive and respond to crocodiles across three attitudinal domains: (1) perceived threats, (2) perceived economic benefits, and (3) conservation or co-existence values. Forty-two fishermen were interviewed across multiple khors (side arms of the lake). The responses showed a multifaceted picture: while many local fishermen associated crocodiles with gear damage, reduced catches, and livelihood risks, support for crocodile protection and recognition of their ecological role were also widespread. Interest in crocodile-based livelihood opportunities, such as harvesting or collecting the hatchlings, was generally low, suggesting social, cultural, or legal barriers to such approaches. Fishing experience influenced perceptions, with fishermen encountering crocodiles more frequently reporting decreased catches and greater concern. Cluster analysis further revealed three different respondent groups with different attitudes: conflict-oriented, moderate, and coexistence-oriented. Support for crocodile protection was the strongest predictor of belonging to the pro-co-existence group. Our findings underscore the complexity of human crocodile co-occurrence in Lake Nasser and, on a wider scale, add to the existing cautions against simplistic mitigations of local HWC. Effective conservation and livelihood interventions will require participatory, context sensitive approaches that integrate the different perceptions and attitudes of local people.

Chakraborty, S. and Sengupta, D.P. (2026). Taphonomic significance of the selective Iron replacement in a crocodilian skull from the *Nummulites obtusus* bed, Harudi Formation, Kutch Basin, Western India. [Research Square](#).

Abstract: This work reports selective taphonomic alterations in a crocodilian skull from the *Nummulites obtusus* bed of the Harudi Formation (middle Eocene, Bartonian), Kutch Basin, western India, which is also the first vertebrate fossil reported from this horizon.

This horizon is a bar/shoal setting with densely packed *N. obtusus* fossils, and the reported vertebrate fossil shows pervasive ferruginous mineral replacement where the iron-bearing minerals have precisely replicated the original bone architecture. This replacement is only localised to the vertebrate fossils, and the *Nummulites* tests do not show any such alteration. This selectivity is interpreted as a product of organic matter-driven early diagenesis. The decay of bone-hosted collagen and associated organic compounds created a locally reducing microenvironment that promoted iron mobilisation and precipitation within and around the bone framework, templated by the organic substrate. The *Nummulites* tests are composed of low magnesium calcite. This study thus documents a distinct taphonomic preservation mode in the Middle Eocene Harudi Formation, highlighting the role of differential organic content in driving selective authigenic mineralisation within carbonate-dominated depositional systems.

Barker, C.T., Tulloch, E., Young, M.T., Naish, D., Leung, L.-C., Rankin, K. and Gostling, N.J. (2026). Re-evaluation of the Wealden crocodyliiform *Koumpiodontosuchus* Sweetman *et al.*, 2015: new osteological and neuroanatomical data from micro-computed tomography resolves a phylogenetic dispute. [Zoological Journal of the Linnean Society](#) 206(4).

Abstract: *Koumpiodontosuchus aprosdokiti* is a small neosuchian crocodyliiform recovered from the Wealden Supergroup (Lower Cretaceous: Berriasian-Aptian) of southern England. It was initially allied to *Bernissartia* within Bernissartiidae, a small but phylogenetically important Late Jurassic and Cretaceous clade traditionally considered the sister group to Eusuchia and thus integral to our understandings of the origins and early evolution of crocodylians. However, recent studies have posited differing phylogenetic hypotheses, either placing Bernissartiidae within Eusuchia or recovering disparate positions for *Bernissartia* and *Koumpiodontosuchus*. We resolve these contrasting topologies by redescribing the known cranial, vertebral, and integumentary (osteoderm) osteology of the holotype specimen (IWCMS 2012.203-204) via micro-computed tomography (microCT). Our virtual models allow previously hidden regions to be visualized (eg braincase), clarify the position of the secondary choana, and provide novel information on the endocranial and pneumatic systems of the skull, all of which improve phylogenetic scoring for this taxon. Our new data confirms the placement of *Koumpiodontosuchus* as the sister taxon of *Bernissartia* within Bernissartiidae and, additionally, support the position of bernissartiids as the eusuchian sister group. Our reconstruction of *Koumpiodontosuchus*'s endocranial anatomy also allows an updated palaeoecological interpretation, and we find that its neurosensory capabilities had much in common with those of extant crocodylians.

Soni, A., Young, M.T., Bowman, C.I.W., Erb, A., Schwab, J.A., Herrera, Y. and Brusatte S.L. (2026). Neurosensory evolution in thalattosuchian crocodylomorphs - integrating somatosensory and visual adaptations across ecological transitions. [Historical Biology](#).

Abstract: Thalattosuchians, an extinct lineage of Mesozoic crocodylomorphs, underwent a remarkable evolutionary transition from primarily semi-aquatic teleosaurids, through increasingly ocean-adapted metriorhynchoids, to the fully pelagic metriorhynchids. Understanding how such a major habitat shift affected their sensory systems provides valuable perspective on vertebrate adaptations. Here, we present a comparative analysis integrating digital endocranial reconstructions from computed tomography (CT) scans of 22 skulls of crocodylomorph species, including extant crocodylians and a diverse range of thalattosuchians. Focusing on somatosensation and vision, we seek to gain new insights into sensory evolution in the group using statistical comparative methods. Our findings reveal that thalattosuchians, especially pelagic metriorhynchids, evolved significantly smaller trigeminal ganglia relative to skull size than non-marine crocodylomorphs, suggesting reduced investment in

facial mechanoreception. Interestingly, visual structures (orbit and optic nerve canal dimensions) scale proportionally with skull size across thalattosuchians, reflecting proportional scaling rather than enlargement. This pattern suggests that metriorhynchids maintained visual reliance and any functional enhancement was likely achieved through optical or neural optimisation rather than cranial modification. These findings challenge assumptions of uniform sensory trade-off during aquatic transitions and highlight the importance of lineage-specific constraints in shaping evolutionary trajectories.

Turala, M.M. (2026). Estimating Body Size and Biogeography in the Genus *Alligator*. MSc thesis, East Tennessee State University, Johnson City, Tennessee, USA.

Abstract: Several studies have examined correlations between total body length (TL) and skeletal measurements in the American alligator (*Alligator mississippiensis*), with some measurements serving as stronger predictors of TL than others. Femur length (FL) has been found to be tightly correlated with TL in *A. mississippiensis*, and this relationship has been used to estimate body size of extinct crocodylians. This thesis demonstrates that the humerus, radius, ulna, and tibia are also strongly correlated with TL and useful for body size estimation in *A. mississippiensis*, and thus, can be applied to related extinct crocodylians. Additionally, species distribution modeling was used to compare present-day and Pliocene habitat suitability for *A. mississippiensis*. Temperature was identified as the primary driver of suitable habitat, and warmer Pliocene conditions supported broader northern ranges than today. These results provide context for long-term ecological responses in *Alligator*.

Kurnaz, M. (2026). Physiological responses and adaptive mechanisms of amphibians and reptiles to multiple interacting environmental stressors: an integrative review. *Frontiers in Physiology* 17: 1785483.

Abstract: This integrative review synthesizes current knowledge on the physiological responses and adaptive mechanisms of amphibians and reptiles to multiple interacting environmental stressors, with particular emphasis on synergistic effects among temperature, hydric stress, disease, and pollution. Given the stronger empirical basis for amphibians in the existing literature, amphibian responses are covered in greater depth, while reptile-specific physiology, immunology, and emerging infectious diseases are explicitly addressed in dedicated sections throughout the review. Critical thermal tolerance analyses reveal that approximately 7.5% of amphibian species will exceed their physiological limits under a 4°C warming scenario, with tropical lowland species already operating near their CT_{max} thresholds. Thermal plasticity is limited, with acclimation responses averaging only 0.13°C increase in CT_{max} per 1°C environmental warming - insufficient to track rapid climate change. Water balance regulation shows dramatic interspecific variation, with cutaneous resistance ranging from 0.05 s/cm in aquatic amphibians to >1000 s/cm in desert-adapted reptiles. Synergistic interactions between thermal and hydric stress significantly amplify vulnerability, particularly in dehydration scenarios that reduce critical thermal limits. Chemical pollutants, including heavy metals and pesticides, cause developmental abnormalities (535% increase in malformation frequency), immunosuppression, and endocrine disruption across multiple life stages. Emerging infectious diseases, particularly chytridiomycosis (*Batrachochytrium dendrobatidis* and *B. salamandrivorans*) and ranaviruses, drive mass mortality events globally, with co-infections exacerbating population declines. Climate change intensifies disease susceptibility through stress-mediated immunosuppression and altered pathogen dynamics. Adaptive capacity varies markedly among species. While amphibians exhibit strong phenological responses (2-4× greater than other taxa), genetic adaptation potential remains limited by narrow dispersal abilities and habitat fragmentation. Microhabitat buffering can reduce thermal

extremes by several degrees but depends critically on habitat structural integrity. This review demonstrates that the pace of anthropogenic change challenges the adaptive capacity of most species, necessitating integrated conservation strategies including microhabitat preservation, climate corridor establishment, pollution mitigation, disease surveillance, and *ex-situ* conservation programs.

Picking, T.A., Mazzotti, F.J., Balaguera-Reina, S.A., Duperrouzel, M. and Smith, D.C. (2026). The first island-wide assessment of the American crocodile (*Crocodylus acutus*) in Jamaica: Population status, habitat use, and conservation priorities. *Herpetological Conservation and Biology* 21(1): 30-52.

Abstract: The American Crocodile (*Crocodylus acutus*) is the most widely distributed New World crocodile, inhabiting lowland and coastal wetlands of the Americas. Despite its broad range, populations face multiple stressors, and survey data remain limited in many areas, including Jamaica, where habitat loss and illegal hunting pose significant threats. We conducted the first island-wide assessment of *C. acutus* in Jamaica to evaluate encounter rates, distribution, size-class structure, and nesting activity. Additionally, we analyzed habitat use to identify Crocodile Conservation Units (CCUs), the most important areas for the conservation of *C. acutus*. Over two years (2020-2022), we conducted 105 spotlight surveys across 35 sites and extracted 1974 geolocations from historical and current data. Our results confirm crocodile presence across the historical South Coast range, with small, scattered populations on the North Coast. We encountered non-hatchling crocodiles at a rate of 2.5 crocodiles/km (1049 crocodiles/427.2 km) with relative abundance varying across different habitats. Sewage ponds, mangrove swamps, and rivers supported the highest encounter rates, and juveniles (27%) and hatchlings (14%) were the most frequently observed. Our findings demonstrate the ability of *C. acutus* to adapt and persist in a changing environment, inhabiting artificial wetlands and disturbed landscapes. We identified seven CCUs that encompass critical natural and artificial habitats, 81.2% of which fall within protected areas. To ensure the long-term survival of *C. acutus* in Jamaica, we recommend a combination of strategies, including protecting critical habitats (CCUs), long-term education programs, stronger law enforcement, and further research.

Caro-Martínez, D.M., Niño-Torres, C.A., Rendón-von Osten, J., Castelblanco-Martínez, D.N., Rios-Mendoza, L.M., Frausto-Martínez, O., del Pilar Blanco-Parra, M., Borges-Ramírez, M.M. and Charruau, P. (2026). Microplastic characterization and abundance in stomach contents of the American crocodile (*Crocodylus acutus*) from Cozumel, Mexico. *Regional Studies in Marine Studies* 98: 105043.

Abstract: Microplastics (MPs) have emerged as widespread and persistent environmental pollutants, posing a threat to biodiversity, particularly for vulnerable species such as the American crocodile (*Crocodylus acutus*). As an apex predator with constant exposure to aquatic environments, *C. acutus* holds potential as a bioindicator of microplastic contamination. This study assessed microplastic ingestion in the stomach contents of 18 individuals from the Punta Sur Ecological Reserve, Cozumel, Mexico. Physical characterization of MPs was performed through stereoscopic and microscopic observation, while polymer composition was identified using Fourier-transform infrared spectroscopy (FTIR). Microplastic abundance ranged from 0 to 39 items ind⁻¹, with a mean abundance of 10.4 ± 11.7 items ind⁻¹. The most frequently observed morphotype consisted of yellow fragments measuring 2-5 mm. Among the eighteen polymers identified, ethylene propylene diene monomer (EPDM) was the most abundant, which may suggest a localized contamination source; its prevalence may also be associated with its high environmental persistence and resistance to weathering, ozone, and UV radiation. The Polymer Hazard Index (PHI) revealed that polyvinyl chloride (PVC), polyvinylidene chloride (PVDC), and polyacrylonitrile (PAN) pose an elevated risk to exposed organisms.

This study provides the first evidence of microplastic ingestion in *C. acutus* in Mexico. The detection of MPs in individuals inhabiting a protected coastal ecosystem highlights the presence of plastic contamination even within conservation areas. These findings provide baseline information on microplastic exposure in a top predator and contribute to improving the current understanding of plastic pollution in coastal ecosystems.

White, D., Kirshner, D., Webb, G.J.W. and Shine, R. (2026). Predation on Cane Toads by Saltwater Crocodiles. *Australian Zoologist* 45: AZ26010.

Abstract: Invasive Cane Toads *Rhinella marina* have fatally poisoned many Freshwater Crocodiles *Crocodylus johnstoni* in Australia, but impacts on the larger Saltwater Crocodile *C. porosus* remain unknown. We photographically document six cases of free-ranging Saltwater Crocodiles capturing and consuming Cane Toads. In five cases filmed in the lower Daintree River, North Queensland, juvenile crocodiles consumed adult female toads, and in each case the crocodile held the toad for 15-20 min prior to consuming it. Crocodiles showed no overt ill-effects of toad ingestion, and in two of these cases the same crocodile was later observed alive and healthy. In the sixth case, a subadult Saltwater Crocodile in the Mary River, Northern Territory, killed and consumed multiple toads. A survey of commercial crocodile operations revealed that although captive Saltwater Crocodiles in outdoor pens were occasionally recorded to kill Cane Toads, no cases of crocodile mortality or ill-health were seen. We conclude that (unlike the case in some populations of Freshwater Crocodiles), Saltwater Crocodiles kill and ingest Cane Toads without suffering major poisoning effects.

Ristevski, J., Louys, J., O'Connor, S., Yates, A.M., Husdell, M., Price, G., Ulm, S., McNiven, I.J., Salisbury, S.W. and Boivin, N. (2026). The late Quaternary crocodylian record from Australasia. *Zoological Journal of the Linnean Society* 207(1).

Abstract: In this study, we synthesize the known late Quaternary crocodylian record in Australasia through literature review and direct assessment of fossil and zooarchaeological material. The late Pleistocene record, mainly from Australia, consists of partial skeletal remains mostly referable to the extinct Mekosuchinae, with some attributable to *Crocodylus*. The youngest reliably dated mekosuchine fossil is ~20,000 years old, suggesting mekosuchine decline and extinction coincided with that of other Australian megafauna. In contrast, three south-west Pacific islands - New Caledonia, Vanuatu, and Fiji - were Holocene refuges for mekosuchines, whose remains occur in archaeological contexts, indicating human interaction. Their extinction followed soon after human arrival, suggesting anthropogenic influence as a potential key factor. *Crocodylus johnstoni* occurs in palaeontological (potentially 28 kya) and archaeological sites in Australia. *Crocodylus porosus* has an ambiguous fossil record potentially going back over 40 kya, but is definitively present by the Holocene. Most *Crocodylus* remains come from coastal sites overlapping modern ranges. Archaeological evidence supports crocodile utilization by humans in Australia, Torres Strait, and New Guinea. The fragmentary nature of the known fossil material, as well as the current lack of reliable dates, leaves many unanswered questions about the morphology, palaeobiology, and disappearance of mekosuchines.

Shinde, S.G., Thomas, A., Deshkar, S., Kothapalli, L., Thakre, K., Borhade, T., Chitlange, S., Sanap, A. and Bhonde, R. (2026). Animal-based oils: Exploration of their nutritional and medicinal benefits. *Current Pharmaceutical Design*.

Abstract: This comprehensive review explores the properties and applications of natural oils derived from diverse animal sources. Fish-based supplements are today widely consumed for their nutritional/health benefits. In this context, this review opens doors to

lesser-known oils that can be explored for such properties. Focusing on the nutritional spectra of omega-3 and omega-6 essential fatty acids, the document highlights the well-established benefits of fish oil, particularly for cardiovascular health. Further, little-known animal-derived oils, including emu, crocodile, ostrich, cobra, and krill oils, are being studied for their unique chemical compositions and potential health benefits. These oils exhibit wound-healing (for burns and diabetic wounds), anti-inflammatory, anti-arthritis, and antimicrobial activities, and are used in the treatment of chemotherapy-induced mucositis and hyperlipidemia. Attempts are also made to understand the mechanistic pathways and signal modulations that contribute to the beneficial properties of these oils. Presently, the effective utilization of these oils in the mainstream is limited and underutilized. As our dependence on plant-based products increases, questioning their sustainability, lesser-known natural oils obtained through the processing of waste animal fats can be effectively employed, harnessing newer alternatives in nutrition, medicine, and therapeutics.

Kashmi, N.S., Parvez, M.T. and Galib, S.M. (2026). Occurrence of *Gavialis gangeticus* in the Lower Ganges of Bangladesh: urgent need for conservation initiatives. *Journal of Fisheries* 14(2): 142401.

Abstract: The gharial, *Gavialis gangeticus*, a Critically Endangered fish-eating crocodilian native to the Indian subcontinent, has long been considered nearly extirpated from Bangladesh, with records largely limited to incidental captures in fishing gear. This study documents recent occurrences of *G. gangeticus* along a 100-km stretch of the Lower Ganges (Padma River) in northwest Bangladesh based on local ecological knowledge collected through a participatory monitoring approach conducted between 2018 and 2025. Eight individuals, including six yearlings, one hatchling and one adult, were recorded as accidental captures. An additional four individuals, including two yearlings, one hatchling and one adult, were directly observed on riverine chars. Occurrence records were spatially clustered around sandbar-associated habitats in the Godagari region, suggesting the presence of suitable microhabitats. The repeated detection of individuals indicates the possible persistence of the species in the region, either through localised recruitment or dispersal from upstream populations. However, the absence of systematic monitoring and the prevalence of fisheries interactions highlight significant threats and knowledge gaps.

Da Costa, J.P., Peralta, M.J., Trindade Dantas, M.A., Caires Nascimento, L., Almeida Barcelos, L., de Oliveira Porpino, K. and de Araújo-Júnior, H.I. (2026). Quaternary crocodilians, testudines, and amphibians from the Lajedo de Soledade site, northeastern Brazil, and their paleoenvironmental implications. *Journal of South American Earth Sciences*.

Abstract: The present study describes and analyzes the anurans, crocodilians, and testudines of the a Late Quaternary fossil vertebrate assemblage from the Ravina das Araras, at the Lajedo de Soledade (Apodi, Rio Grande do Norte, Brazil). The identified remains include anurans assigned to cf. *Rhinella* sp., cf. *Leptodactylus* sp., cf. *Proceratophrys* sp., cf. *Pipa* sp., and Hyliidae indet., as well as crocodilians (Caimaninae indet.) and Testudines with terrestrial and aquatic habits, represented by *Chelonoidis* sp., *Kinosternon scorpioides*, and Chelidae indet. The stratigraphic distribution of these taxa across layers A, B, and C indicates the recurrent presence of vertebrates associated with humid environments and water bodies within the deposit. Ichnological analysis revealed the presence of the ichnospecies *Nihilichnus clavus* on costal plates of Chelidae indet., representing the first record of this ichnotaxon in the Quaternary of Brazil. These traces provide direct evidence of ecological interactions among aquatic vertebrates and are potentially associated with predation on freshwater turtles by crocodilians that share the same habitat and co-occur in layers B and C. Taken together, the paleontological, ichnological, and stratigraphic data indicate that the Lajedo de Soledade recorded a heterogeneous paleoenvironmental

landscape, dominated by open habitats but associated with areas of denser vegetation cover. These environments included temporary water bodies, such as shallow ponds, seasonally flooded areas, and ephemeral channels linked to the local karst system, which acted as structural elements of the landscape and enabled the coexistence of aquatic, semi-aquatic, and terrestrial taxa under conditions of pronounced climatic seasonality.

Salimi, S., Crossley II, D. and Sadat, H. (2026). Roles of the foramen of Panizza and the extracardiac anastomosis in interaortic blood flow and oxygen delivery in the crocodilian heart. Available at [SSRN](#) or [SSRN](#).

Abstract: Crocodilians possess a unique dual-aortic circulation that maintains separation between systemic and pulmonary pressures while allowing flexible redistribution of blood flow during diving and other physiological states. However, the functional roles of the foramen of Panizza (FP) and the extracardiac anastomosis in regulating interaortic blood transfer and oxygen delivery remain debated, particularly regarding the direction and timing of interaortic flow and the mechanisms sustaining left aortic (LAO) perfusion. In this study, blood flow patterns and oxygen transport were examined in the crocodilian cardiovascular system under air-breathing (non-shunting) conditions and pulmonary bypass (shunting) conditions that occur when right ventricular pressure exceeds left aortic pressure. During non-shunting conditions, the LAO consistently receives well-oxygenated blood, comparable to that in the right aorta (RAO), primarily through interaortic transfer via the FP, which accounts for approximately 14% of left ventricular output and provides the dominant contribution to LAO perfusion. The extracardiac anastomosis contributes a smaller but measurable component (~1-2%) to coeliac artery supply. Under shunting conditions, blood from the right ventricle is redirected into the systemic circulation via the LAO, resulting in mixing of oxygenated and deoxygenated blood. At peak shunting, LAO flow consists of approximately 45% oxygenated blood transferred through the FP and 55% deoxygenated right ventricular blood, yielding an oxygen concentration of 3.206 mmol/L. Despite this mixing, oxygen levels remain relatively high, indicating that interaortic connections help preserve oxygen delivery to downstream organs. Flow through the FP varies dynamically over the cardiac cycle, including brief reversal during diastole. Overall, these findings show that interaortic flow is predominantly directed from RAO to LAO during systole, with only transient reversal, and that the FP serves as the primary pathway sustaining LAO perfusion and oxygen delivery, while the extracardiac anastomosis plays a secondary role. These connections also support regional redistribution of blood flow, including perfusion of the gastrointestinal tract and head circulation, providing new insight into the physiological adaptation of the crocodilian cardiovascular system to intermittent hypoxia and diving.

Hoog, M., Andrews, K.M. and Schrey, A.W. (2026). Epigenetic Variation of American alligators (*Alligator mississippiensis*) in the Okefenokee Swamp. *GS4 Student Scholars Symposium*. 101.

Abstract: An animal's survival is heavily influenced by how well adapted it is to the environment in which it lives; however, phenotypes are only able to change so quickly. Epigenetics allows for greater phenotypic plasticity through molecular mechanisms without altering the DNA sequence. DNA methylation is the most widely studied epigenetic mechanism. It has shown the ability to alter gene expression and may even be able to compensate for a lack of genetic variation. Changes in DNA methylation are often caused by stressors that range from anthropogenic causes to natural occurrences. We sought to examine the effect of environmental factors on DNA methylation in *A. mississippiensis* within the Okefenokee Swamp. We collected samples from 96 adult alligators across the three main entrances to the Okefenokee, screened for DNA methylation among individuals using epiRADseq on the Ion Torrent PGM platform. We resolved 491,238 unique sequences

after quality control and trimming, resulting in a pseudo-reference of 3,136,650 bases. The number of sequences among individuals ranged from 1179 to 17,248. From this data, we detected significant differences among individuals grouped into sex, site, season, and year. The results of this study suggested two main hypotheses: The first is that the DNA methylation may play a part in the seasonal reproduction cycles of female *A. mississippiensis*, and the second is that *A. mississippiensis* within certain areas of the Okefenokee Swamp may utilize epigenetic buffering to better adapt to this highly variable environment. To our knowledge, this is the first study that has found evidence to suggest either of these in *A. mississippiensis*.

Nevarez, J.G. (2026). Respiratory anatomy and physiology of reptiles. *Animals* 16(9): 1396.

Abstract: Reptiles have varied lung anatomy with three main lung types: unicameral, transitional, and multicameral. Crocodilians have a well-developed bronchial tree, while all other species have either a limited number of bronchi or no bronchi at all. The primary gas exchange structures are the faveoli and ediculae, which can have either homogeneous or heterogeneous distribution within the lung parenchyma. The physiology of reptile respiration is also complex, varied, and at times contradictory across species. A basic understanding of anatomy and physiology is essential for proper diagnostic and therapeutic approaches to reptile patients. Therefore, a paradigm shift is needed to start thinking of the anatomy and physiology of individual species rather than believing that a single concept applies to all reptiles equally. As such, future research should aim to duplicate concepts across the more common species encountered in clinical practice.

Angalet, B. (2026). Morphological Variation of Lingual Glands in Wild American Alligator (*Alligator mississippiensis*) Populations. MSc thesis, Kennesaw State University, Kennesaw, Georgia, USA.

Abstract: American alligators (*Alligator mississippiensis*) inhabit diverse aquatic ecosystems including freshwater wetlands, swamps, and estuarine rivers. As apex predators, their physiological resilience has implications for ecosystem stability and long-term conservation. With projected sea-level rise and increasing saltwater intrusion into coastal freshwater habitats, understanding the osmoregulatory capacity of alligators is increasingly important. Unlike marine-tolerant crocodilians such as the saltwater crocodile (*Crocodylus porosus*), which possess specialized salt-secreting lingual glands in addition to renal and cloacal mechanisms, the morphology and physiological significance of lingual glands in wild American alligators remain poorly understood. This study examined lingual gland morphology and plasma ion physiology in four wild American alligator populations exposed to differing salinity regimes (Jekyll Island, Sapelo Island, Okefenokee National Wildlife Refuge, and Banks Lake National Wildlife Refuge). Plasma osmolality and ion concentrations were measured from blood samples, and lingual gland biopsies were analyzed using light microscopy to quantify pore count, gland area, secretory tubule count, tubule density, and tubule lumen area. Coastal alligators did not exhibit elevated plasma osmolality or ion concentrations relative to inland populations. Lingual gland morphology also did not differ significantly between populations, although the relationship between secretory tubule count and body size varied. Comparative analyses across crocodilian species showed that crocodile lingual glands are substantially larger and possess greater tubule lumen area and tubule density than those of American alligators, reinforcing pronounced divergence between alligators and saltwater-tolerant crocodiles.

Lindblad, K.T., Bamforth, E., Milligan, J. and Gilbert, M.M. (2026). Significant crocodyliform specimens from the Paleocene Estevan Coalfield of south-east Saskatchewan, Canada. *Canadian Journal of Earth Sciences*.

Abstract: The Souris River Valley in the south-east corner of Saskatchewan, Canada hosts rich fossil assemblages of mammals, fish, and reptiles of mid-late Paleocene (~59 Ma) age termed the 'Roche Percée local fauna'. These are located within the upper strata of the Ravenscrag Formation, equated to the upper Tongue River Member (formerly "Bullion Creek Formation") of Montana and North Dakota, and Paskapoo Formation of Alberta. We present two notable crocodyliform specimens from this region; the first (CMNFV 2758/RSKM P3437) is from a Ravenscrag Formation outcrop of similar age to the 'Roche Percée local fauna' located east of the village of Roche Percée. This specimen is referred to *Borealosuchus* based upon relatively large, keelless dorsal osteoderms and an enlarged foramen on the medial jugal surface. It is preserved within an interbedded siltstone-mudstone and interpreted to represent a distal overbank depositional setting. CMNFV 2758/RSKM P3437 represents the first occurrence of *Borealosuchus* from the middle-late Paleocene of Saskatchewan and may represent the first documented specimen of *Borealosuchus formidabilis* in Canada. A second notable specimen (RSKM P2243.1), an isolated nearly complete frontal found near Boundary Dam, possibly from the lower early Paleocene portion of the Ravenscrag Formation, shows alligatorid affinities. While RSKM P2243.1 cannot be assigned a precise stratigraphic placement at this time, it represents the first alligatorid-like specimen from this corner of the province. These fossil specimens highlight the need for detailed examination of the distribution and disconformable nature of the two informal units of the Ravenscrag Formation.

Okamoto, K.W., Ong, V., Balaguera-Reina, S.A. and Phuc, D.D. (2026). Analyzing how habitat degradation drives extinction dynamics using physiologically-structured population models. [bioRxiv](#).

Abstract: Elucidating how habitat degradation facilitates extinction is critical for effective conservation efforts. Here, we propose integrating physiologically-structured population models into stochastic population viability analyses to assess how differing consequences of habitat degradation interact to drive extinction dynamics in a focal population. Using the isolated spectacled caiman *Caiman crocodilus* population/ecomorph from the Apaporis River as a case study, we find that threatening the resource base, which individuals increasingly rely upon, to outgrow vulnerable size ranges and mature accelerates extinction. We also found that when habitat degradation impacts both the primary adult and juvenile resource bases, this can have marked synergistic effects on threatening population viability. By contrast, destroying nesting sites has only a small effect on accelerating the impact of deteriorating prey availability. Through integrating community-level feedback between habitat degradation/change and population dynamics/structure, our approach provides a comparative framework for assessing the relative importance of distinct mechanisms through which habitat degradation ultimately drives extinction risk.

Sahabantherngsin, T., Srisuporn, P. and Tulayakul, P. (2026). Biotransformation and detoxification enzyme (CYP1A2, CYP2E1, and GST) activities in vital organs of rats using liver extracts of *Crocodylus siamensis*. *Open Veterinary Journal* 16(4): 2142-2154.

Abstract: Detoxification enzymes, including cytochrome P450 isoforms (CYP1A2 and CYP2E1) and glutathione-S-transferase (GST), play key roles in xenobiotic metabolism and organ protection. Although crocodile-derived bioactive compounds have gained biomedical interest, the *in vivo* effects of *Crocodylus siamensis* liver extract on mammalian detoxification pathways remain largely unexplored. Aim: To evaluate the effects of oral administration of *C. siamensis* liver extract on phase I (CYP1A2, CYP2E1) and phase II GST detoxification enzyme activities, kinetic parameters (V_{max} , K_m , catalytic efficiency), and selected blood biochemical profiles in rat liver and kidneys. Methods: Male Wistar rats (n= 5) were orally administered freeze-dried *C. siamensis* liver extract at 0, 50,

100, 200, 400, or 800 mg/kg for 7 days. Liver and kidney tissues were collected for microsomal and cytosolic fractionation. Enzyme activities were quantified using specific substrates (3-cyano-7-ethoxy coumarin for CYP1A2, 7-methoxy-4-trifluoromethylcoumarin for CYP2E1, and 1-chloro-2,4-dinitrobenzene for GST), and kinetic parameters were calculated by Michaelis-Menten modelling. Serum albumin, total protein, cholesterol, and glucose were analyzed using automated clinical assays. Data were assessed by one-way analysis of variance with Tukey's post hoc test for variables that met parametric assumptions, whereas non-parametric data were analyzed using the Kruskal-Wallis test. Results: Crocodile liver extract produced dose-dependent and tissue-specific modulation of detoxification enzymes. Hepatic CYP1A2 showed a biphasic response, with catalytic efficiency increasing markedly at 400-800 mg/kg. Hepatic CYP2E1 activity increased toward 400 mg/kg before stabilizing. In the kidneys, CYP1A2, CYP2E1, and GST activities were consistently elevated, with GST showing the strongest induction; V_{max} increased from 0.16 to 0.59 $\mu\text{mol/minute/mg}$ at 800 mg/kg. Several groups exhibited enhanced catalytic efficiency despite reduced V_{max} , indicating improved substrate affinity. Blood analyses showed increased serum albumin and total protein, while cholesterol and glucose were reduced, suggesting metabolic benefits associated with liver-related biochemical changes. Conclusion: Oral supplementation with *C. siamensis* liver extract modulates phase I and phase II detoxification pathways in rats, with pronounced induction in renal tissues and high-dose enhancement in hepatic enzymes. These findings provide the first *in vivo* evidence that reptile-derived liver extract can enhance xenobiotic metabolism and support metabolic homeostasis, highlighting its potential as a natural bioactive supplement in veterinary applications.

Honegger, R.E. (2026). Das böse krokodil? Das fremde Lebewesen Krokodil in der europäischen Kultur. *Librarium* 69/1: 27-45.

Translation of first paragraph by Editor:

Crocodiles never played a significant role in Europe. However, these magnificent reptiles still have cultural significance for us. Our interest in Nile crocodiles, dried skins or stuffed specimens, and later live animals, began during the Crusades in the early Middle Ages. Pilgrims, adventurers, and emigrants brought them back as souvenirs. There is therefore a direct connection with the colonization of foreign lands. In sacred buildings in France, Italy, and Spain, dried crocodile skins or stuffed crocodiles were hung from the ceiling by chains in a highly visible location as a symbol of evil and subsequently displayed. Many still play a significant pecuniary role in popular culture today. The origin of some of these crocodiles is historically documented, or it is based on legends. In cabinets of curiosities or art collections, crocodiles significantly promoted the popular development of natural sciences; in pharmacies, they even became a trademark. At fairs, stuffed and later also live crocodiles satisfied our ancestors' desire to view exotic creatures.

Akrimajirachote, N., Pattarapanawan, M., Chaipipat, S., Piyasanti, Y., Sritabtim, K., Jurutha, J., Siripattarapavatt, K. and Setthawong, P. (2026). Isolating and validating fibroblast-like cells from the skeletal muscle of the Siamese crocodile (*Crocodylus siamensis*). *Veterinary Science* 13(5): 490.

Abstract: The isolation of fibroblast-like cells from crocodile skeletal muscle provides a valuable platform for studies in comparative physiology, reptilian biology, regenerative medicine, and tissue engineering. In this article, we present an optimized protocol for isolating and characterizing fibroblast-like cells derived from the embryonic skeletal muscle of the Siamese crocodile (*Crocodylus siamensis*). The procedure improved cell yields and viability while maintaining phenotypic and genetic stability. Dorsal and tail skeletal muscle tissue was cultured in flasks pre-coated with collagen. The cells attached and began migrating from the explants within one day. Optimal culture conditions were achieved using

Dulbecco's Modified Eagle Medium/Nutrient Mixture F-12 or Minimum Essential Medium Alpha supplemented with 10% fetal bovine serum, 2% crocodile serum, and growth-promoting factors, incubated at 28°C without CO₂. These conditions supported a shorter population doubling time and enhanced cell proliferation. The established cells displayed a spindle-shaped fibroblastic morphology, expressed the fibroblast-specific marker fibronectin, and maintained a stable karyotype through passage 20. The cell line remained stable and proliferative for at least 30 passages under standard culture conditions. Our study established the first standardized fibroblast-like cell line derived from *C. siamensis*, thus providing a foundation for future studies in reptilian physiology, cytogenetics, and regenerative biotechnology.

Venturelli, G. and Levi, M. (2026). Toward next-generation exotic-leather alternatives: a comparative analysis of genuine crocodile leather and its bio-based and synthetic imitations. *Journal of Material Science*.

Abstract: Crocodile leather production raises ethical and environmental concerns and, unlike bovine leather, lacks quantitative performance targets for optimizing fully bio-based crocodile leather alternatives. This case study provides a preliminary characterization of representative exemplars of bio-based and synthetic crocodile leather imitations, and genuine crocodile leather, to establish a like-for-like baseline for the development of exotic-like, and fully bio-based materials. Morphological and chemical analyses showed that both synthetic and bio-based crocodile imitations are coated laminates with synthetic fabrics as reinforcing backers. Tensile tests revealed strength between 3 and 10 MPa for the synthetic laminate and about 30 MPa for both the bio-based laminate and genuine crocodile leather. Tear tests showed that genuine crocodile leather withstands forces more than seven times those of the synthetic alternative. Water-sensitivity analyses indicated that the synthetic laminate behaved as a water vapor barrier, while bio-based crocodile leather imitation showed greater water affinity, placing it in a tunable regime where bio-derived coatings can be engineered to balance water uptake and breathability. Finally, genuine crocodile leather combines a hydrophobic surface with high water and moisture uptake and the highest vapor transmission, making its mechanical performance most sensitive to humidity. Overall, this study establishes an indicative comparative benchmark for mechanical and moisture performance that can guide the optimization of fully bio-based crocodile leather alternatives.

Finger Jr, J.W., Speaks, H.H., Mendonca, M.T. and Kelley, M.D. (2026). Relationships between white blood cells and morphometrics of wild American alligators (*Alligator mississippiensis*) in East-Central Alabama, USA, are seasonally dependent. *South American Journal of Herpetology* 38(1): 20-27.

Abstract: American alligators (*Alligator mississippiensis*) are top trophic carnivores found throughout several southeastern United States. Nevertheless, little is known of alligators in certain areas of their range, including in the state of Alabama. To aid in our understanding of alligator populations and the various stressors that may influence their health, we seasonally blood sampled alligators from a wildlife refuge in east-central Alabama. Blood samples were then used to make blood smears for eventual enumeration of white blood cells (WBCs) and individuals were measured to obtain morphometrics. Univariate analysis revealed that neither season, which incorporated both abiotic and biotic factors), nor sex affected any WBC level. However, the ratio of heterophil levels to lymphocyte levels, an indicator of stress often used in ecological studies, was affected by season. Season and sex affected head length of alligators (HL, a length measurement) but not tail girth (TG, a volume measurement), suggesting juvenile alligators in Alabama seasonally alter their habitat preference. Multivariate analysis using principal component analysis revealed that season influenced the relationships between WBCs and morphometrics. The results

detailed in this study, which is one of the first studies to investigate alligators in the state of Alabama, should provide a foundation for additional research into stress and the health of one of the largest alligator populations in Alabama.

Gutiérrez-Cervantes, A., López-deBuen, L., Ahuja-Aguirre, C., Viveros-Peredo, S., Montiel-Palacios, F. and Carrasco-García, A. (2026). Effect of vaccination against GnRH on reproductive hormone concentrations and behavior in captive Morelet's crocodiles (*Crocodylus moreletii*). *South American Journal of Herpetology* 38(1): 35-44.

Abstract: Farmed crocodilians are commonly housed together in confined spaces where agonistic behaviors increase particularly in the breeding season, causing lesions that affect the skin quality. In mammals, sexual and aggressive behavior can be prevented through anti-GnRH vaccination. Since mammals and reptiles have the GnRH-I and GnRH-II forms, it was hypothesized that the anti-GnRH vaccine used in mammals would have the same effects in crocodiles. Thus, this study evaluated the effect of anti-GnRH vaccination on reproductive hormones levels and behavior in captive Morelet's crocodile (*Crocodylus moreletii*) during breeding (BS) and non-breeding (NB) seasons. Twenty-four subadult individuals (12 females, 12 males) were randomly assigned to two groups: (1) Vaccinated (n= 6 females and 6 males): anti-GnRH vaccination on Weeks 0, 4, and 12; and (2) Control (n= 6 females and 6 males): no vaccination. On Weeks 0, 4, 12, 22, 37, and 56, serum estradiol and progesterone levels were measured in females and serum testosterone in males, and the presence of anti-GnRH antibodies was determined. The frequency of sexual, agonistic, and maintenance behaviors was evaluated in both groups and seasons. Anti-GnRH vaccination did not affect estradiol and testosterone concentrations in BS or NB (P>0.05), nor progesterone in BS (P>0.05), but it increased progesterone levels in NB (P<0.05). The vaccinated animals had anti-GnRH antibodies from Weeks 4 to 37. The frequency of sexual behaviors was lower in vaccinated animals in BS (P<0.05). The frequency of agonistic and maintenance behaviors was similar in both groups in BS (P>0.05) and lower in vaccinated animals in NB (P<0.05). During the study, seven vaccinated animals developed a caseous lesion at the site of injection, and all animals from both groups showed progressive loss of body mass. Anti-GnRH vaccination did not decrease reproductive hormones levels, but it did diminish the frequency of sexual and agonistic behaviors. However, the lesions developed at the injection site make this vaccine unsuitable for crocodiles.

Resume: Los cocodrilianos criados en granja comúnmente se mantienen juntos en espacios reducidos donde los comportamientos agonistas aumentan particularmente en la temporada reproductiva, causando lesiones que afectan la calidad de la piel. En mamíferos, el comportamiento sexual y agresivo puede prevenirse mediante la vacunación anti-GnRH. Dado que mamíferos y reptiles tienen las formas GnRH-I y GnRH-II, se hipotetizó que la vacuna anti-GnRH usada en mamíferos tendría los mismos efectos en cocodrilos. Así, el estudio evaluó el efecto de la vacunación anti-GnRH sobre los niveles de hormonas reproductivas y el comportamiento del cocodrilo Moreletii (*Crocodylus moreletii*) mantenido en cautiverio durante la temporada reproductiva (TR) y no reproductiva (NR). Veinticuatro individuos subadultos (12 hembras y 12 machos) se asignaron al azar a dos grupos: 1) Vacunados (n= 6 hembras y 6 machos): vacunación anti-GnRH en las Semanas 0, 4 y 12; y 2) Control (n= 6 hembras y 6 machos): sin vacunación. En las Semanas 0, 4, 12, 22, 37 y 56 se midieron los niveles séricos de estradiol y progesterona en hembras y de testosterona en machos, así como también se determinó la presencia de anticuerpos anti-GnRH. Se evaluó en ambos grupos y en ambas temporadas la frecuencia de comportamientos sexuales, agonísticos y de mantenimiento. La vacunación anti-GnRH no afectó las concentraciones de estradiol ni testosterona en TR o NR (P>0.05), ni las de progesterona en TR (P>0.05), pero aumentó los niveles de progesterona en NR (P<0.05). Los animales vacunados tuvieron anticuerpos anti-GnRH

de las Semanas 4 a 37. La frecuencia de comportamientos sexuales fue menor en animales vacunados en TR ($P < 0.05$). La frecuencia de comportamientos agonistas y de mantenimiento fue similar en ambos grupos en TR ($P > 0.05$) y menor en animales vacunados en NR ($P < 0.05$). Durante el estudio, siete animales vacunados desarrollaron una lesión caseosa en el sitio de inyección, y todos los animales de ambos grupos mostraron pérdida de masa corporal progresiva. La vacunación anti-GnRH no disminuyó los niveles de hormonas reproductivas pero sí disminuyó la frecuencia de comportamientos sexuales y agonistas. Sin embargo, las lesiones en piel desarrolladas en el sitio de inyección hacen que esta vacuna no sea recomendable para cocodrilos.

Pedri, M.C.N., Lima, M.P.S., Santos, H.L.L., Júnior, F.R.P. and Bulhões, A.A.V.C. (2026). Histopathological description of an epidermoid cyst in *Caiman latirostris* - case report. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia* 78(2).

Abstract: Epidermoid cysts are rounded non-neoplastic lesions, sometimes ulcerated, diagnosed by histopathology, characterized by the inclusion of keratin in the dermis, surrounded by stratified squamous epithelium. Chronic skin trauma causes hyperkeratosis, which can lead to such cysts, resulting from the traumatic inclusion of keratinous cells from the epidermis in the dermis. According to the research conducted, there are no reported cases in crocodilians, therefore, the objective of this study is to describe the histopathology of this lesion in a broad-snouted caiman (*Caiman latirostris*). A 3-year-old male *C. latirostris* was referred to the Cesmac University Centre clinic, presenting multiple round, firm cystic formations distributed across the skin. Some were ulcerated, presenting yellowish caseous content. A skin fragment with margin was sent for histopathology, which revealed a cystic structure in the dermis, lined by well-differentiated stratified squamous epithelium, containing keratin lamellae with mineralization and ossification, bacterial and fungal infection, and granulomatous dermatitis. The pathogenesis and histopathology of epidermal cysts were discussed and compared to the case. In conclusion, it is suggested that intraspecific fighting is a significant factor in the development of these lesions, and the contribution of this work to the knowledge of new skin lesions in crocodilians is affirmed.

Descrição histopatológica de cisto epidermoide em jacaré-de-papo-amarelo (*Caiman latirostris*) - relato de caso.

Resumo: Os cistos epidermóides são lesões arredondadas não neoplásicas, por vezes ulceradas, diagnosticadas por histopatologia, que se caracterizam por inclusão de queratina na derme, envolta por epitélio escamoso estratificado. O trauma crônico em pele causa hiperqueratose, podendo originar tais cistos, decorrentes da inclusão traumática de células queratinosas da epiderme na derme. De acordo com a pesquisa feita, não existem casos relatados em crocodilianos; portanto, o objetivo deste trabalho é descrever a histopatologia dessa lesão em um jacaré-de-papo-amarelo (*Caiman latirostris*). Um macho de *C. latirostris*, de três anos, foi encaminhado para a clínica do Centro Universitário Cesmac, apresentando múltiplas formações císticas arredondadas e firmes distribuídas pela pele. Algumas estavam ulceradas, com conteúdo amarelado de aspecto caseoso. Um fragmento cutâneo com margem foi encaminhado para histopatologia, que revelou estrutura cística na derme, revestida por epitélio escamoso estratificado bem diferenciado, contendo lâminas de queratina com trechos de mineralização e ossificação, infecção bacteriana e fúngica e dermatite granulomatosa. A patogênese e a histopatologia do cisto epidérmico foram discutidas e comparadas ao caso. Em conclusão, sugere-se que os combates intraespecíficos são um fator significativo no desenvolvimento dessas lesões e afirma-se a contribuição desse trabalho para o conhecimento de novas lesões cutâneas em crocodilianos.

Song, H., Yan, L., Zhao, W. and Yu, Z. (2026). Molecular mechanisms underlying the ameliorative effects of crocodile head-derived

bioactive peptides on DEX-induced muscle atrophy: insights from proteomics and gut microbiota analysis. *npj Science of Food*.

Abstract: Muscle atrophy is relatively common among older adults and can markedly impair their physical function and overall quality of life. Crocodile head-derived bioactive peptides (CP), with high bioavailability and low allergenicity, show promise as a nutritional intervention. This study aimed to investigate the alleviating effects of CP on muscle atrophy and clarify their underlying action mechanisms. Results demonstrated that CP alleviated muscle atrophy-related weight loss, increasing gastrocnemius, quadriceps, and tibialis anterior muscle indices by 60%, 33%, and 28%. The lean body mass percentage increased by 3.7%, while the body fat rate decreased by 6%. Following CP administration, grip strength, motion displacement, and exhaustion time in mouse recovered to 1.71 N, 495 m, and 1130 s. Proteomic analysis revealed that CP potentially ameliorates muscle atrophy by modulating the AMPK signaling pathway to restore energy metabolism homeostasis, activating autophagy to clear dysfunctional organelles, and reprogramming lipid metabolism to suppress ectopic fat deposition in muscle tissue. Analysis of the gut microbiota further indicated that CP intervention significantly increased the abundance of beneficial bacteria, including *Muribaculaceae*, *Allobaculum*, *Lactobacillus*, *Monoglobus*, and *Dubosiella*. In conclusion, CP likely mitigates muscle atrophy progression via multi-target mechanisms, including modulation of energy metabolism, autophagy, lipid metabolism, and the gut microenvironment.

Ge, M., Chang, Q., Ge, Q., Tu, G., Zhou, Y., Yi, P., Sun, H. and Zhao, J. (2026). Intestinal parasite community dynamics in the critically endangered Chinese alligator (*Alligator sinensis*): Multifactorial insights from 18S rRNA amplicon sequencing. *Ecology and Evolution* 16(5): e73706.

Abstract: The intestinal parasite communities of vertebrates are shaped by complex interactions among biological, environmental, and anthropogenic factors. However, such dynamics remain poorly characterized in endangered the Chinese Alligator (*Alligator sinensis*). Here, we conducted a high-throughput 18S rRNA amplicon survey of intestinal parasites in 149 fecal samples from the critically endangered Chinese alligators, spanning two geographic localities, four feeding regimens, three developmental stages, and 3 months. We identified 1524 eukaryotic parasite OTUs and 6606 nematode OTUs, revealing significant geographic variation in parasite composition, with higher richness in Wuhu than in Xuancheng populations. PERMANOVA further confirmed significant locality-level differences in parasite community structure for both eukaryotic and nematode assemblages. Feeding regimen strongly influenced parasite diversity and community composition, with nematode communities exhibiting particularly pronounced responses, showing the lowest abundance and diversity in alligators maintained on a standardized catfish-carp diet and highest in those fed diverse prey. Eukaryotic parasite richness declined markedly with host age, while nematode diversity showed pronounced depression in August. At finer taxonomic resolution, multiple parasite phyla and genera exhibited dynamic, factor-specific responses to locality, diet, age, and sampling month, highlighting strong ecological filtering effects. Linear Discriminant Analysis Effect Size analysis uncovered specific parasite taxa associated with distinct factors. Our results firstly demonstrate the structure of parasite communities in *A. sinensis*, and clarified how they are shaped by interacting ecological and management factors, providing critical baseline data for future research.

Walter, J.D., Macaluso, L., Martin, J.E., Grohrock, T., Rabi, M. and Delfino, M. (2026). Taxonomic and quantitative reassessment of *Diplocynodon*, the most common crocodyliform in the Cenozoic of Europe. *Palaeontology*.

Abstract: The extinct crocodyliform *Diplocynodon* represents

one of the best sampled tetrapods of the Cenozoic era. Endemic to Europe, the fossil record of the taxon spans from the upper Paleocene to the Middle Miocene, documented by a vast number of occurrences comprising both exceptionally well-preserved and fragmentary material. The clade is considered to have reached a peak of diversity during the Eocene, implying allopatric or possibly even sympatric lineage divergence. Based on a critical review and first-hand examination of *Diplocynodon* species, we present the first comprehensive taxonomic revision of the group since its inclusion in modern phylogenetic works. We hereby demonstrate that the diagnoses of several species often include shared and/or irreproducible characters, hampering specific delimitation. This taxonomic revision of *Diplocynodon* spp. presents amended diagnoses for the genus and the species, and confirms 9 valid taxa out of the 11 previously published, recognizing two additional species among an updated list of dubious species. Furthermore, we quantitatively and qualitatively review the state of the published fossil record of *Diplocynodon*, based on two openly available databases, and comment on the state of the art of the taxon record with respect to recommended taxonomic practices.

Silva, P., Evans, D.H. and Spokes, K.C. (2026). Other salt glands. Pp. 193-205 in *The Rectal Gland of the Shark: A Model for the Epithelial Transport of Chloride and Its Control. Perspectives in Physiology*. Springer: Cham.

Abstract: This chapter deals with other species that have developed salt glands to deal with environmental challenges similar to those facing the shark. These are species that, because of the environmental conditions or dietary pressure, face the need to secrete the extra salt they take in. This group includes birds, crocodiles, iguanas, lizards, turtles, and sea snakes. Their glands have various anatomical locations: within the orbit in birds, iguanas, lizards, and turtles, in the tongue as in crocodilians, and under the tongue in sea snakes. The regulatory mechanism for the secretion of salt has been defined only for the avian salt glands. In birds, ANP and VIP are involved just as in the shark. The mechanism by which salt is secreted by the glands has also been defined only for the avian salt gland. The mechanism is similar to that of the shark rectal gland. Although not enough information is currently available to ascertain how these glands in these species are regulated and secrete salt, there are hints that they work in the same way. The underlying significance of the variety of glands in different species that seem to work in similar ways is that collectively they represent examples of convergent evolution. In addition to elasmobranchs, many other species have specialized glands that secrete salt and therefore come under the denomination of salt glands. Among them are the avian salt glands that are found in birds whose habitat is marine or live along the seashore line. Salt glands are found also in marine reptiles, including sea snakes, sea turtles, crocodiles, and lizards. Although salt glands share many commonalities, their anatomical location varies considerably among the different species that possess them. Some have been well described others have not. For some the elements that activate them are known; for others they remain to be elucidated. In general, they share many of the elements that mediate the transport of salt, but the processes that mediate such transport have not been well characterized if at all in all of them. The following is a brief review of the salt glands found in some of these species.

Santos-Filho, M. (2026). Aquatic pathways drive mercury biomagnification in a tropical floodplain food web up to jaguars (*Panthera onca*). Available at [SSRN](#) and [SSRN](#).

Abstract: Mercury (Hg) is a persistent contaminant able of bioaccumulating and biomagnifying across trophic levels in aquatic food webs. Tropical floodplain ecosystems such as the Pantanal provide environmental conditions favorable for mercury methylation and trophic transfer. However, little is known about mercury exposure in terrestrial apex predators inhabiting these systems. In this study, we evaluated mercury concentrations in jaguars (*Panthera onca*) from

the Taiaimã Ecological Station, Pantanal, Brazil, combined with an analysis of mercury distribution across ecological compartments of the food web. Mean mercury concentration in jaguar hair was $4.265 \mu\text{g kg}^{-1}$ (range: $2130\text{--}7259 \mu\text{g kg}^{-1}$). Mercury concentrations varied among ecological compartments (ANOVA, $p < 0.001$), showing an increase along the trophic gradient from water and sediments to periphyton, fish (*Pseudoplatystoma corruscans*), caimans (*Caiman crocodilus yacare*), and jaguars (*Panthera onca*). Regression analysis revealed a positive relationship between trophic level and log-transformed mercury concentrations ($R^2 = 0.69$, $p = 0.041$), resulting in a trophic magnification factor (TMF) of 3.71, indicating biomagnification across the Pantanal food web. Structural equation modeling further highlighted the role of fish as the primary vector transferring mercury from basal compartments to higher trophic predators. Mercury concentrations in jaguar hair were negatively related to body mass ($R^2 = 0.39$, $p = 0.03$), suggesting potential physiological or ecological mechanisms influencing mercury accumulation among individuals. Our results demonstrate that mercury circulates through the Pantanal trophic network, ultimately reaching apex predators. These findings highlight the importance of trophic connectivity in contaminant transfer and reinforce the value of jaguars as bioindicators of environmental contamination in tropical floodplain ecosystems.

Al-Abedine, A.A.Z. (2026). Sobek Lord of Ishrou. *Journal of the General Union of Arab Archaeologists* 11/2: 1-15

Abstract: The cult of Sobek is one of the most widespread rituals in Egypt; there were many cities of the god Sobek, in particular, in the region of Faiyum in Lower Egypt. Its area was sacred during the Middle Kingdom. In Upper Egypt, Kom Ombo was the center of the cult of Sobek, where a large number of crocodiles were found, in addition to many other centers of worship of this deity. Under the generic name of Sobek, there is ample evidence of this cult in Thebes. We first found the crocodile mummies at al-Asasif, just as the deity Sobek was one of the deities «Ennead» of Thebes. He was worshiped in Karnak under the title of Lord of Semnu, possibly a region of Karnak, as he was worshiped in the region of Ishrou, south of Karnak and the region of Ishrou is considered to be one of the Important centers of the worship of the god Sobek, as it was a center for the worship of the goddess (dead) wife of the god Amun in New Kingdom. Therefore, the presence of the cult of the god Sobek in this place is an indication of its high status in the New Kingdom, especially in the 18th dynasty, which continued into the 19th dynasty. Also, through studying the discovered antiquities and the texts on them in the Ishrou region, the importance of his worship and his connection to the sacred lake in this region became clear. We can also learn about the priesthood specific to his worship in this region.

Résumé: Cet article vise à éclairer le culte du dieu Sobek à Karnak, en particulier dans la région d'Ashru (au sud du temple de Karnak). Le culte de Sobek était l'un des plus répandus en Égypte, avec de nombreuses villes qui lui étaient dédiées, notamment dans la région du Fayoum, en Basse-Égypte. Son territoire était considéré comme sacré au Moyen Empire. En Haute-Égypte, Kom Ombo était un centre de culte de Sobek, connu pour son importante population de crocodiles, en plus de plusieurs autres centres dédiés à cette divinité. Sous le nom générique de Sobek, on trouve de nombreuses preuves de ce culte à Thèbes. Les premières momies de crocodiles ont été découvertes à Asasif. Sobek faisait également partie de l'Ennéade (le panthéon des neuf divinités) de Thèbes. Il était vénéré à Karnak sous le titre de «Seigneur de Semenu», probablement dans une zone spécifique du complexe de Karnak. L'étude s'est concentrée sur la région d'Ashru, au sud de Karnak, où Sobek était vénéré. Ashru était un centre important du culte du dieu Sobek et de celui de Mout, épouse d'Amon, divinité principale de l'Empire égyptien durant le Nouvel Empire. Les découvertes indiquent que la présence du culte de Sobek en ce lieu témoigne de son statut élevé durant le Nouvel Empire, en particulier sous la XVIIIe dynastie, une pratique qui perdura jusqu'à la XIXe dynastie. De plus, l'étude des artefacts

mis au jour et de leurs inscriptions dans la région d'Ashru révèle l'importance de ce culte et son lien avec le lac sacré de la région. Elle nous permet également de mieux comprendre le sacerdoce associé à ce culte.

Huaman, N., Nacari, L., Silvera, J., Miranda, N., Yunis-Aguinaga, J., Morey, G., Lopez, D., Cruces, C.L., Luque, J.L. and Chero, J.D. (2026). Integrative morphological and molecular characterization of Proterodiplostominae metacercariae (Digenea: Diplostomidae) infecting siluriform fishes in the Peruvian Amazon Basin. *Journal of Helminthology* 100: e52.

Abstract: Proterodiplostominae Dubois, 1936 is a small but evolutionarily significant lineage of diplostomid trematodes that primarily parasitize crocodilians, with fishes acting as second intermediate or paratenic hosts. In Peru, knowledge of this group has been limited to the record of adult specimens of *Proterodiplostomum longum* (Brandes, 1888) recovered from *Caiman crocodilus* Linnaeus, 1758 (Sauropsida: Alligatoridae) in the Loreto region, and molecular evidence linking larval and adult stages has been absent. The present study provides the first integrative morphological and molecular characterization of Proterodiplostominae metacercariae infecting siluriform fishes in the Peruvian Amazon Basin. Metacercariae were collected from *Hoplosternum littorale* (Hancock, 1828) (Callichthyidae) and *Pterygoplichthys pardalis* (Castelnau, 1855) (Loricariidae) and examined using light and scanning electron microscopy, together with partial 28S rDNA and mitochondrial cox1 sequences. Phylogenetic analyses of 28S rDNA demonstrated that three isolates clustered within a strongly supported clade containing reference sequences of *P. longum* from crocodilian hosts, with minimal genetic divergence ($\leq 0.536\%$), confirming their conspecificity. This study therefore provides the first molecularly supported record of *P. longum* metacercariae in Peruvian fishes and clarifies a previously undocumented component of its life cycle. In addition, phylogenetic analyses revealed two distinct evolutionary lineages (designated herein as Proterodiplostominae gen. sp. 4 and gen. sp. 5) exhibiting 9.882% mitochondrial divergence, suggesting previously unrecognized diversity within the subfamily. These findings expand the known host range of *P. longum*, provide new genetic data for larval stages of Proterodiplostominae in the Neotropics, and highlight the importance of integrative approaches for resolving life-cycle stages and species boundaries in Diplostomidae.

Holzinger, K. (2025). A newly discovered basal Late Cretaceous Eusuchian crocodile in the Gosau Group of Kainach (Styria, Austria). University of Graz, Austria.

Abstract: A skull found in 2016 in southeastern Austria has been identified as a new species and genus of a small bodied basal eusuchian hylaeochampsid. It represents the first known vertebrate remain from the Kainach Gosau, a central-east alpine outlier of the Late Cretaceous Gosau Group. We elaborate on the geological context, the paleogeography, climate, flora, and fauna of the region as well as the development and ecology of Cretaceous Crocodyliformes as a whole. The discovered specimen consists of an upper jaw, missing the teeth. Due to the nature of the preservation only the ventral side proved to be significant for identification. The skull was extensively photographed as well as CT-scanned and a combination of pictures taken before and after preparation as well as CT-scan images were used to reconstruct the original outlines and bone sutures. In this paper we present a description of this skull which shows similarities to the skull of *Iharkutosuchus* Ősi *et al.*, 2007 from the Santonian site of Iharkut in Hungary, as well as a comparison to known skulls of closely related taxa and subsequent paleobiological assumptions. The phylogenetic analysis suggested *Iharkutosuchus* as the closest relative to the Austrian specimen and placed both in a sister taxon to *Hylaeochampsia*. The Austrian specimen differs from *Iharkutosuchus* by three distinct autapomorphic characters: (1) two enlarged posterior maxillary teeth, with the first one being

significantly smaller than the posterior; (2) kidney-shaped suborbital fenestra resulting in little contact with the ectopterygoid; (3) distinct pterygoid with no discernable lateral flanges. The results of this study show that the Hylaeochampsidae had a greater diversity than previously thought and it attests to the importance of the Kainach Gosau as a promising spot for vertebrate fossils.

Hogg, R. (2026). Interspecific patterns of variation in dental growth increments of crocodilians. *Developmental Dynamics*.

Abstract: Multiple studies have supported the hypothesis that incremental growth lines in crocodilian dentin are analogous with circadian von Ebner's lines in mammals; however, variation in these growth lines has been largely unstudied. It is also unknown whether accentuated dentin striations in crocodilians may represent a supradian periodicity analogous to Andresen lines in mammalian dentin. Therefore, the objective of this study is to histologically assess variation in von Ebner's lines and accentuated growth lines among crocodilians. The data do not support the hypothesis that crocodilians express supradian periodicity in accentuated striations of dentin. DSR is significantly correlated with total length and body mass. DSR variance also shows a significant relationship with body size. Body size seems to be the major factor governing DSR in crocodilians; this relationship is expressed both intra- and interspecifically in this dataset, warranting further study of intraspecific variation to assess the impact of ontogeny on DSR within this group. Accentuated striations may not be useful as markers of periodicity in crocodilians, but may be useful indicators of stress or other physiological events in life history analyses.

Čobanović, N. and Pajičić, D. (2026). A comprehensive review of reptile meat as an alternative protein Source: Nutritional composition, safety concerns, environmental impact and welfare issues. *Animal Science and Biotechnologies* 59(1): 391-405.

Abstract: This review investigates the feasibility of reptile meat as an alternative protein source in the context of rising global protein demand and the need for sustainable food systems. It synthesizes current knowledge on edible reptile species (crocodiles, turtles, snakes and lizards), their farming and geographic distribution and the key nutritional, safety, environmental and welfare aspects associated with their use for human consumption. Available data indicates that reptile meat, particularly from crocodiles, snakes and some turtles, is characterized by high protein content, favourable fatty acid profiles (including essential n-3 and n-6 polyunsaturated fatty acids) and appreciable levels of essential amino acids and minerals, making it nutritionally comparable or superior to conventional livestock meats. However, important concerns persist regarding microbiological and chemical hazards, parasites, traceability and the role of reptile farming and harvesting in overexploitation, biodiversity loss and animal welfare challenges. This review highlights substantial regional differences in cultural acceptance and regulatory oversight and identifies major gaps in nutritional composition data, risk assessments, legislation and welfare guidelines for reptile farming and reptile meat safety and quality. Overall, reptile meat may contribute to protein diversification, but its broader commercialization should be contingent on robust food safety management, conservation-compatible sourcing and species-specific welfare standards.

Bateman, L-P., Demers-Potvin, A.V. and Larsson, H.C.E. (2026). Champsosaurs, gharials, and the functional ecomorphology of resource partitioning. *Biological Journal of the Linnean Society* 148(2).

Abstract: Understanding how species interact and partition ecosystems is central to ecology and evolution, yet this remains difficult to test in the fossil record. Here, we examine potential resource partitioning between the Late Cretaceous diapsid *Champsosaurus lindoei* and the

alligatoroid *Leidyosuchus canadensis*, two sympatric semiaquatic predators from the Dinosaur Park Formation of Alberta, Canada. To interpret their ecological interactions, we compare them with the most analogous extant pair, the gharial (*Gavialis gangeticus*) and the mugger crocodile (*Crocodylus palustris*), whose coexistence and dietary differences are well documented. Using 3D reconstructions of skulls and jaw musculature, we estimate ecomorphological performance metrics - including bite force, mandibular inertia, and tooth pressure - validated against the extant predators. Results show that *Champsosaurus* and *Leidyosuchus* differed in tooth and skull morphology, mandibular inertia, and bite performance in ways closely paralleling those values for *Gavialis* and *Crocodylus*. The estimated ecological distance between both pairs of taxa is also broadly similar. These findings confirm that *Champsosaurus* occupied a more specialized piscivorous niche, while *Leidyosuchus* was a generalist predator. Moreover, our approach demonstrates that functional morphology can reveal degrees of resource partitioning in deep time when anchored to extant analogues, providing a framework for reconstructing the ecological structure of ancient communities.

Khanduri, M., Hussain, S.A., Arora, A., Hölker, F., Rani, K. and Candolin, U. (2026). Light cues override temperature as a cue for basking in a critically endangered crocodile, the Gharial. *Global Ecology and Conservation*.

Abstract: Ectothermic species depend on ambient temperature to regulate their body temperature. As such, they may be particularly vulnerable to changes in climate. However, the magnitude of this vulnerability varies by species and their behavioural and physiological thermoregulation capacity. Crocodilians bask to benefit from warmer temperatures on land than in water during the daytime. However, whether they use temperature or light conditions as a cue for basking is unknown. We investigated if basking of gharial (*Gavialis gangeticus*) correlates with light or temperature conditions, by observing gharials in enclosures at the Deori EcoCentre in India. We found that the proportion of individuals basking in the morning was more strongly associated with illuminance than with air temperature or with the difference between water and air temperature. This suggests that light is the primary cue for basking. Younger individuals responded to lower light levels than older ones and varied more in body temperature, while having the lowest body temperatures of all age groups in the morning. Therefore, it may be useful for managers of captive populations to manage light and temperature conditions for hatchlings during mornings. Moreover, a mismatch between light conditions and environmental temperature because of climate change and/or light pollution can disrupt basking timing and affect especially young individuals. Considering the threatened status of the species, their natural habitats should be protected from artificial light at night. Our results highlight the importance of assessing the environmental cues driving behavioural decisions in changing habitats when estimating effects of environmental change on populations.

Clarac, F., Campos, Z. and Marquis, O. (2026). West African crocodiles *Crocodylus suchus* are active thermoregulators. The *Herpetological Bulletin* 176: 1-6.

Abstract: Our earlier investigation of body temperature in the dwarf caiman *Paleosuchus palpebrosus* has shown that this species is a thermoconformer and that this behaviour is associated with habitat niche-specific body-size reduction. In contrast larger, habitat-generalist caiman species are thermoregulators. This led us to investigate the West African crocodile *Crocodylus suchus* which is a rather small-sized species that has recently been identified as distinct from the Nile crocodile *Crocodylus niloticus*, and at least in north-west Africa is a niche specialist inhabiting permanent mountain rock pools (gueltas) and flood plains (tâmoûrts). We compared daily body temperature variations of captive *C. suchus* and *C. niloticus* in Morocco and found that, despite a smaller size and habitat

specialism, *C. suchus* is not a thermoconformer but like *C. niloticus* is an active thermoregulator with marked daily body temperature oscillations. In this regard, we suggest that in crocodiles smaller size per se is not related to a switch from active thermoregulation to thermoconformity.

Humphries, E., Smith, I.M., Ziebell, M., Probst, C.M., Carter, N. and Weeks, B.C. (2026). Evaluating the empirical basis for threat attribution in the IUCN Red List. *Conservation Biology* 40: e70213.

Abstract: Understanding the impacts of different threats on species is key to successful conservation interventions and policies. The International Union for Conservation of Nature (IUCN) assesses threats to species, and the organization's Red List of Threatened Species is a key conservation tool. We quantified the degree to which threats in IUCN assessments for 3 vertebrate groups (birds, amphibians, and ray-finned fishes) were based on species-specific quantitative empirical data. To do this, for 2142 IUCN species assessments, all listed references were reviewed to determine whether they contained species-specific quantitative data linking a listed threat and the assessed species. Only 7.5% of listed threats across all taxa and categories were based on species-specific quantitative data. For species with at least one threat listed, only 12.5% of species had species-specific quantitative data underlying at least one threat. There were more data on threats for some taxa, and there was a trend toward having more information on threats that are generally considered less predictable, such as "invasive/problematic" species and climate change. Understanding how a lack of species-specific data may affect understanding of extinction processes is crucial for continued improvement of conservation outcomes.

Pandhi, P. and Desai, B. (2026). First record of galloping in a free-ranging adult mugger crocodile *Crocodylus palustris*. *Herpetological Bulletin* 176: 45-46.

Bateman, L-P., Demers-Potvin, A.V. and Larsson, H.C.E. (2026). *Champsosaurus*, gharials, and the functional ecomorphology of resource partitioning. *Biological Journal of the Linnean Society* 148(2).

Abstract: Understanding how species interact and partition ecosystems is central to ecology and evolution, yet this remains difficult to test in the fossil record. Here, we examine potential resource partitioning between the Late Cretaceous diapsid *Champsosaurus lindoei* and the alligatoroid *Leidyosuchus canadensis*, two sympatric semiaquatic predators from the Dinosaur Park Formation of Alberta, Canada. To interpret their ecological interactions, we compare them with the most analogous extant pair, the gharial (*Gavialis gangeticus*) and the mugger crocodile (*Crocodylus palustris*), whose coexistence and dietary differences are well documented. Using 3D reconstructions of skulls and jaw musculature, we estimate ecomorphological performance metrics - including bite force, mandibular inertia, and tooth pressure - validated against the extant predators. Results show that *Champsosaurus* and *Leidyosuchus* differed in tooth and skull morphology, mandibular inertia, and bite performance in ways closely paralleling those values for *Gavialis* and *Crocodylus*. The estimated ecological distance between both pairs of taxa is also broadly similar. These findings confirm that *Champsosaurus* occupied a more specialized piscivorous niche, while *Leidyosuchus* was a generalist predator. Moreover, our approach demonstrates that functional morphology can reveal degrees of resource partitioning in deep time when anchored to extant analogues, providing a framework for reconstructing the ecological structure of ancient communities.

Wu, Y., Nong, Y., Zheng, Y., Fu, S., Liu, J., Ma, F., Wang, Y., Liu, X., Ouyang, B., Liu, Q., Huang, H., Guo, Z. and Wang, M. (2026). Comparative analysis of histological and transcriptomic

characteristics in caudal muscles of Nile crocodiles (*Crocodylus niloticus*), Siamese crocodiles (*Crocodylus siamensis*), and their hybrids. [Comparative Biochemistry and Physiology Part D 60](#).

Abstract: *Crocodylus niloticus* and *Crocodylus siamensis* are high-value aquaculture species. *C. niloticus* is large-bodied but less abundant, while *C. siamensis* grows fast but is small-sized. Their hybrids combine parental advantages, yet relevant research is scarce. This study compared the histological and transcriptomic characteristics of the caudal muscle across the three taxa. HE staining indicated that *C. niloticus* had significantly larger myofiber diameters ($p < 0.05$); *C. siamensis* had the smallest, and the myofiber density of hybrids was much closer to that of *C. siamensis*. Masson's trichrome staining indicated that *C. niloticus* had the thickest collagen fibers ($p < 0.05$), *C. siamensis* the thinnest, and hybrids exhibited highly similar histological traits to *C. siamensis*. *C. niloticus* had higher LDH and SDH activities in caudal muscles, whereas the hybrid crocodile indicated the highest CK activity. Transcriptomic analysis identified numerous differentially expressed genes (DEGs), which were enriched in growth, muscle metabolism, and energy allocation pathways via GO/KEGG annotations. PPI analysis screened 24 hub genes related to energy metabolism. This study systematically reveals caudal muscle differences, providing insights into growth-related molecular mechanisms and theoretical support for crocodile artificial breeding.

Muhtianda, I.A., Perdana, A.Y., Tawakkal, I. and Ekananda, E. (2026). *Tomistoma schlegelii* (Müller, 1838) density from 2018 to 2023 in Sekonyer River, Tanjung Puting National Park. *Konservasi Hayati* 22(1): 89-105.

Abstract: Indonesia is a tropical country in Southeast Asia, with Kalimantan (the Indonesian part of Borneo) constituting the second largest region of the archipelago. Tanjung Puting National Park is the largest conservation area in Central Kalimantan and among the largest protected heath and peat swamp forests in Southeast Asia. It also serves as a home for protected organisms in Indonesia, including the famous yet endangered *Tomistoma schlegelii* (false gharial or senyulong). The study on this reptile was conducted from 2018 to 2023 in Sekonyer River, Tanjung Puting National Park, using the modified Spotlight Survey Method applied at three routes: Camp Leakey-Muara Ali, Muara Ali-Natai Tengah, and Muara Ali-Pondok Tangguli. Field data were then presented in tables and histograms to depict the annual population of *T. schlegelii* and its preference for microhabitat and microclimate. The Hanson Method and Hanon Equation were used to estimate probability and population density. Population density was analyzed and presented using Kernel Density in ArcGIS 10.2. In total, 235 individuals were recorded, with Camp Leakey-Muara Ali being the most populated (53.62%). Most individuals were encountered at the riverbank (70.21%), while the largest age class was juvenile (50%). The yearly individual count was 39.16 individuals, showing a slight decreasing trend. The population density of *T. schlegelii* in the Sekonyer River is 1.38 individuals/km, and there is a tendency for each age class to be found in a specific location.

Brace, M., Cramberg, M., Gray, L., Pyatt, K., Xiao, L. and Young, B.A. (2026). The crook in the caudals: Kinematics of defensive tail swipes in the American alligator (*Alligator mississippiensis*). *Vertebrate Anatomy Morphology Palaeontology* 14: 94-103.

Abstract: The American alligator responds to physical threats with a defensive tail swipe, a lateral and vertical sweep of the tail. Despite the large size of the alligator tail, it accounts for roughly half the length and a quarter of the mass of the entire animal, the tail swipe had a mean duration of only 0.2 s, about the duration of a human eye blink. During this interval the distal tip of the tail may be displaced over a meter, resulting in high terminal velocity values (mean = 10.1 m/s) and, not surprising given the large size of the tail, high impact force values (mean = 1.2 kN). Kinematically, the defensive

tail swipe was found to consist of two phases; an initial phase during which the base of the tail was elevated vertically, the terminal phase during which the distal (laterally compressed) portion of the tail was accelerated. Both phases were found to be variable, both in terms of longitudinal positioning along the tail and magnitude of displacement. The initial elevation phase may be a counter-torque strategy for head strikes; a functional role in aiming or ground clearance of the distal tip is also possible. A better understanding of the kinematics of the alligator tail may provide insight into the interpretation of tail structures in other archosaurs.

Lim, L., van Brussel, K., Mélade, J., Boucher, M., Parrott, B.B., Whiteley, S.L., Mandojana, E., Rainwater, T.R., Anderson, J.T., Rose, K. and Holmes, E.C. (2026). Co-circulation of multiple Kolmioviridae lineages through vertebrate evolution. [bioRxiv](#).

Abstract: Although once only characterised by human hepatitis delta virus (HDV), membership of the family Kolmioviridae has dramatically expanded in recent years. Despite this transformation in our understanding of the host range of the kolmioviruses, the evolutionary history of this enigmatic group of RNA viruses is unclear. Kolmioviruses are characterised as small (~1.7kb) satellite viruses that require unrelated helper viruses for replication and encode a single ~200 amino acid delta antigen (DAg). Here, we describe eight novel kolmioviruses from metatranscriptomic studies of the American alligator (*Alligator mississippiensis*), red kangaroo (*Osphranter rufus*), and central bearded dragon (*Pogona vitticeps*), as well as avian kolmioviruses mined from the Sequence Read Archive (SRA). Although the novel kolmioviruses were often found in samples co-infected by other viruses, there was no evidence for the presence of hepatitis B virus as seen in HDV. By employing a range of sequence data sets, alignment methods, alignment trimming methods, and substitution models, we provide an evolutionary history of the Kolmioviridae that maximises the extent of virus-host co-divergence and refines estimates of their evolutionary timescale. Although DAg amino acid sequences are more conserved than nucleotide sequences and hence might be expected to result in more accurate phylogenetic trees, we show that full genome nucleotide sequences likely provide the best representation of kolmiovirus evolution. More broadly, our results reveal that irrespective of the data set used, multiple distinct kolmiovirus lineages have co-circulated throughout vertebrate evolution over timescales spanning hundreds of millions of years, with the association between HDV and HBV only appearing recently.

Rodriguez-Cordero, A.L., McIntyre, N.E., Stevens, R.D., Manthey, J.D., Portillo-Quintero, C., Van Gestel, N., Balaguera-Reina, S.A., Gross, B.A., Munn, M. and Densmore III, L.D. (2026). Climatic niche modelling reveals limited phylogenetic niche conservatism in New World crocodylians. *Journal of Biogeography* 53: e70275.

Abstract: Phylogenetic niche conservatism, the tendency of closely related species to retain ancestral ecological traits, has gained considerable interest, yet the lack of integration across independent evaluation methods has hindered our understanding of whether niches are conserved or dynamic. Such an understanding is especially relevant for taxa of conservation concern, such as crocodylians (order Crocodylia). This study assessed niche conservatism among New World crocodylians by combining ensemble species distribution models, phylogenetics, and standard metrics of geographic and environmental niche overlap. We estimated species' climatic niches in geographic and environmental dimensions to assess overlap patterns and quantified associations between niche overlap and phylogenetic patristic distance using the Mantel test and phylogenetic independent contrast (PIC). Overlap analyses in geographic and environmental spaces revealed climatic niche differentiation across the clade, suggesting divergent environmental preferences among species. The relationship between phylogenetic patristic distance and climatic niche overlap assessed via Mantel tests revealed a significant negative correlation with

geographic niche overlap ($q = -0.361$, $p = 0.005$), but no evidence for associations with environmental niche overlap (Schoener's D : $q = -0.079$, $p = 0.184$; Hellinger's I : $q = -0.063$, $p = 0.250$), suggesting that more distantly related species overlap less geographically. In contrast, the relationship assessed using PIC revealed no evidence for associations between phylogenetic distance and either geographic ($q = -0.200$, $p = 0.579$) or environmental niche overlap (D : $q = -0.294$, $p = 0.41$; I : $q = -0.319$, $p = 0.369$). We found no strong or consistent evidence for phylogenetic conservatism in climatic niches across both geographic (inverse relationship) and environmental (no relationship) dimensions in New World crocodylians. This study enhances our understanding of niche dynamics and highlights the value of integrating niche modelling with phylogenetic analyses to detect biogeographic and evolutionary patterns.

Bahrudin, M., Khalimatus Sa'diyah, F. and Permata Raharjo, R. (2026). Evolutionary instincts and social functions: The tradition of crocodile hunting in Papua. *Human Evolution* 41(1-2): 73-90.

Abstract: This study aims to analyze the function of crocodile hunting practices in Papua for local communities, examine traditional crocodile hunting practices in Papua, and describe the evolutionary biological aspects and socio-cultural functions of crocodile hunting practices in Papua. Qualitative descriptive methods were used in this study as a means of processing data. Malinowski's functionalism and Edward O. Wilson's sociobiological evolution serve as the analytical tools for this research. The research approach uses anthropology that highlights the social life of the Papuan people. The research data consists of screenshots of video scenes and transcripts, with secondary data in the form of relevant articles, theses, books, and internet sources. The results of the research show that crocodile hunting practices implement functionalism theory, which is inseparable from social behavior with the aim of fulfilling needs. Social behavior and simple lifestyles that rely on traditional aspects implement sociobiological adaptation so that based on the combination of the two theories in the analytical tools, a new theory emerges, namely the Sociocultural Functional-Evolutionary theory.

Green, T.P. (2026). Patterns of Molecular Evolution Driving Reproductive and Genomic Processes in Sauropsids. PhD thesis, Mississippi State University, Mississippi, USA.

Abstract: Sexual reproduction is an important driver of genetic diversity and speciation through such forces as selection, mutation, and drift. Sauropsids are an appropriate clade to study shared molecular drivers of sexual and genomic evolution due to their genome architecture, sex determination mechanism (SDM) plasticity, and large syntenous genomic regions. Using comparative phylogenetic methods, I identify predictable patterns of selection in meiotic recombination genes and clade-specific drivers of recombination rate evolution. Then, leveraging whole genome sequencing, I demonstrate that American alligator genomes are characterized by an ancient loss of genetic diversity driven by drift and historic inbreeding. I also generate a fine-scale recombination landscape for alligators, motivating further investigation into the unique recombination landscapes of crocodylians. Lastly, I combine phylogenetic comparative methods with physical and life history trait data to reconstruct ancestral SDMs for sauropsids, infer a bidirectional transition network between genetic and temperature dependent sex determination, and explored patterns of selection shaping the evolution of and transitions between SDMs, identifying no significant patterns of adaptive evolution between sauropsid lineages. Thus, while I identified predictable patterns of molecular evolution acting on the meiotic recombination pathway, the presence of shared genome architecture is not synonymous with a shared function. Studying these mechanisms at the molecular level, within panels of focal genes, and within the population genetics of a focal species with a remarkable population genetics history, allows us to contextualize the forces driving the genetic background and adaptive potential of species in a changing world.

Williams, S.A., Demir, S.B., Ozkocak, D.C., Harris, M.A., Ghosh, I., Hein, M.J.A., Rutter, S.F., Francis, G.J., Hawkins, C.J., Poon, I.K.H., Phan, T.K., Reynolds, N.P., Mechler, A., Okuda, K.S., Kvensakul, M. and Hulett, M.D. (2026). Defensin-DNA supramolecular complexes as a new pH-sensing nanomaterial. *Aggregate* 7: e70385.

Abstract: Defensins are a diverse class of host defence peptides (HDPs) that harbour both direct antimicrobial and immunomodulatory activities. These cysteine-rich HDPs are ubiquitously expressed throughout nature; however, they are classified into two evolutionarily independent superfamilies based on their ancestral lineage: the *cis*-defensins (expressed by plants, fungi and invertebrates) and *trans*-defensins (expressed by vertebrates and some invertebrates). A conserved attribute amongst defensins belonging to both the *cis*- and *trans*-superfamilies is the ability to self-assemble into multimeric complexes when interacting directly with target pathogens. These oligomeric complexes vary greatly in morphology and the required complementary ligands, ranging from phospholipid-induced fibrils to bacteria-ensnaring nanonets. This study now reports that the saltwater crocodile defensin CpoBD13 can bind short sequences of single-stranded and double-stranded DNA to form supramolecular spherical oligomeric complexes. These complexes, named defensin-induced spherical complexes (DISCs), form in a pH-sensitive and reversible process, whereby the complexes assemble in acidic conditions and disassemble when the pH is basic. This innate ability of CpoBD13 DISCs to disassemble upon a change in pH was used to pH-dependently release captured doxorubicin to induce cell death in osteosarcoma KRIB cells, demonstrating proof of concept for the potential use of DISCs as a bioactive pH-sensing nanomaterial. Furthermore, mutagenesis of CpoBD13 (H21R/H35R) generated DISCs that remained stable for at least 3 h *in vivo* within the vasculature of zebrafish embryos and retained morphological characteristics comparable to the wild-type, underscoring the potential of protein engineering to enhance DISC stability.

Mukherjee, D. and Vijay, M. (2026). Habitat ecology and intraspecific variations in Estuarine crocodile *Crocodylus porosus* Schneider, 1801 (Reptilia: Archosauria: Eusuchia: Crocodylia: Crocodylidae) in two contrasting estuarine ecosystems of eastern India. *International Journal of Science and Research* 15(5): 1058-1061.

Abstract: The Estuarine crocodile (*Crocodylus porosus*), the largest extant reptile, occupies a wide range of coastal and estuarine habitats across the Indo-Pacific. We compared habitat ecology and population structure of *C. porosus* between two contrasting estuarine systems of eastern India: Bhitarkanika National Park (BNP, Odisha) and the Sundarbans Biosphere Reserve (SBR, West Bengal). Field surveys conducted during March-April 2026 recorded 52 individuals across both sites, revealing marked intraspecific variation in size distribution, habitat utilization, and ecological pressures. Bhitarkanika, a relatively geomorphologically stable and semi-isolated estuarine system, exhibited higher population density, restricted trophic resources, and increased intraspecific competition. In contrast, the Sundarbans, a dynamic mega delta with strong marine connectivity and exchange, supported broader trophic niches, spatial dispersal, and reduced territorial conflict. We interpret these differences within the framework of trophic ecology, spatial ecology, and evolutionary adaptation, highlighting the role of habitat connectivity in shaping crocodylian population dynamics and conservation outcomes.

Brewington, T.P. (2026). Polydactyl Precursors: Insights into Early Tetrapod Locomotion from Polydactyl American Alligators. MSc thesis, Clemson University, Clemson, South Carolina, USA.

Abstract: Several of the earliest tetrapod lineages exhibited polydactyl limbs, with seven or eight digits per limb rather than the typical five or fewer seen in extant lineages. How these digit

configurations might have been used during terrestrial locomotion is unclear, given the lack of living models in which their performance can be studied and limited evidence from fossil trackways. However, polydactyly occasionally appears in natural populations of American alligators (*Alligator mississippiensis*), animals with body plans that broadly resemble those of early tetrapods. To test how polydactyl limbs similar to those of early tetrapods might have functioned on land, we used high-speed video and an EMED-ST pressure mat to measure the foot pressures and limb kinematics of polydactyl alligators (~1.5 m in length, N= 3) during walking. We also generated trackways from these alligators while walking over clay. Our data indicated that average footfall pressures and locomotor kinematics from polydactyl limbs do not significantly differ from those of non-polydactyl limbs. Moreover, pressure pad trials and trackways show that supernumerary digits are used inconsistently, with pressure recordings or digit impressions only in roughly half of our total trials. These results indicate that polydactyl digits make limited contributions to terrestrial propulsion, providing important context for understanding the evolutionary loss of digits during the invasion of land by Paleozoic vertebrates.

Velasco, A., De Sola, R. and Hernández, O. (2026). Dispersal of Orinoco crocodiles (*Crocodylus intermedius*) after their release into the Capanaparo River, Santos Luzardo (Cinaruco-Capanaparo) National Park, Apure State, Venezuela. *Memoria de la Fundación La Salle de Ciencias Naturales* 84(194): 23-30.

Abstract: In the Santos Luzardo (Cinaruco-Capanaparo) National Park, Apure State, Venezuela, 3136 Orinoco crocodiles raised in captivity until one year of age have been released into the Capanaparo River over the past 18 years. During the population surveys, specimens were captured to evaluate their adaptation to the natural habitat. Thirty-six Orinoco crocodiles were captured, of which 19 were released by breeding farms and recaptured at different times. The distance between the release and recapture sites was determined. The remaining 17 correspond to individuals born in the Capanaparo River. Dispersal distances ranged from 0.24 to 9.76 km from the release site. Only four Orinoco crocodiles dispersed upstream, whereas the remaining individuals dispersed downstream. The period between release and capture ranged from one month to 130 months.

Resumen: En el Parque Nacional Santos Luzardo (Cinaruco Capanaparo), estado Apure, Venezuela, 3136 caimanes del Orinoco criados en cautiverio hasta el año de edad, fueron liberados en el río Capanaparo durante los últimos 18 años. Durante los censos poblacionales, se capturaron ejemplares para evaluar su adaptación al hábitat natural. Se capturaron 36 caimanes del Orinoco, de los cuales 19 fueron liberados por granjas de cría y recapturados en diferentes momentos. Se determinó la distancia entre los sitios de liberación y recaptura. Los 17 restantes corresponden a individuos nacidos en el río Capanaparo. Las distancias de dispersión variaron de 0,24 a 9,76 km desde el sitio de liberación. Solo cuatro cocodrilos del Orinoco se dispersaron río arriba, mientras que los demás individuos se dispersaron río abajo. El período entre la liberación y la captura varió de un mes a 130 meses.

Mukherjee, D., Singh, M., M., V. and Sharma, P. (2026). A review on the evolutionary perspective of snout elongation in extant crocodilians. *International Journal of Science and Research* 14(5): 768-772.

Abstract: The evolutionary morphology of snout elongation in extant crocodilians reflects a complex interplay of ecological adaptation, biomechanical constraints, and phylogenetic history. This review explores how craniofacial variations categorized into semi-altricial, longirostral, platyrostral, and brevirostral morphotypes correlates with foraging strategies, hydrodynamic requirements, and habitat specialization. Emphasis on convergent and parallel evolution of longirostry and brevirostry across monophyletic and non-

monophyletic lineages is also provided. Comparative biomechanical stresses and von Mises factors also highlighted for differences in bite force distribution between snout morphologies. Longirostrals show adaptations for ichthyophagy, while brevirostrals demonstrate secondarily derived traits largely suitable for terrestrial crushing of prey. We hypothesize that post-Cretaceous ecological filtering and spatio-trophic competition with dominant reptilian clades including Theropods shaped the morphological stasis and niche conservatism observed in extant Esuchians. Moreover, paleoenvironmental shifts during the Cenozoic further constrained the range and diversity of crocodilians. Despite their retention of plesiomorphic body plans, crocodilians demonstrate key evolutionary innovations in jaw shapes enabling resource partitioning and survival through mass extinctions. This review also synthesizes evolutionary ecology and biomechanical informations to propose a power cascade jaw width expansion in clade Crocodylia.

Berber, A.A., Akbulut, C., Demir, Ş.N. and Kurnaz, M. (2026). Microplastic contamination in amphibians and reptiles: An ecotoxicological synthesis of exposure, mechanisms, and risk implications. *Toxics* 14(6): 522.

Abstract: Microplastic (MP) contamination has become a defining feature of twenty-first century environmental change, yet the toxicological and ecological consequences for amphibians and reptiles - two vertebrate classes already facing severe extinction pressures - remain fragmented across taxa, regions, and methodological traditions. Here, we synthesize field and experimental evidence from five continents to provide a taxonomically balanced, mechanistically grounded, and geographically explicit assessment of MP exposure, bioaccumulation, and toxicity in herpetofauna, drawing on a structured literature search in Web of Science, Scopus, and PubMed (January 2015-March 2026). Field detection rates of MPs in amphibian larvae range from 26% in conservatively screened Central European populations to 73-80% in anuran tadpoles from high-anthropogenic-pressure Anatolian catchments, with fibrous polyethylene terephthalate (PET), polyethylene (PE), and polypropylene (PP) particles dominating the detected burden. Mechanistic evidence converges on oxidative stress cascades, hypothalamic-pituitary-thyroid axis disruption, gut and cutaneous microbiome dysbiosis, and compromised antiviral and antifungal immunity, with the latter potentially amplifying vulnerability to *Batrachochytrium dendrobatidis* and to ranavirus. Among reptiles, sea turtles display near-universal MP ingestion with documented maternal transfer to eggs; freshwater turtles, terrestrial squamates, and crocodilians remain critically understudied. Three structural asymmetries constrain current ecotoxicological risk characterization: taxonomic bias toward anurans and sea turtles, geographic bias toward the Global North, and experimental bias toward acute, supra-environmental laboratory exposures using pristine, single-polymer particles that fail to capture the chemical complexity of weathered field mixtures. We argue that MP burden may warrant consideration as a candidate stressor criterion within IUCN Red List assessments and within environmental risk assessment frameworks for freshwater and terrestrial biodiversity once a robust quantitative relationship between MP burden and demographic decline or population-level fitness has been established, and propose six hypothesis-driven research priorities: methodological standardization, reptile toxicokinetics, transgenerational epigenetics, MP-pathogen microbiome interactions and their translation into population viability models, temperature × MP interaction under climate warming, and population-genetic consequences of contemporary MP-driven selection, as the most tractable avenues for ecotoxicological progress and for the development of herpetofauna-specific risk characterization frameworks.

Yao, C., Shen, T., Xiong, Z., Wu, M., Yan, J., Chen, Y., Li, Y., Liu, H., Sun, B., Ahmed, M.Y.A. and Shang, X. (2026). Protective effects of crocodile muscle-derived peptide against D-galactose induced hippocampal aging and cognitive impairment in mice. *Journal of*

Abstract: Age-related cognitive decline is closely linked to hippocampal deterioration, in which oxidative stress plays a critical role. Crocodile meat peptide (CMP) is a naturally active peptide enzymatically isolated from crocodile skin and meat. It exhibits potential antioxidant and metabolic properties, and its neuroprotective role remains largely underexplored. This study investigated the protective effects of CMP against D-gal (D-galactose)-induced hippocampal aging and cognitive impairment in mice and elucidated the underlying mechanisms. CMP, prepared by enzymatic hydrolysis with alkaline protease and characterized by mass spectrometry (primary molecular weight <2000 Da), was administered to a D-gal-induced aging mouse model. Behavioral tests showed that CMP supplementation significantly alleviated anxiety-like behavior in the open field test, improved recognition memory in the novel object recognition test, and enhanced spatial learning and memory in the Morris water maze. Histopathological analysis revealed that CMP attenuated D-gal-induced neuronal damage in the hippocampus, including disordered arrangement, reduced cell density, and loss of Nissl bodies. Concurrently, serum oxidative stress marker assays revealed that CMP significantly reduced serum Malondialdehyde levels in the model mice, corrected the abnormal compensation of Superoxide dismutase, and alleviated oxidative stress-induced damage. Mechanistically, CMP treatment significantly downregulated the mRNA expression of the senescence marker p21, modulated the autophagy adapter p62, and altered the expression of the anti-apoptotic protein BCL2 in the hippocampus. These findings indicate that CMP effectively ameliorates D-gal-induced cognitive deficits and hippocampal aging, likely by preserving neuronal integrity and modulating pathways involved in senescence, autophagy, and apoptosis. This study provides experimental evidence supporting CMP as a potential candidate for nutritional intervention in age-related cognitive decline for preventing or mitigating age-related cognitive decline.

Castillo-Visa, O., Bell, P.R., Galobart, A. and Sellés, A. (2026). Soft tissue preservation in the Barremian *Montsecosuchus depereti* (Neosuchia: Atoposauridae). *Zoological Journal of the Linnean Society* 207(2).

Abstract: Crocodylomorpha (crocodilians and their extinct relatives) have an extensive fossil record that extends from the Late Triassic to the present day. Nevertheless, fossilized soft tissues (eg skin and cartilage) are virtually unknown for most clades, with the exception of the marine thalattosuchians. Here, with the assistance of ultraviolet light, we identify and describe a variety of cartilaginous and non-ossified epidermal tissues in the Early Cretaceous (Barremian) putative atoposaurid *Montsecosuchus depereti* from Spain, which is among the most complete and oldest preserved skin among Crocodylomorpha, with scale architecture varying along its body. Although broadly similar to the integument of extant representatives, *Montsecosuchus* lacks the deep caudal 'fin' and deeply keeled scales on the limbs characteristic of modern crocodylians. Additional features include possible integumentary sensory organs and evidence of banded coloration along the tail. The restricted presence of possible integumentary sensory organs on scale inclusions on the body periphery suggests that such organs first evolved as small, specialized scales prior to assuming a more widespread distribution on basement scales along the body. Preserved cartilaginous tissues (uncinate processes and cartilaginous ribs) in the thoracic region show adaptations in *Montsecosuchus* for increased respiratory efficiency. These discoveries help to fill gaps in the evolution of the crocodylomorph integument and respiratory apparatus.

De Oliveira Lima, N.R., Azevedo, L.P., de Menezes Costa, J.V., Pressinotti, L.N., Liotti, R.G., Lemos, L.M.S., Bassi-Branco, C.L., dos Santos Ferraz, R.H., de Vasconcelos, L.K.G., Filho, S.V. and Rios-Santos, F. (2026). Chemical profile analysis and therapeutic

potential of *Caiman yacare* (Daudin, 1802) paracloacal gland oil ethanolic extract. *Ciência e Natura* 48: e85626.

Abstract: With the aim of expanding our knowledge of the *Caiman yacare* (Daudin, 1802) paracloacal gland oil ethanolic extract, we investigated the chemical composition and antimicrobial activity of the ethanolic extract as well as its influence on cell viability. Fourier transform infrared spectroscopy and gas chromatography coupled with mass spectrometry were used to determine the chemical profile. Subsequently, using the broth microdilution method, we evaluated the ethanolic extract for its antimicrobial effect against 15 bacterial strains and two yeast strains as well as its effect on cell viability in different glial cell and skin tissue lineages using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay. The ethanolic extract was found to have a heterogeneous composition, containing compounds such as nitrosourea, hydrocarbons, ketones, and esters. Additionally, the ethanolic extract exhibited a bacteriostatic effect at concentrations above 200 µg/mL against *Pseudomonas aeruginosa* and above 400 µg/mL against *Streptococcus pyogenes* and *Enterococcus faecalis*. The ethanolic extract reduced cell viability only at the two highest concentrations (500 and 1000 µg/mL) in fibroblasts (GM07492) and at the highest concentration in astrocytes (ACBRI-371) and glioblastoma multiforme (T98G). These findings contribute to a better understanding of the pharmacological potential of *C. yacare* paracloacal gland oil, providing support for future investigations and the development of therapeutic products.

Análise do perfil químico e potencial terapêutico do extrato etanólico do óleo das glândulas paraclocais de *Caiman yacare* (Daudin, 1802)

Resumo: Com o objetivo de ampliar o conhecimento acerca do extrato etanólico do óleo das glândulas paraclocais de *Caiman yacare* (Daudin, 1802), investigamos a composição química, atividade antimicrobiana e influência na viabilidade celular desse extrato. Para isso, as técnicas de Espectroscopia de Infravermelho por Transformada de Fourier e Cromatografia Gasosa acoplada à Espectrometria de Massas foram utilizadas para determinar o perfil químico. Posteriormente, foi avaliada capacidade antimicrobiana contra quinze cepas bacterianas e duas cepas de leveduras, pelo método de microdiluição em caldo, e na viabilidade celular em três linhagens de células gliais e duas de tecido cutâneo pelo ensaio deMTT. Os resultados revelaram composição heterogênea, contendo compostos como nitrosourea, hidrocarbonetos, cetonas e ésteres. O extrato apresentou efeito bacteriostático em concentrações acima de 200 µg/mL contra *Pseudomonas aeruginosa* e acima de 400 µg/mL contra *Streptococcus pyogenes* e *Enterococcus faecalis*. Além disso, reduziu a viabilidade celular apenas nas duas maiores concentrações (500 e 1000 µg/mL) nos fibroblastos (GM07492) e na maior concentração em astrócitos (ACBRI-371) e glioblastoma multiforme (T98G). Essas descobertas contribuem para um melhor entendimento do potencial farmacológico do óleo das glândulas paraclocais de *C. yacare*, fornecendo subsídios para futuras investigações e desenvolvimento de produtos terapêuticos.

Pierini, S.E., Valli, F.E., Simoncini, M.S., Ojeda Adame, R.A., Leiva, P.M.L., Viotto, E.D.V., Larriera, A. and Piña, C.I. (2026). Integrating camera-trap photo-identification into non-invasive monitoring of *Caiman latirostris*. *Aquatic Conservation: Marine and Freshwater Ecosystems* 36: e70405.

Abstract: The capture of crocodilians for sample collection and the evaluation of population parameters is important for their management and conservation, particularly in wetland ecosystems where non-invasive monitoring is essential. In this context, identifying complementary tools to conventional recapture of individuals that are non-invasive and provide similar information remains a challenge. This study assessed the usefulness of camera trapping as a complementary method for the individual identification of female broad-snouted caimans (*Caiman latirostris*) during

nesting. We monitored 87 caiman nests using camera traps, selected the images in which marks on the caudal region were visible, and searched for the marks in the historical records of the species that had been created within the framework of population surveys. We were unable to obtain complete images of the caudal region of 15 females. Among the remaining 72 females, we identified marks in 19 (26%) of them: eight corresponded to individuals reintroduced into the wild, three to captures and two were identified by physical marks (eg absence of a limb). In the remaining six females, although they displayed marks in the caudal region, detection occurred at night-time or vegetation hindered visibility, so we could not individualize them. Within the framework of monitoring linked to conservation programs based on the sustainable use of the broad-snouted caiman, camera trapping could contribute to the evaluation of its population status at reproductive ages, particularly if sampling effort is increased during the nesting period.

Edwards, K.L. (2026). Non-invasive biomarkers of reproduction in individuals and populations of wild vertebrates. *Journal of Reproduction and Development* 72: 182-195.

Abstract: An increasing number of vertebrate species are under threat of extinction, and conservation efforts are vital to the survival of many species. Knowledge of reproductive processes across taxa, and how different factors can impact reproductive success, is essential for supporting conservation breeding and mitigating threats to reproductive success of wild populations. Although historically much of our knowledge came from model species and more invasive techniques, non-invasive monitoring of biomarkers related to reproduction can be invaluable to monitor individuals and populations over prolonged periods, crucial to gaining fundamental knowledge on reproductive physiology across a wider range of species and locations, and for evidence-based management of reproduction. Advances over the last few decades have increased the sample types that can be used and the potential biomarkers that can be investigated, but the proportion of vertebrates to which these techniques have been applied remains relatively low. The aim of this review is to highlight some of the hormones and other biomarkers that can inform on reproductive function, the sample types and considerations for non-invasive monitoring, and where efforts are required to further our understanding of reproduction in both individuals and populations of wild vertebrates. Increased application of these techniques across species could not only improve the success of conservation efforts but also help to assess the increasing threats to reproduction, such as by endocrine disruptors in natural environments, that have the potential to impact all species on the planet.

Hoffbeck, C. and Taylor, M.W. (2026). The microbiome in reptile health, disease, and ecology. *Microbiology and Molecular Biology Reviews*.

Abstract: Reptiles are a diverse and speciose class of animals that are broadly threatened by habitat loss, climate change, and other factors. From a microbiological perspective, reptiles have historically been examined as a source of disease, particularly salmonellosis, with most studies being culture-based investigations into causative agents of disease and potential for zoonoses. More recent work has sought to characterize the oral, skin, and gut microbiomes of reptiles more broadly to understand their contribution to reptile health and digestion. Non-avian reptiles are particularly interesting as ectothermic tetrapods, which usually lay eggs and have limited interaction with their young, as their digestion and life history strategies diverge substantially from the more well-studied mammals. Here, we review the reptile skin, oral, gut, eggshell, and nest microbiomes, along with the relationship between the microbiome and temperature stress. We present findings that distinguish the reptile microbiome from those of other studied vertebrate taxa, and place them in the context of their phylogenetic and ecological similarities to other animals. We discuss major disease-causing agents in reptiles, which was historically the main lens through

which to view reptile microbiology, along with potential zoonoses. Finally, we examine how temperature and thermoregulation interact with the microbiome in reptiles, and how the microbiome may play a role in reptile conservation.

Cajiao-Mora, K., Curran, S.S., Brule, J.H., Gordillo-González, D., Dutton, H.R., Warren, M.B. and Bullard, S.A. (2026). *Proctocaecum coronarium* and *Proctocaecum diploporum* (Digenea: Cryptogonimidae): Morphologically- and phylogenetically-distinct but closely related and sympatric crocodilian trematodes with identical life cycles. *Parasitology*.

Zhao, J., Tellez, M., Tu, G., Kuris, A. and Wu, X. (2026) The complete mitochondrial genome of *Brevimulticaecum sinensis* (Nematoda: Heterocheilidae), the first representative of the genus *Brevimulticaecum*. *Mitochondrial DNA Part B* 11(7): 869-873.

Abstract The complete mitochondrial genome sequence of *Brevimulticaecum sinensis* was clarified in this study, and this is the first member of the genus *Brevimulticaecum* ever sequenced for complete mitochondrial genome. The circular mitochondrial genome (13887 bp) of *B. sinensis* encodes 12 protein-coding genes, 22 transfer RNA genes, 2 ribosomal RNA genes, and 2 non-coding regions, all genes exhibiting a nucleotide composition bias toward AT. Phylogenetic studies showed that *B. sinensis* and *Ortleppascaris sinensis* formed a monophyletic group belonging to the family Heterocheilidae. The complete mitochondrial genome sequence of *B. sinensis* should enrich molecular markers for studying the molecular classification, genetic variation, and phylogenetic studies of the Ascaridida nematodes.

Capobianco, A., Darlim, G. and Höhna, S. (2026). How to date a molecular phylogeny: comparison of effective priors between node calibration and fossilized birth-death. *Proceedings of the Royal Society B* 293(2070): 20253255.

Abstract: Time-calibrating a phylogenetic tree is a fundamental step in phylogenetic inference, as it allows the study of macroevolutionary processes such as lineage diversification, trait evolution and historical biogeography. To this end, the fossilized birth-death (FBD) process, a stochastic process that coherently integrates fossils into phylogenies, is increasingly used as an alternative to traditional ad hoc node-calibration densities. However, the effective prior distribution on node ages induced by the FBD has never been investigated before, hindering an informed choice between the two approaches. Here, we analyse two empirical datasets (crocodilians and fireflies) by applying several models of time-calibration, including traditional node calibrations and FBD. We show that the effective node age priors induced by the FBD process in the absence of morphological data are comparable to those induced by flat node calibrations when only the oldest fossil occurrence per calibrated clade is included in the FBD analysis. However, effective node age priors become more informative when several fossil occurrences per calibrated clade are included. Our exploration sheds light on how palaeontological information is translated to node ages by the FBD process, and suggests that node calibration approaches remain an important alternative when the fossil record of the studied group is scarce and other prior information can be used to devise informative calibration densities.

Sirsi, S., Kumar, P., Ajji M., J., Griffith, P. and Lang, J. (2026). Size at maturity and reproductive frequency in female gharials in India and Nepal: Prioritizing populations of a critically endangered, conservation-dependent crocodylian. Available at [SSRN](#) or [SSRN](#).

Abstract: Inaccurate size thresholds during visual surveys may result in biased estimates of mature adults, either too many or too few. This may be the case for the gharial (*Gavialis gangeticus*), a

river-dwelling crocodylian that is Critically Endangered (CR) and highly conservation-dependent. The conventional minimum size-at-maturity thresholds in female gharials range between 2.6 to 3.3 m total length, and are largely unsubstantiated and anecdotal. Here, we present morphometric measurements and subsequent reproductive behavior observations from telemetry-based tracking of female gharials in northern India (n= 73) and southern Nepal (n= 8). In each season, the gravidity (ie with eggs) or lack thereof was determined for each candidate female, based on multiple observations. Morphometric measurements recorded at the time of capture were then compared between gravid and non-gravid females. The most suitable indicator for size-at-maturity in female gharials is a minimum total length >3.0 m, from India (n= 54) and Nepal (n= 4). On the Chambal and in Chitwan, a reproductive frequency of 1.0 was observed. Finally, we illustrated the management relevance of differing size-at-maturity thresholds by comparing counts of candidate female gharials, using either methodology. With the conventional size threshold (>2.7 m), the number of candidate females identified as adults was overestimated, while conventional counts of subadults were underestimated. In marked contrast, the minimum size threshold of >3.0 m. for female maturity, as indicated in this study, appears to apply for wild gharials globally and will facilitate accurate estimates of population abundance and nesting to prioritize conservation actions.

Caselli, A., Fernández, V., Muchiutti, A., Vanstreels, R.E.T., Santiago, M. and Uhart, M.M. (2026). Game meat consumption is associated with increased blood lead levels in children in northern Argentina. *Ecotoxicology and Environmental Safety* 321.

Abstract: Lead (Pb) exposure poses significant health risks, particularly to children, who are highly susceptible to its neurotoxic effects. This study investigated the game meat consumption habits of children in a rural community in northern Argentina, where hunting with Pb ammunition is common, and assessed its potential links to blood Pb levels. Questionnaire surveys of adult caregivers of 276 children (from 182 households) revealed that 82% of children had consumed game meat in the preceding three months. The most frequently consumed species reported were: duck (Anatidae, 77%), capybara (*Hydrochoerus hydrochaeris*, 51%), nutria (*Myocastor coypus*, 46%), armadillo (Dasypodidae, 19%), caiman (Alligatoridae, 16%), hare (Leporidae, 11%), vizcacha (Chinchillidae, 13%), and other species (13%). Measures to reduce Pb ingestion included searching for and removing projectiles (reported for 65% of children) and removing projectile-damaged meat (58%). Blood samples were obtained from a subset of 101 children, and revealed that 51.5% had blood Pb levels exceeding the reference threshold (3.5 µg/dL). Children who had consumed game meat in the preceding three months had significantly higher blood Pb levels (mean ± SD= 4.65 ± 5.53 µg/dL, maximum= 27.6 µg/dL) than children who had not (0.62 ± 1.45 µg/dL, maximum= 4.0 µg/dL). Consumption of game meat from certain species (duck and capybara) and body parts (especially whole carcass) and in certain types of preparation (stew) were associated with greater risk for above-reference blood Pb levels, whereas removing projectile-damaged meat and other types of preparation (empanada) provided some modest protection. These findings highlight game meat consumption as a critical Pb exposure pathway in this region, underscoring the need for public health interventions, including education on Pb risks and promotion of non-Pb ammunition.

Escobar, G.A., Zaracho, V.H. and Luna, C.A. (2026). Anomalies in the sacral region of *Caiman yacare* (Daudin, 1802) (Crocodylia: Alligatoridae) from Corrientes, Argentina. *Revista de Facultad de Ciencias Exactas y Naturales y Agrimensura* 36(1): 5-13.

Abstract: Morphological anomalies recorded in wild reptiles are scarce compared to those in captive animals, and are usually detected in post-mortem examinations. This note describes new skeletal anomalies observed in the sacral region of wild specimens

of *Caiman yacare*. Caudal hemisacralization and an ectopic condyle were identified. Although it was not possible to establish a cause-effect relationship, possible genetic and teratological explanations are explored based on previous reports in other crocodylians. This contribution highlights the importance of reporting morphological anomalies found in reptiles, which could indicate environmental disturbances.

Resumen: Las anomalías morfológicas registradas en reptiles silvestres son escasas comparadas con las de animales en cautiverio, y suelen detectarse en exámenes post-mortem. En esta nota se describen nuevas anomalías esqueléticas observadas en la región sacra de ejemplares silvestres de *Caiman yacare*. Se identificó hemisacralización caudal y un cóndilo ectópico. Si bien no fue posible establecer una relación causa-efecto, se explora posibles explicaciones genéticas y teratológicas de acuerdo con reportes previos en otros crocodylianos. Esta contribución resalta la importancia de comunicar anomalías morfológicas halladas en reptiles, las cuales podrían indicar disturbios ambientales.

Fellows, S. (2026). Population dynamics, breeding success, and conservation implications of *Crocodylus palustris* in captive and semi-natural systems across India. *Ciencia Veterinaria* 28: 1-15.

Abstract: The mugger crocodile (*Crocodylus palustris*), classified as Vulnerable by the IUCN and protected under Schedule I of the Wildlife (Protection) Act, 1972, functions as a keystone wetland predator across the Indian subcontinent. A comprehensive analysis of 2024 Central Zoo Authority (CZA) records from 45 facilities across 12 Indian states (n= 1187 individuals) revealed an average annual captive population growth of 18.5%, driven primarily by inter-facility transfers rather than natality (78% transfer contribution). Overall mortality was 2.53%, with juveniles (<2 years) accounting for 65% of all deaths, and captive populations exhibited persistent male-biased sex ratios (1.14:1 M:F) with 12.4% unsexed individuals. Facilities employing naturalistic enclosure designs demonstrated significantly higher hatching success than standard concrete enclosures (25.1% vs. 11.6%; F= 6.82, p= 0.02), attributable to thermal gradients (28-34°C), sandy nesting substrates, and seasonal hydrological variation essential for oviposition and temperature-dependent sex determination. Because temperature-dependent sex determination is conserved across multiple reptilian taxa in South and Southeast Asia, these findings have broader regional relevance beyond *C. palustris*. Evidence-based recommendations include standardized genetic sex determination protocols, ecological enclosure redesign, improved juvenile rearing systems, and integrated captive-wild conservation frameworks to ensure long-term demographic viability and genetic health of this ecologically critical species

Resumen: El cocodrilo de los pantanos (*Crocodylus palustris*), clasificado como Vulnerable por la UICN y protegido bajo el Anexo I de la Ley de Protección de la Vida Silvestre de 1972 en la India, cumple una función ecológica clave como depredador de humedales en el subcontinente indio. El análisis de los registros de la Autoridad Central de Zoológicos (CZA, 2024) de 45 instalaciones en 12 estados de la India (n= 1187 individuos) mostró un crecimiento anual promedio de la población cautiva de 18.5%, impulsado principalmente por transferencias entre instalaciones más que por natalidad (78% del incremento). La mortalidad general fue de 2.53%, con los juveniles (<2 años) representando el 65% de las muertes, y se observó una razón sexual sesgada hacia machos (1.14:1) junto con 12.4% de individuos sin sexar. Las instalaciones con recintos naturalistas presentaron un éxito de eclosión significativamente superior al de los recintos estándar de concreto (25.1% vs. 11.6%; F= 6.82; p= 0.02), asociado con gradientes térmicos (28-34°C), sustratos arenosos para nidificación y variación hidrológica estacional. Se recomienda la estandarización de métodos de determinación sexual, el rediseño ecológico de recintos, la mejora del manejo juvenil y la integración de estrategias de conservación *ex situ* e *in situ*.

Resumo: O crocodilo-dos-pântanos (*Crocodylus palustris*),

classificado como Vulnerável pela IUCN e protegido sob o Anexo I da Lei de Proteção da Vida Selvagem de 1972 na Índia, atua como um predador-chave de áreas úmidas no subcontinente indiano. A análise dos registros de 2024 da Central Zoo Authority (CZA) de 45 instalações em 12 estados da Índia (n= 1187 indivíduos) revelou um crescimento médio anual da população cativa de 18.5%, impulsionado principalmente por transferências entre instituições e não pela natalidade (78% do aumento). A mortalidade geral foi de 2.53%, com juvenis (<2 anos) representando 65% das mortes, e observou-se uma razão sexual persistentemente enviesada para machos (1.14:1), além de 12.4% de indivíduos sem sexagem. Instalações com recintos naturalísticos apresentaram sucesso de eclosão significativamente superior em comparação com recintos padrão de concreto (25.1% vs. 11.6%; F= 6.82; p= 0.02), devido à presença de gradientes térmicos (28-34°C), substratos arenosos para nidificação e variação hidrológica sazonal. Recomenda-se a padronização de protocolos de determinação sexual, o redesenho ecológico dos recintos, o aprimoramento do manejo de juvenis e a integração entre conservação *ex situ* e *in situ*.

Burke, P.M.J. and Mannion, P.D. (2026). Computed tomography reveals the endocranial anatomy of Crocodylia: Implications for phylogenetic relationships and ecomorphological convergence across Crocodylomorpha. *Journal of Anatomy*.

Abstract: Living crocodylians (alligators, caimans, gavials and ‘true’ crocodiles) are the remnants of a broader clade, Crocodylomorpha, that displays high ecomorphological diversity, particularly in skull shape. However, there are several instances of ecomorphological convergence between distant lineages, especially pertaining to the independent acquisition of a long, slender, longirostrine snout. In some instances, it is difficult to determine whether extinct species belong to one longirostrine lineage or another, with this problem especially prevalent with regards to the gavialoid crocodylian clade. The recent application of computed tomography (CT) scanning to the skulls of vertebrate species has revealed a plethora of previously hidden information on their endocranial anatomy. This in turn has the potential to shed new light on a group’s evolutionary interrelationships, with endocranial data potentially helping to distinguish between shared phylogenetic ancestry of an anatomical feature and ecomorphological convergence. Although CT scans of skulls of several crocodylian species have been evaluated, previous studies have focused on describing the endocranial anatomy of an individual species or assessing intraclade variation of a specific morphological feature. Here, we evaluate the endocranial anatomy of Crocodylia based on a combination of published and newly presented CT-scan data for 43 extant and extinct species, including representatives from the three major subclades, Alligatoroidea (13 species), Crocodyloidea (14 species), and Gavialoidea (16 species), alongside four non-crocodylian eusuchians. Alligatoroids possess a sigmoidal encephalic endocast, an endosseous labyrinth wherein the area of the anterior semicircular canal is more than three times that of its posterior counterpart, as well as snout sinuses lateral and ventral to the nasal cavity. Crocodyloids have dorsoventrally tall pharyngotympanic tubes, antorbital and postvestibular sinuses, and a cerebrum that has its greatest transverse width at its midpoint. Gavialoids have a relatively ‘simple’ endocranial morphology, with a straight encephalic endocast, and reduced or absent snout sinuses. Several extinct gavialoids are also characterised by depressions on the internal surface of the prefrontal bones, which have been previously hypothesised to be osteological correlates for salt glands; however, similar depressions in some extant species of *Crocodylus* appear to be associated with airspace instead. We identify several differences between the endocranial anatomy of phylogenetically distant longirostrine crocodylomorphs: by contrast with thalattosuchians, crocodylians lack a confluent dorsal dural venous sinus and orbital arteries, whereas they possess an intertympanic sinus and nasolacrimal ducts. Our study demonstrates the viability of endocranial data for identifying phylogenetically informative morphological features in crocodylomorphs more broadly.

Li, C., Zhang, Y., Wen, Y., Wang, C., Li, P., Xu, Y., Zhang, Y., Zhou, Y., Wu, X. and Nie, H. (2026). MicroRNA expression profiling and functional analysis of CDH3 during oogenesis in the Chinese alligator (*Alligator sinensis*). *Current Zoology* 72(3): 428-440.

Abstract: MicroRNAs (miRNAs), noncoding RNAs that regulate the expression of target mRNAs, have gained attention. Nevertheless, the biological mechanism underlying oogenesis in crocodiles remains unclear. In this study, RNA sequencing was utilized to analyses miRNA expression at 1-, 15-, and 90 days post-hatching (dph) in *Alligator sinensis*. We identified 92 differentially expressed known miRNAs. Among these genes, 17, 1, and 5 had specific expression patterns at 1, 15, and 90-dph, respectively. GO and KEGG analyses of the predicted miRNA targets revealed enrichment in cell adhesion molecule (CAM) pathways. The expression of CDH3 was significantly higher than that of other family members and was high during the embryonic stage, which coincided with the commencement of mammalian oogenesis. Our prediction indicated the presence of 3 Ca²⁺-binding sites, 2 cadherin domains, and a cadherin cytoplasmic region in the CDH3 amino acid sequence. This finding suggests a similar cell adhesion function to that of mammalian CAM family genes. IHC analysis revealed minimal CDH3 expression in the germ cell nests at 1-dph. Elevated CDH3 expression was observed in primordial follicles formed via Nest breakdown at 15-dph. Notably, CDH3 expression decreased significantly at 90-dph, but positive signals remained in thecal epithelia of the medullary cavities. The results of lentivirus experiments revealed that CDH3 downregulation suppressed the expression of oogenesis genes (FSHR, CYP19A1, BMP15, and BCL2). Our research highlights the function of miRNAs in crocodilian oogenesis, and CDH3 is proposed to be crucial for reproductive developmental mechanisms.

Spiekman, S.N.F. and Ezcurra, M.D. (2026). Getting to the root of it: perspectives on the phylogenetic origins of modern reptiles. *Journal of Systematic Palaeontology* 24(2): 2672998.

Abstract: Reptiles are currently represented by turtles, archosaurs (crocodylians and birds), and lepidosaurs (lizards, snakes and the tuatara). However, these groups represent only a fraction of the known diversity of crown reptiles throughout geological time, and the evolutionary origin of modern reptiles remains a major outstanding topic in vertebrate systematics. The molecular consensus is that turtles are more closely related to archosaurs than to lepidosaurs, but this does not consider the many extinct neodiapsids that also have their origin close to the base of the reptile crown. Great progress has been made on this subject in recent decades through the detailed study of the anatomy and systematics of Permian and Triassic reptile fossils. Nevertheless, there is still no consensus on reptile interrelationships near the origin of the three major modern reptile clades. Here, we review the current state of systematic research for Permo-Triassic lepidosauromorphs, archosauromorphs, pantestudines, sauropterygomorphs, ichthyosauromorphs, thalattosaurs, choristoderes, weigeltisaurids, drepanosauromorphs, and ‘younginiforms’, and provide an outlook for future efforts for these groups. Addressing this systematic question is complicated by the rarity of relevant fossils for some groups and the inherent challenges of studying the phylogenetic relationships of evolutionary radiations. However, increased research efforts, including continuous new fossil discoveries and detailed morphological studies, especially those aided by micro-computed tomography, are likely to help resolve some of these issues. Furthermore, there is a desire for comprehensive morphological character-taxon matrices focusing on this part of the reptile tree, resembling in scope and approach those already available for other major lineages, such as Archosauromorpha and Lepidosauromorpha.

Lima Gorza, L., Oliveira, S., Cardoso Nobrega, Y., Yu Fraga, L., Neris, D., Pierezan, F. and Cunha Flecher, M. (2026). Diagnostic Challenge: Macroscopic image of a heart from a wild broad-snouted

caiman (*Caiman latirostris*). [Journal of Herpetological Medicine and Surgery](#).

Abstract: An approximately 10-years-old female wild broad-snouted caiman (*Caiman latirostris*), with snout-vent length of 82cm, was found dead during monitoring work and submitted for necropsy. Aortic dilatation and luminal narrowing were noted.

Iacobucci, G. (2026). Crocodile attack: Probe after injured boy's medical records are accessed by 40 NHS staff. *BMJ* 393: e100098.

Abstract: An NHS Trust has launched an investigation after the medical details of a child seriously injured in a crocodile enclosure were accessed by as many as 40 members of staff. The 3-year-old boy was taken to Addenbrooke's Hospital in Cambridge after allegedly being thrown into a crocodile enclosure at the Johnsons of Old Hurst zoo near Huntingdon on 18 June.

Gray, L., Brace, M., Cramberg, M., Pyatt, K., Xiao, L. and Young, B.A. (2026). The dorsal root ganglion of the American alligator (*Alligator mississippiensis*). [Anatomical Record](#).

Abstract: The peripheral nervous system of vertebrates develops through the merger of neuritic outgrowths from the central nervous system, and derivatives of the neural crest cells (ncc), including the spinal (or dorsal root) ganglia. Before the neural crest cells differentiate into neural tissue, they migrate through the vertebrate embryo. Relatively little comparative work has been done on the potential relationship between differential ncc migration and interspecific variation in the spinal ganglia. In *Alligator mississippiensis*, the sensory ganglia are located on the dorsal root, immediately distal (lateral) to the bony margins of the intervertebral foramen. No clear evidence of afferent (sensory) nerves, equivalent to the sinuvertebral nerve of mammals, was observed within the vertebral canal of *Alligator*. The biomechanical influence, if any, between the large spinal venous sinus of *Alligator* and the sensory dorsal root ganglia remains unknown.

Sikder, S., Kumar, M., Field, M., Mee, P., Loukas, A., Helbig, K.J. and Sarker, S. (2026). Transcriptional profiling of the *Crocodylus porosus* liver cell response to Kunjin virus reveal novel insights into the host-virus interface. [Microbial Pathogenesis](#).

Abstract: Crocodilians possess a unique and robust immune system, offering a valuable model for studying vertebrate antiviral responses and informing zoonotic disease surveillance and therapeutic discovery. Building on our previous work that characterized crocodilian immune responses to synthetic viral mimics, this study investigates the innate immune dynamics of *Crocodylus porosus* liver (LV-1) cells infected with the Kunjin2011 virus, a genetically and antigenically related member of the West Nile virus (WNV) complex. A time-course infection assay was conducted up to 192 hours post-infection (hpi), combining viral infectivity analysis with transcriptomic profiling. Delayed Kunjin2011 viral replication was confirmed via qRT-PCR, revealing a clear exponential phase after 48 hpi and peaking at 192 hpi. RNA sequencing demonstrated progressive transcriptional reprogramming in LV-1 cells, with early gene expression changes modest but becoming pronounced by 192 hpi. Differential expression analysis identified 1428 upregulated and 1308 downregulated genes, with temporal shifts from early activation to late-stage suppression. Principal component analysis and hierarchical clustering further supported a time-dependent divergence in host transcriptional responses. Notably, CXCL10, a key immune-associated chemokine, exhibited a biphasic expression pattern, with an early peak at 8 hpi, suppression at intermediate time points, and renewed induction from 72 hpi onwards. Together, these results demonstrate that Kunjin2011 infection elicits a dynamic and time-dependent transcriptional response in *C. porosus* liver cells, characterized by early activation of innate immune pathways

followed by extensive transcriptional remodeling during prolonged infection. This study provides new insights into crocodilian host responses to flavivirus infection and establishes a foundation for future investigations of antiviral immunity and host-virus interactions in reptiles.

Muñoz-Velásquez, M., Moreno-Balsa, J.L., Ramos-Baldarrago, S. and Ayala, F. (2026). Beyond sea turtles: Interactions between plastic waste and aquatic and semi-aquatic reptiles. *Regional Studies in Marine Science* 100: Article 105185.

Abstract: In aquatic environments, sea turtles have received considerable attention; however, knowledge regarding the interactions between plastic debris and other aquatic and semi-aquatic reptiles - which encompass multiple lineages and ecological strategies - remains limited. In this context, we present a global assessment of interactions between aquatic and semi-aquatic reptiles and plastic debris. Literature searches were conducted in Web of Science, Scopus, PubMed and Google Scholar to include both indexed and gray literature. The objective was to identify and analyze the main forms of interaction, particularly ingestion and entanglement, as well as to characterize the types of debris involved, the reported effects on organisms, the geographic distribution of the studies, and the affected species. Our results show that, over the past five years, there has been an increase in research on microplastics in reptiles, with growing attention toward previously understudied groups, such as sea snakes. However, scientific output is concentrated in a small number of countries, while numerous regions with high reptile diversity remain underrepresented in the literature. Given this landscape, there is a clear need to expand research efforts in species-rich countries to improve our understanding of the impacts of plastic pollution on these reptiles.

Colston, T.J., Marsh, S.M.E., Ross, J.P., Bernstein, J.M., Burger, R., Camera, B.F., Cromwell, L., Daltry, J.C., Fitzgerald, L.A., Lyons, J., Hamidy, A., Kamil, S.K.S.M., Rivas, J.A., Reynolds, R.G., Shine, R., Shirley, M.H., Muller, B.J., Siroski, P.A., Vidal, N., Waller, T., Webb, G., Whitaker, R., Aust, P.W., Arida, E., Passos, P., Luiselli, L., Micucci, P., Alexander, G.J., Riyanto, A., Mumpuni, Loertscher, M., De Silva, A., Chinnasamy, R., Martin, G., Vyas, R., Toudonou, C., Manolis, C., Larriera, A., Eniang, E. and Natusch, D.J.D. (2026). A global assessment of reptiles in the skin trade. *Scientific Reports* 16(1): 19621.

Abstract: We collated and analyzed information from multiple sources to assess conservation implications of the commercial trade in reptile skins from 2000 to 2020. Of >71 million skins reported over that period, the most heavily-traded taxa were three crocodilians (*Caiman crocodilus*, *Alligator mississippiensis*, *Crocodylus niloticus*), three snakes (*Homalopsis buccata*, *Cerberus rhynchops*, *Malayopython reticulatus*) and one lizard (*Varanus salvator*). In total, 70% of exports were from Indonesia, Colombia, United States, Malaysia, and Argentina, and 78% of imports were from Singapore, Italy, Mexico, France, and Germany. Approximately 45% of traded animals were reported to be collected from the wild, with most others being captive-bred (37%). Traded species exhibited highly specific traits including large body size, broad distributions, and high reproductive output. The squamates in trade generally have relatively early age at maturity and large clutch sizes. Together, these life history and ecological traits make traded species amenable to sustainable use. Most reptiles in the skin trade are ranked as Least Concern by the IUCN, and reptile species traded for skins are less threatened overall than non-traded species. Despite the large volume of commercial trade in reptile skins globally, this harvesting appears to be biologically sustainable in the vast majority of cases.

Hemmer, H. (2026). *Feliopsis* Stremme, 1911 (Mammalia, Carnivora, Felidae) - a Southeast Asian pantherine branch of potential crocodile hunters, hidden for five million years and forgotten for a century.

Abstract: The Late Miocene giant pantherine cat *Pachypanthera piriyai* de Bonis *et al.*, 2023, described from the Khorat sand pits, Nakhon Ratchasima Province, northeastern Thailand, draws attention to a correspondingly but even more highly specialised Pleistocene cat from Java. The latter form was published as *Feliopsis palaeojavanica* Stremme, 1911, and originates from the *Homo erectus* type-locality Trinil, dated either from the latest Early Pleistocene or the late early Middle Pleistocene. It was misidentified in subsequent studies based on the methodology of the time, when allometry statistics were not yet usual, assigned to *Panthera tigris* and forgotten. The Khorat cat is characterised by a mandible that is exceptionally strong for a felid, with functional weight on the front dentition. The premolar enamel is adapted to biting tough material. The mandible of the Trinil cat is missing. In the upper jaw it had the most powerful conical canine known for a cat of its size and an elongated and narrowed premaxillary bone. Both species can be assigned to the same genus, *Feliopsis*, which can be distinguished from *Panthera* thanks to the specialisation around the front dentition, which differs from all other felids. The canine is a further development of the conical canine of the Felinae into a powerful instrument potentially functioning like a splitting wedge, a third type in addition to the dagger-like, flattened canine of the Machairodontinae that has not yet been previously noted. In terms of feeding ecology, the *Feliopsis* cats are interpreted as highly specialised crocodile hunters. Chronologically, there is currently a gap of over five million years between the two species.

Khamis, Z.A.E.R. (2026). The crocodile cache of Hamra Dom in Qena, Egypt. *Moutoune* 19(2): 164-180.

Abstract: Recent archaeological discoveries at Hamra Dom (Qena, El-Tariff Mountain) reveal evidence of crocodile worship like that known from Kom Ombo in Upper Egypt and the Fayum region. This study seeks to address several key questions regarding these findings: where were these crocodiles bred? Were they raised as part of a local crocodile cult in a systematic manner, or did they serve another purpose? Were they votive offerings, or did their burial have a different significance? The article also examines the archaeological evidence for the presence of crocodiles in an otherwise dry environment, explores the reasons for their mummification, and outlines the methods used in the mummification process. Finally, it compares the recently discovered crocodile cache at Hamra Dom with the extensive collections of crocodile mummies found in other cemeteries throughout the Fayum and Kom Ombo regions.

Garg, A. and Kaur, N. (2025). Preferred microhabitats (e.g., basking sites, nesting areas, burrows) of Marsh Muggers in the sanctuary. *International Journal of Research Publication and Reviews* 6(8): 2413-2416.

Abstract: The Marsh Mugger (*Crocodylus palustris*) is a versatile freshwater crocodilian distributed across India and neighboring countries. This study investigates the microhabitat preferences of Marsh Muggers at the Crocodile Breeding and Conservation Centre, Bhor Saidan, Haryana, focusing on basking sites, nesting areas, and burrows. Field surveys conducted from October 2024 to March 2025 recorded environmental parameters, habitat characteristics, and behavioral observations. Results indicated that basking was concentrated on southern-facing banks with high sun exposure and minimal disturbance, nesting occurred on elevated sandy ridges with optimal soil temperatures and drainage, and burrows were preferentially used in shaded zones during the late dry season for thermoregulation. The findings highlight the critical role of specific microhabitats in supporting thermoregulation, reproduction, and shelter, offering practical implications for habitat enrichment and conservation management in semi-natural captive environments.

Kaiho, K., Oshima, N. and Ando, T. (2026). Selective survival at the Cretaceous-Paleogene boundary driven by infrared radiation and climate cooling. [Research Square](#).

Abstract: The extinction and survival mechanisms of terrestrial animals at the Cretaceous-Paleogene (K-Pg) boundary remain poorly resolved. Here we reconstruct global paleoclimate classifications, terrestrial net primary productivity, and the distributions of non-avian dinosaurs, birds, crocodilians, and mammals across the Chicxulub impact using an asteroid-impact scenario. Our results indicate that intense infrared radiation from reentering ejecta immediately after the impact caused severe mortality among unsheltered tetrapods, including non-avian dinosaurs. During the subsequent 1-3 years, cold desert, tundra, and ice-cap climates expanded across most land areas, with appearance of only limited temperate refugia. These refugia explain differential survival and post-impact migration patterns among the four animal groups. Comparisons between model-derived refuges and fossil-based Danian habitable areas enable reconstruction of survival migration routes for birds, crocodilians, and mammals. Our findings highlight the critical roles of infrared radiation and short-term climatic cooling in shaping selective survival at the K-Pg boundary.

Asedillo, N.A.M. and Sy, E.Y. (2025). The online trade of False Gharial *Tomistoma schlegelii* (Müller, 1838) (Gavialidae) in the Philippines. *Journal of Nature Studies* 24(2): 69-78.

Abstract: The False Gharial *Tomistoma schlegelii* (Müller, 1838) (Gavialidae) is an Endangered crocodilian native to Southeast Asia and listed in the CITES Appendix I. Despite legal protection across its range and prohibition on international trade of wild caught individuals, habitat destruction and illegal trade continue to pose a threat to its survival. This study documents the presence of the False Gharial in the Philippine pet trade through systematic online trade monitoring, review of wildlife seizure records, and collation of open-source news articles. From January to December 2024, we surveyed 20 Facebook wildlife trade groups specializing in the trade of reptiles. We documented 15 juvenile False Gharials offered for sale by four traders, mostly located in the National Capital Region. Wildlife traders offered one to three individuals each, while one trader offered nine. Two traders claimed to possess legal permits. Review of wildlife seizure records from 2020-2024 revealed eight seizure incidents involving crocodilians, including one case of False Gharial seizure in a police operation in June 2024. No legal importations of the species into the Philippines have been recorded in the CITES Trade Database since the species was listed in Appendix I in 1975. The availability of several juveniles strongly suggests recent smuggling and claims of legal trade permits warrant scrutiny. This study confirms the continued trade of *T. schlegelii* in the Philippines and highlights the need for continuous monitoring, verification of permits, and stricter enforcement of the R.A. No. 9147 to prevent further trafficking of this highly threatened species in the country.

Anchola-Arteaga, A., de los Ríos-Cardona, J.C. and Quintero-García, K.L. (2026). Estrategia de gobernanza ambiental para la conservación de fauna amenazada en el Magdalena Medio antioqueño, Colombia. [Intropica](#) 21(1).

Resumen: La conservación de la biodiversidad constituye uno de los principales desafíos globales, especialmente para países con alta riqueza biológica como Colombia. En este contexto, las regiones tropicales con alta riqueza ecológica, como el Magdalena Medio antioqueño, enfrentan presiones antrópicas crecientes que amenazan sus ecosistemas estratégicos y la fauna que los habita; por ello, se analizaron las estrategias de gobernanza ambiental implementadas en dicha región para la conservación del manatí (*Trichechus manatus*), la tortuga del río Magdalena (*Podocnemis lewyana*) y el caimán aguja (*Crocodylus acutus*), tres especies amenazadas por la deforestación, la ganadería extensiva, la

contaminación de cuerpos hídricos y la pérdida de hábitat. A partir de un enfoque cualitativo sustentado en entrevistas semiestructuradas, observación participante, revisión documental y análisis de información mediante software especializado, se examinaron las acciones de manejo y conservación desarrolladas por diversos actores institucionales, comunitarios y privados en humedales, ciénagas y bosques ribereños. Los resultados evidencian una predominancia de esquemas de gobernanza tipo B (alianzas multisectoriales) y tipo D (participación comunitaria), expresados en medidas como la reforestación, la educación ambiental, la declaratoria de áreas protegidas y la conformación de organizaciones ambientales locales; si bien se registran avances significativos, persisten amenazas estructurales que demandan enfoques sostenidos, multiactor e interdisciplinarios. La evidencia empírica y conceptual sobre la gobernanza ambiental como herramienta clave para la conservación de la biodiversidad en ecosistemas tropicales estratégicos, con implicaciones relevantes para el diseño de políticas públicas en contextos socioecológicos complejos

Environmental governance strategy for the conservation of threatened fauna in Magdalena Medio Antioqueño, Colombia.

Abstract: The conservation of biodiversity is one of the main global challenges, especially for countries with high biological wealth such as Colombia. In this context, tropical regions with high ecological wealth, such as the Magdalena Medio Antioqueño, face increasing anthropic pressures that threaten their strategic ecosystems and the fauna that inhabits them; therefore, the environmental governance strategies implemented in that region for the conservation of the manatee (*Trichechus manatus*), the turtle of the Magdalena River (*Podocnemis lewyana*) and the needle alligator (*Crocodylus acutus*) were analyzed. Based on a qualitative approach based on semi-structured interviews, participant observation, documentary review and analysis of information through specialized software, the management and conservation actions developed by various institutional, community and private actors in wetlands, swamps and coastal forests were examined. The results show a predominance of governance schemes type B (multisectoral alliances) and type D (community participation), expressed in measures such as reforestation, environmental education, the declaration of protected areas and the formation of local environmental organizations; although significant progress is recorded, structural threats persist that demand sustained, multi-actor and interdisciplinary approaches. The empirical and conceptual evidence on environmental governance as a key tool for the conservation of biodiversity in strategic tropical ecosystems, with implications relevant for the design of public policies in complex socio-ecological contexts.

Garg, A., Kaur, N. and Sangwan, C. (2026). Role of aquatic vegetation in regulating oxygen and pH microgradients within crocodile breeding pools. *International Journal of Advanced Multidisciplinary Research and Studies* 6(2): 713-717.

Abstract: Aquatic vegetation plays a crucial yet under-studied role in shaping the physicochemical environment of crocodile breeding pools. While previous research has focused primarily on water quality management and biological health of crocodiles in captivity, there is limited understanding of how submerged and emergent plants influence micro-scale variations in oxygen and pH. This study reveals that vegetation-rich zones exhibit enhanced daytime oxygenation due to photosynthesis, moderated pH stability, and reduced nighttime oxygen depletion. The findings emphasize the ecological importance of aquatic vegetation in maintaining stable water chemistry and improving habitat quality in conservation breeding programs. Effective vegetation management can therefore strengthen captive crocodile rearing, reduce stress and mortality risks, and promote sustainable ecological engineering of crocodile breeding facilities.

Qadir Khan, A., Ali Shah, A., Gul, A., Shahzad, F., ul Haq, E., Niaz,

M., Anbarin, H. and Ahmad, N. (2026). Winter ambient temperature and daily activities of captive Mugger (*Crocodylus palustris*) in Peshawar Zoo, Pakistan. *NUST Journal of Natural Sciences* 11(2): 32-45.

Abstract: The present study explored the effect of ambient temperature on the daily activities (behavior) of captive mugger (*Crocodylus palustris*) during winter season (December 2023 to February 2024) in Peshawar Zoo, Pakistan. Research data was collected through field observation of daily temperature and corresponding mugger behavior in predefined intervals, including morning (0600 to 1100 h), noon (1100 to 1700 h), evening (1700 to 2400 h) and night (0000 to 0600 h). Different behavioral parameters of mugger include aggression, eating, socialization, basking, submerge, and surface position and movement. Results showed that mean temperatures during study period were $8.85 \pm 0.39^{\circ}\text{C}$, $19.92 \pm 0.40^{\circ}\text{C}$, $14.50 \pm 0.36^{\circ}\text{C}$ and $9.97 \pm 0.35^{\circ}\text{C}$ for the morning, noon, evening and night time respectively. Mugger allocates 60%, 20% and 18% of their time in a surface position, submerged and basking during morning (0600 to 1100 h). As temperature increased at noon (1100 to 1700 h) and evening (1700 to 2400 h), crocodiles spent most of time in basking (55% and 40% respectively) and in surface position (40% and 58% respectively). However, during night (0000 to 0600 h), crocodiles allocated 98% of their time to being in a surface position in water ponds to regulate its body temperature. Linear regression analysis indicated that the mugger submerged activity has showed the highest negative correlation with daily temperature ($R^2 = -0.23$), followed by socialization ($R^2 = -0.20$), basking ($R^2 = 0.10$) and surface ($R^2 = 0.10$). Stepwise regression model indicated that basking, socialization, surface position, submerged position and animal movement have significant relationship with daily temperature ($F = 27.68$, $df = 5$, $P\text{-value} \leq .050$) with overall R^2 and adjusted R^2 values of 0.364 and 0.351 respectively. The study concluded that basking, surface position and submerged behavior were the major activities of *Crocodylus palustris* in peak winter season and the effect of extreme temperatures may further be explored with respect to mugger thermoregulation at Peshawar Zoo.

Aparecida Divina Arruda de Paula, T., Maria Nogueira-Gomes, M., Roberto dos Anjos Candeiro, C., Luisa Nogueira Bandeira, K., Gomes de Souza, L., Louis Brusatte, S.L., Sousa Marques Peixoto, J., Barros Pacheco, P.H., Gomes da Costa Pereira, P.V.L and de Paula Sanchez, J. (2026). Crocodilian remains from Bauru Group (Upper Cretaceous) of Goiás State, Brazil: A correlation with the records of Minas Gerais and São Paulo and geological heritage importance. *Boletim Paranaense De Geociências* 84(2): 20-22.

Abstract: The Bauru Group is one of the best-known Cretaceous sedimentary deposits in Brazil. Among its units, the Adamantina and Marília formations stand out as the most productive in terms of vertebrate fossils, especially Crocodyliformes. In Goiás, these formations are present in the municipalities of Quirinópolis and Rio Verde, where the first fossil vertebrate records occur; however, these sites remain poorly explored. In this work, we redescribe two Crocodyliformes remains (Paleo-UFG/V 0023 and Paleo-UFG/V 0024) found in these municipalities. Despite being poorly known at a broader taxonomic level, the crocodilians of the Bauru Group in Goiás present similar faunal composition to the records from the states of Minas Gerais and São Paulo for the Campanian-Maastrichtian. These records provide new information for the region and contribute to paleontological studies and the advancement of knowledge about the diversity of Cretaceous vertebrate fauna.

Koulalis, J.S., Hardi, R., Tappe, D., Dhubhghaill, S.N. and Dugauquier, A. (2026). Annulated surprise during cataract surgery: A case report. *Case Reports in Ophthalmology* 17(1): 681-686.

Abstract: We report a pediatric case in which a retrolenticular Armillifer armillatus infestation mimicked a white cataract. A ten-year-old girl presented with a white cataract of her right eye

during a humanitarian mission in the Democratic Republic of Congo. Fundoscopy was inaccessible. During surgery, an annulated worm-like parasite was found in the retrolenticular space. Further anamnesis was remarkable for regular snake and crocodile meat consumption, and a clinical diagnosis of ocular pentastomiasis was made. The parasite was morphologically and molecularly identified as *A. armillatus*. After surgery, fundoscopy showed diffuse retinal atrophy and the vision did unfortunately not improve. Human pentastomiasis is a rare, yet emerging zoonosis in rural tropical areas. Consumption of undercooked, infected snake (or rarely other reptile) meat may lead to visceral pentastomiasis, with uncommon ophthalmological involvement. Ocular pentastomiasis can be a devastating cause of vision loss in endemic regions. This case illustrates that a retrolenticular location of the parasite was likely responsible for a white cataract in an otherwise quiet, white eye, highlighting intraocular pentastomiasis as a potentially underdiagnosed cause of vision loss in endemic regions.

Iijima, M. and Tomiya, S. (2026). Postcranial osteology of *Boverisuchus vorax* from the middle Eocene of Wyoming, USA: Implications for terrestrial adaptation in eusuchian crocodyliforms. [Journal of Anatomy](#).

Abstract: *Boverisuchus*, a mid-sized eusuchian crocodyliform from the middle Eocene of Europe and North America, has long been regarded as more terrestrial than extant crocodylians and is often portrayed as one of the apex predators in Laurasian terrestrial ecosystems during the middle Eocene. Although *Boverisuchus* has been studied extensively since the nineteenth century, its skeletal osteology warranted re-examination based on three-dimensionally preserved materials to better understand its anatomy, function, and ecology. Our revised description of the North American *Boverisuchus vorax* provides new insights into previously poorly known aspects of the postcranium, including the configuration of the manus and pes. Comparative analyses of skeletal proportions incorporating phylogenetically informed allometric corrections indicate that *B. vorax* possesses elongated fore- and hindlimbs, elongated proximal carpals, and shortened metacarpals and digits - features that enhance the stance phase support and propulsive capacities, increase stride lengths, and reduce the cost of leg swing. The short, hoof-like terminal phalanges are integral to the overall shortening of the manual and pedal phalanges, reducing distal limb mass and improving swing phase energetics at the expense of stability. Additionally, the diagonal accessory keels and ridges on the paravertebral osteoderms likely functioned to resist torsional stresses on the trunk while trotting. Taken together, these skeletal proportions and postcranial specializations suggest increased terrestriality and improved locomotor capabilities in *B. vorax*.

Chacón, C.F., Parachú-Marcó, M.V., Rodríguez, F.M., Amweg, A.N., Siroski, P. and Poletta, G. (2026). Realistic pesticide mixtures induce early-life lipid metabolism disruption and physiological stress in *Caiman latirostris*. Available at [SSRN](#) and [SSRN](#).

Abstract: Pesticide use in extensive agriculture generates complex exposures for wildlife, however, early-life effects in reptiles remain underexplored. In this study, we evaluated whether embryonic exposure at manufacturer-recommended concentration for field use: glyphosate (GLY at 1 and 2%), 2,4-D (at 0.06 and 0.12%), chlorantraniliprole (CAP at 0.015 and 0.03%), imidacloprid (IMI at 0.1 at 0.2%) and three mixtures at the lowest concentrations (M1: GLY+2,4-D; M2: CAP+IMI; M3: M1+M2) disrupt lipid metabolism, lipoperoxidation and corticosterone levels in *Caiman latirostris* hatchlings. Hatching success declined under 2,4-D 0.06%, CAP 0.03%, and IMI 0.2%. Residual yolk showed alterations in polyunsaturated fatty acids, together with yolk-cholesterol and α -tocopherol depletion, particularly under CAP 0.03% and in the complex mixtures M1, M2, and M3. Changes in plasma lipid profiles, hepatic aminotransferase activities as well as alteration of NADPH-producing gene expression in blood were observed in M2

and M3. Higher lipoperoxidation levels were observed at the highest concentration across single compounds and in M1 and M3; whereas corticosterone increased in 2,4-D 0.12%. These findings demonstrate that early life stages of caimans are highly sensitive to these xenobiotics, affecting lipid metabolism and associated physiological processes. Moreover, mixtures induced stronger and more complex responses than single compounds, leading to metabolic disruption during early development. Our findings highlight the importance of evaluating realistic agrochemical mixtures to better assess their ecological risk.

Palacios, P.D., Johnston, S., Kim, H., Blyde, D., Lever, J. and Gambini, A. (2026). Chilled and freeze-dried preservation of Saltwater crocodile (*Crocodylus porosus*) spermatozoa. [Reproduction, Fertility and Development](#).

Abstract: Artificial insemination in farmed crocodiles is limited by poor sperm survival after cryopreservation, requiring alternative preservation strategies. This study evaluated the effects of three extenders on saltwater crocodile (*Crocodylus porosus*) semen during chilled storage for up to 14 days and assessed post-freeze-drying sperm functional integrity. Semen was collected from six adult males. Samples were then diluted in a commercial milk-based extender, HBSS, or HBSS supplemented with 5% BSA and stored at 5°C, with sperm assessed at 24 h, 48 h, 72 h, 7 d, and 14 d. Freeze-drying (FD) was performed using standard protocols. Ejaculate characteristics (mean $\pm$ SEM) included volume 1.3 ± 0.3 mL, sperm concentration $3.32 \pm 0.2 \times 10^9$ sperm/mL, total motility $65.0 \pm 3.9\%$, viability $97.8 \pm 0.7\%$, and normal morphology $66.8 \pm 6.6\%$. After 72 h of storage, motility, viability, and normal morphology were maintained across all extenders, with the milk-based extender outperforming the HBSS-based extenders. Cytoplasmic droplets, loose heads, and absent midpieces were the predominant abnormalities observed. Following rehydration, freeze-dried spermatozoa showed viability of $23.0 \pm 1.0\%$, normal morphology of $15.0 \pm 3.4\%$, mitochondrial mass in $55.8 \pm 2.7\%$, and DNA fragmentation of $6.2 \pm 0.7\%$, with no evidence of motility recovered. Overall, our results suggest that domestic mammal milk-based extenders support chilled storage of crocodile semen for up to 3 days, supporting semen transport for artificial insemination programs. In addition, this study represents the first report of spermatozoa FD in a reptile species.

Malisa, D.A. (2026). Suspected clostridial myonecrosis following a crocodile bite: A deadly encounter in a resource-limited setting. [Research Connections](#).

Abstract: Gas-forming necrotising soft-tissue infections (NSTIs) are rapidly progressive surgical emergencies associated with substantial morbidity and mortality. Although clostridial myonecrosis is the classic cause, polymicrobial gas-forming infections following traumatic aquatic injuries are increasingly recognised. Crocodile bites are particularly high-risk injuries because they combine extensive tissue destruction, environmental contamination, and inoculation with polymicrobial oral flora. We describe a 42-year-old patient who presented in hypovolemic shock two hours following a crocodile bite to the right lower limb, resulting in an open femur fracture. Emergency debridement was performed shortly after admission. Within hours postoperatively, the patient developed rapidly progressive pain, tissue discolouration, bullae formation, extensive crepitus, and radiographic soft-tissue gas extending proximally to the abdominal wall. He succumbed to septic shock despite broad-spectrum antibiotics and intensive supportive care. This case highlights the fulminant nature of gas-forming NSTI, the necessity of early recognition, and the high infectious risk associated with crocodile-related injuries.

Badial, P.R., Laovechprasit, W., Laue, C., Stacy, B.A., Stanton, J.B., Subramaniam, K. and Ossiboff, R.J. (2025). Piscichuvirus-associated meningoencephalomyelitis in a free-ranging American

alligator (*Alligator mississippiensis*). *Veterinary Pathology* 62(4): 586-591.

Abstract: The American alligator (*Alligator mississippiensis*) is a keystone species of the southeastern United States. In December of 2022, a free-ranging American alligator was found stuporous and tetraparetic. On postmortem evaluation, lesions were limited to the central nervous system, consisting of prominent perivascular cuffs of lymphocytes and histiocytes that extended into the surrounding neuroparenchyma along with gliosis. Next-generation sequencing of the affected brain identified the presence of a piscichuvirus closely related to the freshwater turtle neurovirus 1 (FTuNV-1) recently reported in an alligator snapping turtle with similar microscopic lesions. *In situ* hybridization using zz-probes that recognize FTuNV-1 identified widespread hybridization signal in neurons and glial cells in the alligator's brain and spinal cord. This case represents only the second association of piscichuviruses with vertebrate disease. Moreover, it highlights the potential for disease transmission between different orders (Crocodylia and Testudines) of free-ranging aquatic reptiles that share similar habitats in the United States.

Fernandez Blanco, M.F. and Bona, P. (2026). Disassembling the crocodylian skull: Embryonic development and configuration of the *Caiman* skull and their macroevolutionary implications. *Zoological Journal of the Linnean Society* 207(3).

Abstract: The crocodyliform skull integrates dermal and replacement bones, and understanding their developmental origin is essential for establishing homologies and interpreting macroevolutionary patterns. Although extant species provide the best model for developmental studies, the embryonic pattern of cranial ossification in crocodylians remains poorly documented. Here, we describe the mode and timing of cranial ossification in *Caiman latirostris* and *Caiman yacare* using two embryonic ontogenetic series. Dermal elements are the first to ossify, as in other crocodylians, with the maxilla and pterygoid among the earliest bones, and several elements (including the frontal, parietal, supraoccipital, and parabasisphenoid) originate from multiple ossification centres. In contrast, the palatoquadrate ossifies exclusively as the quadrate and lacks basal and ascending processes. Additionally, we identify significant interspecific heterochronic shifts that correlate with diagnostic adult cranial features, indicating that key morphological differences are established early during embryogenesis and supporting the hypothesis that the two species have distinct evolutionary origins. Finally, comparisons with fossil taxa further suggest that some developmental patterns in caimans parallel major macroevolutionary transformations of the crocodyliform palate and skull roof, linking ontogenetic variation to evolutionary change.

Pick, E., Adams, J., Boruch, A.V., Cramberg, M., DeLeeuw, H., Dille, M., Livingston, S., Thompson, M. and Young, B.A. (2026). Dural pulsations in the American alligator influence the CSF dynamics between the cranial and spinal compartments. *Anatomia* 5: 18.

Abstract: At the foramen magnum of the American alligator (*Alligator mississippiensis*), the central nervous system is surrounded by three concentric and continuous layers: the cerebrospinal fluid (CSF), the dura, and venous blood in sinuses. The present study examined how this spatial arrangement influenced the dura. Pressure recordings from CSF and venous blood were taken simultaneously with laser vibrometric analysis of dural and spinal venous sinus displacement. In the cranial compartment, the cardiac-related pulsations in the CSF induce similar pulsations in the dura, while during ventilation, the dura withdraws from the skull even as the pressure increases in the cranial CSF. Below the foramen magnum, the pulsatile displacement of the spinal venous sinus matches the pattern of the CSF pressure and the dura, but is not aligned with the venous blood pressure. There is an intrinsic pattern of dural movement that greatly

influences the dynamics of the CSF and spinal venous blood. By measuring both the displacement of the dura and the underlying CSF pressure, the study confirmed early findings of low compliance within the CSF system of the alligator. The findings of the present study may offer insight into the best practices for duraplasty and the treatment of dural leaks.

Jankowski, K.J. (2026). Examination of histology and bone soft tissue specimens under polychromatic polarization microscopy: A new way of looking at things. *Microscopy Today* 34(4): 26-34.

Abstract: The polychromatic polarization microscope (PPM), described in 2015 by Michael Shribak, has been used to examine a variety of biological and physical specimens. More recently, it has been applied to stained histology sections and has revealed birefringent structures, such as collagen fibers, in vivid color without the areas of extinction commonly observed with simple crossed polars. Here, we show that examination of unstained specimens yields comparable or superior results and that polychromatic polarization can provide more detailed images than standard polarizing microscopy. We then examined the tissue microstructure of demineralized, unstained, fully hydrated bone soft tissue specimens and present a comparative survey of collagenous structures associated with bone canals from alligator, chicken, and cow. Finally, we demonstrate the presence of porthole-like openings in bone canal structures, which we refer to as micro-foramina, and propose that they may permit enhanced lateral perfusion between canals.

Healy, C. and Neale, T. (2026). Crocodiles, colonialism, and Australian television. Chapter 9 in *The Anthropocene and Visual Culture in Australia*, ed. by L. Williams and H. McDonald. Routledge.

Abstract: Malcolm Douglas funded his first film, *Across the Top* (1967), in part, by selling the hides of the saltwater crocodiles he hunted and killed. In the 1970s and 1980s he was a central figure in the rise of an Australian format that blended wildlife documentary with travel for primetime broadcast audiences. Later, his Cable Bay business farmed the same species for use as wallets, belts, and bags by French fashion houses such as Hermes. By the time of Douglas' death in 2010 the saltwater crocodile had performed a unique feat in the Anthropocene, moving from 'endangered' to 'least concern' on the IUCN 'red list' of species. Today, there is a flourishing economy of crocodile tourism (or 'non-consumptive wildlife-oriented recreation', the restructuring of a legal crocodile skin trade, and a boom in the production of Australian wildlife television in which the massive saltwater crocodile starred. From protected to 'problem' the saltwater crocodile has undergone an era of transformations, an era coincidental with Malcolm Douglas' television career.

Thanoi, P., Saenghong, K. and Lauprasert, K. (2026). Ontogenetic changes in the endocast and endosseous labyrinth of the Siamese Freshwater crocodile (*Crocodylus siamensis* Schneider, 1801) from Thailand. *Zoological Studies* 65: 42.

Abstract: Ontogenetic changes in the brain and sensory systems play an essential role in shaping behavioral performance and ecological specialization in vertebrates; however, these developmental pathways are inadequately recorded in endangered crocodylians. Here, we present the first quantitative analysis of endocast and endosseous labyrinth development across ontogeny in the Siamese freshwater crocodile (*Crocodylus siamensis*), a critically endangered species from Southeast Asia. Using high-resolution computed tomography (CT) and three-dimensional reconstruction, we examined six skulls representing juvenile, subadult, and adult growth stages. Our findings reveal a consistent pattern of allometric scaling, correlated with marked morphological changes in sensory-related neuroanatomical structures. Juveniles display strongly curved forebrains and proportionally prominent olfactory regions,

which is in line with their early reliance on chemosensory cues. As skull size increases, the encephalic endocast becomes longer and straighter, while regions corresponding to the midbrain and hindbrain show proportional morphological changes associated with visual processing and motor coordination, suggesting ontogenetic changes in regions associated with visual processing and motor coordination. Parallel ontogenetic transformations are also observed in the endosseous labyrinth, including increased lagena dimensions and more pronounced semicircular canal curvature in adults. These changes are consistent with ontogenetic variation in structures associated with auditory and vestibular functions. Strong correlations between dorsal cranial length and both endocast and labyrinthine parameters suggest that sensory-related neuroanatomical morphology in *C. siamensis* follows a consistent ontogenetic scaling pattern. These findings establish an important neuroanatomical baseline for understanding sensory ecology in this endangered crocodylian and provide a comparative framework for interpreting fossil crocodylian neuroanatomy, with implications for conservation biology, functional morphology, and paleoneurology.

Takasaki, R., Y. Kobayashi, Y., Fiorillo, A.R., Chinzorig, T. and Funston, G.F. (2026). Gastrolith shape as an indicator of digestive function and its implications for dinosaurian digestive strategies. *Paleobiology*.

Abstract: The evolution of the muscular stomach was a key innovation in the avian body plan, enabling high metabolic rates by functionally replacing oral processing. However, its deep-time origins within Archosauria have remained poorly understood, primarily due to the extreme rarity of fossilized stomachs. Here, we demonstrate that gastrolith shape is a robust proxy for digestive function and, by extension, stomach muscularity and diet. By assembling a comprehensive dataset from 104 individuals across 46 extant archosaur species, we establish a strong correlation between gastrolith shape, stomach muscularity, and diet. Application of this validated method to the fossil record reveals divergent digestive strategies among major dinosaur clades. Herbivorous ornithischians retained angular gastroliths, consistent with limited gastric abrasion and compensation through oral processing. Sauropods likewise retained angular gastroliths, consistent with limited gastric abrasion and digestion relying more on long retention times and fermentation. Conversely, the muscular stomach, indicated by rounded gastroliths, evolved early within Theropoda, appearing at least by the base of Maniraptoriformes. This innovation was likely a crucial prerequisite for repeated transitions to herbivory in maniraptoriform theropods with reduced dentition, shifting mechanical processing from the jaws to the stomach and reducing reliance on heavy jaw adductor musculature.

Weiss, B.M., Dollman, K.N., Botha, J. and Choiniere, J.N. (2026) A revised anatomical and osteohistological description of '*Erythrochampsia*' *longipes* (Broom, 1904) and its implications on early crocodyliform taxonomy and evolution, *Journal of Systematic Palaeontology* 24(2): 2690993.

Abstract: Early Crocodyliformes first appeared in the Late Triassic as generally small-bodied, terrestrial cursorial faunivores. They had a global distribution during the early Jurassic with species found on all continents, except Antarctica. The Elliot Formation (Stormberg Group) of South Africa preserves many fossils of early crocodyliforms, some collected historically when standards for anatomical description and taxonomy were less uniformly applied. The first crocodyliforms described from South Africa included the problematic taxon '*Erythrochampsia*' *longipes* (SAM-PK-11894; originally *Notochampsia* *longipes*). SAM-PK-11894 potentially provides important anatomical information on the postcranial anatomy of early crocodyliforms, but it is preserved in a slab and counterslab, and the delicate nature of the material precludes full preparation. The potentially informative nature of the fossil material, and its muddled 120-year taxonomic history, invite

reconsideration of its anatomy and relationships. Here we redescribe the skeletal anatomy of SAM-PK-11894 using microcomputed tomography, present comparative virtual osteohistology of SAM-PK-11894 and *Protosuchus haughtoni* (SAM-PK-K8026) using propagation phase-contrast X-ray synchrotron micro-computed tomography, and use our observations to evaluate its taxonomic status. The features preserved in the '*Erythrochampsia*' holotype are remarkably similar to those known for *Protosuchus*, although it is much smaller than published specimens in that genus, and we refer SAM-PK-11894 as cf. *Protosuchus*, upholding the nomen dubium status of '*Erythrochampsia*' *longipes*. The body mass of SAM-PK-11894 is inferred to have been about 458 g, whereas the *Protosuchus haughtoni* specimen (SAM-PK-K8026) had a body mass inferred at 859 g, and yet both specimens display relatively slow-growing lamellar bone, confirming the hypotheses of growth rate reduction early in crocodyliform evolution. Our description of the near-complete postcrania of SAM-PK-11894 provides a more comprehensive understanding of crocodyliform postcranial anatomy and growth history, contributing valuable data to the otherwise sparse postcranial record.

Akçakaya, H.R., Milner-Gulland, E.J., Hoffmann, M., Regan, H.M., Naujokaitis-Lewis, I., Punt, A.E., Gaston, K.J., Keith, D.A., Butchart, S.H.M., Stuart, S.N., Collar, N.J., Di Marco, M., Bohm, M., Berryman, A.J., Mallon, D.P., Hochkirch, A., Dulvy, N.K., Rivers, M., Brooks, T.M., Westrip, J.R.S., Rodríguez, J.P., Hilton-Taylor, C., Scott, J., Tarr, S., Ledger, S.H. and Linardich, C. (2026). Three decades of classifying threatened species: lessons learned from and about the IUCN Red List criteria for quantifying extinction risk. *Proceedings of the Royal Society B* 293: 20260316.

Abstract: The IUCN Red List of Threatened Species, the most widely used global system for assessing species' extinction risk, has become a foundational source of information for conservation management, policy and research. Since the adoption of quantitative extinction risk criteria more than three decades ago, the Red List has expanded substantially in scope and influence, informing decisions ranging from species conservation and protected area designation to international agreements, corporate risk assessments and global biodiversity indicators. Given its central role, maintaining scientific rigour, transparency and trust in the Red List system is essential. Feedback from users, emerging from evolving applications and scientific advances, has shaped the Red List throughout. At the same time, the Red List has been subject to recurring critiques, some of which stem from persistent misconceptions about its purpose, design and appropriate use. To address these, we review the history and development of the Red List system, clarify the strengths of its design, delineate the contexts for which the system was and was not intended, and elucidate the circumstances under which it may be modified. Finally, we outline pathways for researchers and users to contribute to ongoing improvements and discuss potential future directions for evolution of the Red List.

Beheregaray, C.M., Tirelli, L.R., Nunes, L.B., Baggio-Souza, V., Lima, J.S., Driemeier, D., Pavarini, S.P. and Soares, J.F. (2026). New record of *Amblyomma dissimile* in *Caiman yacare* in southernmost Brazil: Emerging risks of animal translocation. *Brazilian Journal of Veterinary Parasitology* 35(3): e019025.

Abstract: In Brazil, the species *Amblyomma dissimile* occurs mainly in the North and Midwestern regions and does not naturally occur in the Southern region. Here, we report the second introduction of this tick in Rio Grande do Sul, resulting from the translocation of its host, *Caiman yacare* (pantanal alligator), from the state of Mato Grosso to Gramado (RS), which highlights the risks associated with transporting wild animals between regions with different climates.

Abra, F.D., Goebel, L.G.A., Desbiez, A., Yogui, D.R., Ribeiro, Y.G.G., Ribeiro Costa, M., Laps, R.R., Ascensão, F., de Mello,

L.G.R., Cunha, J.F.L., Del Pino, E.G.R., Guazi, P.A.P.M., Ascensão, S.R.S., Nogueira, A.C., de Oliveira, J.C.L., Barros, D.S., Varanis Junior, E.N., Gregory, T., Alonso, A. and Prist, P.R. (2026). From roadkill monitoring to evidence-based wildlife mitigation in the Brazilian Pantanal. *Global Ecology and Conservation* 70: e04347

Abstract: Wildlife-vehicle collisions are a major threat to biodiversity conservation and human safety, particularly in tropical regions with high wildlife diversity and expanding transportation networks. Despite growing efforts to reduce road impacts on wildlife, there is still limited evidence evaluating the effectiveness of large-scale mitigation strategies in tropical wetlands. Here, we evaluated the spatial and seasonal patterns of wildlife road mortality and assessed the effectiveness of wildlife underpasses and associated fencing along 280 km of the BR-262 highway in the Pantanal-Cerrado ecotone, Brazil. Roadkill monitoring conducted over six years recorded 9157 individuals from 238 vertebrate species, including 17 threatened species. Reptiles and mammals were the most frequently recorded taxa, with *Caiman yacare*, *Dasyus novemcinctus*, and *Cerdocyon thous* presenting the highest mortality rates. Using a Before-After-Control-Impact (BACI) design, we found that long fenced sections reduced road mortality of *Caiman yacare* by 70.4%, whereas no significant reductions were detected for *Cerdocyon thous* and *Hydrochoerus hydrochaeris*. Spatial analyses identified 589 overlapping roadkill hotspots, providing the basis for prioritizing mitigation measures in the most critical sections for medium- and large-bodied mammals, which are predominantly threatened species and are also associated with the most severe collisions involving road users. Based on these results, a large-scale mitigation plan was developed incorporating 170 km of fencing, 44 existing bridges, 22 existing underpasses, 10 new wildlife underpasses, seven artificial canopy bridges, six speed traps, eight jump-outs, and 36 rumble strips. Our findings provide one of the most comprehensive evaluations of wildlife mitigation planning in a tropical wetland ecosystem and offer a scalable framework for wildlife-friendly transportation infrastructure in biodiversity-rich regions worldwide.

Liu, S., Zhang, X., Wu, Y., Ye, S., Li, H., Pan, J., Liu, Z., Zeng, Y., Ding, H., Zhang, B., Wang, M., Yu, J., Huang, S., Yang, N., Fan, L., Guo, G., Zeng, J., Zheng, J. and Li, X. (2026). Lytic phage vB_AdhP_L12 against *Aeromonas dhakensis* from crocodiles: Characterization and safety. *Water Biology and Security*.

Abstract: *Aeromonas dhakensis* (*A. dhakensis*), a highly virulent and multidrug-resistant zoonotic pathogen, poses a severe threat to the sustainable development of aquaculture (eg crocodile farming) and food safety. In this study, we aimed to develop an antibiotic-alternative prevention and control strategy. To this end, we isolated a phage vB_AdhP_L12 with strong lytic activity against *A. dhakensis* from general hospital domestic sewage. Morphological observation and phylogenetic analysis identified vB_AdhP_L12 as a novel phage belonging to the genus *Teseptimavirus* in the family Autographiviridae, which is characterized by an icosahedral head and a short, non-contractile tail. Environmental stability assays demonstrated that vB_AdhP_L12 maintained stable activity at temperatures ranging from -20°C to 37°C and pH values ranging from 4 to 11 and exhibited tolerance to low concentrations of chloroform, indicating its suitability for aquaculture environments. Host range determination revealed that it specifically lysed eight strains of *A. dhakensis* isolated from crocodiles, with no activity against other common aquatic bacterial strains. Whole-genome sequencing revealed that the phage has a linear double-stranded DNA genome of 38,749 bp, containing 42 open reading frames and lacks antibiotic resistance genes, virulence factors, and lysogeny-related genes, confirming its high level of biosafety. *In vitro* experiments confirmed that vB_AdhP_L12 exhibited optimal bacteriostatic effects at a multiplicity of infection of 0.01, efficiently lysing *A. dhakensis* and protecting Caco-2 and EPC cells from damage. In the zebrafish infection model, immersion treatment with vB_AdhP_L12 resulted in a survival rate of 63.33% in the experimental group, with a significant reduction in mortality. Moreover, pathological

damage to intestinal tissues was effectively repaired. Quantitative PCR results revealed that the overexpression of pro-inflammatory cytokines was markedly suppressed, while the levels of anti-inflammatory cytokines and specific antibodies were significantly upregulated. These findings indicate that phage immersion treatment can modulate the host immune response to a certain extent. Nevertheless, whether such immunomodulatory effects arise directly from phage-host interactions or represent a secondary consequence of bacterial clearance remains to be further explored. In conclusion, phage vB_AdhP_L12 has several advantages, including strong host specificity, excellent environmental adaptability, high biosafety, and significant *in vitro* and *in vivo* therapeutic efficacies. This study provides a novel technical prototype for the sustainable prevention and control of *A. dhakensis* infections in crocodile farming, serving as a promising antibiotic alternative with strong potential for translation to aquaculture practice. This study is of critical significance for alleviating the antibiotic resistance crisis and ensuring the safety of aquaculture.

Lacerda, G.M.C., Paiva, F., Tavares, L.E.R., de Araujo Filho, J.A., Ribeiro, S.C. and Pereira, F.B. (2026). Additional morphological data and first genetic characterization on females of *Micropleura vazi* Travassos, 1933, parasitic in *Caiman yacare* from Brazil, with comments on the phylogeny of Dracunculoidea (Nematoda). *Systematic Parasitology* 103(5): 31.

Abstract: Species of *Micropleura* Linstow, 1906 (Dracunculoidea: Nematoda) are common parasites of crocodilians worldwide. Studies related to this genus remain scarce, particularly regarding genetic characterizations, due to the difficulty in obtaining the parasite specimens. Although the morphology of *M. vazi* Travassos, 1933, a parasite of *Caiman* spp. in the Neotropics, has been previously evaluated, some morphological inconsistencies persist, and certain features are insufficiently described. Moreover, there is no genetic data for the species. In this regard, we provide the first genetic characterization of *M. vazi* along with detailed morphological analysis using light and scanning electron microscopy (SEM). We report for the first time in *M. vazi* the presence of phasmids and of oesophageal gland nuclei, in addition to provide a clearer view of the cephalic region and the accurate position of the vulva. Genetic characterization of the species was conducted using partial sequences of the 18S and 28S rDNA, and the phylogenetic reconstructions using these first indicated the monophyly of *Micropleura* and of most families within Dracunculoidea. Moreover, Micropleuridae appears to be the sister group to Dracunculidae, and Philonematidae should be considered valid as it is not close to Philometridae. Furthermore, Anguillicolidae should be allocated in another superfamily, Anguillicolidae, which is basal relative to Dracunculoidea and far from it. The absence of males in the current sampling may suggest a seasonal occurrence of these parasites, as has been reported for other dracunculoid nematodes.

Ronco, T., Zhou, Q., Scharling, F.S., Lund, E. and Bojesen, A.M. (2026). *Testudinibacter crocodili* sp. nov., a new member of the family Pasteurellaceae isolated from crocodilians. *International Journal of Systematic and Evolutionary Microbiology* 76(7).

Abstract: Five crocodilian species were investigated for the presence of Pasteurellaceae. A total of 27 pharyngeal isolates were obtained and characterized by MALDI-TOF MS and preliminary phenotypic tests to enable selection of representative strains for further genotypic characterization. Twelve isolates were selected for sequencing followed by phylogenetic analyses, digital DNA-DNA hybridization (dDDH) and calculation of average nucleotide identity (ANI), in addition to comparative analyses of partial rpoB, 16S rRNA gene sequences and further phenotypic characterization. The phenotypic and genotypic comparisons grouped the strains into three clades (clade 1: n= 4; clade 2: n= 3; clade 3: n= 5). The clade 3 strains had a 16S rRNA gene sequence similarity ranging from 94.8 to 96.5%, a dDDH value of ≤48.7% and an ANI value of

≤92.6% to the closest relative, *Testudinibacter aquarius* ELNT2xT, and could be distinguished from all current Pasteurellaceae species by a combination of phenotypic traits. Our results indicate that the clade 3 strains should be classified as representatives of a new *Testudinibacter* species for which we suggest *Testudinibacter crocodili* sp. nov. The type strain of *T. crocodili* is Cuba42T (=CCUG 77853T=DSM 118260T) and was isolated in Denmark in 2018 from the pharynx of a captive Cuban crocodile (*Crocodylus rhombifer*).

Mathe, J., Bobe, R., Ângela, M., Tonecas, A., Bouley, P. and Carvalho, S. (2026). Primate carcass ecology in the Urema Rift, Mozambique. [Primates](#).

Abstract: Primates constitute an integral part of many African ecosystems. In some areas, primate species can be locally very abundant, while in others they are rare or absent. Our central question is: does the abundance of primate bones (or carcasses) reflect the abundance of local living populations? Past bone surveys in Amboseli National Park, Kenya, and Virunga National Park, Democratic Republic of Congo, revealed a positive correlation between carcass abundance and living mammal communities, with a notable exception: a low abundance or absence of primate carcasses when compared to other medium-sized and large mammals. Recent research conducted at Gorongosa National Park, Mozambique, revealed a similar discrepancy between the abundance of primate carcasses and mammalian live census data. This study aims to understand this mismatch between live and dead by examining the influence of ecological factors on primate carcass occurrence and bone distribution in the modern rift ecosystem of Gorongosa National Park. To address these issues, we investigated whether (1) landscape type, proximity to roads, and water sources (pans, rivers, and lakes) predict primate carcass occurrence relative to other mammal taxa, and (2) the accumulation of primate bones significantly differs from that of other mammals in annually flooding and non-annually flooding landscapes (broadly speaking, in the floodplain vs. higher areas). We analysed 26 bones from 18 chacma baboon individuals (*Papio ursinus*) and 255 bones from 20 other mammal species. Generalised Linear Model (GLM) outputs suggest that permanent water sources such as rivers and lakes are key drivers of primate bone accumulation ($p < 0.05$). A Fisher's Exact Test indicates that primate bones are deposited more frequently in Rift Valley Riverine & Floodplain landscapes ($p < 0.05$). Given that baboons regularly cross rivers in Gorongosa, these findings also suggest that crocodile predation may play an important role in determining where baboon carcasses ultimately accumulate, potentially contributing to the observed mismatch between living and dead communities. These findings have important implications for our understanding of primate bone accumulations in the African fossil record, where some palaeontological sites contain abundant primate fossils whereas others preserve few or none.

White, D. and Fukuda, Y. (2026). Female's nursery wallows as a 'kindergarten' for *Crocodylus porosus* Schneider, 1801 hatchlings in Australia. *Herpetology Notes* 19: 557-559.

Wang, J., Weladji, R.B., Su, H., Guo, X., Meng, X. and Carrasco, L.R. (2026). Export patterns and network dynamics in the trade of CITES-listed reptiles. *Global Ecology and Conservation* 70: e04350.

Abstract: The global reptile trade is one of the most extensive and economically significant wildlife markets. As captive breeding of reptiles has expanded as an important supply source, understanding captive-bred versus wild-sourced trade dynamics and source-specific conservation risks becomes essential. Here we compared the taxonomic composition and network dynamics of wild-sourced and captive-bred reptile trades reported under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) from 1995 to 2024. Over time, reported trade involved 631 captive-bred and 583 wild-sourced reptile species, and

62.03% of total trade volume remained wild-sourced, with Sauria (42.07%) and Crocodylia (29.28%) dominating the trade. Leading exporters differed between source types, with wild-sourced trade becoming increasingly concentrated among dominant exporters and captive-bred trade expanding through broader but more diffuse connections. Countries/territories with higher reptile species richness tended to have higher export connectivity-intensity in both trade networks. Stronger governance capacity was associated with export participation and prominence, whereas lower GDP per capita characterized more prominent exporting roles. Source-specific monitoring strategies focusing on consistently dominant wild-sourced exporters of high reptile diversity and lower economic development can contribute to effective allocation of regulatory and conservation efforts.

Cedillo-Leal, C.N., Barrios-Quiroz, G., Padilla-Paz, S.E. and González-Jáuregui, M. (2026). SOS Cocodrilo Tampico: First-responder actions to human-crocodile interactions in northeastern Mexico. *Ecological Solutions and Evidence* 7: e70297.

Abstract: 1. Human-crocodile interactions are a global concern and Laguna del Carpintero in Tampico, Tamaulipas, Mexico, is no exception. This urban lagoon has undergone significant environmental changes due to extensive recreational infrastructure development. These changes have caused habitat loss and consequently increased interactions with *Crocodylus moreletii*, making this lagoon a priority area of national concern for this issue. The objective of this study was to analyse human-crocodile interactions (HCI) and evaluate the implementation of the Human-Crocodile Contingency Response Protocol (PACH-C; SEMARNAT, 2018) in the urban context of Tampico during 2021-2022. Based on the operational experience gained through documented HCI events and the identification of gaps in the existing protocol, a critical action path (CAP) was developed and proposed as an adapted emergency response model for urban environments. 2. General data were recorded for each interaction, including location, date, time, type of interaction, type of medical care provided and response time. Victim data included sex, age, occupation, number and type of injuries sustained. When possible, data on the crocodile responsible for the interaction were also recorded, including total length and sex. These data were collected through field documentation during the emergency response, victim interviews and direct observation of the animals involved. 3. We documented 100% (four) of the human-crocodile interactions recorded during the study period, which resulted in two fatal and two non-fatal injuries. Our findings indicate that homeless people are at greater risk of these interactions. The implementation of coordinated response protocols demonstrated improved outcomes when government institutions, academic researchers, health professionals and crocodile specialists worked collaboratively during emergency situations. 4. Practical implication. Based on these findings, we propose updating the Human-Crocodile Contingency Response Protocol by integrating a critical action pathway for emergency response that establishes clear courses of action and incorporates medical, legal and social service components not previously included in the national protocol. These actions emphasize the importance of rapid inter-agency coordination and could serve as a model for other urban areas facing similar challenges related to conflicts with wildlife.

Griffith, P., Basnet, P., Acharya, H., Chaudhary, A., Lamichhane, B.R., Poudyal, L.P., Rayamahji, B., Sillero-Zubiri, C., Turvey, S.T. and Lang, J.W. (2026). Individual differences in post-release behaviour and survival shape outcomes in a headstarting programme for the critically endangered gharial. [Research Square](#).

Abstract: Headstarting, or rear-and-release, is a widely used conservation intervention that assumes animals raised in captivity to a larger size have better survival than if left in the wild. It has been the main conservation intervention for the critically endangered Gharial (*Gavialis gangeticus*) since the 1970s, yet most populations

have not recovered. In Chitwan National Park, Nepal, recruitment of headstarted individuals into the adult population remains poorly understood, so we used VHF radio telemetry to monitor survival, dispersal, and residency of released Gharial ($n = 20$). Most individuals dispersed 20–60 km (mean = 47 km) downstream during an initial exploratory phase, after which some established residency. Individuals that established residency were significantly smaller, both overall and relative to age, than those that did not. Larger Gharial showed no improved survival, and post-release mortality was high, with 25–50% dying within two years, mostly due to gill-net bycatch. Our findings show telemetry is a useful tool for post-release monitoring, helping explain survival outcomes and evaluate release strategies. In Chitwan, reducing bycatch remains critical for population recovery. Releasing Gharial upstream of suitable habitat, before the monsoon, and at smaller sizes may improve outcomes. More broadly, our results suggest the core assumption of headstarting – that bigger is better, regardless of captive rearing – should be critically evaluated across species and systems.

ERRATA: Franco *et al.* (2026). First report of predation of a smooth-fronted caiman (*Paleosuchus trigonatus*) by a Neotropical otter (*Lontra longicaudis*). *Acta Amazonica* 54(3): e54bc23340.

On page 1: where it reads: “Exército Brasileiro, Recife, Pernambuco, Brazil.” Please read as: “Pesquisador Autônomo, Recife, Pernambuco, Brazil.”

Barbini, L., Romano, M. and Mannion, P.D. (2026). Analysis of the endocranial anatomy of the Miocene European crocodylian *Diplocynodon ratelii* with phylogenetic, ecological and ontogenetic implications. In *Paleo4Alps 2026. Joint Meeting of the Italian, German, Austrian and Swiss Paleontological Societies*, 19–23 July 2026, ed. by E. Kustatscher, G. Tavilla, M. Hörnig, V. Roden and C. Wellstein. Bozen/Bolzano: Italy.

Abstract: *Diplocynodon* is typically recovered as one of the earliest diverging taxa within Alligatoroidea. Although its extant relatives today can only be found in the Americas and China, *Diplocynodon* was seemingly endemic to Europe, being the last known alligatoroid taxon to have inhabited the continent. Spanning the late Paleocene to the Middle Miocene, the fossil record comprises several occurrences from all over the continent, with eleven currently recognized species. *Diplocynodon* specimens are typically recovered from freshwater environments; however, remains of one species have been found in a marine setting, potentially indicating a degree of salt tolerance. This would differ from extant alligatoroids and might have been an important factor facilitating the dispersal of early members of the clade. Additionally, some phylogenetic analyses have recently cast doubt on the monophyly of these species and have even suggested that *Diplocynodon* might instead lie outside of crown-group Crocodylia. One possible avenue to address these questions is to evaluate the endocranial anatomy of *Diplocynodon*, which can potentially reveal important ecological information, as well as provide a source of currently neglected anatomical features that can be incorporated into phylogenetic analysis. Here we present new results based on CT scans of two specimens of the type species *D. ratelii*, both from the Miocene of France. The high level of internal preservation has permitted a detailed reconstruction of their endocranial anatomy, comprising almost every main internal cavity of the crocodylian skull. Through detailed description and comparative analysis with closely related eusuchian groups, we provide new insights into the phylogenetic relationships, ecology, and ontogeny of this taxon.

Darlim, G., Godoy, P., Khakurel, B., Hermanson, G., Rankl, V. and Höhna, S. (2026). Assessment of Notosuchia phylogenetics through tip-dating Bayesian inference. In *Paleo4Alps 2026. Joint Meeting of the Italian, German, Austrian and Swiss Paleontological Societies*, 19–23 July 2026, ed. by E. Kustatscher, G. Tavilla, M. Hörnig, V. Roden and C. Wellstein. Bozen/Bolzano: Italy.

Abstract: Notosuchia is a diverse group of predominantly terrestrial crocodyliiforms that inhabited Gondwana during the Cretaceous Period spanning until the Middle Miocene, as evidenced by the fossil record of South America. The combination of fossil discoveries, reassessment of historical taxa and comprehensive dataset refinement marks progress in Notosuchia systematics. Phylogenetic analyses of Notosuchia predominantly rely on maximum parsimony, although few studies have included notosuchians in Bayesian analyses of broader crocodyliiforms. The monophyly of Notosuchia and major lineages (eg Baurusuchia, Sebecidae) is commonly well-supported, whereas constant expansion of data matrices is inevitably accompanied by contentious internal clade support depending greatly on the dataset used. Nevertheless, studies still elaborate on the nomenclature and evolution of internal clades, leading to potentially misleading discussions on evolutionary and biogeographical patterns. Here, we use two comprehensive Notosuchia-centered datasets accounting for differences in taxon coverage and character composition to provide a robust assessment of Notosuchia systematics under a tip-dating Bayesian inference using RevBayes. Our time-calibrated trees strongly support the abovementioned major notosuchian lineages, whereas many internal clades show extremely poor posterior probability support (eg Peirosauridae, Pepesuchinae). Specifically, ambiguity on the phylogenetic position of lineages crossing the Cretaceous–Paleogene (KPg) boundary (ie sebecids) complicates precise divergence age estimates. Hence, our results demonstrate inherent limitations of the fossil record and complexity of elaborating on the evolution of Cenozoic notosuchian lineages. Our results emphasize that assessing Notosuchia systematics through integrative methodological approaches is key to investigate Notosuchia evolutionary history and paleobiology, transcending terminology delimitations.

Messina, M.Y., Buosi, C., Costamagna, L.G., Lai, G., Pillola, G.L. and Zoboli, D. (2026). New preliminary data on crocodylomorphs and anurans from the early Eocene Lignitifero Formation (SW Sardinia, Italy). In *Paleo4Alps 2026. Joint Meeting of the Italian, German, Austrian and Swiss Paleontological Societies*, 19–23 July 2026, ed. by E. Kustatscher, G. Tavilla, M. Hörnig, V. Roden and C. Wellstein. Bozen/Bolzano: Italy.

Abstract: The Eocene vertebrate record of Sardinia reveals a diverse continental fauna, including mammals, reptiles, and freshwater fishes. However, microvertebrate assemblages from this interval remain poorly documented. Here we report new preliminary data on Eocene microvertebrate remains from the Lignitifero Formation (Ypresian–early Lutetian) exposed at Tanca Aru (Vallermosa, SW Sardinia, Italy). The fossil-bearing succession consists of continental deposits interpreted as alluvial plain sediments. The material was recovered from a thin (~8 cm) bioclastic lacustrine limestone layer and processed using a 10% acetic acid solution. The assemblage includes two teeth assigned to Crocodylomorpha indet. and three maxillary fragments referred to Anura indet. The crocodylomorph teeth are characterized by apicobasal ridges, well-developed carinae, and a marked basal constriction; one specimen shows a spatulate morphology, whereas the other, although incomplete, appears to be caniniform (Frey & Monninger, 2010). The anuran remains consist of maxillary fragments bearing a linear series of well-defined tooth alveoli, interpreted as housing pedicellate teeth, and nutrient foramina along the labial surface. The bone is thin and slightly curved, consistent with an anuran maxilla. These remains represent the first documented occurrence of crocodylomorph and anuran material from the Lignitifero Formation. This assemblage expands current knowledge of Sardinia’s Eocene vertebrate diversity and provides new insights into the paleoecology and paleobiogeographic relationships of southwestern Europe during the Paleogene.

Rocchi, R., Segurado, P., Sellés, A. and Vila, B. (2026). Detailed neuroanatomy at the base of the crocodylian radiation provides new perspectives into the paleoecology of European eusuchians of the latest Cretaceous. In *Paleo4Alps 2026. Joint Meeting of the Italian,*

German, Austrian and Swiss Paleontological Societies, 19-23 July 2026, ed. by E. Kustatscher, G. Tavilla, M. Hörnig, V. Roden and C. Wellstein. Bozen/Bolzano: Italy.

Abstract: Allodaposuchidae (Crocodyliformes, Eusuchia) were among the most abundant crocodylomorphs in the Upper Cretaceous of Europe. This clade, recently established to encompass numerous Cretaceous eusuchian species described over the past decade, exhibits remarkable diversity that has generated ongoing systematic controversy. Here, we re-evaluate a historical allodaposuchid specimen from the lower Maastrichtian locality of Els Nerets, within the Tremp Group (Catalonia, Spain), in light of newly acquired micro-CT data. The specimen consists of a posterior skull table that, despite its small size, displays features indicative of an adult individual. It also exhibits a combination of distinctive characters that prevents referral to any eusuchian taxon currently reported from the lower Maastrichtian transitional deposits of the Tremp Group. CT segmentation enabled the reconstruction of internal cavities, including most brain and cranial nerve endocasts, as well as an almost complete pneumatic system and the entire inner ear. The exceptional preservation of these structures provides the most detailed account of the pneumatic system and inner ear in any allodaposuchid to date. Several internal features show marked similarities to some extinct terrestrial crocodylomorphs, including a dorsally elevated anterior semicircular canal and a well-developed 'dural peak' of the brain endocast. However, other traits are more consistent with extant semiaquatic crocodylians. Notably, the inner ear configuration differs from that of other known crocodyliforms, including *Allodaposuchus hulki*, another early Maastrichtian allodaposuchid from the Tremp Group, whose inner ear has been reconstructed in greater detail for this study. These findings provide new insights into neuroanatomical evolution at the base of the crocodylian radiation and raise questions about paleoecology and potential niche partitioning among eusuchians shortly before the K-Pg mass extinction event.

Brittain, K., Muhlbach, T., Cao, R., Mijangos, J.L., Yibarbuk, D., O'Brien, E., Somaweera, R., FitzSimmons, N.N. and Gongora, J. (2026). Unique population or unique species? Genetic insights into the pygmy freshwater crocodiles of northern Australia. *Ecology & Evolution Journal* 16(8): e74055.

Abstract: Isolated populations of Australian freshwater crocodiles (*Crocodylus johnstoni*) in few elevated, rocky escarpment areas of the Northern Territory of Australia reach sexual maturity earlier and generally have an adult size half that of their downstream counterparts. There is debate over whether these "pygmy" or "dwarf" crocodile populations are the result of extreme phenotypic plasticity or the origins of a unique species through peripatric speciation. This debate is of conservation concern as these populations face immediate threats from invasive species and climate change, and species classification can affect conservation management strategies. We used mitochondrial DNA control region and cytochrome b sequences to investigate whether mtDNA haplotype variation supports any evidence of speciation between the pygmy and standard-size freshwater crocodiles. Additionally, we used genotyping by sequencing (dd-RADseq) to examine genetic clustering. Separated and concatenated control region and cytochrome b haplotypes were shared between pygmy and standard-size crocodile populations. Principle Component Analysis and STRUCTURE analyses on dd-RADseq data showed pygmy and standard-size crocodiles cluster by geographic location as much as by phenotype. We found no clear and objective genetic evidence to suggest that the pygmy freshwater crocodiles should be considered a separate species from any other population of the standard-size crocodiles. However, the isolation and environmental adaptability of these unique pygmy freshwater crocodile populations make them ecologically unique and valuable for conservation, and worth safeguarding against potential threats.

Bashyal, A., Shrestha, N., Thapa, R., Dhungana, B., Ram, A.K., Pathak, S. and Shrestha, S. (2026). Gharial (*Gavialis gangeticus*, Gmelin 1789) beyond protected areas of Nepal: Population, reproduction, and seasonal migration of Gharial in the Karnali River and its tributaries. *Ecology & Evolution Journal* 16(8): e74133.

Abstract: Habitats beyond protected areas are essential for crocodilian conservation, as many species utilize these extended habitats for basking, nesting, foraging, and seasonal movements. Gharial (*Gavialis gangeticus*) is a Critically Endangered apex predator in freshwater ecosystems whose populations in Nepal are restricted primarily within or adjacent to protected areas, with few records from the south-western lowlands. In this study, we gained insights into the status of the Gharial population residing in the Karnali River and its tributaries - the Mohana, Patthariya, and Kaande - by providing the first systematic accounts of their counts, nesting and reproduction, and possible seasonal migration. We conducted surveys before, during, and after the monsoons in 2024 and 2025 in 76 km of these river reaches. We recorded the highest counts for Gharials for all rivers pooled during monsoon surveys in 2024 (n= 8) and 2025 (n= 12), and the lowest during post-monsoon surveys in 2024 (n= 4) and 2025 (n= 3). Gharial number ranged between one and seven in the Karnali and between zero and five each in the Mohana and the Patthariya across surveys in both years. The gharial population is dominated by adult females with no adult males recorded. We documented a total of 16 Gharial nests containing 427 live hatchlings from 509 eggs with a hatching success of over 80%, including both years. Our results showed that there is a small resident Gharial population residing in the Karnali River system, and they are reproducing successfully. There is likely seasonal movement of Gharials among the Karnali and its tributaries, and possible transboundary movement along the Karnali between Nepal and India. We underscore the need for protecting these riverine habitats of Gharials beyond protected areas and for coordinated transboundary research and conservation efforts to ensure long-term Gharial conservation.

Saldarriaga-Gómez, A.M., Luzuriaga-Neira, A., Vargas-Ramírez, M., Amato, G. and Hekkala, E. (2026). Genome evolution and long-term demographic history in true crocodiles. *G3: Genes, Genomes, Genetics*.

Abstract: Reference-quality genomes remain scarce for true crocodiles (*Crocodylus*), limiting comparative analyses of genome evolution and demographic history. Here, we generated and analyzed 2 long-read genomes, 1 for *Crocodylus intermedius* and 1 for *C. niloticus*, to investigate genome architecture, coalescent effective population size (N_e), and patterns of molecular evolution across crocodilians. Comparative analyses revealed broadly similar repeat landscapes in both species and extensive macro-synteny with *Alligator sinensis*, indicating strong structural conservation across crocodilian genomes. Using phased diploid assemblies and MSMC2, we reconstructed historical N_e trajectories and found marked differences between species. *Crocodylus intermedius* exhibited persistently low N_e throughout most of the late Quaternary, with a pronounced decline during the Late Pleistocene-early Holocene transition. In contrast, *C. niloticus* showed substantially larger N_e over comparable time intervals. Genome-wide codon-based analyses identified significant heterogeneity in dN/dS (ω) among crocodilian lineages. *Crocodylus niloticus* showed the lowest genome-wide ω , whereas elevated values in *C. intermedius* and other lineages were consistent with reduced long-term efficacy of purifying selection under smaller historical population sizes. Branch-site tests identified candidate genes under positive selection in both focal species, with functional categories related to ion transport, endocrine regulation, and cellular signaling. Together, these results provide genomic resources for *Crocodylus* and support an association between long-term demographic history and genome-wide patterns of molecular evolution across crocodilians.

Iijima, M. and Tomiya, S. (2026). Postcranial osteology of *Boverisuchus vorax* from the middle Eocene of Wyoming, USA: Implications for terrestrial adaptation in eusuchian crocodyliforms. [Journal of Anatomy](#).

Abstract: *Boverisuchus*, a mid-sized eusuchian crocodyliform from the middle Eocene of Europe and North America, has long been regarded as more terrestrial than extant crocodylians and is often portrayed as one of the apex predators in Laurasian terrestrial ecosystems during the middle Eocene. Although *Boverisuchus* has been studied extensively since the nineteenth century, its skeletal osteology warranted re-examination based on three-dimensionally preserved materials to better understand its anatomy, function, and ecology. Our revised description of the North American *Boverisuchus vorax* provides new insights into previously poorly

known aspects of the postcranium, including the configuration of the manus and pes. Comparative analyses of skeletal proportions incorporating phylogenetically informed allometric corrections indicate that *B. vorax* possesses elongated fore- and hindlimbs, elongated proximal carpals, and shortened metacarpals and digits—features that enhance the stance phase support and propulsive capacities, increase stride lengths, and reduce the cost of leg swing. The short, hoof-like terminal phalanges are integral to the overall shortening of the manual and pedal phalanges, reducing distal limb mass and improving swing phase energetics at the expense of stability. Additionally, the diagonal accessory keels and ridges on the paravertebral osteoderms likely functioned to resist torsional stresses on the trunk while trotting. Taken together, these skeletal proportions and postcranial specializations suggest increased terrestriality and improved locomotor capabilities in *B. vorax*.

Steering Committee of the Crocodile Specialist Group

Chairs: Alejandro Larriera and Charlie Manolis, P.O. Box 530, Karama, NT 0813, Australia

For further information on the CSG and its programs on crocodilian conservation, biology, management, farming, ranching, or trade, contact the Executive Office (csg@wmi.com.au) or Regional Chairs

Deputy Chair: Christine Lippai (lippainomad@gmail.com)

Executive Officer: Dr. Sally Isberg (csg@wmi.com.au)

Regional Chairs, East and Southern Africa: Dr. Xander Combrink (xandercombrink@gmail.com). **Regional Vice Chairs:** Christine Lippai (lippainomad@gmail.com); Dr. Alison Leslie (aleslie@sun.ac.za); Howard Kelly (crocfarm@venturenet.co.za); Paul Reilly (paul@pmsustainability.com); Dr. Margaret Mosse (mossenabwari@gmail.com).

Regional Chair, West and Central Africa: Dr. Matthew Shirley (projectmecistops@gmail.com). **Regional Vice Chairs:** Emmanuel Amoah (emmanuelamoah610@gmail.com); Dr. Nathalie Kpera (nathaliekpera@gmail.com); N'dede Michel Ahizi (ahizi5883@yahoo.fr); Christine Lippai (lippainomad@gmail.com)

Regional Chair, East and Southeast Asia: Dr. Steve Platt (sgplatt@gmail.com). **Regional Vice Chairs:** Prof. Wu Xiaobing (wuxb@ahnu.edu.cn); Sen Rith (rith.sen07@gmail.com); Kornvika Youngprapakorn (panyafarm@gmail.com); Yosapong Temsiripong (yosapong@srirachamoda.com); Rainier Manalo (rimanaloeology@gmail.com); Dr. Sai Kerisha Kntayya (saikerisha87@gmail.com); Dr. M. Izwan Z. Abdul Gani (izwanz@sarawakforestry.com); Lonnie McCaskill (lmccaskill4wildlife@gmail.com)

Regional Chair, Latin America and the Caribbean: Dr. Pablo Siroski (cocokaima@hotmail.com). **Regional Vice Chairs:** Alfonso Llobet (alfyacare@yahoo.com); Dr. Hesiquio Benítez Diaz (hbenitez@conabio.gob.mx); Dr. Marisa Tellez (marisatellez13@gmail.com); Dr. Luis Bassetti (luisbassetti@terra.com.br); John Calderon (jhoncalderon@gmail.com); Dr. Laura Porras Murillo (lauporras@gmail.com); Dr. Carlos Piña (pina.carlos@uader.edu.ar); Gustavo Sosa Rodriguez (gsr78rh@gmail.com); Dr. Melina Simoncini (melinasimoncini22@yahoo.com.ar); Valerie García (valeriegarci@gmail.com) **Regional Trade:** Alvaro Velasco (velascocaiman@gmail.com)

Regional Chair, South Asia and Iran: Anslem de Silva (kalds@sltnet.lk). **Regional Vice Chairs:** Madhava Botejue (madhavabotejue@gmail.com); Babu Ram Lamichhane (baburaml@gmail.com); Maheshwar Dhakal (maheshwar.dhakal@gmail.com); Raju Vyas (razoovyas@gmail.com); Abdul Aleem Choudhury (aleemc1@gmail.com); Asghar Mobaraki (amobaraki@yahoo.com); Dr. S.M.A. Rashid (carinam.bangladesh@gmail.com)

Regional Chair, Europe: Fabian Schmidt (fabian.schmidt@zoobasel.ch). **Regional Vice Chair:** Rosanna Mangione (rosanna.mangione@gmail.com)

Regional Chair, Australia and Oceania: Dr. Matthew Brien (croc matt@hotmail.com); **Regional Vice Chairs:** Eric Langelet (eric@mainland.com.pg); Dr. Yusuke Fukuda (wildcroc4@gmail.com); Josef Hurutaru (jhurutaru@gmail.com).

Regional Chairs, North America: Dr. Thomas Rainwater (trainwater@gmail.com); Jeb Linscombe (jlinscombe@wlf.la.gov). **Regional Vice Chairs:** Dr. Frank Mazzotti (fjma@ufl.edu); Dr. Venetia Briggs-Gonzalez (vsbriggs@ufl.edu); George Melancon (gmelancon@wlf.la.gov).

Chair, Industry and Trade: Christy Plott (christyplott@amtan.com). **Vice Chairs:** Enrico Chiesa (enricochiesa@italhide.it); Riccardo Colato (riccardo.colato@yahoo.it); Simone Comparini (renzocomparini@libero.it); Sarah Maria Gutierrez (sarahmaria@iacare.com); Domingo Panterani (dodaz@whiteline.it); Stefan Van As (stefan@lecroc.co.za); Angela Freeman (angela@wildlifetnq.com) **Trade Monitoring:** John Caldwell (john.caldwellxx@mail.com)

Chairs, Veterinary Science: Dr. Paolo Martelli (paolo.martelli@oceanpark.com.hk); Dr. Luis Bassetti (luisbassetti@terra.com.br). **Vice Chair:** Gowri Mallapur (gowrimallapur@gmail.com)

Chairs, Zoos: Dr. Kent Vliet (kvliet@ufl.edu); Colette Adams (colettehadams@aol.com)

Chair, Taxonomy: Dr. Kent Vliet (kvliet@ufl.edu) **Vice Chair:** Dr. Chris Brochu (chris-brochu@uiowa.edu)

Chair, Legal Affairs: Curt Harbsmeier (charbsmeier@hdalaw.com)

CSG IUCN Red List Authority: Dr. Sally Isberg (csg@wmi.com.au); Deputy RLA: Dr. Sergio Balaguera-Reina (sergio.balaguera@ufl.edu)

IUCN SSC Young Professionals Task Force Focal Points: Dr. Phoebe Griffith (griffithphoebe@gmail.com); Dr. Brinky Desai (desaibrinky1@gmail.com)

Honorary Steering Committee Members: Ted Joanen (USA), Romulus Whitaker (India), Phil Wilkinson (USA), Dr. Dietrich Jelden (Germany), Dr. Valentine Lance (USA), C.H. Koh (Singapore), Yoichi Takehara (Japan), Allan Woodward (USA), Oswald Braken Tisen (Malaysia), Dr. Ruth Elsey (USA), Kevin Van Jaarsveldt (Zimbabwe), Pam Ashley (USA), Dr. Cathy Shilton (Australia), Bruce Shwedick (USA)

Working Group Chairs: Ecotoxicology Working Group, Dr. Jérémy Lemaire (jeremy.ca.lemaire@gmail.com). Communications Working Group, Dr. Venetia Briggs-Gonzalez (vsbriggs@ufl.edu).