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CROCODILE

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IUCN - The World Conservation Union
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COVER PHOTO. *Crocodylus niloticus* at the National Zoo of Abidjan, in Cote d'Ivoire (January 1990). Photograph: Bruce Schwedick.

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Erratum

The caption for the photograph of *C. niloticus* on page 20 of Newsletter 25(1) was incorrectly credited to “Ralph Schwedick” - it should have read “Bruce Schwedick”.

Editorial

The 18th Working Meeting of the Crocodile Specialist Group will start on 19 June 2006, in Montélimar, France. It will be the first working meeting ever held in Europe, despite the significant role Europe has always played in the processing and marketing of crocodilian products. We are expecting a good roll up of members and participants, and I am confident of another successful CSG meeting. Among other things, I suspect the meeting will create increased opportunities for "cross-cultural" exchanges between industry and non-industry members. This has been important to the CSG's ability to advance conservation in the past and I'm sure it will be in the future. None of this would have been possible without the tremendous effort by Samuel Martin (La Ferme aux Crocodiles at Pierrelatte) and the meeting organisers in Montélimar, who are to be congratulated for their efforts to prepare for the meeting. The CSG Steering Committee meeting on 19 June, will cover a wide range of issues and of course … everyone is welcome.

The Commercial Live Exports Task Force, convened in March 2005, has submitted a draft report summarising its discussions and recommendations. Perran Ross and his Task Force have done a great job in re-visiting what has always been a complex area for the CSG. Their report will be submitted to the CSG Steering Committee for discussion and adoption in Montélimar, with perhaps new directions for further work.

A draft proposal has been received for the transfer of the Brazilian population of Black caiman *Melanosuchus niger* from Appendix I to Appendix II of CITES. The proposal is currently being reviewed by a group of CSG members, prior to discussion by the Steering Committee in France. The Steering Committee will formally provide CSG advice to the Brazilian authorities.

The review of CSG membership has been completed and forwarded to the IUCN-SSC for consideration. The recommended membership numbers approximately 300 persons. There were about another 100 people who did not respond to the offer of membership or who could not be contacted. The SSC will now contact the CSG members individually, seeking their acceptance of membership of the SSC.

Many of you may have heard that I sufferred a heart problem recently, whilst at a sea turtle symposium on the island of Crete in Greece. Luckily, Charlie Manolis (who speaks fluent Greek) and my daughter Catherine (a qualified nurse with “Médecins Sans Frontières”), were both with me at the time. The facilities in Crete were excellent, and they were able to effect the necessary repairs without any permanent damage. Needless to say, my lifestyle has changed dramatically since returning to Darwin! I would like to thank everyone who passed on their best wishes during this time.

A reminder that publication of Karlheinz Fuchs’ book “Die Krokodilhaut” is on schedule, and 100 discounted copies have been made available to the CSG. Contact Tom Dacey (csg@wmi.com.au) for details and/or an order form. But be quick, as they are going fast!

Professor Grahame Webb, CSG Chairman.

Review of Crocodile Conservation and Management in the Republic of Palau

Between 7 and 11 March 2006, a CSG review team comprised of Charlie Manolis (CSG Regional Chairman, Australia and Oceania) and Tom Dacey (CSG Executive Officer), undertook a visit to the Republic of Palau. The overall aim was to review the conservation status, management and sustainable utilisation of Saltwater Crocodiles (*Crocodylus porosus*) in Palau, and make recommendations that can help it to achieve its goals with crocodiles. Financial support for logistic costs associated with the review was provided by Reptilartenschutz e. V. (Offenbach, Germany).

The CSG's involvement with Palau extends back to 1991, when spotlight surveys were undertaken by Professors Harry Messel and F. Wayne King. Extensive surveys were undertaken in 2003 by CSG members Peter Brazaitis and Joshua Eberdong (now National Co-ordinator for Crocodiles, Marine Turtles and Dugong, within the Bureau of Marine Resources, Ministry of Resources and Development), and in 2005 by Palauan authorities. Joshua Eberdong has been involved with crocodiles for over 25 years, and is well-known throughout Palau as the "crocodile man".

When Palau joined CITES in July 2004, it lodged a reservation on *C. porosus* and other CITES-listed species. After the 13th Conference of the Parties to CITES (October 2004) and after discussion at the 53rd meeting of the CITES Standing Committee, the CITES Secretariat sent a notification to all Parties who had entered reservations, asking them to review their reservations and whether there were still valid reasons for retaining them. The CSG has always discouraged Parties to enter and maintain reservations on crocodilian species.

Palau's decision to enter a reservation on *C. porosus* when it joined CITES were linked to its lack of CITES-enabling legislation at that time. During the review, no crocodile products of Palauan origin were sighted within tourist stores in the main population centre of Koror. Indeed, only one store held crocodilian products previously - they had been imported from Thailand! Thus, the likelihood that crocodilian products derived from Palauan *C. porosus* could be "exported" by tourists is negligible, if not non-existent at this time.

Of importance, Palau currently has no legislation protecting crocodiles, and so there are no regulations regarding the killing or commercial trade in crocodiles and/or products, including exports. National legislation is required not only to fulfill Palau's obligations to CITES, but also to provide a tier of protection and regulation for crocodiles at a National level.

Palauans generally fear crocodiles, and they are often killed for this reason alone! The meat is sometimes eaten. Given the public attitudes to crocodiles in Palau, economic benefits derived from the sustainable use of crocodiles, including legal international trade, will be important to create incentives for the long-term conservation of crocodiles and their habitats. Tourism is the most important "industry" for Palau, and increased human-crocodile conflicts as a result of increasing crocodile populations would exacerbate current negative public attitudes to crocodiles.

Joshua Eberdong and his staff, including Sarah Klain (US Peace Corps) (Fig. 1), are now drafting a management program for *C. porosus*, which is based on sustainable use, and which includes public education as an important element. The CSG has already contributed to the development of thes management program, and will no doubt continue to do so.

Figure 1. From left, Tom Dacey, Joshua Eberdong, Roman Mongami, Sarah Klain and Erbai Yuykiwo, during a visit to *C. porosus* habitat on Babeldaob Island.

[A full copy of the review report will soon be available at: www.flmnh.ufl.edu/natsci/herpetology/CROCS.]

Regional Reports

Latin America & the Caribbean

Mexico

OBSERVATIONS ON YOUNG CAPTIVE AMERICAN CROCODILES (*CROCODYLUS ACUTUS*) AT LA VENTANILLA, OAXACA, MEXICO. The American Crocodile, *Crocodylus acutus*, breeds at La Ventanilla, in

the state of Oaxaca, on the south Pacific coast of Mexico. It is a lagoon that presents mayfly connection with the sea, showing mainly fresh water conditions (Becerril-Morales 2001). For sustainable wildlife use, the community is registered as a Unit of Management and Sustainable Use of Wildlife (Unidad de Manejo y Aprovechamiento Sustentable de la Vida Silvestre, UMA), that carries out boat trips for ecotourism (Avila-Foucat 2002).

People in the community provide food for the American crocodiles, especially chicken and fish. Occasionally, larger crocodiles hit the roots and branches of mangroves, causing nesting chicks of several birds species to fall (*Egretta alba*, *E. thula*, *Bubulcus ibis*, *Butorides striatus*, *Cochlearius cochlearius*, *Quiscalus mexicanus* and *Phalacrocorax brasilianus*). Young crocodiles are predated by bare-throated tiger Heron (*Tigrisoma mexicanum*). Crocodile management involves some nests being collected every year and hatchlings kept in captivity for one year. A special tank is used for this purpose. The goal of these activities is to increase survivorship.

Between May 2003 and June 2004, four wild nests were selected, and their development in captivity followed. Hatching success varied slightly between nests: 0.71 (24 May), 0.61 (27 May), 0.86 (29 May) and 0.75 (4 June). Based on monthly measurements we observed a significant relationship between length and weight ($p<0.0001$, $r^2= 0.946$; Fig. 1). This agrees with observations in newborn captive *C. acutus* in Peru ($p<0.001$, $r^2= 0.763$; Pérez and Escobedo 2005).

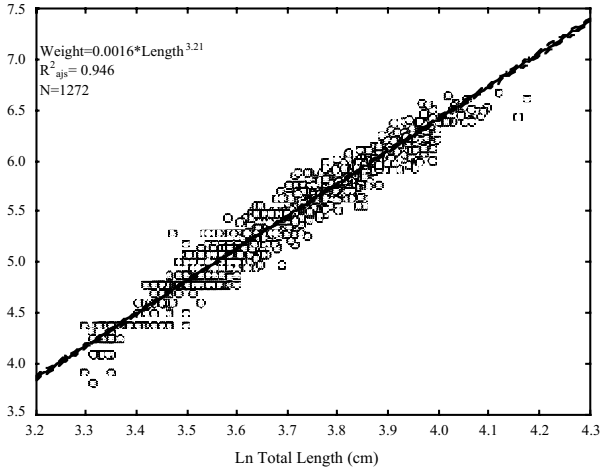

Figure 1. Relationship between total length and weight of *C. acutus* measured monthly throughout their first year in captivity.

Mean total length for the different clutches varied, with individuals from the 4 June nest being the highest (Fig. 2). Mean individual growth was 0.614 mm/d (or 1.84 cm/mth). This is low in comparison with other studies (de la Ossa-Velázquez and Sampedro-Marín 2002), perhaps due to the conditions that prevail during captivity.

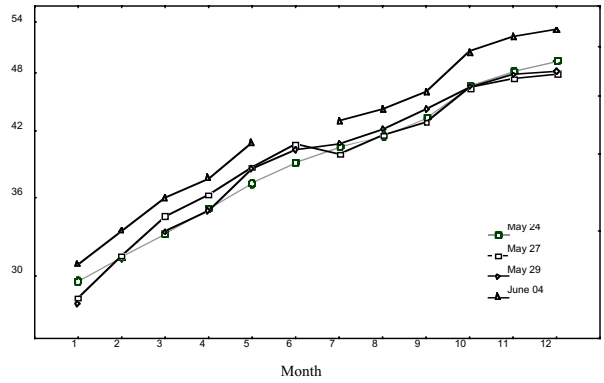

Figure 2. Mean monthly total length of *C. acutus* from four nests collected in La Ventanilla, for their first year in captivity.

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MAYAN KNOWLEDGE OF CROCODILES IN MEXICO: A CASE STUDY IN THE EJIDO OF XHAZIL. Crocodile hunting was extensively practiced in Mexico during the 20th century, until its federal prohibition in 1970, when this activity started decreasing (Casas-Andreu and Guzmán 1970). Mayans from the ejido of Xhazil, Quintana Roo, hunted "lagartos" (local name given to *Crocodylus moreletii*) to sell their skins during the 1960s and 1970s. Although crocodile populations were driven nearly to extinction during those decades, they have greatly recovered since then (Dominguez-Laso 2005). Increased crocodile populations and Xhazil hunter's expertise motivated the present study about the ecological knowledge

of crocodiles that these people have, as a step towards sustainable management of *C. moreletii* in the ejido.

Over a period of four months in Xhazil (February-May 2004), 50 semi-directive interviews were conducted with 17 local informants, all well-recognized crocodile hunters in the past. The ages of the hunters ranged between 54 and 83 years. During the interviews, hunters were consulted on the following subjects: 1. history of crocodile hunting in the region; 2. distribution, habitat, and behaviour of crocodiles; 3. hunting practices and techniques; and, 4. hunting strategies. Concurrently, several journeys with the hunters were conducted through different types of wetlands, including sinkholes and lagoons.

The ejido of Xhazil is limitd to the east with the Sian Ka´an Biosphere Reserve (SKBR). The wetlands within the SKBR (created in 1986) were the main area of crocodile hunting for the Mayans. The largest environmental unit of the SKBR is a marshy plane or savannah of sawgrass (*Cladium jamaicense*) and dwarf mangroves communities, where "tree islands" or "petenes" of tropical climax vegetation dot the region (Olmsted and Durán 1990).

The results shown in this communication were extracted from the author's Masters Thesis, which was presented in the CSG Regional Meeting of Latin America and the Caribbean in Santa Fe, Argentina [CSG Newsletter (2005): 24(2)]. For a complete description of the methodology, results and other relevant information please refer to Zamudio (2005). The following is a summary of information gathered from the interviews of the crocodile hunters of the ejido of Xhazil.

History of crocodile hunting in the region

- The interviewed hunters affirmed that their fathers and grandfathers seldom hunted crocodiles, and only for medicinal purposes. According to Jorgenson (1993) crocodiles were not consumed by these Mayan communities. Until nowadays, the general perception was that crocodile meat was not good for consumption.
- Commercial crocodile hunting was spread in the region by dedicated foreign hunters called "lagarteros", who arrived from the States of Yucatan, Campeche and even from Belize. Commercial hunting became a regional phenomenon that gathered Mayan and mestizo hunters, from several localities, into the wetlands of the now SKBR.
- Mayans from Xhazil began hunting crocodiles for their skins in the mid-1960s. This activity lasted until the end of 1970s, even after prohibition was declared in the country. Crocodile hunting became integrated as part of the primary subsistence activities (ie agriculture, hunting and fishing), as an additional source of income in the ejido. Nowadays, Mayans from Xhazil do not hunt crocodiles anymore, and there are no reports of negative human-crocodile interactions.

Distribution, habitat, and behaviour of crocodiles

- Crocodiles present a cluster distribution in the SKBR savannah during the dry season. This type of distribution was explained by the existence of: dry areas mostly unsuitable for crocodiles known as "blanquizales" (white soil) or biltum; and, and swampy areas around "petenes" that maintain a favorable habitat.
- Hunters pointed out that there were certain areas they could not enter due to restrictions to physical access and the lack of appropriate boats. This implies that favorable habitats were not always the main hunting spots.
- Hunting spots were caves inside small ponds called "pozas" (between 10 and 20 m2), and small mangrove islands (Fig. 1). An 83-year-old hunter stated: "crocodiles are mostly found in the "pozas" located in the savannah […] although they can also be found in the lagoons, the "pozas" are the resting area of the animal, so it's easier to hunt them there, while crocodiles are in their in their borrows, you can't miss". The interviewed hunters recognized that "pozas" represent an important refuge for the crocodiles because they comprise three main requirements for their survivorship: food supply (fishes and turtles), water and shelter.

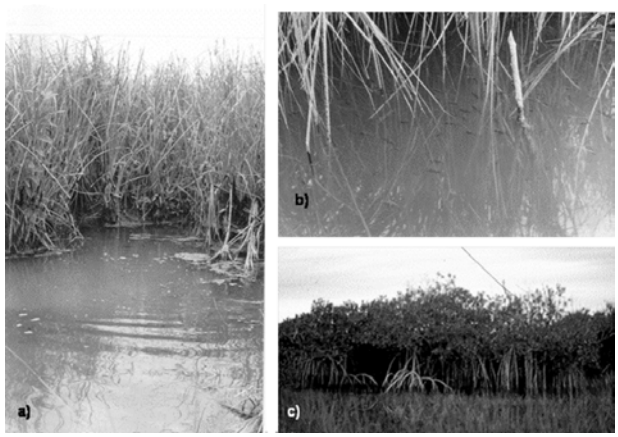

Figure 1. a) "Poza", turbid water is an indicator of the presence of crocodiles; b) fishes (Cichlidae) in a "poza"; c) small mangrove island or monospecific "peten".

- Xhazil's hunters developed a precise ecological knowledge on the movement dynamics of crocodiles, which constituted the basis of their hunting strategies. They were able to identify the constant movements of crocodiles among the remaining suited habitat for food and shelter during the dry season. Three types of movements were identified and classified following the overall distance covered by crocodiles: 1. nocturnal movements nearby their shelters in the search of food; 2. among different "pozas" and mangroves islands

searching for food or new refuges with enough water, including males searching for females during the mating season in May; and, 3. long distance movements, even throughout the jungle.

- Some hunters affirmed to have killed crocodiles in the same "poza" several times, suggesting a colonization dynamic of these habitat during the dry season. A 71-year-old hunter stated: "sometimes, we went into an area and killed 2 or 3 animals there, and when we left, other crocodiles came in; this is because there are empty houses left and at night crocodiles are walking around searching for shelter".

Hunting practices and techniques

- Mayans from Xhazil hunted exclusively during the dry season (February to May), and mainly during the day, while crocodiles were occupying their caves. Hunters walked very large distances - as far as 40 km through the savannah - searching for crocodiles. A major characteristic of the searching method of hunters was the burning of sawgrass in order to facilitate their displacement through the savannah and finding pathways and crocodile footprints leading to their refuges.
- Crocodiles were mostly killed using harpoons, while they were in their caves (Fig. 2). Other, less frequently practised techniques consisted in the use of baited traps, and firearms fired from wooden rafts.

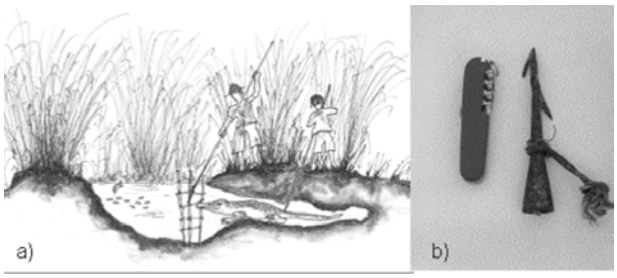

Figure 2. a) Hunting technique in caves inside a "poza"; b) tip of a harpoon.

Hunting strategies

- Xhazil hunters gathered in groups of 3 or 4 persons, who were usually close relatives.
- To explain their hunting strategy, Xhazil hunters mention two key spatial references: "working paths" (WP) which were very well known pathways or trails in the savannah; and, "crocodile working areas" (CWA), meaning those areas where crocodiles were abundant, and where water and fuelwood could also be found in order to camp in the wild. The so called "petenes", with sinkholes in their inside and swampy areas all around, were invariably present in any CWA.
- Hunters assigned common place names to CWA and other well-displayed places, facilitating some information exchange between hunting groups about recently visited areas and observations of crocodile abundance. By exchanging this important information, hunters were able to coordinate the CWA areas rotation. Knowing the best WP was a key issue in reaching CWA with rather difficult or restricted access.
- Hunters also more frequently checked out those "pozas" and mangrove islands where they had killed crocodiles several times in a given CWA (crocodile's colonization dynamic of empty "pozas"). They "mind mapped" these places in order to reduce the hunting effort.

Hypothetical hunting scenario

Figure 3 shows a hypothetical hunting scenario where Xhazil's Mayan knowledge and hunting strategies are integrated. While burning the savannah, hunters of group A are walking to a CWA named "Pucté", because hunters of group B told them they were going to another CWA named "Sal". Hunters are going to check out the presence of crocodiles in nearby "pozas" (a,b,c,d) and in mangrove islands (e,f) where they have killed crocodiles several times. On another hunting trip, they will change CWA, going to "Caucamo" (CWA rotation strategy).

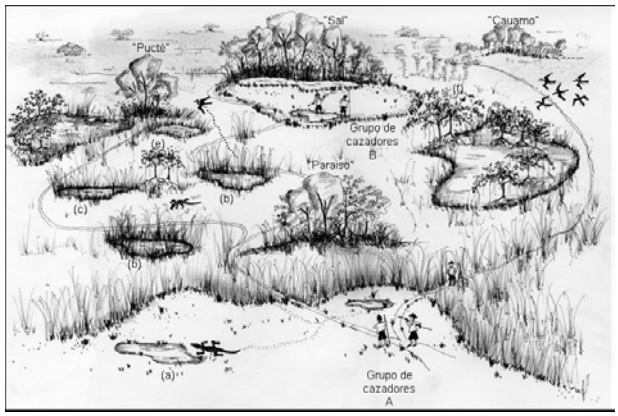

Figure 3. Hypothetical hunting scenario in the savannah of sawgrass, dwarf mangroves and "tree islands" or "petenes".

Conclusions

Hunting by Mayans of Xhazil was based on their social organization forms and on their knowledge about crocodile habitat and movements during the dry period. This knowledge is relevant because of its specificity at a local level. Hunters contributed with relevant information about a poorly studied environment with restricted physical access. The role assigned by Xhazil's hunters to caves inside "pozas" and mangrove islands should be evaluated, as few references exist about these habitats (Platt 1996; Cupul and Rubio 2004). Studies about crocodile holes (Palmer and Mazzotti 2000) can be replicated for comparison. It is interesting to note the contribution of

crocodile hunters in Belize in the research by Platt (1996). Belize's hunters provided information on recurrent killings of crocodiles in the same caves, and also helped find these caves for scientists, as Xhazil's hunters did in my study. Knowledge of local people should be considered in further studies about crocodile behaviour and habitat in Mexico. Local participation is necessary in decision-making strategies on crocodile conservation and management.

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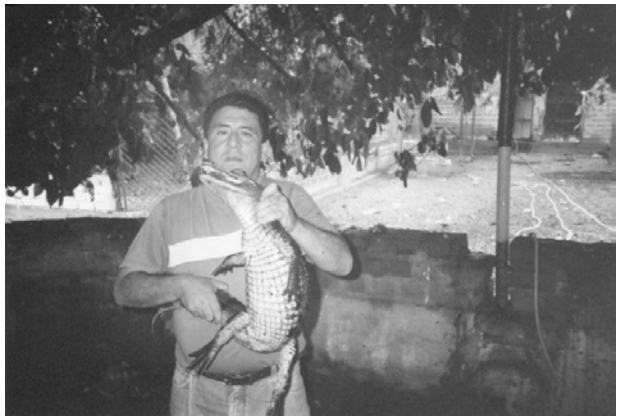
Peru

EXOTIC FAUNA IN THE CHIRA RIVER, PERU. The Chira River in Piura, northwestern Perú, was historically the southernmost limit of the American crocodile's range. In the last decades, few crocodiles have been reported in this river, until a few months ago when we received news of recent observations. Since *Crocodylus acutus* is the only crocodilian species found on the coast of Perú, misidentification of species has never been a problem.

For some time now we have been working with conservationists in Piura, who are struggling to reduce water pollution in the Chira River. Researchers are demanding that some mining companies operating in the area of the Chira Valley take proper measures to reduce the discharge of toxic waste into the river (www.ens-newswire.com/ens/feb2005/2005-02-23-02.asp). They claim that large numbers of endemic species are being affected by water pollution and habitat destruction. "Also jeopardized would be the freshwater Piuran white crocodile, unique to this area and struggling to survive in the polluted Chira River." (Craig C. Downer; www.ens-newswire.com/ens/feb2006/2006-02-06-insdow.asp).

Many researchers taking water samples periodically mentioned seeing very big crocodiles in the river or basking on the sandy beaches. There were even rumours of a large female with her hatchlings in a secluded area near one of the study sites. When we asked the researchers for pictures of the "white crocodiles", Alejandro Zegarra Pezo from "Pro Norte Perú", was kind enough to send us several photographs. Much to our surprise, the pictures didn't show the expected crocodiles but were all photographs of *Caiman crocodilus* instead! (The common caiman is known as "white caiman" in Perú, hence the reference to "white crocodiles" by local people).



Caiman crocodilus is one of the 7 species of crocodilian that occur in Perú, and is found in the Amazon forest on the other side of the Andes Mountains, which separate the Peruvian coast from the rainforest. How did caimans end up in the Chira River? We don't know for sure, but we are looking at two possibilities. In the 1990s, the authorities in Piura tried to boost local tourism through the implementation of water sports and recreational activities in the "Represa de San Lorenzo", a large water reservoir which forms part of the Chira basin. The project never flourished, so some people thought it would be a good idea to introduce Tilapia and caimans to take advantage of the artificial habitat that had been created. There are no official data confirming the introduction of caimans but it is common knowledge that it occurred.

On the other hand, jungle pets are commonly kept in many Peruvian homes and it is rumoured that "nice little caiman pets" that become too big and risky to keep at home are sometimes thrown into nearby rivers and lakes. This practice may account for the caimans in the Chira River. (Two *Melanosuchus niger* were captured in a big lake near a private school in Lima 20 years ago).

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Bolivia

INFORMATION FOR SUSTAINABLE MANAGEMENT: THE OFFICIAL WEBSITE FOR THE PROGRAM ON CONSERVATION AND SUSTAINABLE USE OF THE LAGARTO (*CAIMAN YACARE*) IN BOLIVIA . Among wildlife species with high economic potential the southern spectacled caiman or Lagarto (*Caiman yacare*) is probably the most robust one in Bolivia. With a harvest area ranging 0.4 million km^2 (an area larger than Italy), the Bolivian Government has been developing a Program for the Conservation and Sustainable Use of Lagarto (*Caiman yacare*). The Lagarto Program was initiated in 1997 and is now part of the National Policy on Sustainable Use of Biodiversity (Estrategia Nacional de Biodiversidad de Bolivia. Ministerio de Desarrollo Sostenible. La Paz, 2002). Within this policy, the Program seeks to conserve the Lagarto and its habitat through developing local capacities for responsible and efficient harvest, promote the fair and equitable sharing of the benefits, and oversee the different stages of the chain production.

Among the most relevant stakeholders are: indigenous peoples, peasant communities and cattle ranchers who are mainly responsible for hunting and transporting the harvest; companies that tan hides and process the meat for further export, mainly to Europe and USA; academic institutions; specific programs such as Biotrade; and, some NGOs that provide with technical assistance for developing management plans, give value added, and organize local communities for sustainable production. The overall coordination is carried out by the CITES Management Authority, the National Directorate of Biodiversity, which is settled in La Paz, in close coordination with the Regional Governments (Prefecturas) of Beni and Santa Cruz through their Natural Resources and Environment Directorates. The CITES Scientific Authority is the Museum of Natural History Noel Kempff Mercado, which is based in the city of Santa Cruz.

Although there is consensus among scientists that lagarto populations in Bolivia are not under threat, it was evident that much improvement could be done in the allocation of hunting permits, the monitoring of the lagarto populations, as well as in controlling the different stages of the production. Because of this, during 2004 and 2005 the Lagarto Program was deeply revised and a number of legal, administrative and technical reforms have been set in place in a short time. Thus, large amounts of information were generated that needed to reach at different stakeholders such as indigenous peoples and peasants organizations, companies, as well as Prefecturas (the regional administrative authorities). An effective way of delivering this information was thought to be the web.

At the end of 2005 the official website (www.mds.gov.bo/DGB/Lagarto/PagPrincipal.html) was launched in order to deliver information on the Lagarto Program [see Crocodile Specialist Group Newsletter 25(1): 10]. Presently the website is one of the main tools for information exchange and distribution, which also enhances the overall transparency of the program. The website has been designed to be an easy and simple information tool for public use. The information includes the regulations at a national level, news, an image gallery, frequent asked questions about the Program, bibliography on taxonomy, biology, ecology, and distribution, technical papers from the Bolivian Crocodile Specialist Group and others related to *Caiman yacare*, as well as links to other related sites. Additionally, to reach remote areas with no access to internet, handouts about the Lagarto Program have been published and are presently being distributed. The website will be continuously updated in order to have the latest official information available. At the General Directorate for Biodiversity we will be glad to receive comments and suggestions about the website.

Acknowledgements

We express our special thanks to Luís Fernando Terceros, Patricia Reyes, Carlos Troche and Alfonso Llobet for their valuable contributions and suggestions to the content, design and promotion of the website.

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Colombia

REPOPULATION OF BABILLAS IN TOCAGUA SWAMP. On 30 March 2006, 600 *Caiman crocodilus fuscus* were released into Tocagua Swamp, as part of the Wetlands Recovery Program (Programa de Recuperación de los Humedales) run by the Corporación Autónoma Regional del Atlántico (CRA).

The repopulation activities aim to re-establish the production capacity of environmental goods and services of wetlands, with a view to generate future alternatives for communities involved in sustainable use of natural resources in the area.

The releases were carried out with the Fishermen's Association of San Juan de Tocagua, which will be responsibile for monitoring and following the progress of the released individuals, nesting and harvesting of nests. The CRA repopulation program has been undertaken in collaboration with: the technical consultant's office of the University of the Atlantic; the support of the caiman farms (San Francisco, Salazar Investments, Babilandia and Colombian Caribbean) which supplied the caimans and fulfilled their annual quota for repopulation, as required by law; and, the scientific co-ordination of biologist Sergio Medrano.

The releases started at 0600 h, with the involvement of the Corporation Director, Tohnny Palencia Londoño, the Mayor of Luruaco, Rodolfo Romero, and members of the community (see Figs. 1 and 2). Four hundred female (0.90-1.0 m TL) and 200 male (>1.15 m TL) *C. c. fuscus* were released into a water area of about 200 ha.

Figure 1. Program Chief Ayari Rojano (far right) poses with a babilla before its release.

Figure 2. Corporation Director Tohnny Palencia Londoño releases a babilla into the swamp.

The releases will continue this year to complete the annual quota for repopulation defined by the Ministry of Environmental, Housing and Territorial Development.

This article was compiled from information contained in a press release (29 March 2006) by the Corporación Autónoma Regional del Atlántico (prensa@crautonoma.gov.co) and provided by Ayari Rojano (Program Chief) and Alvaro Velasco (CSG Regional Chairman, Latin America and the Caribbean).

Southeast and East Asia

Philippines

The Silliman University Crocodile Breeding Facility was established in 1980, due to concerns about the endemic Philippine Crocodile (*Crocodylus mindorensis*). The facility succeeded in breeding the species and documented several behavioral traits including parental care (Alcala *et al.* 1987).

Funding of this facility has relied solely on University sources, and research and expansion of the breeding areas have been hindered by limited finances. It was therefore a great relief that Coral Farms, Inc. (see CSG Newsletter 24 (4): 17-18) agreed to donate Philippine Pesos 450,000 ($US 8900) for the construction of an additional breeding pen and several holding pens. In addition, part of these funds is earmarked to support a graduate student in biology for one year to monitor and observe the behavior of the crocodiles in the facility and in semi-wild conditions. Progeny of this breeding program will be released in suitable semi-wild and protected habitats already identified by Silliman University and Coral Farms, Inc.

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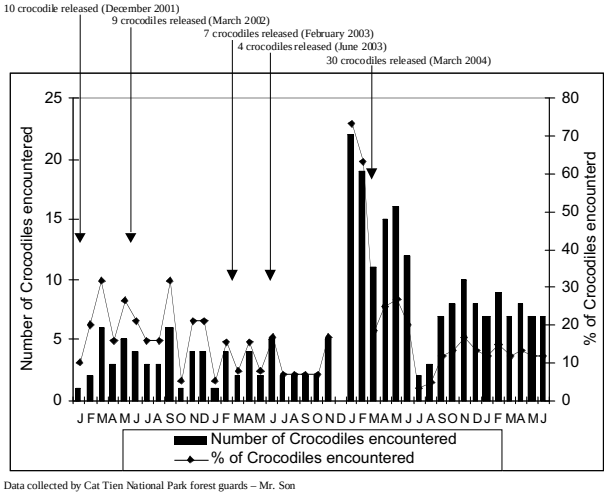
Vietnam

RE-INTRODUCED SIAMESE CROCODILES IN CAT TIEN NATIONAL PARK, VIETNAM, ARE BREEDING! On 17 September 2005, while on routine patrol in Cat Tien

National Park, forest guards Mr. Long. Mr. Truong and Mr. Son were attracted by an unusual chirping sound. The source of the sounds was 7 hatchling crocodiles in the Park's Bau Sau (Crocodile Lake) wetland complex. The young crocodiles were about 25 cm in length (Fig. 1).

Figure 1. Cat Tien National Park forest guard with wild Siamese crocodile hatchling. Photograph: Mr. Son, Cat Tien National Park.

The discovery of these crocodiles announced the success of the re-introduction program of Siamese Crocodiles *Crocodylus siamensis* undertaken in the period December 2001 to March 2004, when a total of 60 crocodiles were released into the wild. The program has been a joint effort between Cat Tien National Park authorities and the Netherlands Government-funded Cat Tien National Park Conservation Project, managed by the World Wide Fund for Nature (WWF).



Data collected by Cat Tien National Park forest guards – Mr. Son

Figure 2. Siamese crocodiles encountered during monitoring surveys (number and % of total), January 2002 to June 2005.

Over a 39-month period, 60 crocodiles were released in Cat Tien National Park's Bau Sau wetlands (Polet *et al*. 2002; Murphy 2004; Fig. 2), after having been DNA tested at the Universities of Queensland and Canberra, Australia, to confirm that they were pure *C. siamensis* (FitzSimmons *et al*. 2002). The crocodiles were donated to Cat Tien National Park authorities by two privately-owned crocodile farms in southern Vietnam. Between January 2002 and June 2005, bi-monthly monitoring surveys were conducted by the Park's forest guards stationed at the Bau Sau lake. Figure 2 reveals the number of crocodiles encountered and the percentage of known crocodiles which have been encountered. On average, 6 crocodiles have been encountered during the surveys, reflecting about 17% of the crocodiles present, with peaks after crocodile releases.

The Bau Sau wetland complex measures about 2500 ha (Wuytack 2000) and received international recognition as a wetland of international importance under the Ramsar Convention on 4 August 2005. The Bau Sau wetland complex became the 1499th Ramsar site and Vietnam's second. The wetland holds a modest but important diversity and number of water-related birds but is mainly recognised as a largely intact wetland representative of lowland evergreen and semi-deciduous tropical forest in Indo-China.

The wetland complex is currently threatened by an invasion of *Mimosa pigra* (Murphy 2004). Efforts to manually eradicate the weed in 2000-2005 has been successful in a small part of the complex. A larger effort to eradicate the invasive species from the wetland complex in its totality has to be undertaken. Illegal fishing operations in the wetland are still occurring but appear to be getting more and more under control (Fig. 3). However, redundant fishing nets and hook-lines pose a threat to the fledgling Siamese crocodile population.

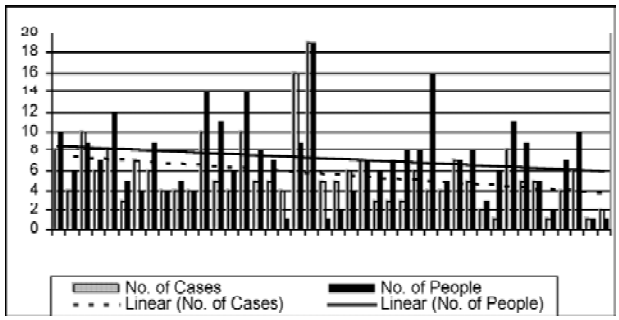


Figure 3. Fishing violations encountered in the Bau Sau Wetlands Complex (January 2002 to June 2005). Data from Cat Tien National Park-Forest Protection Department.

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SCIENTISTS CONSIDER WAYS TO RESCUE RARE, WILD SIAMESE CROCODILES. A recent workshop (30 March) held in co-operation by the Vietnam Environmental Protection Agency (VEPA), the Institute of Tropical Biology (ITB) and supported by the Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (MWBP), is considered an important step towards saving the last of the wild crocodiles in Vietnam.

It brought together scientists and managers to discuss how to raise awareness about the significance of and the need for conservation of wild crocodiles and their habitats, and to formulate solutions for protecting the current Song Hinh (Hinh River) crocodiles, in central coastal Phu Yen Province.

Reported sightings of wild freshwater crocodiles in December 2004 by local villagers and fishermen in the Song Hinh area were investigated and confirmed in June 2005 through a joint survey by MWBP, ITB, Fauna and Flora International (FFI) Cambodia and local Government authorities. Survey findings included one fresh track of a 100-kg individual on a steep swamp bank, and observation of an adult crocodile during spotlighting at night.

“These findings are an important discovery for Vietnam as the species was thought to be extinct in the wild," said Alvin Lopez, Wetland Ecologist, MWBP. *Crocodylus siamensis* has been selected as one of the flagship species of the MWBP.

Meeting participants contributed to a proposed action plan for wild crocodile conservation. Urgent actions include awareness raising activities for local communities to protect the species, in conjunction with rules to prohibit electrofishing methods in the areas.

At the national level, VEPA will work closely with scientists and MWBP to develop a comprehensive proposal for further assessing solutions for rescuing the wild species, and conducting further surveys in potential areas of central southern and highland Vietnam, especially in Krong H'Nang and Ba Rivers of Gia Lai and Phu Yen Provinces.

In addition, a request will be sent to the Environmental Impact Assessment and Appraisal Department (EIA) of the Ministry of Nature Resource and Environment, to ask investors in the Ba Ha River dam to conduct the impact assessment on biodiversity for the EIA report, which as yet had not addressed the wild *C. siamensis* in its current review. The previous environmental impact assessment of the Ba Ha River dam did not address the existence of this species in the area.

The site containing the crocodiles will soon become a reservoir in conjunction with the Ba Ha River hydro-power dam. Construction of the dam is soon to be complete, and once operational, the current crocodile habitat will be flooded causing a loss of the habitat and breeding areas of the crocodiles.

Source: *Viet Nam News, 5 April 2006.*

North America

USA

INDIA POLICY TO ALLOW MANUFACTURING WITH AMERICAN ALLIGATOR. The Fur and Alligator Advisory Council (FAAC) is pleased to report success in expanding the manufacturing base for genuine Louisiana alligator watch straps. Due to the combined efforts of Christine Maynard and Tanya Sturman at BaselWorld (watch and jewelry show) in Switzerland, India will now allow a manufacturing company to proceed with plans to build and operate a facility to create alligator watch bands.

A managing partner of Sibrama, Rajiv Marwah, informed FAAC representatives that his group, which currently operates a facility in France, had been denied approval to operate in India for some time. They did not know where to turn to obtain vital information regarding legality, sustainable use, and CITES, in order to convince the ministries to change their ruling.

The Indian Wild Life Act 1973 has certain Schedules (5 nos) consisting of names of species (flora and fauna) which are restricted for importation. Many reptiles fall in these Schedules and hence are restricted for import in any form. After a thorough check of the Schedules, it was found that

Alligator mississippiensis was not listed, and was thus eligible for importation into India.

French buyers appear very excited about the new development, and plans are already underway for the first plant in India to incorporate American alligator in their finished products.

It is crucial for the future of our industry that we continue our trajectory of expansion, through education of others who lack awareness about the legitimacy and viability of genuine American alligator. The innovative work of Ms. Maynard and Mrs. Sturman should be lauded, and our efforts to educate re-doubled.

Darrell Dupont, *Chairman, Fur and Alligator Advisory Council, USA, Tel. 1.337.775 9587.*

THREE FATAL ALLIGATOR ATTACKS IN ONE WEEK. On 10 May, the dismembered body of a Florida Atlantic University student was found in a canal near Fort Lauderdale. A medical examiner concluded that the 28-year-old woman was attacked near the canal bank and dragged into the water. A 2.9 m(9.5') alligator believed to be responsible was captured in the area.

On 14 May, the body of a 43-year-old woman was found in a canal 32 km north of St. Petersburg. The body had been in the water for about three days, and had suffered bites consistent with an alligator. A preliminary autospy suggested that an alligator "did play some part in the victim's death", but the cause of death is still pending.

Also on 14 May, a 23-year-old woman was attacked while snorkelling in a secluded area near Lake George, 80 km southeast of Gainesville. The woman's body had to be pulled out of the alligator's mouth.

These cases would bring the total number of fatal alligator attacks in Florida to 20. Seventeen attacks occurred between 1947 and 2005 [see Crocodile Specialist Group Newsletter 24(3)].

Source: *The Associated Press, 2006.*

Australia and Oceania

Australia

RARE AUSTRALIAN FRESHWATER CROCODILE ATTACK. Sixteen-year-old Curtis Dodd was bitten by a 2 m long Australian Freshwater Crocodile (*Crocodylus johnstoni*) as he and three friends tried to swim across the flooded Katherine River (Northern Territory) on the afternoon of 6 April. The teenager was bitten twice, leaving four minor puncture wounds on his back and arm, before using his fists to beat the crocodile off.

The crcodile had first nudged one of the youths, and then snapped at the victim as he swam further downstream. The boys then climbed a tree and called for help. Police from the Tactical Response Team rescued the stranded boys several hours later.

Australian Freshwater crocodiles are considered harmless, unless provoked, and there have only been two recorded cases of directed attacks on humans by wild *C. johnstoni* (in 1988 and 1990) - both were considered to be a case of "mistaken identity". It is possible in this recent attack that the crocodile accidently swam into the boys, and reacted instinctively by biting the closest one. The boys would have been much larger than the size of prey that a "freshie" of even this size would normally take.

Source: *NT News, The Age, Herald Sun (7 April 2006).*

Science

Recent Publications

Ricky L. Langley (2005). Alligator attacks on humans in the United States. Wilderness and Environmental Medicine 16: 119-124.

Objective. Encounters with alligators are increasing in the United States. Both severe injuries and fatalities can occur from an alligator attack. This study provides information on alligator attacks reported in the United States as well as infections that are commonly associated with alligator bites.
Methods. In order to collect information on the number of alligator bites, nuisance calls, and estimated alligator population of each state, calls were made to wildlife offices in all southern US states, and an online search for lay press articles was performed. Detailed information was available from Florida and is presented regarding the types of injuries and the activities of the victims at the time of the injuries.
Results. From 1948 to August 1, 2004, 376 injuries and 15 deaths have been reported in the United States as a result of encounters with alligators. The number of nuisance calls as well as thealligator population is increasing.
Conclusions. As the human population encroaches on the habitat of alligators, attacks and nuisance complaints increase. A uniform reporting system among states should be developed to obtain more complete information on alligator encounters.
[Available at: www.allenpress.com/pdf/weme_16_303_119_124.pdf]

Rex L. McAliley, Ray E. Willis, David A. Ray, P. Scott White, Christopher A. Brochu and Llewellyn D. Densmore III (2006). Are crocodiles really monophyletic? - Evidence for subdivisions from sequence and morphological data. Molecular Phylogenetics and Evolution 39(1): 16-32.

Abstract: Recently, the phylogenetic placement of the African slender snouted crocodile, *Crocodylus cataphractus*, has come under scrutiny and herein we address this issue using molecular and morphological techniques. Although it is often recognized as being a "basal" form, morphological studies have traditionally placed *C. cataphractus* within the genus *Crocodylus*, while molecular studies have suggested that *C. cataphractus* is very distinct from other *Crocodylus*. To address the relationship of this species to its congeners we have sequenced portions of two nuclear genes (C-*mos* 302 bp and ODC 294 bp), and two mitochondrial genes (*ND6-tRNA^{glu}-cytB* 347 bp and control region 457 bp). Analyses of these molecular datasets, both as individual gene sequences and as concatenated sequences, support the hypothesis that *C. cataphractus* is not a member of *Crocodylus* or *Osteolaemus*. Examination of 165 morphological characters supports and strengthens our resurrection of an historic genus, *Mecistops* (Gray 1844) for *cataphractus*.

Christopher A. Brochu. (2006). Osteology and phylogenetic significance of *Eosuchus minor* (Marsh, 1870) new combination, a longirostrine crocodylian from the late Paleocene of North America. J. Paleont. 80(1): 162-186.

Abstract: *Eosuchus minor* (Marsh, 1870) is based on skeletal fragments from the Late Paleocene or Early Eocene of New Jersey, but more complete material from the Late Paleocene of New Jersey, Maryland, and Virginia permits a detailed description and systematic assessment. It is a slender-snouted form and can be distinguished from most other crocodylians on the basis of an enlarged quadrate foramen aereum; a distinct W-shaped rugosity along the ventral margin of the basioccipital tuber; a prominent crest on the lateral braincase wall encompassing portions of the quadrate, pterygoid, and basisphenoid, forming the lateral wall of the lateral eustachian canal at its ventralmost extent; and arrangement of dentary alveoli into couplets. Specimens of larger crocodylians from the same units may represent either the adult form of *E. minor* or a separate taxon. The enlarged quadrate foramen aereum, couplet arrangement of dentary alveoli, and basioccipital tuber shape are shared with *Eosuchus lerichei* from the Late Paleocene of Europe. *Eosuchus* lies within Gavialoidea crownward of the basal forms *Thoracosaurus* and *Eothoracosaurus*. The braincase of *Eosuchus* is intermediate between that of *Thoracosaurus* and that of *Gavialis*; the basisphenoid retains a short (but externally visible) descending lamina, but the basisphenoid is also anteroposteriorly expanded at the level of the median eustachian foramen.

Christopher A. Brochu (2006). New miniature horned crocodile from the Quaternary of Aldabra Atoll, Western Indian Ocean. Copeia 2006(2): 149-158.

Abstract: A new crocodylid is described on the basis of fragmentary, but diagnostic, material from the Quaternary of Aldabra Atoll. It differs from all other known crocodylians, living or extinct, in having a prominent semicircular crest, or ''horn,'' on the dorsolateral margin of the squamosal. Unlike the horns seen in some living *Crocodylus*, the apex of each horn was at its midpoint anterior to the external otic aperture and not near its posterior end. It also has a highly vaulted premaxillary palate and an anterodorsally-oriented external naris, and dorsal exposure of the supraoccipital on the skull table was extensive. Phylogenetic relationships of the new form are unclear, making its biogeographic origins difficult to trace, but it was very likely an immigrant from elsewhere and not endemic to Aldabra Atoll, as it occurs in deposits formed shortly after a period of submergence ended 120,000 years ago.

Craig E. Franklin, Greg Taylor and Rebecca L. Cramp (2006). Cholinergic and adrenergic innervation of lingual salt glands of the estuarine crocodile, *Crocodylus porosus*. Aust. J. Zool. 53: 345-351.

Abstract: Many marine reptiles and birds possess extrarenal salt glands that facilitate the excretion of excess sodium and chloride ions accumulated as a consequence of living in saline environments. Control of the secretory activity of avian salt glands is under neural control, but little information is available on the control of reptilian salt glands. Innervation of the lingual salt glands of the salt water crocodile, *Crocodylus porosus*, was examined in salt water-acclimated animals using histological techniques. Extensive networks of both cholinergic and adrenergic nerve fibres were identified close to salt-secreting lobules and vasculature. The identification of both catecholamine-containing and cholinergic neurons in the salt gland epithelium and close to major blood vessels in the tissue suggests the action of the neurotransmitters on the salt-secreting epithelium itself and the rich vascular network of the lingual salt glands.

James G. Smith and Ben L. Phillips (2006). Toxic tucker: the potential impact of cane toads on Australian reptiles. Pacific Conservation Biology 12: 40-49.

Abstract: Cane toads *Bufo marinus* are a highly successful invasive species, having invaded more than twenty countries in the last 150 years. In Australia, they currently

occupy more than 1 million square kilometres. Toads are highly toxic and Australian predators have no evolutionary history with the cardiac toxins in toad skin. As such, toads constitute a novel and extremely toxic prey for Australia's predators. Australia's reptiles are perhaps the largest group likely to be affected by the invasion of the toad. By examining species distributions, we conclude that 59% of agamids, 85% of the varanids and all of Australia's crocodiles and freshwater turtles are potentially at risk from toads. We then assayed eleven species of reptile; one freshwater turtle (Chelidae), two crocodiles (Crocodylidae), two dragons (Agamidae), one python (Pythonidae) and five species of monitor (Varanidae) for resistance to toad toxin. We found a high level of variation between species in resistance to toad toxin but in all cases (except for one species of crocodile) all species were easily capable of eating a toad large enough to kill them. We conclude that toads pose a real and ongoing threat to the majority of Australian species we examined.

[Excerpt from **Conclusions**: "Freshwater crocodiles *C. johnstoni* are at a higher risk given that the young individuals we tested were susceptible to relatively small doses of toxin and that this species is more reliant on freshwater habitats than *C. porosus*. Larger specimens may be buffered somewhat in that they would need to consume much higher doses of toxin to kill them. As a crocodile grows it will certainly reach a size where ingesting even a large toad is unlikely to kill it. Therefore, small individuals are likely to be at higher risk, an outcome that is paralleled in snakes, albeit for different reasons (Phillips and Shine, in press). Saltwater crocodiles *C. porosus* are less at risk given that even comparatively large doses induced very little effect."]

Kevin M. Gribbins, Ruth M. Elsey and Daniel H. Gist. (2006). Cytological evaluation of the germ cell development strategy within the testis of the American alligator, *Alligator mississippiensis*. Acta Zoologica (Stockholm) 87: 59-69.

Abstract: The cytological changes to germ cells were investigated within the seminiferous epithelium of the American alligator (*Alligator mississippiensis*). Testicular tissues were collected, embedded in plastic, sectioned on an ultramicrotome, and stained with the periodic acid-Schiff+ procedure followed by a haematoxylin counterstain. Alligators have a prenuptial pattern of germ cell development, where spermatogenesis begins in early spring and sperm is mature by the time mating begins in May. Consistent spatial relationships between germ cells are absent within the seminiferous epithelium of the alligator. Their germ cells progress through the phases of spermatogenesis as a single cohort, leading to one continuous spermiation event that occurs during their mating season (May-June). This temporal germ cell development is different from the consistent spatial development seen within seasonally breeding birds and mammals but is similar to the recently described germ cell development strategies of two other temperate breeding reptiles, the slider turtle and the European wall lizard. The germ cell development strategy shared by these three temperate reptiles representing three different taxa within the class Reptilia is reminiscent of the temporal strategy seen within the anamniotic testis. Thus, alligators and at least two other temperate reptiles exhibit primitive spermatogenic cycles within derived amniotic testes and may be consider intermediates in terms of testicular organization, which may have significance phylogenetically.

Platt, S.G. and Rainwater, T.R. (2005). A review of morphological characters useful for distinguishing Morelet's crocodile (*Crocodylus moreletii*) and American crocodile (*Crocodylus acutus*) with an emphasis on populations in the coastal zone of Belize. Bulletin Chicago Herpetological Society 40(2): 25-29.

Abstract: Morelet's crocodile (*Crocodylus moreletii*) and the American crocodile (*Crocodylus acutus*) are broadly sympatric in the coastal regions of Belize, Mexico, and perhaps Guatemala. The two species are morphologically similar and difficult to distinguish in the field, presenting special problems for investigators particularly with regards to population surveys. Because accurate field identifications are an obvious prerequisite for biodiversity studies, we review the morphological characteristics useful for distinguishing *C. moreletii* and *C. acutus*. Differences in body coloration and body size are of little value for distinguishing the two species. The morphological characters most useful for distinguishing *C. moreletii* and *C. acutus* include structural differences in the head and skull, and dorsal and subcaudal scutellation. The head of *C. acutus* is more slender than the broad, compact head of *C. moreletii*. Moreover, the configuration of the premaxillary suture differs between the two species, being transverse in *C. moreletii*, but extending posteriorly in *C. acutus*. Scutellation in *C. acutus* is highly variable and overlaps with *C. moreletii*; however, *C. acutus* typically has no more than four scutes in each transverse precaudal scale row while *C. moreletii* has more than four (usually 5 to 6) scutes in each row. The best diagnostic feature for distinguishing *C. moreletii* from *C. acutus* is the presence of irregular scale groups among the caudal scales of *C. moreletii*. Caudal irregularities are occasionally present in *C. acutus*, but generally no more than three are present, consisting of one to three scales confined to the lateral surface of the tail. Caudal irregularities are most pronounced and always present in *C. moreletii* and occur, but are not limited to, the ventral surface of the tail. These irregularities consist of either a single to many scales arranged laterally. Because these characters are not readily obvious under field conditions, crocodiles must be captured to positively identify specimens found in habitats where

C. acutus and *C. moreletii* occur together. Field identifications of either species based solely on visual observation in habitats where sympatry is likely must remain suspect.

Qianghua Xu, Shengguo Fang, Zhenwei Wang and Zhiping Wang. (2006). Heavy metal distribution in tissues and eggs of Chinese Alligator (*Alligator sinensis*). Arch. Environ. Contam. Toxicol. 50: 580-586.

Abstract: Chinese alligator (*Alligator sinensis*) is a critically endangered species endemic to China. Concentrations of heavymetals (As, Fe, Mn, Cu, Pb, Cd, Cr, Zn, and Hg) were examined in the tissues of Chinese alligators to elucidate the background distribution of these metals in the alligator body. Generally, within the body compartments, metal concentrations were high in liver, kidney, and heart, and low in pancreas and gonad. Studyof heavymetal levels in the feces and eggs of Chinese alligator suggested that Chinese alligators could reduce bodyburden of toxic substances byexcreting them to feces and/or sequestrating them into eggs to a lesser extent. In addition, to test whether eggshell or egg membrane could be used as surrogates to measure heavymetal load in egg contents, the correlation of metal concentrations between three egg compartments was determined. Of the nine elements analyzed, concentrations of iron, copper, and zinc in the shell membrane were highlycorrelated with the levels in egg contents, whereas no metal was significantlycorrelated between eggshell and egg contents. This suggested that the shell membrane could be a useful bioindicator for Fe, Cu, and Zn contaminations in the eggs of Chinese alligator. In a comparison of metal contents in the eggs of individuals from the Anhui captive population, the wild population in Anhui Province, and those of the Changxing captive population, higher Cu, Zn, and Cd levels and a lower Pb level were found in the Changxing individuals, indicative of specific pollutants in different areas. In addition, the majorityof metal elements in the muscles of Chinese alligators and American alligators are in the same ranges. As a result of the data found in the eggs of the two alligator species, the Chinese alligators maybe exposed to a higher level of metal pollutants. The study provided measurement of the heavymetal distribution in the endangered Chinese alligator for the first time and could serve as the background for the monitoring of possible heavymetal contaminations in the alligator habitats.

Qianghua Xu and Shengguo Fang (2006). Variable number tandem repeats in the mitochondrial DNA control region of the Chinese alligator, *Alligator sinensis*. Amphibia-Reptilia 27: 93-101.

Abstract: Variable number tandem repeats (VNTRs) are present in the control region of mitochondrial DNA (mtDNA) of the alligatorid species; however, the evolutionary dynamics of the repetitive sequences and the significance of the VNTRs in the context of genetic monitoring of these species are not well explored. The Chinese alligator, *Alligator sinensis* is critically endangered and is now largely in captive breeding. Previous studies in mitochondrial genes revealed little genetic diversity existing within the populations. We reported here the structural variation and evolutionary features of mtVNTRs in the Changxing population of the species. The mtVNTRs contained 676-785 base pairs, made up by 5 distinct motifs repeated 31-36 times in 32 individuals examined. The motifs were 21-22 nts in length, with high sequence similarity between each other and with those of the American alligator (*Alligator mississippiensis*), indicating origination of the mtVNTRs from a single ancestral duplication unit in both species. The 5' and 3' portions of the repetitive sequences in the Chinese alligator were very much conserved among the individuals, while those in the middle showed a higher degree of sequence variation. The frequency of each motif appearing in the mtVNTRs showed positive correlation to the binding energy of the potential secondary structure the motif could adopt. 17 VNTR types, of which, 6 from the second generation and 12 from the third generation were identified from the samples. Analysis of the multiple VNTR types showed a high level of stochastic mutation within each generation. The suitability of the mtVNTRs as a marker to monitor the genetic differentiation of the Chinese alligator was also discussed.

Qianghua Xu, Shengguo Fang, Zhiping Wang and Zhenwei Wang. (2005). Microsatellite analysis of genetic diversity in the Chinese alligator (*Alligator sinensis*) Changxing captive population. Conservation Genetics 6: 941-951.

Abstract: Chinese alligator (Alligator sinensis) is a critically endangered species endemic to China. In this study, the extent of genetic variation in the captive alligators of the Changxing Reserve Center was investigated using microsatellite markers derived from American alligators. Out of 22 loci employed, 21 were successfully amplified in the Chinese alligator. Sequence analysis showed loci in American alligators had a bigger average size than that of the Chinese alligators and the longest allele of an individual locus almost always existed in the species with longer stretch of repeat units. Eight of the 22 loci were found to be polymorphic with a total of 26 alleles present among 32 animals scored, yielding an average of 3.25 alleles per polymorphic locus. The expected heterozygosity (H_E) ranged at a moderate level from 0.4385 to 0.7163 in this population. Compared to that in the American alligators, a lower level of microsatellite diversity existed in the Changxing population as revealed by about 46% fewer alleles per locus and smaller H_E at the homologous loci. The average exclusion power and the ability to detect shared genotypes and multiple paternity were evaluated for those markers. Results suggested that when the polymorphic loci were combined, they could be sensitive

markers in genetic diversity study and relatedness inference within the Chinese alligator populations. The level of genetic diversity present in the current Changxing population indicated an important resource to complement reintroductions based on the individuals from the other population. In addition, the microsatellite markers and their associated diversity characterized in this population could be utilized to further investigate the genetic status of this species.

Submitted Articles

GREY BABILLAS. During the 18 years I have been working with crocodilians, I have witnessed the hatching of thousands of caimans (*Caiman crocodilus fuscus*) in a number of Colombian farms. Generally they present the phenotype (eg scale and eye colouration) associated with the species, and occassionally some have exhibited some minor variations - nothing significant compared with animals with normal pigmentation.

I had previously seen about 18 albino hatchlings, but had never seen individuals lacking the black markings and greenish/oyster colouration in the skin, and yellow eyes. The caimans reported here were practically grey on the back and beige/yellow on the belly (the latter is characteristic of the species).

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EMPTY NAMES POSSIBLY IDENTIFIED TO GENUS. In 1995, two CITES lists of crocodilians were published, one in Canada, and the other in England. The well known Canadian produced CITES guide recognized the two Fuchs new Latin American names of 1971, and altered in 1974, and ultimately spelled *matogrossiensis* and *paraguayensis* in 1977, as valid subspecies of *Caiman crocodilus*. In contrast, the English booklet, from the Joint Nature Conservation Committee, listed the two Fuchs names in a manner implying that they are junior synonyms of *Caiman yacare*. In detail, the WCMC's "JNCC Checklist of Reptiles and Amphibians Listed in the CITES Appendices" did not recognize the two Fuchs names, but the parenthesis containing them is under the Yacaré cayman's heading, and the two Fuchs names are not present under *Caiman crocodilus* in the 1995 U.K. publication. Thus, in 1995, these two CITES lists contradicted each other about which species the Fuchs names are in.

My objection to both of the 1995 publications is that the two Fuchs subspecies in question are empty names, which are neither *Caiman crocodilus* nor *Caiman yacare*, because the Fuchs names lack type specimens, and the written description announcing them lacks data about the head and the dorsal armor, and is thus insufficient to identify them to species. The photos of *matogrossiensis* and *paraquayensis* and also the ventral and flank scale details in Fuchs (1974), do not count as part of the type description, because the data was published later than Fuchs (1971). Further, Fuchs (1974) did not identify the photographed skins as the types of his names. They are merely an example of their taxon, like the other taxa covered by the book.

My question is whether Fuchs (1971) presented enough information to identify his two new names to genus. The most relevant information directly pertaining to *matogrossoiensis* and *paraguayiensis* in Fuchs (1971) is the total length of the commercial belly hide, and the monetary value of the finished leather. In both of these characters, Fuchs (1971) said that the new names were closely comparable with *Caiman* as a genus. Note that if he had *Melanosuchus* or *Paleosuchus*, the price and the size should be different from the common commercial cayman. The Fuchs (1971) names appeared in a leather industry magazine, and the relevant paragraphs are quoted in their original German in my bibliography. In literal translation, Fuchs (1971) said:

"Although this classification differs from the existing zoological taxonomy, that is, it was expanded around two geographical breeds (subspecies), I feel it is proper and necessary. The new forms do not deal with modifications (forms that have non-hereditary variations), but with two completely different breeds. The Mato Grosso spectacled caiman differs in the following points from the Gran Chaco spectacled caiman. It is larger, has compacter belly hide ossifications and large-scaled, partly lightly ossified flanks. For reptile leather production that means that the skin of the Mato Grosso spectacled cayman is harder to de-ossify than that of the Gran Chaco spectacled caiman and also remains somewhat harder and therefore more brittle in the tanned state. Besides that, the flanks of the Gran Chaco spectacled caiman are considerably more valuable, because in preparation, they develope a pretty pearly Bombé-grain. Considerably more ossified are the skins of the three other subspecies of the spectacled cayman, among which, on the other hand, the skins from Colombia and Venezuela are the hardest. After tanning their de-ossified belly scutes tend very easily to sag together like vulcanized horns and become, therefore, very hard, unworkable and unsightly."

Fuchs, K.H. (1971). Die südamerikanischen Reptilhäute. Das Leder 22(9): 197-213.

Fuchs, K.H. (1974). Die Krokodilhaut. Eduard Roether: Darmstadt, Germany.

SCHMIDT DWARF-CROC SAFE TEMPORARILY. The reason the IUCN does not recognize *Osteoblepharon* Schmidt as a genus, nor *osborni* Schmidt as a species, is that the cranial and dorsal armor characters originally alleged to distinguish *osborni* Schmidt from *tetraspis* Cope did not withstand the test of enlarged sample sizes. Unfortunately, the one neck scale character that some people still think might separate *osborni* Schmidt from *tetraspis* Cope, the postoccipitals, does not necessarily work.

I have compared the type descriptions of *tetraspis* Cope and *osborni* Schmidt about the postoccipitals, and find that K.P. Schmidt made an error about the *tetraspis* condition. However, the belly scales between the gular collar and the cloacal vent may possibly enable CITES enforcement to identify African Dwarf crocodiles to subspecies level as *Osteolaemus tetraspis tetraspis* Cope with 25 or more transverse rows crossing the ventral midline, as compared with *Osteolaemus tetraspis osborni* (Schmidt) with 24 or fewer scales between the collar and the vent (Fuchs *et al*. 1974). Larger sample sizes will probably falsify the Brazaitis (1973) hypothesis that the belly distinguishes two distinct taxa of African Dwarf crocodiles, but perhaps not.

Brazaitis, P. (1973). The identification of living crocodilians. Zoologica 58: 59-101.

Fuchs, K., Mertens, R. and Wermuth, H. (1974). Zum Status von *Crocodylus cataphractus* und *Osteolaemus tetraspis*. Stuttgarter Beiträge zur Naturkunde, Ser. A: Biologie (266): 1-8.

AFRICAN SLENDER-SNOUT BELLY IS POSSIBLE CLINE. While it is probable that King and Brazaitis (1971) had a high percentage of old Belgian Congo material in their total sample of *Crocodylus cataphractus* Cuvier, and thus their collar to vent counts down the belly partly agrees with the original count in the type description of the new subspecies *C. cataphractus congicus* (Fuchs *et al*. 1974), it appears certain that Fuchs, Mertens and Wermuth had not read the King and Brazaitis (1971) paper when the Germans created *congicus* as a new species-group name based on ventral scale counts along the length of the belly in 1974, because neither Fuchs *et al*. (1974) nor Fuchs (1974) discussed the discrepancy between the American and German sets of belly scale data for *C. cataphractus* as a species, and particularly the nominate subspecies part of the German pair. In theory, if they knew about the King and Brazaitis (1971) data from American collections being a poor match for their German commercial belly-leather based data, the Europeans should have mentioned and explained the discrepancy.

In historical review about the nominate western African subspecies; 1. King and Brazaitis (1971) said that *C. cataphractus* with no subspecies has 25-29 from the collar to the vent. 2. Fuchs *et al*. (1974) said *C. cataphractus cataphractus* has 20-24, which is totally outside the range of the 1971 paper. 3. Fuchs (1974) said *C. cataphractus cataphractus* has 21-24, with slightly changed data that is not part of the type description because it was published later. 4. Wermuth and Fuchs (1978) kept *C. c. cataphractus* as 21-24, and 5. Wermuth and Fuchs (1983) also kept the nominate subspecies as 21-24. Thus, all of the King and Brazaitis (1971) sample is excluded from the German defined nominate subspecies.

Similarly, about eastern subspecies, *C. niloticus congicus* (Fuchs *et al*. 1974): 1. It was included in the King and Brazaitis (1971) sample, and the NYZS data was possibly all from the *congicus* geographic area; 2. In their original German magazine article, Fuchs *et al*. (1974) described *C. c. congicus* as having 25-26 transverse rows crossing the ventral midline between the gular collar and the cloacal vent; but, 3. Fuchs (1974) changed the original data to become the new 24-27 in his book. Then, 4. Wermuth and Fuchs (1978) and 5. Wermuth and Fuchs (1983) repeated the revised and enlarged range data from Fuchs (1974) about 24-27 for the *C. c. congicus* subspecies, as opposed to keeping the the original 25-26 numbers from Fuchs *et al*. (1974).

The 25-29 data for *C. cataphractus* as a species in King and Brazaitis (1971) agrees with the data for *C. cataphractus* as a species in Brazaitis (1973). Thus, assuming that the specimens in the United States that King and Brazaitis examined were all from wherever *congicus* comes from, and assuming that the German leather came from *congicus* territory and also from much more western African localities, along the Gulf of Guinea and up the Niger River to Senegal, it is possible that Senegal and Gambia are most different from Lake Tanganyika, and that Nigeria and Cameroon are intermediate. This hypothesis deserves testing.

Brazaitis, P. (1973). The identification of living crocodilians. Zoologica 58: 59-101. New York Zoological Society.

Fuchs, K. (1974). Die Krokodilhaut. Eduard Roether: Darmstadt, Germany.

Fuchs, K., Mertens, R. and Wermuth, H. (1974). Zum Status von *Crocodylus cataphractus* und *Osteolaemus tetraspis*. Stuttgarter Beiträge zur Naturkunde, Ser. A: Biol. (266): 1-8.

King, F.W. and Brazaitis, P. (1971). Species identification of commercial crocodilian skins. Zoologica 56(2): 15-70.

Wermuth, H. and Fuchs, K. (1978). Bestimmen von Krokodilen und ihrer Haüte. Gustav Fischer: Stuttgart.

Wermuth, H. and Fuchs, K. (1983). CITES identification manual. Volume 5, Part 2: parts and derivatives - crocodilians. IUCN: Gland, Switzerland.

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New Herpetology Journal

A new peer-reviewed journal, "Herpetological Conservation and Biology", dedicated to the conservation, natural history and ecology of amphibians and reptiles has been announced. The journal is being run by a group of 50 scientists from around the world.

Subscriptions to the online journal are free for individuals, and hard copies will be available for library deposition. Detailed information about the journal can be viewed at "www.herpconbio.org".

Endangered Species Research

Endangered Species Research (ESR) is a new multidisciplinary conservation journal, with a vision that is very much in line with that of the IUCN. It is well-designed for IUCN specialist groups.

ESR "publishes contributions reporting research on all species (and habitats) of conservation concern, whether they be classified as Near Threatened or Threatened (Endangered or Vulnerable) by the International Union for the Conservation of Nature and Natural Resources (IUCN) or highlighted as part of national or regional conservation strategies. Submissions are also welcomed on (among others) the following wider cross-cutting issues and themes pertinent to the conservation of biodiversity."

ESR begins as an online journal free of charge, and there are plans to expand later to a print version for paying subscribers. Details are available at "www.int-res.com/journals/esr/esr-home/ESR".

Meeting Announcements

18th CSG Working Meeting

Location: Hotel du Monard, 5km out of Montélimar, France

Hosted by: La Ferme aux Crocodiles at Pierrelatte

Dates: 19 June - CSG Steering Committee meeting
20-23 June - Working meeting
24 June - field trip (optional)

Registration: Visit <www.lafermeauxcrocodiles.com/meeting>.

Papers: Submit through <www.lafermeauxcrocodiles.com/meeting>.

Accommodation: All accommodation is being handled through the Montélimar tourist office (congres@montelimar-tourisme.com). Details are posted on the website (www.lafermeauxcrocodiles.com/meeting).

Additional information available from: Samuel Martin (info@lafermeauxcrocodiles.com; Tel: 33 4 75 960931; Facs: 33 4 75 963907).

Crocodile Forum

The National Museum of the Philippines, Silliman University, Crocodylus Porosus Philippines, Inc. and the Veterinary Office of the City of Manila, wish to invite interested persons to attend a 3-day meeting on crocodiles in the Philippines. The meeting will be a Filipino dialogue on conservation and commercialisation of *Crocodylus porosus* and *C. mindorensis*.

The meeting will be held from 31 January to 2 February 2007 at the Tambunting Hall, National Museum of the Philippines (Luneta Park, Manila) with post-meeting field trips. Contributed papers will be considered for oral presentation or as posters, and the Proceedings will be published. International participation is welcome.

Further details regarding registration, accomodations, etc., will be forthcoming. Enquiries can be directed to Vic Mercado at <philippinecroc@yahoo.com>.

Steering Committee of the Crocodile Specialist Group

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