CROCODILE SPECIALIST GROUP

NEWSLETTER

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IUCN--The World Conservation Union
Species Survival Commission

Cover Photo: *Crocodylus rhombifer*, about 1.7m, Brazo Sereno, Lanier Swamp, Isla de Juventud, Cuba. Captive bred individual released in 1994. See Cuba below. P. Ross photo.

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The CSG NEWSLETTER is produced in both printed and www editions by the Crocodile Specialist Group of the Species Survival Commission, IUCN - World Conservation Union. The NEWSLETTER provides information about crocodilians, their conservation, status, and management, and on the activities of the CSG. The hardcopy edition of the NEWSLETTER is distributed to CSG members and, upon request, to other interested individuals and organizations. We hope you find this www edition of use. All subscribers and users are asked to contribute news and other materials—see Editorial Policy below. As a professional courtesy, the sources of the news and information are identified throughout the NEWSLETTER. If you use any of the information provided in the NEWSLETTER, please continue that courtesy and cite the source. Subscribers who receive the printed edition of the NEWSLETTER are requested to make a voluntary contribution (suggested $40.00 US per year) to defray expenses of publication and mailing. Comments concerning the NEWSLETTER or this www page should be addressed to the CSG Editorial Office: Dr. J.P. Ross, Executive Officer, Florida Museum of Natural History, Gainesville, FL 32611-7800, USA.

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CORRECTIONS

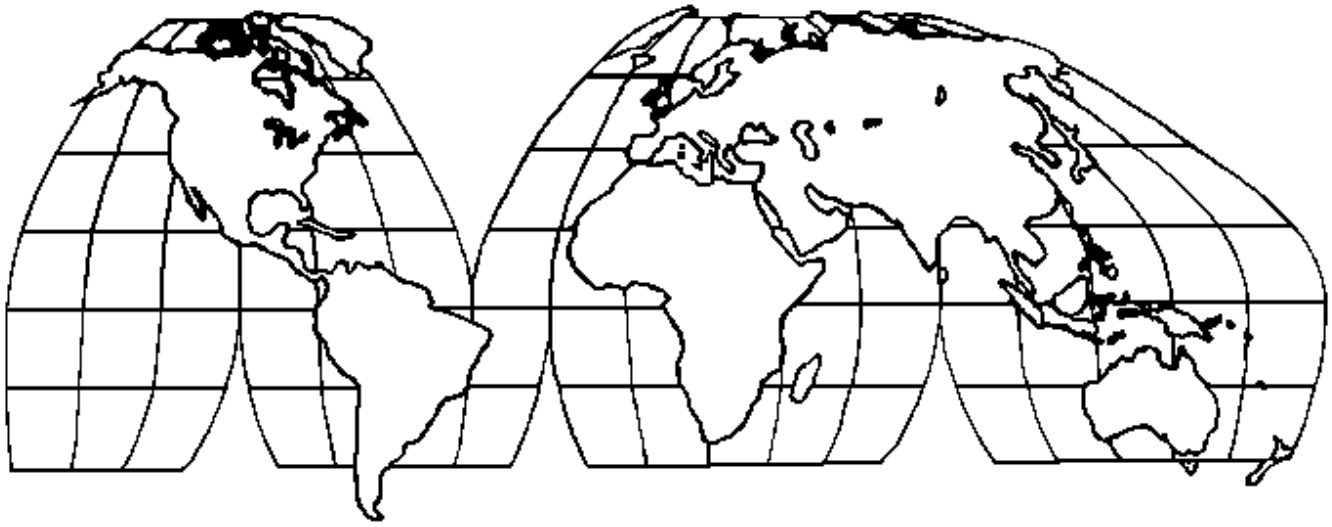
COLOMBIAN NEWSLETTER. (See Vol. 15 (2):11) The correct name of the new Colombian Newsletter is 'ZOOCRIA COLOMBIANA' and it is produced by the Associación Colombiana de Zoocría-AZOOCOL.—Arturo Lievano, *Executive President AZOOCOL, Calle 19 no.7.48. Ed. Covinoc, Santafe de Bogota, Colombia*.

IDENTITY OF COVER CROCODILE. Newsletter 15 (1). The crocodile pictured is a male *C. acutus* held at ZOOMAT in Chiapas.—L. Sigler, *Inst. de Historia Natural, Dept. Zool., Aptado Postal 6, Tuxtla Guitierrez, Chiapas, Mexico.* [We are not the first to confuse these two species. Other opinions are invited.—*Eds.*]

STEERING COMMITTEE

COMMITTEE CHANGES. Following the recommendations offered at the Santa Fe Steering Committee meeting in May, the Chairman has made some changes in the Steering Committee. Alejandro Larriera will replace Juan Villalba-Macias as Vice Chairman for Latin America and the Caribbean. The Chairman thanked Juan for his long term efforts on behalf of the CSG and crocodilian conservation in the region. Dr. Hoo Choo Giam has joined the Steering Committee in the eastern Asia regional section. Dr. Giam is formerly the representative of the Singapore CITES Management Authority with extensive experience in Asian wildlife trade affairs and remains active on the Animals Committee of CITES. His assistance to CSG will be greatly welcomed. Bernardo Ortiz remains a Steering Committee member but will serve as a representative of IUCN in recognition of his current position and interests. Professor I Lehr Brisbin will continue to serve on the Steering Committee in the Science section. The proposal to develop a new regional subdivision of Central America and the Caribbean has been taken under advisement and the Chairman, Vice chairman for Latin America and other regional representatives will be exploring structures and identifying appropriate leadership to develop this proposal. Additional recommendations for changes in the Trade Monitoring section are being explored. The Steering Committee will meet in Montreal in early October.—J. P. Ross, *Executive Officer CSG*.

AREA REPORTS



Africa

Benin

MORE ON *C. CATAPHRACTUS.* In the NEWSLETTER 15 (2): 15, Mathew Dore reported that 'No specimens of long snouted crocodile were seen in this survey'. During 1965 -1972, I operated a wildlife collection business in Dahomey (now Benin) and in this period I saw not one African slender snouted crocodile (*Crocodylus cataphractus*) despite traveling weekly up the Oeme river past the Zou branch, the Zou every other week, the Couffo and the Mono river along the Togo border about once every couple of months and the hyacinth choked Okpara occasionally.

I collected many West African dwarf crocodiles (*Osteoleamus tetraspis*), for which I had to compete with the food market. One of the dwarfs I shipped in the 60's died recently at the Brookfield Zoo at a recorded length of 8 feet, a giant dwarf! Nile crocs were also plentiful but less in demand for local cuisine, but I avoided collecting *niloticus* in the Mono river region.

The Mono is the centre of a small animist tribe of crocodile worshipers. Once a year a new-born baby, sired by the crocodile priest with a different young maiden each year whose high honour is to be chosen to bear the child, is sacrificed to appease a rather large *niloticus* river god, thus assuring a good catch of fish for the coming year.

I had many orders for juvenile *cataphractus* and put out the word that I would purchase these. Maurice Abelanski, the noted French crocodile hunter, based at the time in Bohicon, Dahomey, shipped hundreds of *niloticus* hides to France each year, but did not recount ever seeing any *cataphractus*. In nearly seven years of collecting in the wetlands of southern Dahomey, of which five days a week were spent in good crocodile habitat, I neither saw nor heard of any cataphractus in the region. Nor did I see any *cataphractus* skulls for sale in the local markets where there were usually niloticus and *Osteoleamus* parts available. On an unrelated note, ball or royal python (*Python regius*) worship, whose main temple and python high priest are in Ouidah, Dahomey (the python Vatican so to speak), is an early example of sustainable use and conservation. Grain is stored by villagers in granaries raised on stilts. Rodents are a persistent problem. For at least the last 600 years pythons have been venerated as god, with local priests exhorting villagers to bring them into the villages as sacred animals where they are kept in a kind of religious farming. No python worshiper would ever harm a ball python or think of eating one. The village python collections and their offspring keep the rodent population down and protect the village grain stores. The python cult is so strong that the Portuguese in the 17th century built a cathedral directly across the square from the python temple. Sustainable use may be a difficult concept for some today, but the Dahomeans in their corner of Africa have been practicing species protection through value for hundreds of years to their advantage and that of the pythons.—Roger Ruvell, *Geneva Farms, 400 S. Cochran Rd., Geneva, FL 32732, USA*.

Madagascar

REPORTS OF CROCODILES ATTACKS ON PEOPLE IN MADAGASCAR 1990 to 1996. The following information was collected through regional water and forest representatives and there is no reason to doubt its veracity. In fact it is certainly an underestimation. The most detailed reports show that many times the people are caught by the crocodiles (by a foot and sometimes by the hands) while crossing a river, washing or collecting water. The accidents are reported to occur mainly between 4 p.m. and 6 p.m. "time at which women are collecting water and people in general coming back from the fields". The attacks are happening mainly between November and March (hot season). The following summary is collected from detailed reports of individual attacks which specify year, district, locality and information on the victim.

Summary: Reported attacks and deaths due to crocodiles in Madagascar between 1990 and 1996.

Year	Deaths	Reported Attacks
1990	14	27

1991	7	18
1992	11	22
1993	5	16
1994	8	23
1995	12	34

The population usually try to kill the crocodile but most of the time they fail in getting them. The comments given during the collecting of information were almost always the same:

- The local populations request the extermination of these dangerous animals;
- The local authorities request at least to bring down the numbers of crocodiles;
- The agents of the management authority facing extreme difficulties, if not impossibilities, to take any action for preservation of animals considered as nuisances, recommend the opening of legal hunting to regulate the numbers of animals.

—Olivier Behra, *CSG Deputy Vice Chairman for Africa.*

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Nigeria

CROCODILE PROTECTION DECREE. In the recent article by Dore on crocodiles in Nigeria (NEWSLETTER 15(2):15-16), the author recommends that "Local hunting, capturing and trading in crocodile should be banned for a period of five years." However, Nigerian Decree Number 11 dated 1985 states that the "hunting or capture of, or trade in, the animal species listed in Schedule I ..is absolutely prohibited." Both *C. niloticus* and *O. tetraspis* are listed in Schedule I although *C. cataphractus* is not listed. The Management Authority of the US has been repeatedly assured by the Nigerian CITES Management Authority that this decree is still in effect. It appears that the problem is not that a ban is needed, there already is one. What is needed is enforcement of the existing ban, but given the current difficult political situation in Nigeria, it is not surprising that conservation gets lost.—Carol Carson, *Office of the Management Authority, USFWS, 4401 N. Fairfax Dr., Room 420C, Arlington, VA 22203, USA*.

South Africa

CROCODILE RELOCATION. A 4 m long crocodile weighing 350 kg was among eight crocodiles captured at Mallanjack Estates in the Nkwalini valley, Natal, and transported to a new home at the popular Dumazulu Kraal and Lodge. The huge crocodile, thought to be 60 - 80 years old, and affectionately known as Maweni, starts a new life at Dumazulu where he and his fellows will enjoy five-star treatment at a crocodile farm. Another eight will be moved from Mallanjack next month. The crocodiles were captured in an operation headed by Dave Blake, officer in charge of the St. Lucia Crocodile Center, assisted by ranger Carl Koen and Alison Leslie who is doing research on the role of crocodiles in St. Lucia. Moving the crocodiles was no mean feat, although it appeared to be all in day's work for Mr. Blake and Ms. Leslie. The crocodiles, who have been living in and around an enclosed dam, were tranquilized using syringes attached to long poles. Then their mouths were bound, their eyes padded and they were dragged out of the mud and reeds and carried to a flatbed truck to be driven to Dumazulu. A crowd of local farm workers watching the operation were overheard to remark in Zulu "These white people are quite mad!"—*Natal Mercury 26 April 1996, submitted by* Alison Leslie, *P.O. Box 228, St. Lucia, Kwazulu/Natal, South Africa*.

NILE CROCODILE BARBECUE?? Dave Blake and I moved a number of large crocodiles from one farm to another recently. Unfortunately the entire operation took place on the coldest day we have had this winter. The crocs seemed to be battling to come out from the muscle relaxant that we administered. In order to help them along we built a long line of fire and coals, long enough to easily roast a rock python in one go (see photos)! I must also explain that the empty bottles you see lying all over the place were not the result of a wild party, but are the hot water bottles which we put in the crocs armpits to warm them up, but it does look funny, and you can see our 'Earthwatch' volunteers appear to be tucking into a hors d'oevres before the main course of roast crocodile!—Alison Leslie and Dave Blake, *P.O. Box 22, St. Lucia, Kwazulu/Natal, South Africa*.

Warming crocodiles in Natal. A. Leslie photo.

Eastern Asia, Australia and Oceania

Australia

QUEENSLAND CONSERVATION PLAN. A recent publication by the Queensland Department of Environment, the Conservation and Management of *Crocodylus porosus* in Queensland 1995-1997 may be of interest to readers. This publication comprises three documents, a Nature Conservation (Problem Crocodiles) Conservation Plan 1995, a Management Program for *Crocodylus porosus* in Queensland 1995-1997 and a Background Information on *C. porosus* in

Queensland. The conservation plan is subordinate legislation to Queensland's Nature Conservation Act 1992. The purpose of the Conservation Plan is to provide the public with protection from identified problem saltwater crocodiles while providing for the conservation of this vulnerable species. The Conservation Plan is administered in conjunction with the Management Program. The purpose of the Management Program is to document strategies required to achieve the conservation of *C. porosus* in Queensland. The guiding principle of crocodile management in Queensland is to maintain animals in the wild unless there is a clear source of danger to humans, stock or dogs. If a clear threat is identified at a particular location, the crocodile will be removed from the wild at that location. These crocodiles may be placed in licensed crocodile farms or zoos, translocated to remote locations or, in difficult circumstances, may be destroyed.

The conservation plan allows for the continuation of the crocodile farming industry. That industry is based on keeping crocodiles bred in captivity, with occasional introductions of problem crocodiles taken from the wild. Products such as skins and meat are produced by the industry for domestic and international trade. However, the management program makes provision for alternative management strategies (such as ranching) to be tried where clear conservation benefits could result.

The publication also provides background information on the conservation status and legislative framework for the protection of *C. porosus* in Queensland as well as the biological basis for management. Copies are available at a cost of A$10.00 from:—The Department of the Environment, Queensland National Parks and Wildlife Service, Wildlife Management Section, P.O Box 155, Brisbane Albert Street Qld 4002, Australia. *Submitted by* J. Womersley, *Director, Queensland National Parks and Wildlife Service*.

China

TOURIST DEVELOPMENT FOR CHINESE ALLIGATORS. Anhui Research Center of Chinese Alligator Reproduction (ARCCAR) has been trying to develop funding resources in conjunction with tourist excursions. In 1994, Chinese Alligator lake, which is the large outdoor breeding enclosure at the ARCCAR facility, was designated as an excursion stop for tourists. In 1995, ARCCAR and Beijing Natural Rare Animals Land (BNRAL) developed a display in Beijing. BNRAL provided the breeding space and ARCCAR provided 300 alligators for breeding. In 1996, Chinese Alligator Lake was expanded to include three landscape locations and a children's playground. ARRCAR anticipates a return of 700-800 thousand Yuan from tourist fees which can be applied to ARCCAR's captive reproduction and species preservation activities.

In 1995, the new crocodile farm established in Guangdong (NEWSLETTER 11(4):5) produced 95 F2, but the fertilization rate was low and the hatching technique inferior. Only two young hatchlings were obtained. In Hainan, the Hainan Qiongshan Tian Yi alligator farm produced 38 F2 eggs and 18 F1 eggs in 1996 but fertilisation rates remain low. This is thought to be a result of the disadvantageous effect of the Hainan weather (NEWSLETTER 14(3):9). The alligators physiological condition was impaired and they do not reproduce normally.—Zhang Zhen Dong, *Anhui Research Centre of Chinese Alligator Reproduction, Xuancheng, Anhui, People's Republic of China*.

NILE CROCS IN CHINA. Seventy two *Crocodylus niloticus* have been introduced into China from South Africa (NEWSLETTER 15(1):5-6). At present, most of them are being raised adjacent to Sanya City, in the far south of Hainan Island. A small number are being maintained in Qinghuangdao in Hebei Province and at the Beijing Crocodile Lake Park in Beijing. All are growing well and Chinese crocodile specialists are starting breeding research on them. In Sanya City there is also a tourist facility displaying a performance of taming *Crocodylus porosus*. The Beijing Crocodile Lake Park is becoming a popular tourist spot and displays 300 Chinese alligator as well as the Nile crocodiles.—Wang Jingzhi, University of International Business and Economics & Huang Zhujian, *Inst. of Zoology, Academia Sinica, Beijing People's Republic of China*.

Philippines

CROCODILE CONSERVATION WEEK. The City of Puerto Princessa, through the initiative of the Crocodile Farming Institute, took the unprecedented step of paying tribute to these maligned reptiles by declaring March 6-11 as 'Crocodile Conservation Week.' City Resolution No. 946-95 was sponsored by several local councillors and signed by the Mayor in February. " We requested the City Government to declare an annual Crocodile Conservation Week as part of our efforts to change the prevailing negative impression of many Filipinos on these reptiles," said Sammy Magbanua of CFI. "It is sad when we portray these animals as vermin or greedy because close study reveals that they play a vital role in the ecosystem and have great potential to contribute to our economy because of their valuable hide and meat. It is actually an insult to the crocodiles to compare them to our unscrupulous countrymen," said Magbanua. CFI project director Gerardo Ortega lauded the city government for its support of conservation noting that this is the first time in the Philippines for such action and is indicative of the administration's sincere concern for protection of wildlife species.

Puerto Princessa City hosts the Crocodile Farming Institute which is a special project of the Department of Environment and Natural Resources tasked with the conservation of the two endangered crocodile species in the Philippines. The farm is developing crocodile farming technology, particularly for the saltwater crocodile, for commercial utilization, and is successfully breeding the highly endangered Philippine crocodile. The project attracts tens of thousands of visitors annually who marvel at the crocodile museum, live crocodiles and other attractions such as a mini zoo featuring other endemic species such as the Palawan bear cat, Palawan peacock sand talking mynah.

During Crocodile Conservation Week, elementary and high school students participated in painting and essay writing contest and a quiz show. Daily demonstrations of crocodile handling and laboratory procedures at CFI were conducted. So while other Filipinos disparage crocodiles, the people of Puerto Princesa City are taking initial steps to recognising the ecological and economic importance of these magnificent reptiles.—CFI Press Release, *P.O. Box 101, Irawan, Puerta Princessa City, Palawan, Philippines.*

Thailand

CROCODILES SEIZED FROM FREIGHTER. Animals, including saltwater crocodiles, smuggled from Indonesia have been seized from a freighter, Thai Customs officials said 1 July 1996. Some of the animals were originally from Australia and included dozens of exotic birds and endangered crocodiles. The animals were found stuffed into cages and boxes aboard a cargo ship

which arrived at Samut Sakhon Port, just south of Bangkok. Many of the animals were found dead. Among the survivors were 80 young saltwater crocodiles. Also found were 60 cockatoos, one emu, three wallabies and four Indonesian pigeons and six parrots. Jaisant Maiket the captain of the ship 'I.M.G.3.' which brought the animals to Thailand, was arrested on charges of violating laws on international trade in wildlife and faces a fine of up to 200,000 baht.—*BANGKOK POST 2 July 1996, submitted by* Harold Nicolay, *Fritz-Michalski str 9., 34346 Hann. Munden, Germany*.

West Asia

India

CROCODILE PROGRAM IN ORISSA. As reported earlier, the rear and release program for saltwater crocodiles at Bhitarkanika has been taken up on a modest scale. So far 1,657 captive reared juvenile *Crocodylus porosus* over 1.0 m length have been released into suitable locations far from human habitation in the Bhitarkanika Wildlife Sanctuary. The annual survey of crocodiles in the rivers of the sanctuary was conducted during January 1996 and indicated 40% survival of the released crocodiles. Some of the crocodiles released in the first three years of the project (1977-79) have bred and have fertile eggs. Restoration of degraded habitat, both inside and in peripheral areas of the sanctuary have been taken up by the wildlife wing of the State Forest Department. Studies on the ecology and biology of *C. porosus* have been conducted and the data used for the management of the species along with other wildlife and the mangrove habitat.

Rehabilitation of mugger crocodiles (*Crocodylus palustris*) continues on a small scale in addition to earlier large scale releases at Simalipal Tiger Sanctuary and Satkoshia gorge on the Mahanadi river. Two muggers reared at Nadanakan Zoological Park were released in Ambilopkhari (a man-made reservoir) inside the Chandaka Wildlife Sanctuary, which is also an Elephant reserve. These were released by Shri J. B. Patnaik, Honourable Chief Minister of Orissa in January 1996. A young male and female mugger were released in 1990 in another reservoir in the Elephant reserve.

Since the survival of released gharials *Gavialis gangeticus* in the Satoshkia Gorge Sanctuary has not been at all satisfactory, 22 juvenile gharials over 1 m length were translocated from Nandayakana Zoo in March for rearing in seminatural pools prior to their proposed release into suitable water bodies in the Hirakud Reservoir. Along with these gharials, six muggers have been translocated for the rear and release program.—Sudhakar Kar, *7-Saheed Naggar,Bhubaneswar, Orissa, 751 007 India*.

MADRAS CROC BANK. The Madras Crocodile bank had an immensely successful breeding year with 7,500 mugger eggs laid and consigned to the compost pit due to lack of facilities to maintain them or locations to release them. The Government of India has refused to consider the future of crocodile management except to say that commercial farming, even for needy tribal people, is ruled out. We have had a recent change in government so its worth trying again, but there is not much hope for injecting dynamism into state policy since the same advisors on Government wildlife policy are still around. We are now offering 2,000 adult and subadult muggers free of charge to anyone who wants them (and can get the permits, of course). We continue to hope that more suitable wild habitats will be approved for re-stocking but since the

various State Government projects have several thousand captive muggers of their own, our surplus is not likely to have any takers.

Similarly, we have not allowed any *Crocodylus porosus*, *Crocodylus moreletii* or *Caiman crocodilus* eggs to hatch, though we are continuing to breed *Gavialis gangeticus* and *Crocodylus siamensis*. As we are now a recognised Indian 'zoo' we are able to send animals abroad in zoo exchanges (although the permits take 6 -12 months to arrange) and we would like to hear from zoos who could send us a couple of pairs of species we do not have in exchange for any of ours. In addition to the species mentioned above we have *Tomistoma schlegelii*, *Osteolaemus tetraspis*, *Crocodylus niloticus* and *Alligator mississippiensis*.—Romulus Whitaker, *Vice Chairman CSG, Madras Crocodile Bank Trust, Post Bag No.4, Mamallapuram 603 104 TN, India*.

Sri Lanka

CROCODILES IN RUHUNA NATIONAL PARK. Two species of crocodile occur in Sri Lanka, *Crocodylus palustris* (mugger) and *C. porosus* (saltwater crocodile). Both species occur in the Ruhuna National Park in the southeast of the island. Observations on the crocodiles were carried out seasonally from January 1993 to October 1994 in Block 1 (140 km^2) of the park, during which a total of 341 crocodiles of both species were counted in 77 observations. Solitary animals made up most of the observations (55.8%), while pairs accounted for 13%. Crocodiles were found in 22 water holes. Although crocodiles could be observed during any time of the day, they were particularly encountered in the early morning between 0700 and 0900 hours and in the evening around 1600 hours. The population structure consisted of 44% hatchlings, 6% juveniles, 24% subadults and 26% adults. Hatchling losses can be high through predation by jackals (*Canis aureus*), varanus monitor lizards (*Varanus bengalensis*) and wild pig (*Sus scrofa*). Crocodiles were observed to be opportunistic and indiscriminate feeders. The diet varied from insects (in the case of hatchlings) to big game. But much of the food consists of fish, water birds and mammals such as spotted deer (*Cervus axis*) and wild pig. The observed minimum crude density of crocodiles in Block 1 was 1.2 animals per km2, but it is likely that the actual density is higher (about 1.9 animals per km^2) with *C. palustris* outnumbering *C. porosus* by 10:1. The population of crocodiles in Ruhuna National Park appears to be secure and safe from poachers, while outside the protected areas in Sri Lanka, they are killed as vermin by farmers or killed for their skins. The national parks, however remote they may be, are still prone to environmental disturbances outside their boundaries. Crocodiles, if they are properly managed, either in the wild or in captivity, can become a considerable economic asset to local people. In the final analysis, the survival of crocodiles in Sri Lanka is intimately linked to their acceptance by the local people living in and around crocodile habitats. Summarized from a paper by S. Wijeyamohan, B. V. R. Jayaratne, Sarath Dissanayake, Mangla de Silva & Charles Santiapillai, Int. Conference on the Biology & Conservation of South Asian Amphibians and Reptiles, 1-5 August 1996 in Sri Lanka.—Charles Santiapillai, *Dept Zooloogy, University of Peradeniya, Peradeniya, Sri Lanka*.

Latin America

Belize

COX LAGOON CROCODILE SANCTUARY. Cox Lagoon Crocodile Sanctuary (CLCS) on the 14,600 ha Singh Tut Big Falls Farm is located approximately 45 km west of Belize City and

extends 5.5 km from Cox Creek to Mussel Creek. The open fresh water of Cox Lagoon is surrounded by swamp forest and on the western side contains a very large expanse of marsh.

Howard Hunt (L) and Jim Tamarack (R) at Cox lagoon, Belize. H. Hunt photo.

Morelet's crocodile in Cox Lagoon. H. Hunt photo.

In addition to its status as a private sanctuary for Morelet's crocodiles, Cox lagoon was listed by the Belize Ministry of Agriculture in a regulation establishing sanctuaries for the large freshwater turtle or hickatee, *Dermatemys mawii*. Our crocodile surveys indicate that a significant population of *C. moreletii* inhabits Cox lagoon. In 1993, we conducted 11 surveys and recorded 413 sightings of crocodiles. During the survey periods 13 other species of reptiles, 124 species of birds and 23

species of mammals including howler monkeys, tapirs, cougars and jaguar, were recorded.

Because of the abundant wildlife and location near Belize City, the Belize Zoo, The Community Baboon Sanctuary and Monkey Bay Sanctuary, Cox Lagoon Crocodile Sanctuary can be promoted for ecotourism. Farm staff and owners of the property have taken advice from conservationists on the management of Cox Lagoon as a sanctuary. Recently tourists and researchers have visited CLCS but the wetland is still relatively unknown. To aid wildlife watchers, Matt and Marga Miller of the Monkey Bay Sanctuary have been offering canoe shuttles from Monkey Bay to Cox Lagoon. They can also arrange camping at either Monkey Bay or CLCS.—R. Howard Hunt, *Zoo Atlanta, 800 Cherokee Ave, SE, Atlanta, GA 30315, USA, &* James Tamarack, *Wildlife Conservation Society, St. Catherine's Island Wildlife Centre, Route 1 Box 207-Z, Midway, GA 31320, USA*.

Costa Rica

NACIMIENTOS DE CAIMANES EN CAUTIVERIO. Como parte del proyecto de investigación en Manejo y Conservacion de los Crocodilidos de Costa Rica, la Escuela de Ciencias Biologicas de la Universidad Nacional, que durante ocho anos ha trabajado con *Crocodylus acutus* y *Caiman crocodilus fuscus* en cautiverio, ha logrado por primera vez que anidaran las hembras cautivas.

Los nidos fueron construidos con materia orgánica en descomposición como hojas secas, ramas y pastos secos que fueron colocados para este fin en los encierros de reproductores. Se recogieron un total de 123 de huevos de sus nidos y fueron colocados en un incubador de construcción artesanal en la Granja Lagar-tico situada en la localidad de Jaco, Puntarenas, Costa Rica; que se localiza en el Pacifico Central del pais. Durante la incubación controlada se evaluo la condicion de los huevos y se les brindo las condiciones adecuadas de humedad y temperatura para su normal eclosion.

El promedio de huevos por nido fue de 17.58, el nido de mayor tamano consto de 28 huevos y el de menor tamano de 18. Del total de los huevos, el 50 % se resulto infertil, el 7 % sufrio mortalidad prenatal y el 43 % eclosiono. La longitud y peso promedio de los recien nacidos fue de 227.2 mm y de 33.31 g. respectivamente.

La eclosion se dichos nidos ocurrio durante los meses de Octubre y Noviembre de 1995, logrando obtener 53 neonatos en cautiverio, ya que sus progenitores transmitieron sus gametos encontrandose en un medio controlado, es decir, un medio completamente manipulado por el hombre, con limites disenados para evitar que los especimenes salgan o entren en dicho lugar, donde se les brinda alojamiento artificial, evacuacion de desechos, asistencia sanitaria, proteccion contra depredadores y la alimentacion es suministrada artificialmente.—Juan R. Bolanos Montero. *Laboratorio de Manglares, Escuela de Ciencias Biologicas, Universidad Nacional, Aptdo 86-3000 Heredia, Costa Rica. Email: jbolanos@irazu.una.ac.cr*.

BIRTH OF CROCODILES IN CAPTIVITY. [*Free translation of preceding article.*] As part of the project for research in management and conservation of crocodilians in Costa Rica, the School of Sciences at the National University has been working for eight years on *Crocodylus acutus* and *Caiman crocodilus* in captivity. Recently we obtained the first nesting of captive females. The nests were constructed of decomposing organic material such as dry leaves and branches which were placed for this purpose in the reproductive enclosures. From these nests we recovered a total of 123 eggs which were placed in an incubator of artisanal construction at Jaco, Puntarenas, in the

central Pacific region. During incubation the condition of the eggs and the incubation conditions of temperature and humidity were monitored to ensure normal hatching.

The average number of eggs per nest was 17.58 (range 18-28) and 50% of the eggs were infertile and another 7% suffered prenatal mortality, giving a hatch rate of 43%. The average hatchling length and weight were 227.2 mm and 33.31 g respectively.

The hatchling of these nests occurred during October and November 1995 producing 53 hatchlings. This production demonstrates the transfer of the gametes in a controlled medium completely manipulated by people, in which the animals can neither enter or leave and all the conditions of accommodations are offered and, waste removal, protection from predators and food supply, are artificially supplied.—Juan R. Bolanos Montero, *Laboratorio de Manglares, Escuela de Ciencias Biologicas, Universidad Nacional, Aptdo 86-3000, Heredia, Costa Rica*.

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Cuba

REINTRODUCTION OF CUBAN CROCODILE ON THE ISLE OF PINES. On Isla de la Juventud, Cuba, (Isle of Pines) a program of release of captive-raised *C. rhombifer* has been underway since 1990 and about 600 marked individuals have been released. The crocodile farm at Cayo Potrero was established in 1987 from stock originating at the Laguna Tesoro Crocodile Farm in the Zapata Swamp. All the founder stock were selected for their strong rhombifer phenotype and no animals of known hybrid origin or apparent hybrid appearance were brought to Isla de la Juventud. In Laguna Tesoro, *C. rhombifer* and *C. acutus* have been kept separately since 1974 and hybrids were completely eliminated by 1980 except for a small group maintained in isolation for experimental purposes (R. Ramos pers. comm.) The founder stock at Cayo Potrero consisted of 52 adults from Laguna Tesoro that were held at the Havana Zoo, 650 juveniles of 90 - 120 cm total length and a second group of 75 individuals 75 cm -185 cm total length brought directly from Laguna Tesoro. Currently there are about 140 adult size breeding females at Cayo Potrero, a similar number of adult males and several hundred subadults. Several hundred live offspring have been produced at the farm.

As reported in the CITES evaluation of the Cayo Potrero farm in 1991, animals regularly escaped to the surrounding swamp. The farm is located within the eastern Lanier Swamp and is directly in water contact with the natural habitat. In 1994, this release program was formalized and 200 animals graded by size to present a 'natural' size distribution from juveniles (90 cm TL) to subadults (120 - 180 cm TL) were deliberately released. This was repeated in 1995. All the animals in the farm are permanently marked with an individual number by the removal of a coded sequence of caudal scutes. Information on the ID number, sex and size of each animal was recorded at release. The farm operators estimate that as many as 200 crocodiles may have escaped prior to these releases, particularly during heavy flooding episodes in 1993 and 1994. No unmarked hatchlings are thought to have escaped from the farm. The crocodiles released from Cayo Potrero received de-facto quarantine in the period of captivity before release, and the captive stock was under the care of a competent veterinarian (Dr. O. Casanova) who reports that problems of disease were rare and no parasites were observed. Several fundamental requirements for successful re-introduction have therefore been met (IUCN Reintroduction Specialist Group Guidelines 1994). The released stock was genetically diverse and of the best wildtype stock available. The numbers released have been substantial (further reducing concerns about genetic bottlenecks) and were in apparently good health. The releases have been directly into the core of the original habitat area, a factor recently identified to be of primary importance to re-introduction success. The animals are individually marked and an active program exists to monitor their subsequent success.

A monitoring program of released crocodiles was conducted in the field between 28 August and 4 September 1996. During our field activities we saw and captured ten *C. rhombifer* at distances of 3-11 km from the Cayo Potrero release site. Eight of these were identified by caudal scute mutilations as known animals from the release program and data on their growth and dispersal was collected. Two animals 65 TL and 1 m TL had no marks and may be the offspring of escaped farm stock. We also found a skull and back skin of an illegally killed *C. rhombifer* that appeared to be marked. We found two additional skulls of *C. rhombifer* of about 1.5 and 2 m length. All the captured animals were in extremely good condition and ranged in size from 65 to 220 cm TL. Quantitative spotlight surveys are not practicable in this heavily vegetated habitat. We examined two important habitats (Brazo de las Palmas and Brazo Sereno) at night by flashlight and observed seven and four eyeshines respectively, suggesting we had captured between 25% and 50% of the crocodilians present. We conclude from these samples that irrespective of whether native wild crocodiles persist in the Lanier swamp, that the released animals appear to be dispersing and thriving.

Conversation with elderly residents of Isla de Juventud confirmed that *C. rhombifer* was once quite abundant in the eastern portion of the Lanier Swamp and was hunted extensively for skins between 1920's and 1950. These informants reported that by 1950 the population was virtually extirpated and *rhombifer* were rare or absent. This process was aided by two large fires in 1926 and 1944 which destroyed most vegetation in the southern part of the island and allowed hunters to track the crocodiles through the ashes into the most remote refugia and kill them. A photograph on display at the Presidio Modello Museum shows prisoners capturing a crocodile that appears to be *C. rhombifer*. Our informants agreed that to their knowledge, *C. rhombifer* has always been confined to freshwater habitats in the eastern portion of the Lanier Swamp.

Our aerial reconnaissance of this region revealed that the area of freshwater habitat is quite small (perhaps 100 km^2 total) and fragmented into freshwater pools and marshes that lie discontinuously scattered through the dry karst and semideciduous Caribbean forest that covers the region. The freshwater habitat is dominated by buttonwood (*Conocarpus erecta*) and sawgrass (*Cladium jamaicensis*). The area is very rich in available crocodile food ranging from apple snails (Pomacea) and dragonfly larvae, small fish (*Gambusia affinis*), larger fish (*Cichlasoma* sp., *Tilapia* sp, *Lepisosteus tristochus*), turtles (*Trachemys decussata*) small mammals (*Capromys pilorides*) and big game (whitetailed deer,

Odocoileus virginianus, pigs, *Sus scrofa*). The major habitats are shallow ponds and pools resulting from dissolution of the limestone, and extensive muddy marshes of sawgrass. A much larger area of freshwater marsh dominated by sawgrass lies west of the present north-south road, and numerous shallow impoundments are found throughout the northern half of the island, but these do not now contain Cuban crocodiles, and perhaps never have. As in Zapata Swamp on the Cuban mainland, the habitat of *C. rhombifer* appears to be restricted to areas of remote and difficult access and permanent fresh water.

Long-time residents who hunt in the eastern Lanier Swamp, and employees of the crocodile farm who have been monitoring the area since 1990, are unable to confirm that any wild crocodiles persist in the area. We were told of one large female that was said to lack any marks indicating a captive raised origin, but this individual was not captured or displayed. Whether *C. rhombifer* persisted in remote refugia in the depths of the eastern Lanier Swamp after the 1950's cannot be confirmed.

Introduced *Caiman crocodilus* are widespread and abundant on the Isla de Juventud. The total population has been estimated by Cuban biologists to be in excess of 40,000 individuals. Caiman are most abundant in the artificial freshwater impoundments and lakes in the northern part of the island. Caiman occur in the eastern Lanier Swamp, particularly in the larger open water bodies (e.g. Laguna Grande adjacent to the Cayo Potrero farm). However, the densities of caiman are reported to be much lower in Lanier than elsewhere on the island. We captured 3 caiman and found two caiman nests during our field work. Caiman have been speculated to be a contributing factor to the decline of *C. rhombifer*, although local informants insist that the *rhombifer* were reduced by 1950 before the caiman became abundant. It seems likely that dense caiman populations could inhibit the recovery of *C. rhombifer*. Starting in 1995, a program of caiman harvesting has been underway, partially for economic gain and in part to control caiman numbers. The harvest to date has been about 650 caiman total. The meat is consumed locally and the skins salted for export. It is planned that economic returns from this program will be used to support an increased harvest rate of caiman and conservation action for crocodiles.—Roberto Soberon, *Proyecto Nacional de Cocodrilos, Empressa Nacional para la Protecion de la Flora y Fauna, Havana, Cuba,* Roberto (Toby) Ramos, *Laguna Tesoro Crocodile Farm, Ministry of Industrial Fisheries, Havana, Cuba,* William McMahan, *Louisville Zoo, Louisville, KY 40233, USA &* Perran Ross, *Florida Museum of Natural History, Gainesville, FL 32601, USA*.

Members of the Cuban crocodile re-introduction team, Isla de Juventud, with recaptured crocodiles. (l-r) Esebio Piñero, Jorge Leiva, Luis Mojena, Bill McMahan, Raoul, R. Soberon, Alex Lieva. P. Ross photo.

Ecuador

POBLACIONAL DEL CAIMAN NEGRO, *MELANOSUCHUS NIGER*, Y DEL CAIMAN BLANCO, *CAIMAN CROCODILUS*, EN SEIS LAGUNAS DE LA AMAZONIA NORTE ECUATORIANA. Thesis abstract, Santiago R. Ron June, 1995. The population status of *Melanosuchus niger* and *Caiman crocodilus* was monitored in lakes located at the north Ecuadorian Amazon between October 1992 and February 1994. Spotlight counts, captures and a capture-recapture experiment were conducted. A high variation was found in the species ratio (*M. niger / C. crocodilus*) among lakes. In the Cuyabeno Lacustrine System a predominance of *C. crocodilus* over *M. niger* was observed (91.8% at the

studied lakes) meanwhile in the Imuya lake the predominant species was *M. niger*, comprising 77.3% of the observations. In the Aangococha lake, *M. niger* accounted for 100% of the observations. The species ratio appears to be related to the physical accessibility of humans to each of the lakes during the past: less accessibility accounted for less hunting pressure and that benefited specially *M. niger*. *Paleosuchus* spp. were absent in all the lakes except for one observation of *P. trigonatus* made in the Canangueno lake. The size distribution of the population in both *Caiman crocodilus* and *Melanosuchus niger* in the Cuyabeno Lacustrine System was characterized by a low proportion of caimans less than 60 cm. in total length. *Melanosuchus niger* in the Canangueno and Mateococha lakes showed an absence of several size groups suggesting demographic problems. In contrast *M. niger* in the Imuya lake showed an apparently normal population curve with many hatchlings and a gradual decline in abundance with size increase. In the Cuyabeno Lacustrine System, *Caiman crocodilus* showed a sex ratio of 1.9 males:1 female. There was a high variation in the sex ratio between size classes. The estimated absolute density in the Mateococha lake lies between 35.0 and 44.0 caimans/km of shore line for *Caiman crocodilus* and 1.2 and 1.4 caimans/km of shore line for *Melanosuchus niger*. Concerning interspecific spatial relations, it was observed that in the lakes where *Caiman crocodilus* and *Melanosuchus niger* coexist there is a tendency for each species to occupy specific areas in the lakes. In the Canangeno lake there is a greater probability of a caiman being found near a conspecific rather than besides a caiman of the other species. Abiotic factors had great influence on the relative abundance indexes obtained. In the Mateococha lake, where more nocturnal counts were performed, the variation in the caiman number seen ranged between 3 and 152 during a period of 14 months. The majority of the variation appears to be the result of the influence of abiotic factors. The most important environmental factor affecting the number of caimans observed in spotlight counts was water level. The relationship between these two variables was negative as fewer caimans were observed during periods of high water level. A positive relationship was also determined between the water temperature and the number of caimans sighted in nocturnal counts. There were a gradual diminution in the caiman number seen during the surveys conducted in the capture-recapture experiment at the Mateococha lake. This appears to have been the result of population movements and increase in wariness as a response of caimans to the disturbance produced by the experiment.—Santiago R. Ron, *Natural History Museum, The University of Kansas, Lawrence, KS 66045, USA. Email: santiago@eagle.cc.ukans.edu*.

North America

Mexico

AMERICAN CROCODILE IN THE CENTRAL PACIFIC REGION. The central Pacific region of Mexico includes the states of Michoacan, Colima, Jalisco and Nayarit which have a sub-humid tropical climate with a heavy rainy season in summer. Along the coast of this region the limnological systems, including wetlands and estuaries are subject to dramatic increases and decreases of water level in annual cycles. In several of these systems, in all the mentioned states, American crocodiles, *C. acutus*, are found. In most of these water bodies the populations were dramatically reduced in the past. Today, several populations have recovered, particularly those that occur in productive ecosytems and have been left alone. In Colima state for example there are two significant stocks. In the north of the state at El Potrero near Manzanillo International Airport we counted 410 crocodiles in one night, including adults and some very large males. In Lake Amela situated in the southeast of the state, several surveys by eye counts indicated densities of over 45 crocodiles/ km with all size classes represented.

These two examples may appear exceptional but there may be other healthy populations in the region yet to be reported. Local initiatives for crocodile management and conservation are urgently needed. Illegal hunting has begun again and of greater importance are the threat from other economic uses of the crocodiles ecosystems which have a high ecological value. Because of its crocodile populations, and its educational system, Colima could be a pioneer state to set up a model for a ranching program for American crocodiles in the central Pacific region of Mexico.—Francisco A. Castillo, *Blvd. de la Luz 777,9, Jardin del Pedregal, Mexico DF CP 01900, Mexico.*

USA

ALLIGATOR RANCHERS PROTEST POSTER. The familiar long snouted reptile on a poster at London's Heathrow Airport has some Florida alligator ranchers vexed. The poster, produced jointly by World Wildlife Fund and the U.S. Fish and Wildlife Service, and appearing around the world, is part of a campaign to warn consumers against buying goods made from endangered species. It also features a photo of a leather handbag and its source, which bears more than a passing resemblance to an alligator.

World Wildlife Fund / US, based in Washington DC says its a case of mistaken identity: The animal may look like an alligator but it is actually an endangered black caiman of South America. But ranchers in Florida and Louisiana plan to

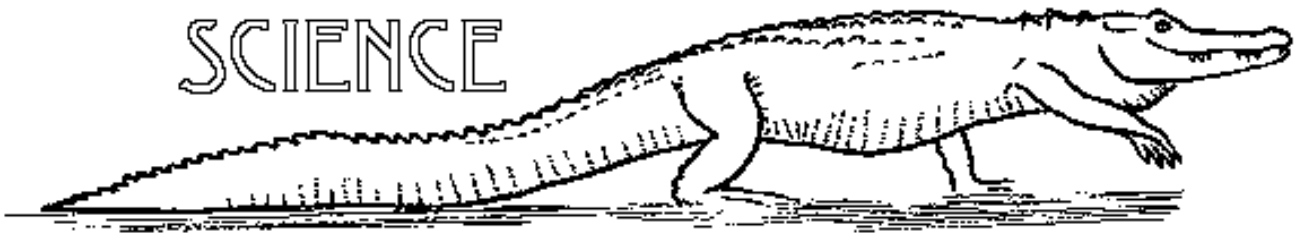
ask the group to rethink the poster anyway.

As they see it, the posters only add to what they see as an increasing threat to the alligator industry: the widespread - and erroneous - beliefs that the alligator is endangered and that alligator products are illegal. They were for many years, but haven't been since 1987. "The general public just hasn't caught up yet," says Thomas Hines, a wildlife biologist and president of the American Alligator Council. Ranchers fear that hidebound attitudes are curtailing consumer demand for their cash crop just as the number of alligator hides brought to market is nearing a 50 year high, and as competition is on the rise. "You can't expand sales if there is a stigma attached to the product," says Tallahassee based alligator marketing consultant Don Ashley. The stigma dates back to 1967 when the alligator was on the federal governments endangered species list. "There was a pretty intensive campaign to make alligator products taboo, that if you purchased a wallet or a handbag you were contributing to their decline," said Kent Vliet, a zoologist at University of Florida. Hunting wild alligators is now strictly regulated by state authorities, as are commercial alligator ranches, and the states alligators are thriving, not only in wild marshes but in backyards, shopping malls and swimming pools. Public reports of wandering alligators rose to 13,615 in 1995 reported the Florida Game and Freshwater Fish Commission.

Florida's alligator farmers have increased to about 50 but alligator farmers say their profits are slim and won't improve until more consumers are convinced its politically correct, as well as fashionable to buy alligator purses and shoes . For now that means tearing down the posters. WWF says the group has no intention of taking down save the caiman posters but apologizes for any untoward implications about US alligators. If it really is US alligator, go ahead and buy it they say. In fact WWF considers the American reptile's resurgence a game management success story in which farming has played a role in preserving habitat and reducing poaching. Don Ashley recasts the message bluntly, " If you want to save an alligator," he says, "buy a purse."—*Adapted from FLORIDA JOURNAL of THE WALL STREET JOURNAL, 19 June 1996, submitted by* Don Ashley, *Ashley Associates Inc. P.O. Box 13679, Tallahassee, FL 32317, USA*.

SIAMESE CROCODILE SMUGGLER. Toru Hattori, 39, pleaded guilty in federal court in Los Angeles for smuggling a small Siamese crocodile—an endangered species—into the United States in his luggage. Hattori said the creature was his pet, but authorities were skeptical since it was in his checked luggage, which exposed it to extreme heat and cold. The crocodile died about a week after it arrived.—*WASHINGTON POST, 2 August 1996, submitted by* Carol Carson, *Office of the Management Authority, 4401 N. Fairfax Dr., Arlington, VA 22203, USA.*

SCIENCE



CROCODILE RESUSCITATION. During capture and handling of crocodiles, it occasionally becomes necessary to resuscitate animals from partial drowning, asphyxiation, etc. This report presents a case history of resuscitation of a freshwater crocodile, *Crocodylus johnstoni*, by artificial respiration via mouth to nostril. The crocodile was resuscitated from a state of no eye reflex and an absence of muscle tension.

The specimen was a *Crocodylus johnstoni* juvenile approximately 11 months old; weight: 200g; sex: unknown; total length: 48cm. The crocodile was placed on its ventral surface on a board inclined at a 45° angle, thus elevating lungs above mouth to create a gravity system for the drainage of air and any inhaled water and vomit. The mouth of the resuscitator was sealed over the nostrils of the crocodile. Subsequently the animal's lungs were ventilated by blowing gently through its nostrils until its lateral abdomen was seen to expand. After inflation the air in the lungs was allowed to drain out without application of external pressure. An inflation/deflation cycle required between 10 - 15 seconds. After each cycle the animal was observed for initiation of voluntary breathing, which occurred after one minute of

resuscitation. The eye reflex returned approximately 20 seconds later, followed shortly by a return of muscle tension and posture. The crocodile was monitored for four weeks after the episode and did not appear to have been affected. Factors that may influence the success of resuscitation on crocodiles are: 1) The cause of respiratory arrest, and 2) the time elapsed since the event. Although crocodiles can tolerate periods of hypoxia (Frye, 1992), there has to be a critical point of no return, depending on the size of the animal, the water temperature, and the presence of other physiological stresses. An absence of heart beat, for example, reduces the possibility of successful resuscitation, as any gas exchanged in the lungs is not circulated throughout the body. The original cause of asphyxiation will also need to be temporary and reversible. Another facilitator for successful resuscitation is the availability of support equipment. Artificial respiration via endo-tracheal tube is considered possible on any size crocodile, as long as the diameter and the length of the tube are adjusted to suit the crocodile. Mouth to nostril ventilation works on small crocodiles, and may be successful on larger ones. The critical factor in this method is the efficiency of the seal created by the soft palate in crocodiles with no voluntary muscle tension. A higher partial pressure of oxygen in the air (such as compressed O_2) applied in artificial ventilation may shorten the time needed for the procedure. However, this could cause unsubstantiated physiological complications. It should be stressed that a larger animal under treatment must be restrained at all times to ensure the safety of the resuscitator and assistants.—E. Ariel (1), S. Bowden (1) and J. Miller (2). *(1) Department of Biomedical and Tropical Veterinary Sciences, James Cook University, Queensland, Australia, (2) Department of Environment , Queensland, Australia*.

INTEGUMENTARY SENSE ORGANS. The skins of crocodylids and gavialids can be distinguished from those of alligatorids by the presence of darkly pigmented pits, known as integumentary sense organs (ISO's), on the postcranial scales. The structure of ISOs in *Crocodylus porosus* was studied using light microscopy and scanning and transmission electron microscopy. The stratum corneum of the epidermis in the area of the ISO is thinner, while the stratum germinativum is thicker, relative to other regions of the integument. beneath the epidermal layer the ISO region has a paucity of collagen fibers relative to the rest of the dermis. Widely dispersed fibrocytes, nerve terminals and chromatophores occur throughout the ISO region of the dermis, but these elements are concentrated in the area immediately beneath the stratum germinativum in the ISO. The morphology of the ISO's suggests that they are sensory organs. It has traditionally been assumed that sensory organs on the amniote integument have a mechanosensory function. However, alternate functional interpretations of this structure are possible and a resolution awaits further work. Although ISOs have been well studied as taxonomic characters their structure and function are not known. In contrast, detailed studies have been performed of mechanoreceptors or 'touch papillae' of *Caiman crocodilus*. These touch papillae are confined to the cranial scales and are found in all crocodilians.—*from* MORPHOLOGY AND ULTRASTRUCTURE OF POSSIBLE INTEGUMENTARY SENSE ORGANS IN THE ESTUARINE CROCODILE, *CROCODYLUS POROSUS. K. Jackson, D. G. Butler and J. Youson, 1996. J. Morphol. 229:315-324.* Kate Jackson, *Museum of Comparative Zoology, Harvard University, Cambridge, MA 02138, USA*.

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TRADE

CROCODILE SKIN PRODUCTION FIGURES 1993-1994. The following estimates of crocodilian skin production have been derived from CITES gross export data. Trade figures, as reported by the producing countries, have been used in preference to reported imports, where they were available. Where the number of skins reported by the producing countries are much lower than expected, the import figures have been used in preference. The source of the skins have also been included, i.e, whether they were captive-bred or wild, or where the source was unknown, etc.

As for previous updates, these figures represent whole skins or equivalents and include the possibility of production in one year and export in another. These updates replace the 1993 estimate of crocodilian skin production in CSG NEWSLETTER, Vol. 14, No. 1, January - March 1995.

Legend

* = Range State CITES Annual report not available, information derived from CITES Party import records.
** = Range State CITES Annual Report not available and no records from importers.
(I) = Import figures used instead of the exporting country's figures as the difference in the reported trade is so vast (range states figures are extremely low compared to the import records).
IM = Import figure used as range state reported no exports.
IMnp = Import figure used as export state is not a Party to CITES.
0 = CITES Annual Reports consulted but zero exports or imports reported.
UE = Under estimate.
E = Estimate.
? = Situation unknown.

Source of skins:

C = reported as captive-bred
W = reported as wild
R = reported as ranched
N = no source reported
U = source reported as unknown

Crocodile Skin Production Figures 1993-1994

Country	1993	1994
Caiman crocodilus		
Bolivia	0	**
Colombia	457,749 C	536,501 C
Guyana	1,558 W 96%	**
Nicaragua	9,963 W	8,919 W
Panama	7,869 C	2,840 *C
Paraguay	see notes	5,466 W
Taiwan	21 IMnp C	0
Venezuela	78,972	54,038
	50% W, 50% C	99% W
Crocodylus johnsoni		
Australia	4,290 R	2,381
		46% C, 54% R
Crocodylus niloticus		
Botswana	7,414	587 W
Ethiopia	594	2 IM
Israel	1,055 C	0
Madagascar	1,909 73% C	620 91% R
Malawi	2,036 R	1,732
		87% R, 13% W
Mozambique	3,164 R	1,915 R
Somalia	? **	? **
South Africa	18,451 95% C	25,416 C
Sudan	0	0
Tanzania	144	342 W
Uganda	4,019 R	4,269
		94% C, 6% R
Zambia	8,645	5,594
	39% C 60% N	80% R, 9% C
Zimbabwe	54,111 92% C	40,954 91% C
Crocodylus novaeguineae		

Indonesia	2,363	4,851
		91% C, 5% W
PNG	19,133	20,854
	71% W, 21% C	57% W, 43% C
Crocodylus porosus		
Australia	6,886	5,328
	62% R, 38% C	64% R, 36% C
Indonesia	1,064	3,346
Malaysia	0	60 C
PNG	8,451	7,551
	35% W, 56% C	67%C, 33% W
Singapore	286 C	301 C
Thailand	0	0
Crocodylus rhombifer		
Cuba	0	0
Crocodylus siamensis		
Thailand	19 UE C	2,067 C

Notes on the figures provided for certain populations.

C. porosus Australia, 1993: 5,253 skins were produced in the Northern Territories and Western Australia (information supplied from Conservation Commission of the Northern Territories Wildlife Operations and the Department of Conservation and Land Management, Western Australia).

C. novaeguineae and *C. porosus* Indonesia, moratorium on trade since 1 November 1994.

Caiman crocodilus Taiwan has no native species of crocodilian. 1,152 skins were imported from Taiwan in 1994 by Singapore, the origin of these skins was given as Venezuela and their source was reported as wild.

Caiman crocodilus Paraguay: Information provided to the IUCN/SSC Crocodile Specialist Group by the CITES Scientific Authority of Paraguay is that zero 'legal' production or export occurred in 1992 or 1993 (Paraguay reported exporting three skins in its 1993 CITES Annual Report). A stockpile of around 23,000 skins was seized from illegal operators. They have since been tagged and inventoried and were placed on the market for 1994 and 1995.

Crocodylus niloticus Israel reported exporting 1,055 skins in 1993 to Singapore, the latter reported importing the same number of skins in 1994 (the transaction having taken place late in 1993). Zero

skins have therefore been entered for 1994 as there were no additional trade records.—L. Collins, *World Conservation Monitoring Centre, 219 Huntingdon Rd., Cambridge CB3 ODL, UK*.

CSG ON-LINE

CSG HOMEPAGES REVISED AND ENLARGED. The format and content of the CSG Home page on the World Wide Web has been expanded and improved by Deputy Chairman F. Wayne King. New features include a new attractive layout, clearer organization, lots of pictures, a crocodile photo gallery, and hyperlinks to a very wide selection of other croc locations on the web. The DRAFT REVISED ACTION PLAN is also now available on our homepage. See this great new homepage at http://www.flmnh.ufl.edu/natsci/herpetology/crocs.htm.

Other valuable websites are the CITES web pages at http://www.unep.ch/cites.html. IUCN Re-introduction Guidelines at http://www.rbgkew.org.uk/conservation/RSGguidelines.html. For all interested in updates on US regulations the US Federal Register is available (without charge) at http://www.access.gpo.gov/su_docs/aces/aces140.html.

MYSTERY WEBSITE. While 'surfing' around the net in June we came across an item titled 'CSG Action Plan' at http://kybernetes.ecn.purdue.edu:5971/book_examples/web/examples/registration-form.html. Intrigued, as we had not yet put the 1995 Revised Action Plan on the web, we looked at the site and came across what appears to be a class project developed at Purdue University in which a student named Russ Jones, working for a Professor named either Haslam or Wright, had placed extracts of our 1992 Action Plan on the web. This was of no concern as we encourage the spread of our material, but we were a little suprised to see the site included a request for funds to support crocodile conservation. We thought this was such a good idea that we incorporated a similar request in our new web pages (so far without result). However, we are concerned that Mr. Jones might be running a scam under our name so we contacted the address given CE597N / Jeff Wright. So far Mr. Wright has not had the courtesy to reply to our polite request for information. Meanwhile we have found copies of the Jones/Crocodile Action Plan page at sites in Japan and Australia. If anyone has any idea what's going on here, please let us know.—*Eds*.

BIBLIOGRAPHY HAS MOVED. I just wanted to notify all of you that 'The Bibliography of Crocodilian Biology' has moved to a different server. The old server had an annoying disk space restriction on it, and this new one does not. Aside from that, the old server was less reliable and (here's the good one) the administrators just informed me that they're changing the domain name for all pages. So, the biblio is now located on a server that I have a bit more control over. The new URL for the main page is http://utweb.ut.edu/faculty/mmeers/bcb/index.html.

I apologize for the pain involved in changing your bookmarks, but it will ultimately be worth it! Enjoy, and send me some more references for the next update!—Mason B. Meers, *Dept. Cell Biol. & Anatomy, Johns Hopkins University, 725 Wolfe St., Baltimore, MD 21205, USA*.

PUBLICATIONS

WILDLIFE REVIEW LIVES! Wildlife Review has been reconstituted in privatized form and will continue to collect scientific citations in a data bank for distribution. In correspondence, the new editor of Wildlife Review, Ms. Karen Fleming, has graciously agreed to continue to reciprocal exchange of recent literature information on crocodilians and to allow CSG to publish an annual list of recent publications, for which we are grateful. There follows a listing of recent publications from WR data base covering the period January 1995 - May 1996. Citations, some with the useful addition of authors addresses, are given with the Wildlife Review reference number 'WR XX'.

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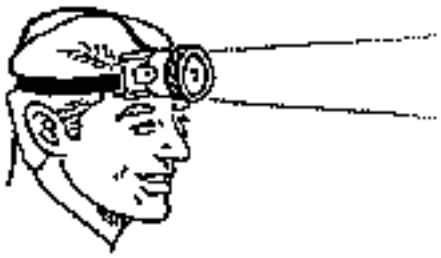
PERSONALS



Santiago R. Ron, Natural History Museum, The University of Kansas, Lawrence, KS 66045-2454, USA, is beginning his graduate studies having completed his licentatura degree in Ecuador. He can be reached at tel: 913 864 3439, fax: 913 864 5335, or e-mail: sron@csd.uwm.edu.

Luis Sigler, Instituto de Historia Natural. A.P. 6, Tuxtla Gutierrez, C.P. 29000, Chiapas, Mexico, and his wife Jacqueline Gallegos welcomed the birth of their daughter on 30 July. She is named Yunuen which means 'queen of the water' in the Tarasco language of Chiapas. Their many friends and colleagues who have been waiting for this news since the Argentina CSG Meeting join CSG in sending all the family our best wishes.

[Many participants at the 13th Working Meeting in Argentina commented upon the quite remarkable concurrence of eclosion of the offspring of CSG members with the Working Meetings. We recall that John Hutton kept the 11th Meeting in Zimbabwe on tenterhooks waiting for news of his daughter's birth, and Dennis David missed Thailand for the same reason. At the last meeting, Alvaro Velaso's wife gave birth a couple of weeks before and Luis and Jaqueleine a few weeks after. We have carefully considered the normal reproductive periodicity of *Homo sapiens crocodiliensis* and are unable to determine a mechanism, although theories abound. Hypotheses about the stimulating effects of vigorous discussion in the Steering Committee on testosterone levels, the effect of social hierarchies on reproductive success, travel and changes of temperature on spermatogenesis, temporary deprivation of conjugal contact and other speculations have not been convincing. The effect on our spouses of two weeks peace and quiet back home has also been suggested. The only positive correlation we could find was that the call for papers for the Working Meetings is usually 9 months prior to the meeting, although why this should stimulate fertility is not clear. Perhaps we need to initiate a long term study.—*Eds.*]

OBITUARY

IN MEMORIAM MIGUEL ALVAREZ DEL TORO (1917-1996). Miguel Alvarez del Toro nació el 23 de agosto de 1917 en la Ciudad de Colima, capital del estado de Colima en México. En ese lugar realizó sus estudios básicos. Desde muy pequeño mostró gran afición por la colecta de insectos, aves y otros animales, así como plantas que se encontraban en los alrededores de la propiedad de su familia en Colima. Fue en esos lugares y con esas experiencias, como el mismo Miguel lo seqala en su obra "! Así Era Chiapas !", que desarrolló el germen de su gusto por la Historia Natural y en particular la Zoología.

Alvarez del Toro no realizó estudios formales, sin embargo, su gran capacidad como autodidacta y su avidez por la lectura, le dieron la formación que virtió a lo largo de su vida en el campo de la Historia Natural. Miguel, junto con su familia, se trasladan a la Ciudad de México en 1939, al perder sus propiedades en Colima, debido a la reforma agraria de México. Ya en la Ciudad de

México, entre 1939 y 1942, trabaja en el Museo de la Flora y la Fauna Nacionales, primero como taxidermista y posteriormente como subdirector.

En 1941, realiza recolecta de aves para la Academia de Ciencias Naturales de Filadelfia en las cercanias de la Ciudad de Mixico, en la Sierra del Ajusco y Tres Marias, asi como en Las Estacas, en el Estado de Morelos. En ese ano, realizó su primer viaje a la Selva tropical en los alrededores de Sarabia, en el Istmo de Tehuantepec, Oaxaca, que en aquellos tiempos, todavía conservaba grandes extensiones de Selva.

Debido a una convocatoria publicada por el Gobernador del Estado de Chiapas, para ocupar una plaza de técnico y taxidermista en ese estado en 1942, Alvarez del Toro viaja a Chiapas e inicia su trabajo en la institución conocida en ese entonces como Viveros Tropicales y Museo de Historia Natural. El profesor Eliseo Palacios Aguilera, director de los viveros y museo, muere prematuramente y es substituido por Alvarez del Toro, quién desde entonces y hasta su muerte en 1996, dirigió al que ahora se conoce como Instituto de Historia Natural de Chiapas, y que estaba constituido por el Museo de Historia Natural y por un pequeqo Zoológico.

En sus primeros años en Chiapas, Miguel recolectó e hizo taxidermia, principalmente de aves y mamíferos para las exhibiciones en el museo, aunque ya en el año de 1944 realizó un viaje a la Selva Lacandona, describiendo la presencia de gran cantidad de cocodrilos en el Rio Jatate, y del tamano y numero de los cocodrilos del raudal de Mal Paso, en el que observó un cocodrilo de ocho metros de longitud, el más grande que vio en su vida. En esas y en otras expediciones, Alvarez del Toro realizó numerosas observaciones sobre los vertebrados terrestres de Chiapas, mismas que se enriquecieron ampliamente, con las experiencias que obtuvo en el Zoológico de Tuxtla Gutiérrez.

Indudablemente que Don Miguel, fue un conservacionista muy activo y fue el motor para la creación de seis de las once áreas protegidas del estado, mismas que son controladas por el Instituto de Historia Natural de Chiapas, entre otras, La Selva del Ocote, las Reservas de la Biosfera de El Triunfo y La Encrucijada. Entre 1968 y 1971 y debido a su gran conocimiento sobre los cocodrilos, con el apoyo del World Wildlife Fund desarrolla un proyecto sobre "Reproducción Controlada del Cocodrilo de Pantano", del que se produjeron muchos conocimientos sobre la biologma de *Crocodylus moreletii*. Dada su experiencia sobre la fauna tropical de Mexico fue miembro de los grupos de especialistas en primates, cocodrilos y aves rapaces de la Union Internacional para la Conservacion de la Naturaleza y sus Recursos (IUCN). De igual manera, fue miembro de numerosas sociedades científicas nacionales e internacionales. La "Fundación Chiapaneca Miguel Alvarez del Toro para la Proteccion de la Naturaleza" (FUNDAMAT), creada en 1987 y denominada así en su honor, ha sido de gran importancia e influencia en el manejo actual de los recursos naturales de Chiapas. En el aspecto editorial, Miguel publicó mas de 60 artículos científicos y de divulgación, tanto en revistas nacionales como internacionales. Dictó innumerables conferencias y pláticas, en muy diferentes tipos de foros. Sus libros, muy reconocidos en México y en muchos otros países, tuvieron tal demanda, que fue necesario hacer varias reediciones de los mismos. Entre sus libros más conocidos se encuentran "Los Animales Silvestres de Chiapas" (1952), "Los Reptiles de Chiapas" (1960, 1973 y 1982), "Las Aves de Chiapas" (1971 y 1980), "Los Crocodylia de México" (1974), "Los Mamíferos de Chiapas" (1977) y "Así Era Chiapas" (1985 y 1990).

El trabajo de Alvarez del Toro en el campo de los cocodrilos, se publicó por primera vez en 1960 en el libro "Los Reptiles de Chiapas", presentando nuevos datos sobre la historia natural de estos cocodrilos, que han sido de gran trascendencia para el conocimiento de estos animales de México y

Centroamerica. Esta información fue ampliada en "Los Crocodylia de México", publicado en 1974. También publicó varios artículos en diferentes revistas científicas, sobre la biología y crianza de *Crocodylus moreletii*, los que también contribuyeron al conocimiento de esta especie.

Miguel Alvarez del Toro muere en la Ciudad de Tuxtla Gutiérrez, Chiapas, a los 79 años de edad, en agosto de 1996, pidiendo como última voluntad que sus cenizas fueran esparcidas en la Selva de Chiapas, dejando una obra que es orgullo y ejemplo para los herpetólogos y otros científicos de las Ciencias Naturales. El legado y espacio por el dejados, serán muy dificiles de llenar. Ojalá que sus cenizas sean un abono fértil para que la selva se mantenga perennemente verde y conservada.—Gustavo Casas Andreu, *Instituto de Biología, Universidad Nacional Autonoma de México. Apartado Postal 70-153, 04510, México, D.F. México*.

ALVAREZ DEL TORO AND THE CROCODYLIA OF MEXICO. Miguel Alvarez del Toro was born on 23 August 1917 in Colima on the Pacific coast of Mexico. As a child he knew about the crocodiles in Colima but he was not to meet them until 1941. After moving to Mexico City with his family in 1939, he worked as a taxidermist and caretaker at the Natural History Museum in Mexico City and worked with the Philadelphia Academy of Sciences as a scientific collector. During a visit to Veracruz at this time, as he recounted in his book "Asi era Chiapas", he came close to being attacked by a large *Crocodylus acutus* in the Coatzacoalcos river, where the species has now been extirpated.

In 1942 he was invited by the governor of Chiapas to work with a newly formed Tropical Vivarium and Natural History Museum as a taxidermist and to form a zoo. Two years later he was named director of the institution, renamed the Natural History Institute, a position he occupied until his death.

His activities as a taxidermist and zoologist led him to know every corner of Chiapas, which is one of the richest States in biodiverity in Mexico. He became known as a wildlife expert and was called upon to catch "maneater" crocodiles which he prepared as specimens for the Museum. Some specimens over 4m remain in the collection.

In 1968 he was invited by the Mexican government and World Wildlife Fund to conduct a project on the biology and captive breeding of Crocodylus moreletii, and the eventual results of this work, involving comparison of the three species of crocodilian in Mexico, was the basis for his major work 'Los Crocodylia de Mexico' published in 1974. Other major publications reflecting his broad interest in the fauna of the region included "Los Animales Miguel Alvarez del Toro muere en la Ciudad de Tuxtl Silvestres de Chiapas" (1952), "Los Reptiles de Chiapas" (1960, 1973 y 1982), "Las Aves de Chiapas" (1971 y 1980), "Los Mamiferos de Chiapas" (1977) and "Asi Era Chiapas" (1985 y 1990). He published over 70 papers in scientific journals.

The zoo which he established became one of the best known and highly praised in Latin America and recorded such significant events as successful breeding of tapirs, lesser grison and tayra, successful exhibition of quetzal, a record longevity in captivity of a harpy eagle (47 years) and the first captive breeding in Mexico of *C. acutus*. Alvarez del Toro was the first to note parental activities in male crocodilians during hatching observed at the zoo.

Alvarez del Toro was a founding member of the CSG. He was distinguished with the Chiapas award in 1952, honoured among 'Distinguished people of America', Man of the Year in Chiapas (1984), the Alfonso L. Herra medal for Ecological Merit and Conservation (1985), the Paul Getty Prize for Ecology (1989) and awarded a degree Dr. Honoris Causa by the University of Chapingo (1992) and the University of Chiapas (1993). As a result of his ecological work over more than 50 years, three Biosphere Reserves were declared in Chiapas, El Triunfo B.R., La Encucijada B.R. and La Sepultura B.R., and a fourth, El Ocote B.R., will be declared shortly.

Don Miguel, as he was widely known, was a man of few words and many actions. Working with him was a graceful and enriching experience. Reading his books was to return to live at a time when the wildlife of Chiapas was abundant in its forests, rivers, lagoons and seas. Now we have to struggle to maintain these diverse ecosystems. Last August, on his 79th birthday, a singular concert was given in his honour by his son Federico. The music emanated from an island in the Grijalva river in the Sumidero National Park, and in a united musical celebration, technicians of the zoo released turtles, crocodiles, green iguanas, boas, chacalacas, parrots, spiders and racoons born in the zoo facilities. Following his last wishes the ashes of Alvaro del Toro will be scattered from the air over the new El Ocoto Biosphere reserve in September. Rest in peace, last naturalist of the 20th century, a man to whom the wildlife of Chiapas should be grateful.—Luis Sigler, *Investigador en Zoologia, Instituto de Historia Natural, A.P. 6, Tuxtla Gutierrez, C.P. 29000, Chiapas, Mexico*.

EDITORIAL POLICY - The newsletter must contain interesting and timely information. 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. The information in the newsletter should be accurate, but time constraints prevent independent verification of every item. 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, unless specifically indicated as such, are not the opinions of the CSG, the SSC, or the IUCN-World Conservation Union.

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