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The Caiman Lands on the Cold Southern Coast



**Releasing a caiman in the Lago dos Patos, Rio Grande do Sul.
Photo by Bill Magnusson.**

My invitation to work in Brazil had come from Warwick Kerr, who was Director of the Institute at that time. Dr Kerr is renowned for his work in genetics and one of Brazil's most respected scientists. He is deeply religious, but has a politically incorrect sense of humor that makes it fun to share conversations with him. Everybody who has ever worked with him, including me, loves him. Unfortunately, by the time I arrived in Brazil, he was ending his first term as Director, and my only time with him in the early years was a lunch-time conversation on the day he left Manaus.

Dr Kerr was also famous as the person who had introduced African bees into the Americas. As an agricultural geneticist, he hoped to augment the vigour of the European honeybees raised in Brazil to increase their honey production by selectively adding genes from their African sisters. He was careful to place barriers constricting entrances to the hives so that the large queens could not leave and found new colonies. Unfortunately, one of his assistants, noting that the entrances were abnormally narrow, corrected what he thought was a mistake, and the aggressive bees spread across the continent and eventually into North America. When I lunched with Dr Kerr, I was unaware of the bee episode, and did not expect to be involved in controversies about introduced species.

In 1980, I received an invitation to visit Rio Grande do Sul, Brazil's southernmost state, from Francisco (Chico) Widholzer, the Director of the Porto Alegre Zoo. Brazil is an enormous country, much bigger than Australia and most other nations in the World, so I was eager to see what other parts looked like. It was drizzling and the temperature only 9 °C when the plane landed in Porto Alegre 2 hours early. It was the only time that I have been in a plane that landed more than 10 minutes early, and I didn't want to sit around the cold airport for two hours, so I called Chico. He said that he would come immediately, but when I put the phone down I realized that we did not know

what the other looked like. The only chairs were a long way from the exit gate, and I wondered how I would recognize him in the crowded airport.

I stood out like a sore thumb in the Amazon because I was taller and much lighter skinned than most people. However, most of the Porto Alegrians were descendants of Germans or northern Italians, and my pasty complexion was not out of place in the airport. About half an hour later, a rotund well dressed man entered the airport, looked around and made directly for me. “You must be Bill Magnusson” he said. When I asked him how he had recognized me, he said that, even though he was expecting someone older, I was the only person in the airport huddled over shivering, and he assumed that I must have just arrived from the Amazon.

Chico took me to a five-star hotel, and I was surprised at how like Sydney the city was. The houses had red-tiled roofs, and the street trees were eucalypts and grevilleas. Even the European trees were the same species as those planted in Sydney, such as privet and plane trees. The drizzle and cold of the Austral winter reinforced the resemblance, reminding me of why I had been so glad to leave Sydney. This was the first time I had stayed in a five-star hotel, and things that I take for granted now, such as a well-stocked mini fridge, large television and dimming lights at the head of the bed, were sufficiently different for me to note them in my diary.

The next day, Chico took me to the zoo, 18 km from town, and introduced me to his student trainees. Betina was tall, blond, rambunctious and mainly interested in caimans. Terezina was shorter, quiet, wispy haired and loved birds. They showed me around the zoo, which was set in 400 hectares of what Chico called “natural” forest. I had looked forward to seeing native forests in Rio Grande do Sul, and was disappointed when the forest in the zoo turned out to consist mainly of gum trees, with the occasional casuarina, grevillea or hoop

pine. The forest was called natural because it regenerated by itself, and supported a saw mill that provided timber for the zoo. The zoo had a large collection of kangaroos, reinforcing the impression that I was back in Australia.

I also did the obligatory tour of the Zoological Foundation's administration. I must have shaken fifty hands, and drunk 50 cafezinhos, the small concentrated coffee served in tiny tumblers, before we finally got to see caimans. The broad-snouted caimans were kept in ponds dug into a small stream that was walled off by 60 cm high fences. I assumed that the caimans were happy there because the fences would not have been an obstacle if they decided to leave. One pair was breeding in the enclosure.

The scientific name for the broad-snouted caiman is *Caiman latirostris*, which has the same meaning as the English common name. It is a strange looking crocodilian adapted to living in swamps and marshes. Its head is wide like an alligator's, but deep like that of a dwarf caiman. The broad-snouted caiman is the only species of crocodilian that occurs naturally on the coastal plains between the Serra do Mar coastal range and the sea in southern Brazil. The same species occurs in a few areas to the west of the divide, and it extends well south into Paraguay and Argentina. Its range covers some of the most densely urbanized and intensively farmed agricultural areas in South America.

The animals were active, even though the water temperature couldn't have been more than 10 °C. Terezina called the caiman by imitating the grunting roar of an adult, and one of the females swam sinuously towards us, thrashing the water, with virtually the whole body exposed. Betina wanted to study the caimans for her undergraduate thesis, but course commitments did not leave much time for field work. Chico had slides of caimans carrying their babies from the nest to water, so I suggested that Betina study behavior of the caimans in the zoo for her thesis.

We spent the rest of the day at the zoo, which I did not find very exciting. The enclosures were clean and the inmates fat and healthy, but captive animals always depress me. The cold drizzle did not let up and Chico was busy with zoo problems. The wall of the elephant enclosure had collapsed, and the administration was sensitive about animal breakouts because a hippopotamus had escaped into the river a week before. I was amazed at how people underestimated the capacity of animals to escape, especially when they could have the help of natural disasters. This would have a strong bearing on my future attitudes towards farming of introduced species.

The next day we went to a site where Betina and Terezina had been studying caimans in the wild. It was only about a half-hour drive from the centre of Porto Alegre. The landscape was agricultural, with close-cropped pastures broken only by copses of eucalypts and Australian acacias. If you transported a blind-folded Australian there, they would not suspect that they had left their home country. We walked to a turkey dam about 60 m from a farm house. The tiny lake was less than 100 m in its longest dimension and less than 30 m wide. Betina and Terezina pointed to a caiman nest on a raft of floating grass in the middle of the dam. I was astounded that caimans bred in such an artificial landscape.

There were five dams close to the farm house and we walked over the hill to another that was about the same size as the first. Betina played a tape of a caiman roar, and a big animal responded from the far end of the dam. It came thrashing towards us, giving the same display as the caiman at the zoo had done the day before. For me, crocodilian study had mainly been a nocturnal activity, and I was amazed at what you could learn about broad-snouted caimans while sitting on a lawn in the middle of the day.

Chico lagged behind as we walked back up the hill, and was puffing from the exertion. I mentioned to the girls that he did not seem to be accustomed to field work, and they said that it was the first time he had been into the field with them. By the time we got back to the car, the driver had made a churrasco, which is the Brazilian term for a barbeque, using the ubiquitous acacias for firewood. People from Rio Grande do Sul, who like to be called Gauchos (South American cowboys), are very proud of their churrascos, and we ate far more than I was accustomed to. I had been craving red meat because I had been raised on beef and lamb, but fish had been my basic diet in the Amazon.



Photo 11.1 *Betina, Terezina and Chico showed me broad-snouted caiman in the most unlikely agricultural land dominated by pasture and introduced Australian trees. Photo by Bill Magnusson.*

After the long lunch, Terezina, Betina and I took a small boat out on a reed-filled lake in the lowlands between the farms. It was shallow and you could walk across it in most places. The floating vegetation made rowing difficult

except in the open areas in the middle. The girls had chest high waders and walked around in the reeds looking for caimans. Trying to find caimans by walking around during the day in the cold water did not seem to be very efficient, and I asked if they ever went out at night, but they said that they hadn't thought of it.

We saw no caimans, but the reeds supported large snails, as well as their bright pink egg masses, which reflected off the water and looked like the adornments around a Japanese ornamental pool. The girls said that they had taken similar snails from the stomachs of caimans they found as road kills, and I was surprised that snails would be a major item in the diet of a caiman. I had imagined crocodilians as stealthy hunters of fast-moving prey, but I would later learn that snails are common food for marsh-dwelling species.

Betina and Terezina took me to dinner at a very nice Gaucho restaurant that night. The atmosphere was cosy and there was a quiet background of traditional music. I had been eating far more than I was accustomed to in the Amazon, and I thought that I would not be able to do justice to the meal. However, I had forgotten how the cold eats into you and makes you crave for high calory food to keep your temperature up. Just being in a warm place away from the cold and drizzle was a reward in itself.

The next day, Chico and the girls arrived at 07:30, which was soon after sunrise in the Austral mid winter. They wanted to show me the islands in the river in front of Porto Alegre where they said caimans still nested. The boat with a powerful outboard motor only took about 15 minutes to get to the first island, which was low lying and fringed by rushes, with their bight pink baubles of snail eggs. Chico related stories about the presence of caimans on the islands that he had heard from local fishermen. With a backdrop of the modern city of Porto Alegre, I was surprised at the caiman's ability to live in close proximity to

dense populations of humans. I asked Chico why he didn't look for the caimans at night with a spotlight. He looked at me as though I was mad and said in Portuguese "No Bill, it's dangerous to go out in boats at night!" I didn't press the point, but I was starting to see why some species of swamp-dwelling crocodilians were thought to be endangered, even though they were easily found if you went looking for them. The caiman experts in those areas simply weren't used to field work.



Photo 11.2 *Betina and Terezinha looking for caimans in farm dams in Rio Grande do Sul. Photo by Bill Magnusson.*

Chico had given me a cheque to cover my expenses in Porto Alegre, but the Foundation had paid for the hotel and most of my meals. I had the equivalent of several hundred dollars over and it did not seem right to keep it because my institution had been covering my salary. I gave the money to Chico and said that he could use it for the project, but he was perplexed, and said that nobody refused the opportunity to make a bit more money over that of their salary. I

said that he could use the money to finance Betina's and Terezina's studies, which he agreed to do, but I could see he was not happy. It was as though I had refused a present, and I was sorry that I hadn't given the money surreptitiously to the girls. I would learn later that many Brazilian biologists became rich by accumulating per diems that they did not need.



Betina and Terezina never published their studies, and neither did Chico, though he became a consultant for many caiman farmers in later years. My next contact with Gauchos and broad-snouted caimans came about because Renato Cintra introduced me to Maria Tereza Queiroz Melo, better known as Tereca, at a zoology congress in Cuiabá near the Brazilian Pantanal. Renato invited both of us to his study site in the Pantanal, and later Tereca asked me to co-supervise her Master's thesis on broad-snouted caimans.

Tereca studied caimans in the extensive coastal lagoons of southern Rio Grande do Sul. The largest of these, the Lagoa dos Patos, is saline at its southern end and turns into freshwater marshes to the north and west. The coastal dunes support pine plantations, and many of the freshwater areas have been converted to rice fields. However, there are still large areas of freshwater marshes that support a wide range of wildlife species, and are important staging areas for migratory wildfowl.

I had taught Tereca how to mark caimans and take stomach contents when we were at Renato's field site, but I had not spent time with her in the field in Rio Grande do Sul, so she arranged for her university to pay for me to give a statistics course at the field station beside the Lagoa dos Patos. The course was

useful to the few students who participated, but it was obviously mainly an excuse to be able to go into the field at night after the lessons.



Photo 11.3 *Tereca taking stomach contents from broad-snouted caimans in Rio Grande do Sul. Photo by Bill Magnusson.*

The marshes were largely impenetrable for humans, and we were limited to the few channels of relatively open water through the rushes. The use of airboats in nature reserves was now restricted because of the damage that they could do to the vegetation and the fauna dependent on it. In any case, the airboats in the reserve did not have aircraft engines, they were powered by Volkswagen Beetle air-cooled car motors, which were heavy and not powerful

enough to push the boat across anything but the sparsest vegetation. The course was given in winter, so I was again surveying for caimans in doleful weather, and this time at night. My fingers were white, my teeth chattered, and I was embarrassed by my feebleness in comparison to the Gauchos, who did not seem to realize how miserable their climate was.

We noosed some animals that were over 2 m long, which is large for broad-snouted caimans. I was surprised at how strong they were for their size. They were much stronger than spectacled and black caimans, and possibly stronger than any other crocodilian I had handled, except the slender-snouted crocodile that had played hopscotch with Laurence Taplin's legs in South Africa. I was cautious because Tereca had a large scar on her thigh where a large caiman had driven the largest of its teeth. Despite the deepness of the wound, and the long recovery period due to infection, Tereca had not been psychologically wounded and handled the caimans we caught expertly.

Despite the cold, the caimans were too heavy and feisty to upend by hand to take their stomach contents. Therefore, we strung them upside down from the wall of the research base and pumped out their stomachs with a garden hose. We didn't get a lot of stomach contents, but I was surprised that the caimans were eating anything at the chilling midwinter temperatures. Out came fish, shrimp and lots of the bony opercula that snails use to close the entrance to the shell when they are attacked or dormant. The opercula may have been in the stomachs for some time, because crocodilians often retain hard objects, called gastroliths, in their stomachs for long periods.



We had a chance to study broad-snouted caimans further north because Tim Moulton, an expatriate Australian, invited us to participate in Earth-Watch expeditions to Cardoso Island in São Paulo State. The island is close to the largest tract of Atlantic forest that still remains, and many parts of its rugged hills are covered by relatively pristine rainforest. The caimans occur around the small streams that flow into the mangroves around the island. The short fast-flowing creeks are generally too small for boat travel, so we had to look for caimans on foot.

The caimans do occur in sea water in the mangroves, and I suggested to Gordon Grigg that he study their salt balance. Tim, Gordon and their teams showed that, like other alligatorids, the broad-snouted caimans have very little physiological ability to regulate salt balance in seawater. However, because of their size, they can spend extended periods in the mangroves before they have to return to the freshwater streams to drink. Most of the caimans Tim, Tereca and I caught were in fresh water, and we marked individuals of all sizes. Most of the largest animals were too wary to catch using nooses and we only managed to mark them because they went into mesh funnel traps that we had set for turtles.

The world of the caimans living on Cardoso Island was nothing like that the species occupied in Rio Grande do Sul. Instead of broad frigid marshes, the caimans were surrounded by lush rainforest in streams that gushed over mountain rocks into short meanders through coastal plains formed from ancient sand dunes. The Atlantic forest was different for me, though some of the forest on the steepest slopes looked like the rainforest on the escarpments in northern NSW that I had hiked through during university breaks in Australia. It would have been a paradise if not for the swarms of sandflies that made any work outside at night agonizing at some phases of the moon.



Photo 11.4 Gordon Grigg and Lyn Beard taking a sample from a broad-snouted caiman on Cardoso Island in 1992. Photo by Tim Moulton.

I was trying to find a way through the forest to set a turtle trap one day and I was marking the route by chopping off small patches of bark on trees near the track I was forging. When the machete hit a hard bit of wood it resonated and a

bee dove down and impaled my arm with its sting. It hurt a lot, and I waited about 10 minutes after pulling out the sting for the pain to subside. I then continued on, but when I hit a tree with the machete, another bee stung me on the arm. It was only after the third tree and a sting on my face that I realized what was happening. There was a nest of Africanized bees nearby. Their ancestors had evolved in an environment where chopping or scratching a tree meant an attack by a human or a honey badger. The sound was enough to initiate an attack.

I carefully left the area without chopping any more trees. I could count myself lucky that the bees were safely ensconced in a tree hollow. When they are swarming, and the queen is vulnerable, they do not attack one at a time. Crushing a bee or dragging out its sting releases a pheromone that makes most of the swarm attack, and many people die each year in Brazil because they get too close to a swarm and receive hundreds or thousands of stings. I thought of Dr Kerr, a wonderful man full of the best intentions, and wished that there had been some legal mechanism that would have stopped him from undertaking the ill conceived experiment that led to the introduction of the African bees. With no general legal system to prevent unnecessary imports, every wouldbe introducer of exotic fauna or flora has to discover for himself just how damaging playing God with species distributions can be.

The forest along the lower reaches of the streams was low, and the ground was covered to waist height by bromelias with hooked spines that made walking off paths difficult. Therefore, we generally allocated a lot of time for checking turtle traps. Nonetheless, one night a gale hit unexpectedly and I was worried that a caiman might be trapped underwater in a turtle trap by the rising water. Without waiting for help, I ran upriver, pulling out the traps and leaving them on the bank. It was near midnight when I reached the last trap, and I was cold from the lashing rain, my legs were bleeding from the bromeliad hooks, and I

was nervous from being alone in the dark. The trap was totally underwater, I could not reach it with my foot when hanging from a tree on the bank, and I couldn't see it through the murky water.

There was a danger of being swept into a tangle of logs downstream if I dived to get to the trap, but I know I would have tried if I had someone with me to give me courage. However, I was cold, nervous, and convinced myself that there was little probability of there being a caiman in the trap lying in the dark water. I left it there and went back to the comfort of the research center. The water had receded by the next day and I could retrieve the trap. There was no caiman, but a turtle had drowned in it because I was too frightened to dive at night. I was beginning to realize that you should never work close to the limit of your physical ability or your courage. You should always have a safety margin. If you don't, even if you don't pay the price, your study animals are likely to.



Photo 11.5 An Argentinian long-necked turtle, *Hydromedusa tectifera*, from Cardoso Island. Photo by Bill Magnusson.

Tereca would publish on the diet of broad-snouted caimans and Tim would lead a paper on their growth, but I ended up being involved more with another species of crocodilian in Rio Grande do Sul. African researchers were having a lot of success in captive propagation of Nile crocodiles, and they had developed recipes for doing so. Techniques for the captive propagation of caimans lagged far behind, and the lower value of their skins reduced potential profits. Tereca informed me that a farmer in Rio Grande do Sul had imported Nile crocodiles for captive propagation and sale of their skins.

I was worried. I knew that most of the species imported to Brazil in recent years, such as North American bullfrogs and African catfish, had not returned profits to most would be farmers, and the abandonment of raising facilities had led to their escape into the wild and associated environmental problems. In fact, the largest profits associated with any introduction for captive raising usually go to the first importer. The importer advertises that easy money can be made with the species, and earns a lot of money by selling brood stock or equipment to new farmers. There is of course no such thing as easy money, and most of these operations quickly go out of business. I imagined crocodile farms being abandoned all over Brazil, and what it would mean to have man-eating crocodiles inhabiting the major river systems of South America.

I mobilized the CSG, and we got more than 400 letters sent to IBAMA, including one from the President of Paraguay, asking for the cancelation of the import permits. However, as far as I am aware, no reply was received by anybody. I discovered that the President of IBAMA would be at a meeting at the Tropical Hotel in Manaus and went to find him. He was not attending the talks, but someone said that he had a room at the hotel. I knocked on his door and he apparently thought it was just room service, because he opened it

wearing only his underpants. I couldn't miss the opportunity, however, and asked for a minute of his time.

It took more than a minute for me to explain to him the seriousness of the situation, I sitting on one bed listing all the dangers, and he sitting in his underwear on the other nodding agreement. The meeting was hurried, but he seemed to get most of it right. The only thing I regretted was that I said that there could be a lot corruption associated with crocodile farming, and he later told others that I had said that the IBAMA agent who authorized the importation was corrupt, which I didn't. That agent was reprimanded, removed from his post, and has had a very cold relationship with me ever since.

The hotel-room meeting, combined with the letters, did not get the crocodiles sent back to Africa, but resulted in the Nile crocodiles being confined to the original farm. The owners were not allowed to extend the facilities or sell stock to other farms. They got around the first restriction by creating a zoo on the property. Zoos do not have strict restrictions on exotic fauna, but in any case the crocodiles could not legally be taken to other places in Brasil.

I started to advocate stronger restrictions on importation of exotic species to Brazil, and gave talks on the subject in any congresses that I could attend. When I left one presentation, I found Dr Kerr sitting outside and I was worried that he might have been offended because I had used the African bees as an example of unrestricted importations. However, he was his usual generous self, said that he agreed with everything I had said, and that I should continue on my crusade.

One of the congresses was in Porto Alegre, and Tereca looked after me while I was there. We visited the crocodile farm and the owners allowed us to see everything without restriction. The adults were in large outdoor pens with double fences, and the young animals were grown out in completely-enclosed

temperature-controlled sheds. I agreed with the owners that their security arrangements were very good, but could see that a major natural catastrophe, such as a subtropical cyclone or a flood could allow the animals to escape. Losing adults would probably not be an incurable problem because they could be hunted down. However, I knew that no-one was systematically surveying the waterways of Rio Grande do Sul at night, and hatchlings were difficult for untrained people to distinguish from caimans in the field. If a large number of hatchlings got away, there would be no way to find them all, and they would probably be forgotten until they were large enough to start breeding and eating people.



Photo 11.6 Bill and Tereca at the Zoology Conference in Porto Alegre in 1996. Photographer unknown.

I thought that I had reasonably good relations with the owners of the crocodile farm, considering the circumstances. However, hysteria was building about the crocodiles in Rio Grande do Sul. There were stories that the crocodiles had been used to smuggle in diamonds that were hidden in their

stomachs, and other equally improbable tales. I obviously used the local example in my talk, but I did not feel particularly aggressive, especially because the farm had been able to retain its operating permit. However, when Tereca took me to the airport after the meeting, she drove through back streets, and ended up taking twice as long to get to there as I had expected. When I asked why, she said that a price had been put on my head and it was best not to take any chances by using a predictable route while I was in the state. I didn't believe that I had a price on my head, but I was grateful for her concern over my safety.

The Nile crocodile farm was a success in terms of growing out the animals, but without being able to make profits by selling stock to other would be owners, it eventually failed economically. All the crocodiles were killed and their skins sold. Soon, nobody will remember the Nile crocodiles of Rio Grande do Sul, and the work done by Tereca, me and other dedicated conservationists in Rio Grande do Sul with the help of the CSG. Nevertheless, I suspect that our contribution to conservation of Brazilian crocodilians through the restriction on the importation of *Crocodylus niloticus* will far outweigh those resulting from any of our scientific publications.

