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TEXT AND PHOTOGRAPHS BY UWE W. PETERS

The world's first captive breeding and hatching of the Aldabra giant tortoise was the beginning of Taronga Zoo's successful programme of breeding endangered reptiles

THE DAYS OF the menageries are over. The modern zoo of the twentieth century, as well as people all over the world, have developed a more conscientious attitude towards conservation of fauna and flora. Or rather, they are worried about what is left of it. Zoos all over the world are getting more involved in valuable breeding programmes for animals that are threatened with extinction in their natural environment. In the sanctuary of a zoo the unfortunate creatures find refuge, and many species have been bred successfully in several generations. At Taronga Zoo we currently pursue such a programme with the endangered giants of South American iguanid lizards. But it all started four years ago with the world's first captive breeding of the Aldabra giant tortoise, *Geochelone gigantea*, from the Aldabra and Seychelles Islands in the Indian Ocean.

In 1947, Taronga Zoo imported a number of Aldabra giant tortoises, which at the time of their arrival were reported to be approximately 30 centimetres long. From 1967 to 1975 mating attempts had been observed; each year two females laid eggs but the eggs were cast out in the sand and were infertile. Obviously there was something wrong in the way we kept or fed the tortoises. After consultation with the Zoo's veterinarian in 1972, we planted grass in the sandy enclosure and changed the diet of the animals.

Finally, on 15th April 1976, one female laid a clutch of thirteen eggs — but instead of scattering them, this time she dug a hole in the sand 25 centimetres deep, in which she deposited the eggs. We immediately dug up the

A COMMON or green iguana breaks its shell and peers out into the world.

eggs and incubated them artificially. On the morning of 25th September 1976, after an incubation period of 162 days, two fully hatched Aldabra tortoises were running around in the incubator. They weighed a tiny 53 to 58 grams, compared with their parent's notable weight of 175 kilograms for females and 300 kilograms for males.

Over a period of twenty-one days, a total of nine tortoises hatched. The sixth baby was able to cut its shell and then died before fully hatching. Only in the second week of their lives did the hatchlings begin to eat. They devoured daily a variety of food — lucerne, various grasses, brawn, minced carrots, apples and capsicum as well as mealworms and fly pupae. Authorities on the breeding of the related Galapagos tortoises warned us that rapid growth in juvenile tortoises might result in serious shell deformities. In order to avoid this problem, we worked out a stable and nutritious diet as the babies approached the second or third month.

Their development has been satisfactory over the past years and we hope we have further positive news on this significant breeding success in about twenty years, when a new generation of zoo keepers will be breeding these babies in second generation.

IN THE MEANTIME our taipans, *Oxyuranus scutellatus*, classed amongst Australia's most venomous snakes, were breeding well and in a few years were in second generation. Within eight years we hatched and reared eighty-three taipans and were able to supply many other institutions in both Australia and overseas with the surplus offspring.

A pair of green iguana, *Iguana iguana*, from South America, which was sent to Taronga from the Los Angeles

Zoo in October 1968, started breeding in November 1973 and produced early in 1974 two young which hatched from eggs. With the growing age of the parent lizards, the number of fertile eggs and hatchlings began to increase. The following year we had six iguana babies, and in 1976, twenty-one of these lovely, bright green jewels. Again we supplied other eligible institutions with surplus and kept a stock of eight young iguanas, which are now breeding in second generation. They gave us fourteen healthy babies in 1979. In order to secure a strong colony free from inbreeding, we imported a freshly captured adult male. He settled in well, keeping his harem of four iguana ladies in line.

Encouraged by our success in breeding one of South America's large iguanids, we requested permission to import a breeding group of the massive, prehistoric-appearing rhinoceros iguana, *Cyclura cornuta*. These iguanas of the Dominican Republic are becoming very rare. Their numbers are diminishing rapidly because of their restricted range, growing civilisation, and domestic animals which are destroying the iguana nests, devouring their eggs and young.

Because of strict Australian quarantine laws and international regulations in the trade with endangered species (in which category the green and rhinoceros iguanas belong) it took a while to finalise an import proposal. The *Parque Zoologico Nacional* in Santo Domingo, impressed with our green iguana breeding report, agreed to send us one male and three females and finally, after the long road of red tape, our impressive rhinos arrived in Sydney in September 1978.

After being held in quarantine for a period, they were transferred to



Taronga's reptile department and went on exhibition in a newly designed outdoor enclosure. Similar to their natural environment, the exhibit was set up as a dry, stony landscape, with a few patches of grass and some cacti scattered around. In these surroundings the huge lizards soon settled down and displayed a nasty temper towards their keepers, unlike the herd of green iguanas which are completely tame. With hits of their strong tails, rhinoceros iguanas have been reported to put dents into metal buckets.

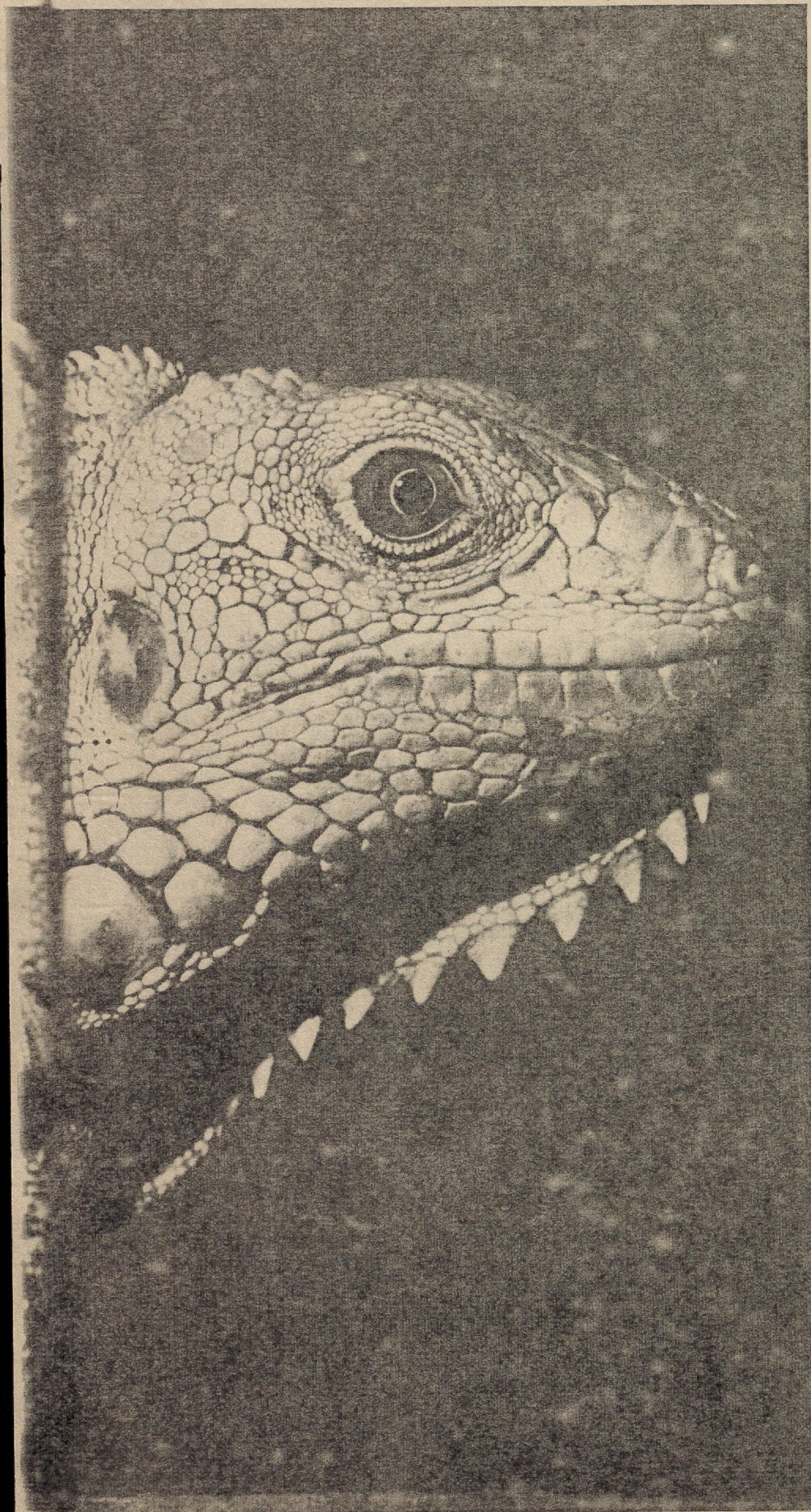
Two pairs of endangered Californian gopher tortoises, *Gopherus agassizi*, are sharing this enclosure. Although gophers originate from another part of the world, they prefer the same environment and were accepted by the lizards.

To simulate the rhino's tropical home in the Caribbean, we installed infra-red heaters in a shelter. These intelligent lizards quickly learnt to use the warm facilities and withstood the Sydney winter in perfect comfort and health.

On 15 December 1979, one female dug a shallow hole in the sand and began to lay fifteen eggs. A gopher tortoise, which inadvertently strolled too close to the nesting site, was pushed on its back by the iguana female. She then scattered another five eggs around above ground. In early January 1980 a second female scattered about sixteen eggs above ground.

All the eggs were taken away by the keeping staff, and artificially incubated in plastic bags lined with moist sphagnum moss. During the incubating, twenty-nine eggs turned bad; of these, twenty-two seemed to be infertile, and seven contained dead embryos in various stages of development. Imagine our excitement when we found, on 23 February, the first fully hatched rhinoceros iguana with a second risking an eye from the cut-open eggshell. Until mid-March a total of five babies hatched, one of which was comparatively small and weak and only survived three days. At this stage two more eggs are in the incubator and we watch proudly the development of our four future giants. This captive breeding is very significant, since it is only the fifth

THE AUSTRALIAN TAIPAN female laying its eggs. The total of this clutch was twenty-four eggs, all of which hatched after seven weeks' incubation.



breeding of rhinoceros iguanas in the world, the first outside the Americas and, of course, another 'first' for Taronga Zoo. We hope to achieve our goal to release future zoo-bred surplus of green and rhinoceros iguanas in their country of origin, hence making our contribution to the conservation of endangered wildlife.

IN TODAY'S TECHNICAL, modernised reptile husbandry, it is not unusual for large pythons to be bred in zoo reptile collections. Melbourne Zoo bred African rock pythons, *Python sebae*, and last year Bredl's Reptile Park, Renmark, South Australia, reported the hatching of a number of Indian pythons, *Python molurus bivittatus*. At Taronga Zoo too, a number of pythons have been bred during the past ten years. Although we had already bred some Australian species of this family, such as scrub python, *Liasis amethystinus*; water python, *Liasis fuscus*; and carpet python, *Morelia spilotes variegata*; until now, we could only report the breeding of one species of exotic pythons. The handsome African ball python, *Python regius*, only 1.5 metres long, surprised us in 1972. One pair was displayed and produced two hatchlings. Unfortunately the youngsters and their father died a year later, leaving us with a lonely female, still alive today.

Taronga's reptile department exhibits a pair of reticulated pythons, *Python reticulatus*. Reaching a length of almost 10 metres, this is the largest species of python; every self-respecting large zoo has this spectacular snake in its reptile collection. In late August 1979 the female suddenly started to lay eggs. Because none of the staff had observed the slightest mating behaviour, and the male was not quite two years old, we did not pay too much attention to this egg-laying display.

The male had hatched in New York's Bronx Zoo in 1977, and at the time of the egg-laying showed a length of approximately 4 metres. Large python species grow rapidly, if fed sufficiently. It has been observed that a mating of very young reptiles often results in a total, or very high, infertility rate.

Our female, however, was in a state

THIS PRIZED TARONGA-BRED male iguana is one year old. Two years later it became the father of our first second generation iguanas.

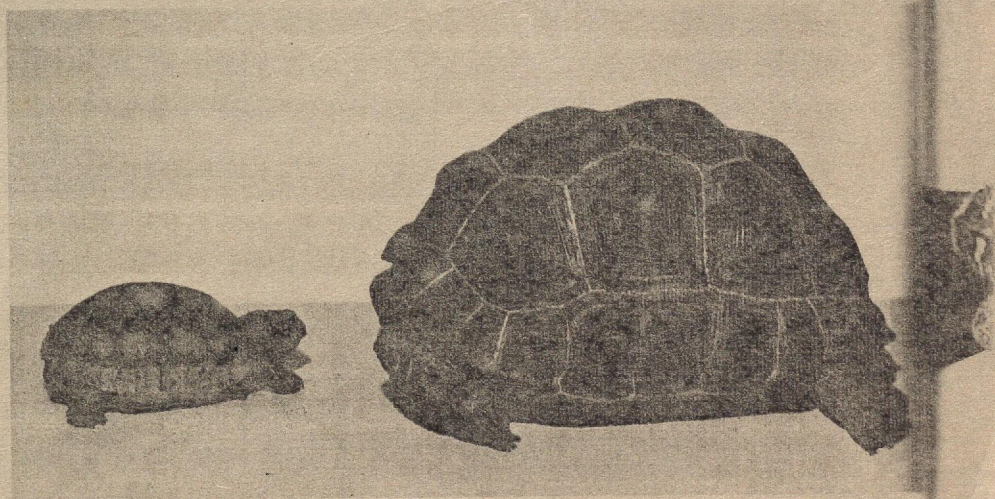
of nasty disposition and, in python fashion, coiled its body around the eggs, closing the top of the coils with its head. We later learned that she had laid forty-nine eggs with an average weight of 250 grams each. During the following weeks she remained motionless in the clutch of eggs. From the fifth week on she left the eggs for brief feeding or drinking periods. Around 8 November 1979 she clearly showed signs of discomfort and left the clutch of eggs, watching it from a short distance. Upon closer examination we noticed a cockroach infestation. Instantly, but nevertheless extremely carefully (the angry mother python was not very happy with our invasion of her privacy) we cleaned the eggs of the roaches. Then, anticipating that the very upset female would abandon the eggs, we carefully incubated them artificially.

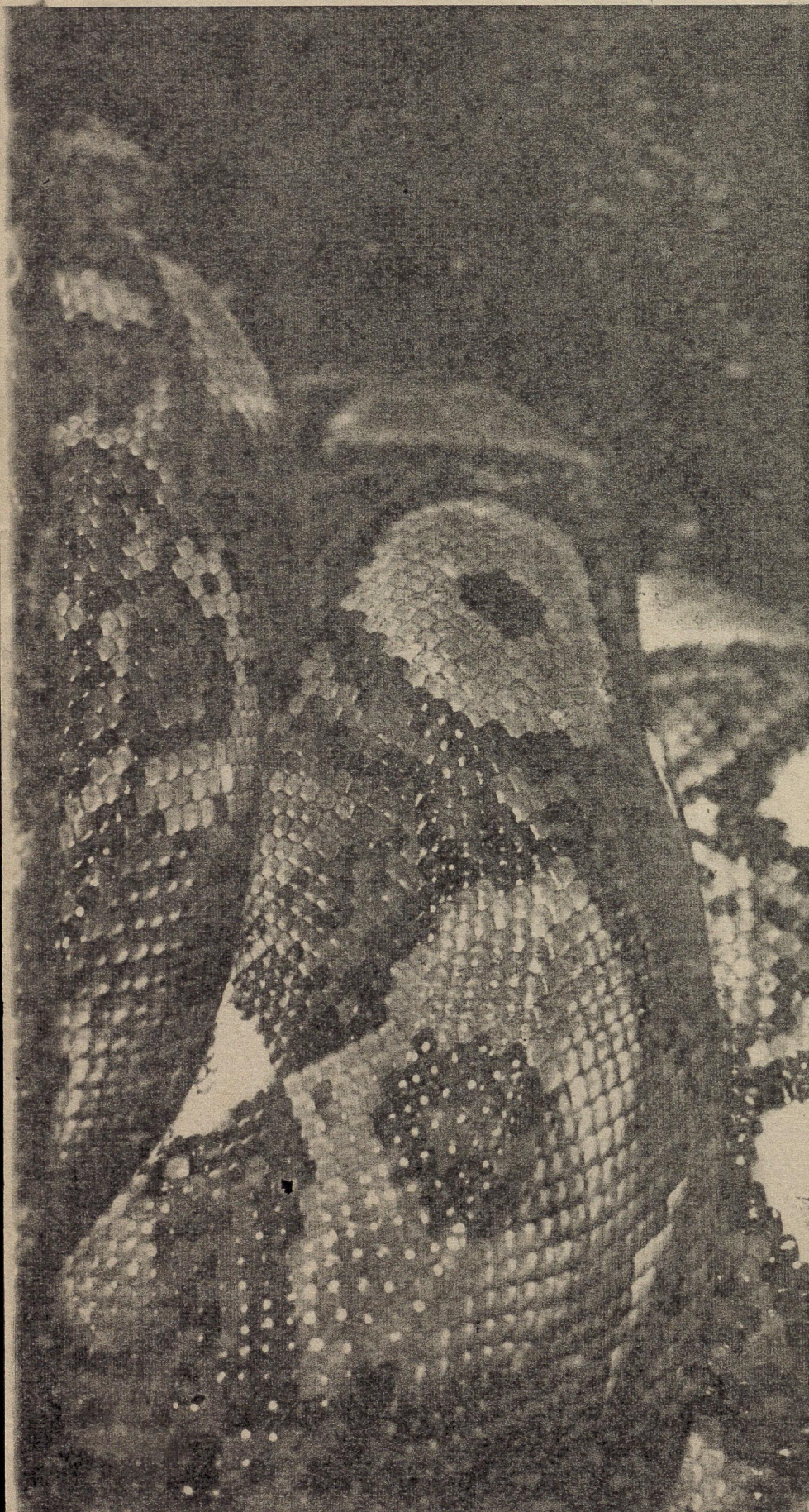
Only two days later, to our delight, the first little python slit open its eggshell and stuck its head out. But the next morning found the little fellow still in the same position, dead. Two more eggs were slit open. Finally, at 11.30 am on 12 November 1979, after an incubation of eighty-two days, the first vicious little snake hatched fully, trying to bite the hand that was to feed it at a later date. However, for us reptile cranks it was the most beautiful thing on earth. It only weighed 148 grams and was 714 mm long.

During the following ten days a total of thirty-three healthy python babies hatched. Every one of the remaining sixteen eggs contained dead embryos in different stages of development, thus giving this breeding a fertility rate of 100% and Taronga another 'first'. The theory that young reptiles lack fertility got a nasty dent.

The mob of youngsters is doing just fine. I call them 'mob' because that's how they behave: biting everything moving in their vicinity, trying to steal food from each other, and in short giving their keepers a good handful of

THE MALE ALDABRA tortoise (above) puts an impressive 300 kilograms on the scale. Pictured is the father of Taronga's successful herd of babies. Notice the difference in size between two tortoises (below left) aged one day and one year. Unlike the green iguana, the rhinoceros iguana (below centre) will try to bite, although only a few days old. At hatching, the juvenile reticulated python (below right) is 714 millimetres long, and weighs a mere 148 grams.





work. As they grow, we must dispose of most of these unexpected reptile children to other institutions. About half of them went on display for a children's counting competition, and it was not easy for the Sydney kids to count the number in a big ball of little pythons.

THE FINAL EVENT that took place in Taronga's reptile department was not a true breeding, but nevertheless an interesting story. On a sunny day in June 1979, officers from the Australian Quarantine Department arrived at the zoo. During their routine check on an incoming boat they had found an illegal shipment of live tortoises and a case with forty tortoise eggs from South Africa. It was the African soil, in which the eggs were neatly embedded, that really annoyed the Quarantine Department. Accordingly, we destroyed the soil, cleaned every egg of it, and washed and disinfected the eggs.

Unlike bird eggs, reptile eggs are not to be turned at regular intervals. It can prove fatal to the developing embryo if reptile eggs are handled or even turned, so, after the ordeal of the long sea voyage, the rough handling during washing, the turning and tossing they had received, we not very enthusiastically incubated the clean eggs.

After four months, on 20 October 1979, the reptile department received a message from Taronga's quarantine station that 'three leopard tortoises had hatched from the illegal eggs'. Everyone who had been involved in the tortoise-egg episode was thrilled.

In a time span of twenty-four days a total of fourteen cute little tortoise babies hatched and are thriving under Sydney's sun, eating well and showing sure signs of growth. We now know that the eggs originated from the species *Geochelone pardalis*, which is the African leopard tortoise.

At present we are incubating nineteen eggs laid by adult leopard tortoise females, which arrived with the questionable, although for us unbelievably successful, consignment from Africa. □

THE RETICULATED PYTHON hatching shown on the previous page, now three weeks old, displays a brilliant iridescent coloration.

German-born UWE W. PETERS recently retired as Supervisor of Taronga Zoo's reptile department in Sydney. He has worked as a professional herpetologist for the past 25 years in zoological institutions in Germany and the United States, and during that time has had numerous articles published.