

EDUCATION AND RESEARCH – THE “EL NINO” YEARS

FRIEDEMAN KÖSTER, 1981-83

Although a German citizen, Friedemann Köster, the next Director, had had years of experience of South America both as a schoolboy and as a nature conservationist. There was an interregnum of some months before he and his wife and children could take up residence and during this period David Duffy, the staff ornithologist, took charge of the Station.

There were significant changes at the CDRS during Köster's years, particularly in the related fields of education and scientific staff. Eugénia del Pino, a lecturer at the Catholic University in Quito, had pointed out to the CDF's Executive Council that, while the scholarships introduced by Kramer to enable Ecuadorean students to work at the station had marked an admirable advance in collaboration with the national universities, the scheme still fell short of the contribution that the Darwin Foundation was capable of making to Ecuadorean education and development. (*Noticias de Galápagos* No. 31). The difficulty was that the CDF lacked the funds to employ more international scientific staff to do the

teaching. Fortunately the state of the oil market produced a brief boom in the Ecuadorean economy and the government, anxious to promote scientific education, greatly increased its financial contribution: indeed, for a brief period it met more than half the expenses of the CDRS. While this bonanza lasted, the Darwin Foundation could afford to enlarge the Station's scientific staff to include a herpetologist, a marine biologist, a botanist, an ornithologist, an entomologist, an officer in charge of feral mammal control, a human ecologist and a co-ordinator of education. Each served for about three years. This strengthening of the resident staff enabled the CDRS to increase the number of its students and to improve the standard of teaching. More research could also be devoted to conservation. Contacts with the universities on the mainland grew closer. With the help of Gonzalo Oviedo, the education co-ordinator, environmental education in the Galapagos schools was re-organised and new text books provided.



Seminar in the Van Straelen (lecture & exhibition) Hall,
CDRS

Conservation projects which had been researched in previous years were now put into operation. To the general surprise, the campaigns to eradicate the dogs in key areas were completed in less time than planned. Thanks to the labours of the GNPS and CDRS teams, the dogs were virtually eliminated within two years both from the Conway Bay area of Santa Cruz and from the coast of Isabela. While it was not certain that no dog had escaped and there was no guarantee that domestic dogs would not turn wild in the future, the new situation clearly encouraged the release of some of the captive-bred land iguanas in their traditional habitats. Cats were still a threat to the young ones but risks had to be taken and careful monitoring showed that the risks were justified. (*Noticias de Galápagos No. 36*).

While the dogs were being brought under control, another holding project had also proved successful. As there was no space for them in the CDRS pens, 38 of the rescued iguanas were transferred to a tiny islet just off the coast of Santa Cruz, where it was hoped that they would be beyond the reach of the dogs. The GNPS wardens laboriously covered the islet with 90 tons of earth into which the iguanas could dig nesting burrows. The experiment prospered and the iguanas bred, thus providing another line of defence against the extinction of this community. Dogs never reached the islet but rats did, and they had to be eliminated.

A third population of land iguanas was also preserved in remarkable circumstances. In the 1930's there was an abundant and vigorous community on the arid island of South Seymour (now known as Baltra) but none on nearby North Seymour. This puzzled a visiting scientist, who transferred some 30 iguanas to the smaller island to see what would happen. What happened was that South Seymour became a U.S. military base and airfield during the Second World War and not a single iguana survived there, while those removed to North Seymour lived on to a ripe old age. Howard and Heidi Snell found that there were still some 20 of them remaining. They were breeding but the young were not surviving, presumably owing to local conditions. This meant that the population would eventually die out. So in 1981 a few of them were taken to the CDRS pens

where they bred and their young were successfully raised. The genes of the South Seymour - Baltra iguanas had been preserved but this left the problem of the future of the community; North Seymour was apparently an unsuitable habitat and it was doubtful whether the iguanas could be safely released on their ancestral island of Baltra in view of the radical changes that had occurred during the last half-century and the fact that it did not form part of the National Park. (*Noticias de Galápagos No. 34*).

The captive breeding of these three distinct populations of land iguanas was a notable achievement. Nothing comparable had been attempted anywhere else. There were many setbacks and much research and experimenting was needed before satisfactory incubating temperatures and humidities could be established. Great credit goes to Dagmar Werner for her initial intervention, to Howard and Heidi Snell for their years of basic scientific research, to Miguel Cifuentes of the GNPS and Robert Reynolds of the CDRS and their devoted staffs for the management of the programme.

After years of research, the CDRS finally went into action to save the dark-rumped petrel. Under the direction of Malcolm Coulter, the new staff ornithologist, Felipe and Justina Cruz zealously maintained a cordon of poison baits round a nesting colony in the rain-drenched highlands of Floreana. This method almost completely excluded the black rats from the area and 72 of the 100 nests fledged young. This was just one breeding colony on one island and the others were still at the mercy of rats and pigs (though no longer of dogs) but it did demonstrate that, given the manpower and the money, this splendid petrel could be saved from extinction.

Efforts by the staff entomologist, Yael Lubin, and her helpers to eradicate the introduced fire ants were not completely successful. These aggressive insects, which had a very destructive impact on the native terrestrial invertebrates, were carried from one island to another, concealed in people's clothes and food. Drastic methods were employed to prevent their spread and to stamp them out wherever they had established themselves, but it had to be accepted that the most that could be achieved was limited local control.

Luong Tan Tuoc, a CDRS staff botanist, cooperated with the GNPS team engaged on eradicating introduced plants and trees. Experiments were made with herbicides and arboricides and a scheme for the use of controlled fire was considered. This last method would need to be followed by the planting of rapid growing native trees, so nurseries were established. Luong's inventory of the flora of the archipelago and its species composition, besides contributing to botanical knowledge, revealed the alarming extent of the spread of alien plants and trees.

At long last a marine laboratory was installed under the staff marine biologist, Gary Robinson, who also continued the underwater explorations of Gerard Wellington and drafted detailed plans for the establishment of a marine park (*Noticias de Galápagos No. 37*). Together with Priscilla Martinez of the National Institute of Fisheries, he analysed the extent and reproductive potential of the black coral populations, which were being exploited for the manufacture of souvenirs for tourists. This and all other Galapagos corals had been badly affected by the climatic conditions of 1983.

All scientific and conservation activities, in fact all life in the Galapagos, were dominated by the extraordinary *El Niño* event of 1982-83 and its aftermath. *El Niño* is a frequent if irregular warm and wet weather phenomenon occurring about Christmastime. On this occasion it was not only much more intense but it was also prolonged for months. There was no parallel in recorded history though comparable events had doubtless taken place in earlier centuries. The rhythm of nature was disrupted. The rainfall measured at the Darwin Station during the 9 months of *El Niño* was 3264 mm, compared with the average annual figure of 254 mm. Deserts became lakes and muddy torrents rushed through the cactus zones. The tortoises left the even wetter uplands and stayed down on the coastal plains for months. Many plants flourished abnormally with the extraordinary rains and, in consequence, insects and land birds did likewise. Finches produced five, even six broods in the season and early broods bred themselves in their first year.

But the animals that depended on the sea were

decimated. Boobies, albatrosses, flamingos, gulls and other ground-nesting sea birds had their nests flooded out and all species that derived their food from the ocean were faced with starvation as the water temperature rose by 4-8 degrees C. and no longer produced the usual nutrients. Those birds that could fly left the islands, but some could not. Half the flightless cormorants and three quarters of the little Galapagos penguins died. Gulls, boobies and cormorants regained their numbers gratifyingly quickly but the recovery of the penguins was long delayed. The marine iguanas suffered severely as the particular algae on which they largely depended disappeared from the sea: up to 90% of the year's hatchlings died, while overall mortality varied between 45% and 70% on different islands. The sea lions' numbers were greatly reduced and the fur seals lost nearly all the young born in the four years 1980-83 and possibly 30% of the adult population. It seems quite probable that if this climatic catastrophe had occurred in the 1920's or 1930's, when their numbers were dangerously depleted, the endemic Galapagos fur seals would have become extinct. They survived this crisis because years of protection had increased their numbers to the point where they could bear the abnormal stress.

There was little that the conservationists could do to cope with the crisis but for the long-term researchers this cruel event was an exceptional scientific opportunity. (Not for all scientists however: some simply had to abandon their projects). Fritz Trillmich had been studying the fur seals for several years and so had the experience on which to base a comparison of population fluctuations before, during and after the disaster. Andrew Laurie was actually engaged on a three year study of the population dynamics of the marine iguanas and his project was extended to six years so that he could assess the effects of the *El Niño* event and the reaction of the iguanas to the disaster. At the "normal" rate of reproduction, which he had already established, it would have taken decades for their numbers to recover, but this was countered by a remarkable increase in fertility once the surviving iguanas were restored to fitness. Laurie's research provides a firm basis for policies for the future preservation of this

peculiar Galapagos species.

Since 1971 Ole Hamann had been investigating the dynamics of the Galapagos vegetation by monitoring permanent study quadrats on various islands. The *El Niño* phenomenon caused a spectacular change in the structure and composition of the Galapagos vegetation when herbaceous species flourished and woody species and cacti died. The study of these changes complements the research conducted over the years on the recovery patterns of vegetation after the eradication of feral goats on several islands and so contributes to our understanding of the functioning of the Galapagos ecosystems, which is fundamental for managing and conserving the unique biota of the archipelago.

Peter Grant was leading a group of colleagues in a very longterm investigation of the finches and they had already compiled a vast amount of statistical information before *El Niño* struck. The rains led to the unprecedented population explosion which they recorded in detail. *El Niño* was then followed

by a prolonged drought and a shortage of food, which savagely reduced the finches' overswollen numbers. This conjunction of exaggerated expansion and contraction provided an opportunity, unlikely to be repeated for generations, to study how extreme conditions affect survival and the evolution of species and it could throw light on some of the factors governing natural selection.

The Charles Darwin Foundation published in Quito a volume of 30 articles on the 1982-83 *El Niño* event, edited by Gary Robinson and Eugénia del Pino, half in Spanish, half in English.

Friedemann Köster ended his period as CDRS Director in December 1983 but he did not leave the islands immediately. He and Sylvia Harcourt, a staff ornithologist, joined with Dieter and Mary Plage, a distinguished camera team, to make a series of five one-hour films for Anglia Television's "Survival" series. They devoted three years to this task, and their films gave to millions a comprehensive picture of Galapagos wildlife and the measures being taken to conserve it.



Miguel Castro, the first Conservation Officer,
gives a Natural History Lesson

Photography by Sven Gillsäter