MARINE IGUANAS SUFFER AS EL NINO BREAKS ALL RECORDS

by

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Among the consequences of the unprecedented severity of the El Niño event of 1982-83 has been the disappearance of most of the algae such as *Ulva, Spermothamnium, Centroceras* and *Gelidium* on which marine iguanas normally feed. The intertidal and subtidal zones have been colonised by several new species including *Giffordia* sp., with disastrous results for the iguanas. The change in algal flora coupled with extremely high sea levels and heavy swells, which restrict access to the feeding grounds, have been accompanied by massive mortality of marine iguanas on all the islands, although there are differences between islands in both overall and age-specific mortality rates.

Almost all animals are under weight and in some populations on Fernandina there has been almost 50% mortality: at Cabo Douglas in June we picked up 400 carcasses along 800 metres of coastline. Where there is little intertidal feeding but mainly subtidal feeding by diving as at Caleta Webb (Isabela) adult mortality has been light but juvenile mortality very high. On the other hand, on Santa Fé, where most of the feeding is intertidal, both juveniles and adults have suffered heavily. About 40% have died and there has been a mean 30% weight loss among the surviving adults over the past twelve months. Most juveniles have not suffered actual weight loss but, compared with their normal annual weight increase of 35%, the mean annual weight increases this year of 3-5 year olds was only about 8%. Hatchlings normally more than double in weight during their first year (mean: 110% increase) but the mean weight increase of the 1982 hatchlings after one year was only 65%.

Autopsies of dead animals have revealed stomachs either completely empty or containing the largely undigested remains of the new species of algae mixed with items of carrion such as pieces of dead crabs, sea lions and iguanas, and earth and stones. The new algae seemed difficult to digest: they had hardly changed in appearance as they passed through the digestive tract, and the faeces, which are normally liquid and amorphous, were dry and fibrous, with food remains readily identifiable. Whether toxins active against the iguanas themselves or against bacteria or protozoa in the hind gut are responsible remains to be discovered by analysis of specimens of the algae, stomach and intestine contents, and faeces. Fixed specimens of iguanas which died in these circumstances are being examined in detail at the Royal College of Surgeons, London, to discover the exact cause of death. Some animals had particularly heavy loads of the trematode parasite *Iguanacola navicularis* in the gut, but this is unlikely to be a primary cause of death. Bones from more that 1000 dead animals on 10 different islands have also been collected in the hope that, as has already proved possible with temperate reptiles, their ages can be determined from annual rings visible in stained, decalcified sections. If successful, this will obviously be of immense importance for the study of population dynamics.

El Niño has taken a severe toll and although it was sad to see iguanas, many of them known individuals, dying, day after day, it has been a unique opportunity to study a natural disaster and its effects on the populations. The 1982-83 El Niño has not been matched for at least 100 years and in recent El Niño years there have been no records of mass mortality of marine iguanas, despite the presence of biologists working in the islands. It has been tremendously exciting to be in Galapagos during such an exceptional year after seeing the islands in two normal years beforehand, but the value of the study would be disproportionately increased by extension now for a fourth year to observe the recovery of the populations and the effects of El Niño on the next breeding season.

There are now (July 1983) signs that conditions are returning to normal: the sea temperature is dropping, and on Santa Fé the swallow-tailed gulls have returned and started nesting after a long absence. I hope to return to Galapagos in October to see which iguanas, in relation to age and breeding history, survive this year's exceptionally severe conditions and to determine the breeding success of the survivors in comparison to previous years. Such information is not only of purely scientific interest, but of vital importance for conservation. On islands without introduced predators there is no danger of extinction but, on islands where cats still kill large numbers of juveniles, this year's high natural mortality could prove critical to the survival of some populations.

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