THE STATUS OF THE PINZON ISLAND GIANT TORTOISE

by

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INTRODUCTION

More than any other animal, the giant tortoise (*Geochelone elephantopus*) symbolizes the Galapagos Islands, from the inspiration for the name to the focus of current conservation efforts. Once numbering in the hundreds of thousands, they have been depleted to the point where only 3 of 11 surviving taxa can be considered naturally self-replacing (MacFarland *et al*, 1974a). In 1959 the giant tortoise was afforded protection by the establishment of the Galapagos National Park and, in recent years, the status of all but one of the populations has improved as a result of the aggressive conservation program carried out by the Galapagos National Park Service (GNPS) in collaboration with the Charles Darwin Research Station (CDRS).

The Pinzón (Duncan Island) population has been the subject of considerable attention and it is instructive to briefly review its history before discussing the current status in order better to judge how far we have come and what remains to do.

HISTORY

Pinzón is a low (457m), dry and relatively small island (18.05km^2; Wiggins and Porter 1971). Centrally located in the archipelago between Isabela, San Salvador and Santa Cruz, it offered little as a source of fresh water, wood and good anchorage, essentials for the whaling ships that began frequenting these islands in increasing numbers from the end of the 18th century (Townsend, 1925). The depredation of tortoise populations for fresh meat supplies by these sailing ships was initially incidental to finding a safe anchorage at which to affect repairs and to replenish water and wood stores. Floreana and San Cristóbal were the first to suffer major exploitation. Pinta and Española, the northern and southern-most tortoise islands, also suffered exploitation as the first landfall of ships coming north after rounding Cape Horn or those returning from the northern Pacific whaling waters but neither has a reliable source of fresh water. By 1850 the Floreana population was probably extinct and that on San Cristóbal eliminated from the inhabited end of the island. As it became difficult to get a full load of tortoises on these islands the mariners increased the pressure on the populations of the lower and drier islands. In less than 60 years the Pinzón population was reduced to rarity.

The Pinzón tortoises (*G.e. ephippium*) are relatively small (adults curved carapace length (CCL) = 60.97cm; Santa Cruz adults CCL = 75-150cm) and light (adult maximum weight 76kg; Santa Cruz adult max. wt. 290kg); this was a disadvantage as the whalers preferred tortoises that could be carried by one man. The island is small and it is possible to walk from the landing to any part of the island and return in a few hours. The vegetation is Arid Zone (Wiggins and Porter, 1971), more open, offering less concealment than on the moister islands. These facts encouraged the collection of large numbers of tortoises and it was only the collapse of the whaling industry in the latter part of the 19th century that prevented the extinction of the Pinzón population.

In 1970 the Pinzón population was thought to consist of 150-200 adults (MacFarland and Reeder, 1975). Black rats (*Rattus rattus*) were introduced to Pinzón before 1891 (the date they were first recorded; Patton *et al*, 1975), preying heavily on hatchling tortoises to the extent that it was thought that virtually no recruitment had occurred this century (MacFarland *et al,* 1974a). The CDRS began collecting eggs from natural nests on Pinzón in 1965/66 and transferring them to the Darwin Station on Santa Cruz for hatching and rearing of the young until they were big enough to be safe from predation by rats. In December 1971 the first group of captive-raised tortoises was repatriated and each year since then another group has been released on Pinzón.

CURRENT STATUS

Our observations on Pinzón were made from 3-23 July 1982. Searches were concentrated in those areas where station-raised tortoises were released (MacFarland and MacFarland, 1972; MacFarland *et al*, 1974b). Tortoises were identified using the National Park Service numbering system (Thornton, 1971), weighed, measured and the location recorded. Information on the previous captures made by the wardens was obtained from National Park records. Sex determination was made using the extent of concavity of the plastron, length of tail and position of the vent on the tail. If there was any doubt on the sex of smaller tortoises they were listed as immature.

Of the 85 tortoises encountered, 62 were captive-bred repatriates. They ranged from 22.0 — 86.0cm curved carapace length (CCL). Females ranged from 56.5 — 80.5cm CCL and males 76.5 — 86.0cm CCL. Native-born tortoises ranged in size from 34.0 — 97.0cm CCL with females from 59.6 — 66.0cm CCL and males 74.5 — 97.0cm CCL.

The sex ratio of identifiably mature repatriates was 0.63:1.00 males to females. For native tortoises on Pinzón the sex ratio was 2:1.

The first group of repatriates, the 1965/66 year class, was composed of 29 tortoises of which 19 were observed in 1982. At the time of release they ranged in size from 25.0 — 37.0cm CCL ($\bar{X}$ = 17.4) and in 1982 from 64.5 — 77.5cm CCL. This group was reared at the Station in outdoor pens for 4.1 yrs. before release. In contrast the 1970/71 year class, composed of 11 tortoises of which 9 were seen in 1982, was raised in the temperature-controlled tortoise house under more constant conditions and released at 3.2 yrs. and a $\bar{X}$ = 26.6cm. The 1970/71 class grew faster, reaching a larger size more quickly ($\bar{X}$ = 22.6± 3.4cm CCL, 2.10 yrs.) than did the 1965/66 class ($\bar{X}$ = 17.4± 1.6cm CCL, 2.8 yrs.). However, after release the 1965/66 class grew more rapidly achieving greater size sooner ($\bar{X}$ = 51.9± 3.0cm CCL, 7.1 yrs.; $\bar{X}$ = 68.3± 3.4, 11.4 yrs.) than the 1970/71 class ($\bar{X}$ = 55.4± 4.5cm, 11.6 yrs.). The 1970/71 class experienced a period of at least 10 months immediately following release during which no growth occurred. In contrast the 1965/66 class had ininterrupted growth. The 1965/66 class was released in December 1970; the 1970/71 class in March 1975. Meteorological data for these periods shed no light on the discrepancy in growth.

No reproductive behaviour was observed among the repatriated animals with the exception of an adult native male attempting to mount a medium-sized immature repatriated tortoise of undetermined sex. Secondary sexual characteristics were identifiable on tortoises 16 year old (1965/66 class); sex could not be determined on most of the younger tortoises. The age of first reproduction for the Pinzón race of tortoise is not known but females of the captive-bred 1965/66 class are larger ($\bar{X}$ = 72.5cm) than the native females $\bar{X}$ = 62.2cm) which are supposedly in excess of 80 years old and still reproductively active (MacFarland *et al*, 1974x).

Recently it was discovered that sex determination in many species of sea turtles is temperature-dependent (for review see Bull, 1980); for example, eggs incubated at low temperatures in the normal range develop predominantly one sex while high temperatures produce the other; intermediate temperatures produce intermediate sex ratios. It has been suggested that some incubation procedures for sea turtle eggs may be producing an abnormal percentage of one sex (Morreale *et al*, 1982). Galapagos tortoises have not been shown to exhibit temperature-dependent sex determination but it is likely that they do. The eggs of all endangered populations are incubated at the station (MacFarland *et al,* 1974b) and concern has been expressed by some scientists that skewed sex ratios may be produced or even monosexual broods (Reynolds, pers. comm.). MacFarland *et al* (1974a) reported 36% males for mature Pinzón tortoises and ranging from 20% to 70% in the populations of other islands. We found 39% males for sexable repatriated tortoises. It is not clear what a normal sex ratio for this population would be as the ratio for mature animals certainly reflects the impact of historical and recent disturbance (e.g. 19th century sailors tried to collect tortoises that one man could carry, usually females; Snow, 1964). What is important at this stage is that current incubation methods at the Darwin Station are producing both sexes in nearly equal proportions.

It is of considerable interest that 3 tortoises were observed with number codes notched in the shell that indicate they are native tortoises and of a size that would place them at 5-10 years. Misnumbering is a possible explanation and cannot be discounted, but MacFarland *et al* (1974a) also reported finding a one-year old tortoise in the nesting area. So it seems clear that natural reproduction and recruitment has occurred on Pinzón in the last 10 years, admittedly at a trivial level; nonetheless it represents a potential. It is calculated that from 1964-1974 7,000-19,000 hatchlings were produced on Pinzón and subsequently destroyed by rats (MacFarland *et al*, 1974a), a massive potential for recovery of population levels if only the rats can be controlled.

SUMMARY

The success of the captive-raising program in getting rat-proof tortoises back onto Pinzón is unqualified. These tortoises behave similarly to juvenile tortoises on San Cristóbal and Santa Cruz and have demonstrated good growth records, approaching full adult size. They are assuming the saddleback carapace shape characteristic of their population. Secondary sex characteristics have appeared indicating that the incubation process is not producing individuals of only one sex. The final parameter of reproductively active repatriated tortoises has not yet been observed.

THE FUTURE

A promising development is the discovery of a non-toxic chemical compound 300X more bitter than quinine. Tests are presently being conducted to determine its suitability for use in protecting nests and hatchlings from rat molestation. Continued monitoring of the repatriated tortoises for reproductive behaviour and success is needed. Aggressive inquiry into the use of non-toxic chemical repellents to protest nests and hatchlings from rats should be pursued.

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