

5.7 Giant tortoises:

a) Husbandry and duty of care:

An assessment was made of the health and husbandry of the giant tortoises at Plantation House. Advice was sought from curator Tim Skelton¹ of Bristol Zoo, UK, and Dr Justin Gerlach² of the Nature Protection Trust of Seychelles and a report produced. The full report can be found on file at ANRD, and a condensed version in Appendix 4. Attention is drawn to **the recommendations**, notably:

1. That routine care of the gardens of Plantation House and of the tortoises is included in the job description of the Governor to avoid ambiguity and confusion;
2. That the Vet and Livestock Section of the ANRD, in cooperation with the resident Governor, is made to have a duty of care for these animals, and to monitor their husbandry and well being. This is on the basis that the tortoises are a national asset owned by the nation, and that the ANRD provides the government veterinary service.

b) Identification:

A by-product of this investigation was the interesting discovery that Jonathan, estimated to be between 170 and 200 years old, may be extremely rare. There are two distinct populations of giant tortoises in the world: those of the Galapagos archipelago, and those of the scattered islands of the Indian Ocean. Of the many species of giant tortoise that used to exist in the Indian Ocean, all but one have been made extinct by mariners harvesting the tortoises as portable fresh meat. This was considered to be the case until 1997. Until now it has been assumed that all five giant tortoises belong to the one Indian Ocean species still populous in the wild, the Aldabra Giant Tortoise, *Dipsochelys dussumieri*.

In 1997 the Nature Protection Trust of Seychelles launched a worldwide search of private and public collections, and rediscovered two of the species formerly considered extinct, the Arnolds and the Seychelles Giant Tortoise. Dr Justin Gerlach has provisionally identified Jonathan as an example of the latter, *Dipsochelys hololissa*. As such he is a solitary example of a handful of survivors left in the world. This is achievable simply because the extreme old age of Jonathan takes him back in history.

Identification is based on measurements of the scutes (shell plates) and the suture lines (joins) on the plastron (underside of shell case). David and Jonathans' measurements and Dr Gerlach's identification chart³ are to be found in Appendix 5. David's figures are being checked by Dr Gerlach but he is most likely to be an Aldabran. As a note of interest, one of the females (Frederika?) is missing a plate called the nuchal scute, a central shield above the head. This is supposed to be the identification feature of a Galapagos tortoise. Photographs have been taken to check general morphology to confirm or deny this.

The existence of these different species is subject to vigorous debate since they were identified as such before the development of DNA testing. In a personal communication Dr Colin McCarthy⁴ of

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² Dr Justin Gerlach, Scientific Co-ordinator - Nature Protection Trust of Seychelles, 133 Cherry Hinton Road, Cambridge, CB1 7BX, UK. Researcher at the Department of Zoology, Cambridge University jstgerlach@aol.com

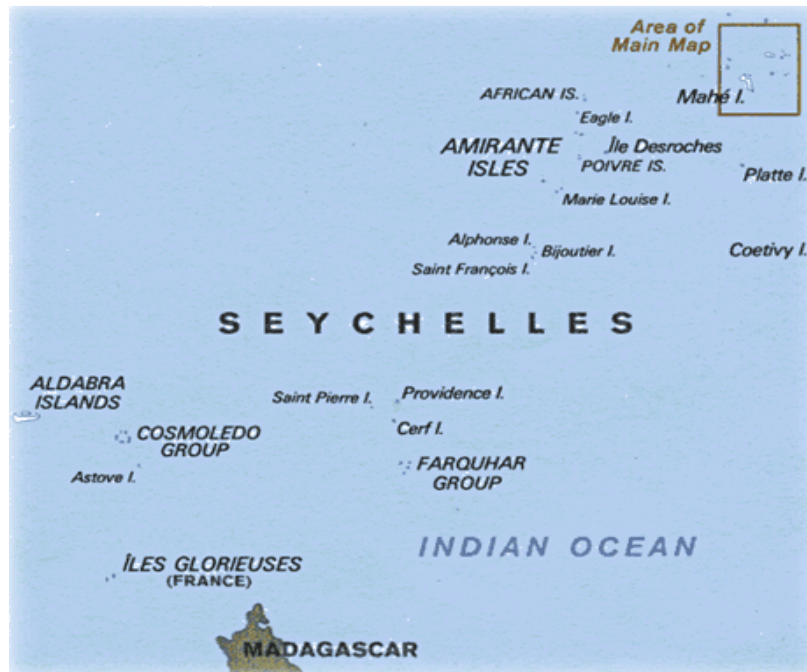
³ Also to be found at: <http://islandbiodiversity.com/tortid.htm>

⁴ Dr Colin McCarthy, Dept of Zoology, The Natural History Museum, London SW7 5BD C.McCarthy@nhm.ac.uk

the Natural History Museum, London, quotes a paper published in 2003⁵ which, quote: ‘...found that the genetic variation between Aldabra and Seychelles tortoises was negligible and concluded that they belonged to the same species’. Dr Gerlach himself was a co-author of a paper⁶ publishing research into mitochondrial DNA sequences, a cooperation between Yale University, USA and Cambridge University, UK, which states as its conclusion: ‘We found no variation in the mitochondrial control region among 55 individuals examined... pointing to the survival of just a single lineage of Indian Ocean tortoises’. However, Dr Gerlach is the first to agree that the species debate is valid. The Aldabran atoll is several hundred miles from the main Seychelles island group and has only been in existence for 10,000 years, barely enough time to produce a new species from the parent stock.

Finally, it should be borne in mind that the life expectancy of a giant tortoise is approximately 150 years or thereabouts, and that Jonathan must be reaching the end of his natural term.

Map 1: Illustrating the relationship between the islands groups on the Seychelles⁷.

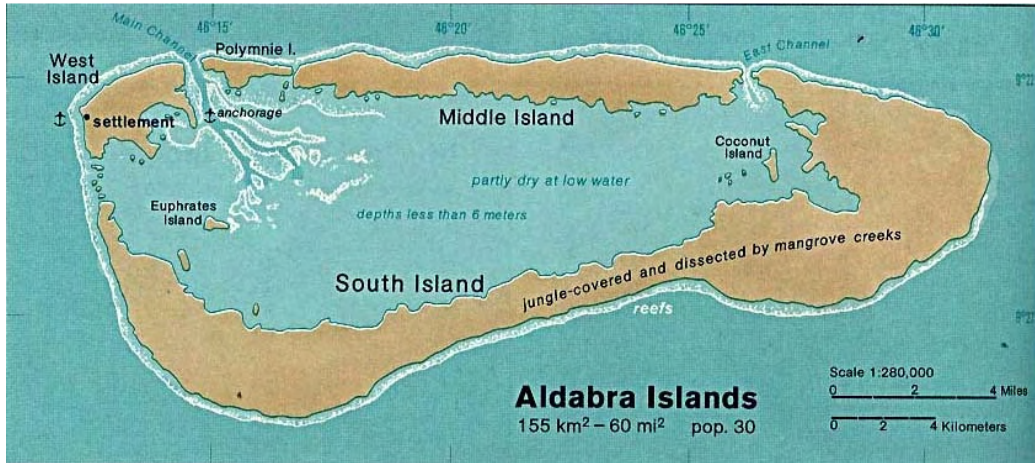


Map 2: The Aldabra Islands, part of the Seychelles group¹⁴.

⁵ Austin, Arnold & Bour (2003) *Molecular Ecology* 12 pp.1415-1424

⁶ Palkovacs P, Marschner M, Ciofi C, Gerlach J & Caccone A *Are the native giant tortoises from the Seychelles really extinct? A genetic perspective based on mtDNA and microsatellite data*

⁷ Tourism website



It is recommended that this identification, backed by data in this report, is used in publicity material to promote St Helena tourism. Ultimately it may be that the Seychelles Giant Tortoise can only be considered a breed or a sub species, rather than a species. Nonetheless it does not invalidate Jonathan's rarity either as a rare breed or a member of an historical classification of a species.

Appendix 4 Giant Tortoise Report

AN ASSESSMENT OF THE CARE AND HUSBANDRY OF THE GIANT TORTOISES AT PLANTATION

Introduction:

A full assessment was made of the care and husbandry of the giant tortoises at Plantation.

There are two distinct populations of giant tortoises in the world: those of the Galapagos archipelago, and those of the scattered islands of the Indian Ocean. Of the many species of giant tortoise that used to exist in the Indian Ocean, all but one have been made extinct by the depredations of man: mariners harvesting the tortoises as portable fresh meat. This was considered to be the case until 1997.

There are five tortoises at Plantation, 2 males, Jonathan and David, and 3 females, Myrtle, Frederika and Emma. All five, it has been assumed, belong to the one Indian Ocean species still populous in the wild, the Aldabra Giant Tortoise, *Dipsochelys dussumieri*.

An investigation was made into the feed available and the species requirements. Two sources of information were used:

1. Tim Skelton M.Sc., Curator of Reptiles & Amphibians, Bristol Zoo Gardens, Clifton, Bristol, BS8 3HA;
2. Dr Justin Gerlach, Scientific Co-ordinator - Nature Protection Trust of Seychelles, 133 Cherry Hinton Road, Cambridge, CB1 7BX, UK. Affiliated Researcher at the Department of Zoology, Cambridge University.

In 1997 the Nature Protection Trust of Seychelles launched a worldwide search of private and public collections, and rediscovered two of the species formerly considered extinct. Dr Justin Gerlach has provisionally identified Jonathan as a member of one of them, the Seychelles Giant Tortoise, *Dipsochelys hololissa*. As such he is a solitary example of a handful of survivors extant in the world.

Husbandry and diet:

A summary of the advice given follows:

Regarding grass, length, and other leafy foods:

TIM SKELTON:

- ‘...As a rough estimation, I would say that ours [Aldabran tortoises] can eat a kilo or two of hay and grass mix each day...’
- ‘...Ours will also graze the grass in their paddock to a height of just a couple of cm [or less] quite easily since their beaks can graze very close to the ground...’
- ‘...Ours certainly won't eat the grass if it is allowed to get more than about 30cm long...’
- ‘...Coarse green "weeds" and dry[ish] grass are sufficient...’
- ‘...grass that is too rich is probably too much for these animals...’
- ‘...Regular cutting of the grass may actually be promoting fresh growth and more nutritious shoots...’
- ‘...They have evolved to thrive on a very sparse diet of the vegetation of the Seychelle Islands...’
- ‘...Perhaps you could encourage your tenant to leave some small areas of longer grass, at least to encourage the growth of some native broadleaf species that the tortoises might enjoy...’
- ‘...If you want to supplement with anything, use native green "weeds" [We use dandelions, soft thistles, some browse from trees etc. Leafy green chicories are a good source of nutrients also....]...’
- ‘...We also provide ad-lib good quality hay...’

DR JUSTIN GERLACH:

- ‘...Diet - a varied diet of plant matter is good... High vegetable protein is not a problem as long as the plants are also calcium rich...’
- With reference to the presence of Kikuyu (*Pennisetum clandestinum*) and Matt grass (*Stenotaphrum secundatum*) in the paddock: ‘...the grass sounds good as they do eat quite a bit of *Stenotaphrum dimidatum* in Seychelles, although I dont have any records of them eating *Pennisetum*...’
- ‘...Aldabra tortoises are largely grazers but the Seychelles ones (*ref: Jonathan*) like quite a variety of leaves (shrubs, trees and especially creepers)...’
- ‘...Long grass tends to stay long and they seem to prefer to graze from shorter grass where possible, 5cm sounds good...’

Regarding the feeding of supplements:

TIM SKELTON:

- ‘...The occasional treat of vegetables such as a carrot, peppers or some celery sticks once a week...’
- ‘...one thing is for certain, they shouldn't be given lots of supplementary food eg, fruits and veg...’
- ‘...I should reiterate though, not to feed them banana, tomatoes or any such commercially available fruit. It is just not good for them except as a seasonal treat once or twice a year. Otherwise, may result in upset stomach and/or excessive shell growth...’
- ‘...In fact, I doubt than any supplements [fruit/veg], apart from a bit of fresh hay from time to time, would ever be required given the size of this paddock. Perhaps some edible leaves from time to time...’

DR JUSTIN GERLACH

- ‘...fruit only as an occasional item...’

Regarding the provision of water:

TIM SKELTON:

- ‘...They also like to bathe and should be provided with a pool large enough for them to get completely in for a soak.....Will help them to keep hydrated and reduce the possibility of formation of stones...’
- ‘...I guess that there is always a shallow pool or some other form of bathing water available?...’

DR JUSTIN GERLACH:

- ‘...We always ensure ours have plenty of water...’

- ‘...On Aldabra they can manage without water for a long time although they do like it if available. The Seychelles tortoises (*ref: Jonathan*) naturally have water available all the time...’
- ‘...Being able to bathe in water (or mud) is important to them for thermoregulation (they will go in water if too hot or too cold) and probably for removal of any parasites...’
- ‘...I would strongly advise that you provide water for drinking and somewhere they can wallow...’

Summary:

- The giant tortoises are primarily grazers, evolved to survive the sparse dry conditions of the sun baked Indian Ocean islands.
- In their natural environment they would have little if any access to fruits and vegetables except chance discoveries (David was observed swallowing a Brazilian Guava whole).
- Excessive kindness through the over-supplementation of rich foods can be damaging. Supplements should be limited to perhaps weekly, and it is suggested vegetables rather than fruit.
- Other leafy plants such as chicory, thistles, dandelions, and native broad leaf species, plus leafy shrubs and bushes are considered good.
- In the UK winter, consumption of feed halves and the grass is supplemented with good quality hay. In St Helena temperatures are still moderate and grass growth slowed but not static, so the provision of hay is of dubious necessity.
- They dislike long grass (over 30cm), and will happily graze short grass down to 1 or 2 cm.
- A water bath is a must.

Examination of the paddock:

A visit was made and the paddock grass examined to assess quality.

The periphery of the paddock is long grass. In the mown area the depth of grass when pressed down with a ruler was approximately 5cm to the roots. This consists of an upper roof of lush shoots formed in rosettes from the cut stems, and a deeper zone of coarse widely spaced stems over a bed of dead mulch.

An area was raked open to reveal the rank underlayer and lift the coarse dead matter. The green vegetation was then scythed off and the percentage of live to dead matter estimated by methodically separating the two and weighing.

The sample weighed 920gms, of which 610gms was discoloured dead matter and 310gms green live matter, a ratio of almost exactly 2:1.

The only apparent water provision at the time was an old stock trough by the kissing gate, reached by a short concrete ramp. It has a raised concrete edge, and is a vertical tank 42cm deep, 65cm wide and 120cm long. It was stagnant, and when baled out, found to contain tadpoles and a sediment of rotting leaf matter.

Discussion:

General:

The purpose of this analysis is to safeguard the welfare and enhance the longevity of these rare and valuable animals.

It is a fact that Jonathan is now extremely aged, and that sooner rather than later he will die through natural causes. At the moment he appears to be thriving, grazing regularly and mating heartily on a frequent basis, but every step should be taken to prolong this state of well being. Tortoises are relatively closed to clinical examination, and deterioration can be gradual, insidious and culminate in an apparent rapid decline.

In addition, the giant tortoises set against the splendour of Plantation are an important tourist attraction. The fact that Jonathan may also be a member of an almost extinct species, the Seychelles Giant Tortoise, as opposed to the relatively numerous Aldabra Giant Tortoise, gives him additional pulling power.

Grass length:

It is apparent from the advice received that there is no one length of grass that will either debilitate the tortoises or make them thrive. What is being sought is an appropriate compromise on grass length that falls well within the safe zone of adequate length.

The advice from the UK on grass length will have been based on varieties of finer bladed paddock grass, and a direct comparison with matt grass and Kikuyu should therefore be made with caution. In addition the fact that underlying these coarser grass varieties there was found to be a rank zone of dead mulch further compromises the calorific value of the 5cm found. This has probably arisen through repeated mowing without grass collection, so that the cut blades settle between the stems and blanket the ground. Although probably good for continued grass fertility - as it is returning organic matter to the soil - it negates the nutritional value of the lower 2-3cm of the total 5cm.

A further factor to consider is that the females are smaller than the males, and have different bite sizes. David, a fully mature adult male, was seen to cut an impressive grazing track through deep grass. The intact grass blades were measured at approximately 60cm (of which 40cm was green and 20cm woody stem). Grazing removed the top 15cm of greenery in a remarkably methodical manner. These averaged measurements were taken after raising the grass laid down by his passage.



David grazing long grass



David's grazing track (still flattened)

It would seem prudent therefore to seek a greater average length of nutritious grass so that the act of grazing is more fruitful per bite.

To clarify: if grazing effort is expended taking:

- a. Sparse mouthfuls (ie: few green blades per bite);
- b. Short mouthfuls (ie: short green blades);

then the combined effect of these two factors is to greatly reduce feed input per unit of time spent grazing.

The logical conclusion is to offer an area of longer grass and provide choice. At the same time the grass should not be of such a length that it is rank.

Water:

The provision of water has clearly fallen short of what is required. Access to the converted stock trough is awkward and impractical, and does not encourage regular visits. Although the tortoises have been observed to use it, they have to haul themselves up a narrow ramp, raise their shells onto the ledge, and then crane their necks down to the surface of the water. They then have to back out. The design is entirely inappropriate.

In addition the quality of water is poor and potentially hazardous to health. The tank is topped up with a tap, not a ball valve, and can only be refreshed manually or by the rain.

It transpires that a well designed, good quality walk-in-walk-out bath does exist in the deep grass on the far side of the paddock. It is a well thought out construction ideally suited to its purpose. Tortoises like to wallow in order to thermoregulate, drink and defaecate.

This bath had been overwhelmed by grass and had become sludged and stagnant. Since then, it has been cleaned out, made accessible, and replenished.

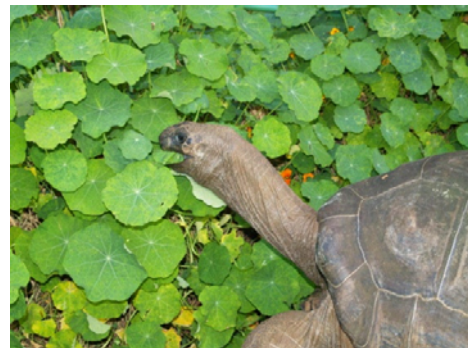
Responsibility of care:

It is on record that the resident Governor is responsible for the upkeep of the gardens (and therefore the paddock). He or she is also, by tradition, responsible for the care of the tortoises. However it transpires that this is not always made clear when the post is taken up. It is in many ways a difficult responsibility since little guidance exists as to their requirements. It is hoped that this report will act as a tangible record to assist in the future.

Recommendations:

3. That 1/2 of the paddock is left to grow to a length of greater than 5cm (2 inches) but less than 30 cm (1 foot), this to lift the greenery above the rank underlayer, to provide longer green shoots for grazing, and to encourage the development of broad leaved native species. Whether this is achieved by creating a broad peripheral band adjacent to the deep tree grass, or through the use of an alternating pattern between mowings, is probably immaterial;

4. That the tortoises are observed when grazing to see if they indicate a preference for one area or the other;
5. That the stock trough is regularly baled out and replenished to prevent stagnation;
6. That the bath is maintained, kept clear of deep grass, and regularly cleaned out and refreshed to prevent stagnation and gross contamination with faeces;
7. That a supplement in the form of vegetables or fresh cut, green leaved weeds and thistles is fed every one to two weeks (but not more than once weekly) to ensure an additional source of vitamins, minerals and trace elements. The tortoises are confined and unable to forage naturally. Historically they were free to roam. It is common knowledge that when the vegetable gardens were cultivated to provide for the house, vegetables were routinely harvested and fed to the tortoises. This has lapsed, and would be good to reinstate. A relatively organic, pesticide-free source would be preferable;
8. That at the same time should supplies be occasionally plentiful, restraint should be shown and the tortoises not overfed;
9. That fruit should not be fed except as a rare occasional treat;
10. That peripheral bushes and shrubs are not excessively trimmed but allowed to hang down towards the ground. The giant tortoises are relatively long necked specifically to allow the foraging of leaves. One of the females was observed grazing the nasturtiums;
11. That routine care of the gardens of Plantation House and of the tortoises is included in the job description of the Governor to avoid ambiguity and confusion;
12. That the Vet and Livestock Section of the ANRD, in cooperation with the resident Governor, is made to have a duty of care for these animals, and to monitor their husbandry and well being. This is on the basis that the tortoises are a national asset owned by the nation, and that the ANRD provides the government veterinary service.



Grazing nasturtiums

The maintenance of the bath, feeding and grass cutting will no doubt fall to the gardener and estate manager of Plantation. Whether this requires additional labour and therefore additional funding is for others to decide.

Appendix 5 Giant Tortoise Identification

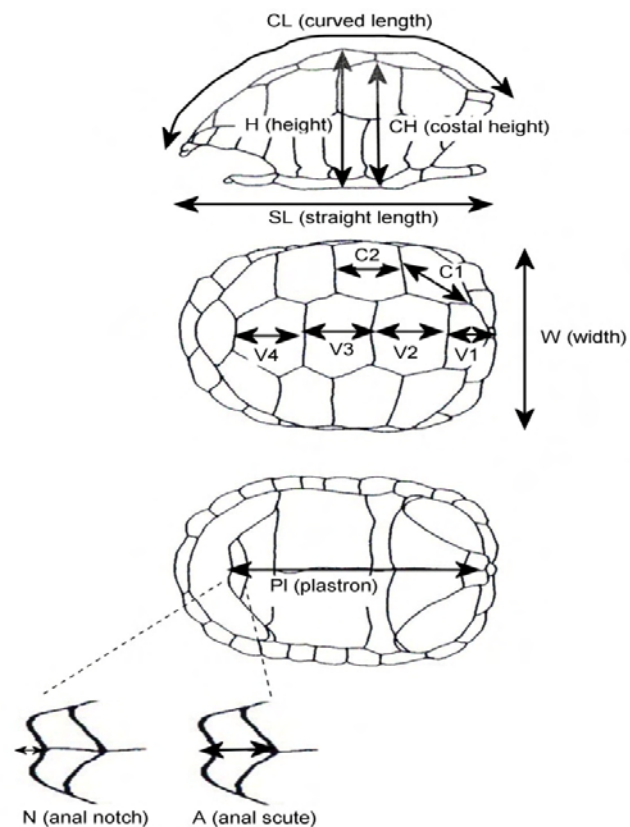
Identification chart for the Aldabra and Seychelles Giant Tortoise:

(<http://islandbiodiversity.com/tortid.htm>)

		Aldabra tortoise <i>Dipsochelys dussumieri</i>	Seychelles giant tortoise <i>Dipsochelys hololissa</i>
Width	posterior / anterior	approximately equal	approximately equal
Height	highest vertebral scute	3, sometimes 2, rarely 4	2 and 3 equal
	costal height	low (73-85%)	high (86-89%)
Vertebral scutes 3	compared to V2	approximately equal, less than 10% difference	equal or slightly shorter (0-5%)
	compared to V4	0-25% shorter or longer	0-33% shorter or longer
Costal scute proportions	pit	no pit	no pit
		costal 1/2=85-114	73-109
Caudal		flat or recurved	flat or recurved
Humero-pectoral suture		curved	angled
Abdomino-femoral suture		curved	angled
Plastron	proportion of straight length	75-94%	71-91
Anal notch	proportion of anal scute	14-32%	0-16%

Any analysis of these tortoises should include:

1. Straight length (SL)
2. Curved length (CL)
3. Height (from the bottom of the plastron to a level with the highest part of the carapace) (H)
4. Costal height (from the bottom of the plastron to a level with the top of the second costal scute) (CH)
5. Length and width of all vertebral scutes (V1-5)
6. Length of costal 1 and 2 (C1-2)
7. Plastron length (PI)
8. Length of anal scutes at back of plastron (A)
9. Depth of notch between anal scutes (N)



Measurement in centimetres for Jonathan and David (refer to previous chart):

	JONATHAN	DAVID
SL	110	105
CL	140	135
H	55	55
CH	48	50
V1	22	23
V2	24	22
V3	21	23
V4	28	23
V5	30	27
C1	25	24
C2	20	23
Anterior width	64	65
Posterior width	72	65
Plastron	76	90
Anal scute	8	11
Notch	1	4
Hum-pect and Abd-fem suture lines	Sharply angled	?
Highest vertebral scute	2 and 3 equal	2 and 3 about equal