

NOTES ON THE MARGINATED TORTOISE (*TESTUDO MARGINATA*) IN GREECE AND IN CAPTIVITY

M.L. HINE

Chelonia Herpetoculture, York Lodge, The Street, Stowlangtoft, Suffolk

INTRODUCTION

A field trip was planned and conducted in the Peloponnese, at Tolon, a small hillside coastal village in south eastern Greece, and Tolon Island, during the months of May and June, 1980. The main objectives of this venture were:

- 1) To collect a small number of Marginated Tortoises (*Testudo marginata*) for a captive breeding project.
- 2) To study the natural habitat in order to further the management of this species and its preservation in the wild.
- 3) To supply captive bred tortoises, in conjunction with the Greek authorities, for reintroduction to the wild if ever the need should occur.
- 4) To supply captive bred tortoises to other herpetologists and institutions for further study.

After departing from Gatwick airport late in the evening of Wednesday 21st May, 1980, we arrived at Athens airport in the early hours of the following morning. A meeting with the Minister Director General of Agriculture followed and, after a helpful discussion, we proceeded on a 160km journey overland, by coach, to our destination of Tolon, arriving at approximately 14.30. After making a few tentative enquiries in Greek, a local man came to our rescue, bundled us into his car and sped along the dusty village road before depositing us at the door of our future hillside villa apartment, overlooking the sea. As we strolled through the village that evening in search of some local gastronomic delight, we saw three tortoises in private gardens by the sea front. They were, to our great pleasure, *Testudo marginata*. All three were of medium size i.e. 15-20cm carapace length, in good condition and at liberty to roam throughout the gardens.

DESCRIPTION OF HABITAT

It was decided that the main study area would be the middle region of the surrounding hillside, an area of approximately 6km² easily accessible from the rear of the villa, and that the secondary study area would be on Tolon Island extending to an area of approximately 1km². The island was approximately 1km from the mainland. The hillside habitat consisted mainly of dry, stony ground with occasional belts of rocky projections, dry grass and low scrub. The secondary habitat was cultivated olive groves, again with stony ground but with the dry grass concentrated around the bases of the trees. The basic habitat of the uncultivated Tolon Island was the same as on the mainland but with the addition of dense, low bush growth. The only evidence of past human activity were the remains of stone terracing and derelict goat pens and shelters.

DESCRIPTION OF TORTOISES

Juvenile: Body colouring is of varying shades of beige with black markings to head and limbs. Carapace: Round, lacking flare to rear of shell.

Carapace colouring: Centre of costals, vertebrals and marginals is beige with black edging.

Plastron: Round and flat.

Plastron colouring: Basically beige with four pairs of brown to black triangular markings on the pectoral, abdominal, femoral and anal plates.

Head: Small, usually with darker mask-like markings to face and a marking on top of the head between the eyes.

Limbs: Front, black-faced edge. Rear, black-faced edge to feet.

Young Adults: Similar to juveniles. Carapace elongated. Flare visible to rear of shell in males, plus deep concave in plastron.

Colouring: Generally a shade darker than juveniles.

Mature Adults: Carapace generally elongated, but not necessarily so in females which only have a slight flare to the rear of the carapace. In the male the carapace is elongated with strongly serrated flare to the rear, deep concave in plastron and hooked jaw. In both sexes: Colouring: Of body and limbs and carapace is dark brown to black. Plastron colouring: Dark beige with black triangular markings.

FIELDWORK

Fieldwork was conducted daily between the hours of 07.00 and 13.00. On the first morning we sighted a *marginata* on the hillside. It was an adult female of medium size, dark brown to black in colour with a worn, smooth, rounded edge to the carapace and plastron. Later that morning a true pair of adult specimens were sighted in the nearby olive groves, and from then on tortoises were seen frequently.

Information was collected on each tortoise by observing, photographing, numbering, weighing, measuring the maximum carapace straight length, noting the sex and the condition of the specimen, the time of day found and the ground level temperature. A few tortoises were placed in collecting bags and taken back to the villa. There they were washed in an antiseptic solution and de-ticked before being placed in open pens which had been constructed beside the veranda. The tortoises that were not collected were immediately released after the recording procedure.

The weather for most of the time was clear, dry and sunny. The wild tortoises were usually found out and about during the mornings, with the ground surface temperature varying from 18-31°C depending on the time. First thing in the morning most tortoises were observed sunbathing either in or outside their nightly place of retreat in thick, dry grass or low bush growth, before feeding commenced. The main activities observed were walking, sunbathing and feeding. Tortoises were seen to eat Sowthistle, Chamomile, and a plant called *Medicago orbicularis*. No fighting, attempts at mating, egg-laying or drinking were seen. All the tortoises observed and collected on the mainland were mature adults, whilst those on the island were predominantly younger adults and juveniles, the exception being the largest adult female examined, No. 10, which had a carapace length of 25cm and weighed 2.8kg. (See Table 1).

Table 1. Data collected from wild tortoises during the period 24th May - 1st June 1980

Specimen	Sex	Size CSL	Weight (kg)	Location	Condition	
1	*	OMF	24 cm	2.030	Mainland Hills	Carapace worn smooth
2		OMM	24.5cm	2.030	Mainland Hills	Normal
3		OMF	24.5cm	2.275	Mainland Hills	Normal
4		YMF	22 cm	1.800	Mainland Hills	Normal
5		OMM	25 cm	2.375	Mainland Hills	Normal
6		OMF	23.5cm	2.275	Mainland Hills	Damage to carapace
7		YMM	21.5cm	1.250	Tolon Island	Normal
8		YMM	21.5cm	1.250	Tolon Island	Normal
9		J	12.5cm	0.332	Tolon Island	Disfigurement to carapace
10		OMF	25 cm	2.800	Tolon Island	Normal. Largest female (mature)
11	*	OMF	23.5cm	1.525	Tolon Island	Normal
12		J	7.5cm	0.070	Tolon Island	Normal
13	*	OMF	25 cm	2.500	Mainland Hills	Disfigurement to carapace
14	*	OMM	29 cm	3.175	Mainland Hills	Normal
15		YMF	21.5cm	1.575	Mainland Hills	Chip to lamina of carapace
16		OMF	26.5cm	2.725	Mainland Hills	Rear left leg scarred 1st & 2nd digits fused
17		OMM	24.5cm	2.150	Mainland Hills	Normal
18		YMF	20.5cm	1.700	Mainland Hills	Normal
19		OMF	24.5cm	2.275	Mainland Hills	Normal
20		OMM	27.5cm	2.600	Mainland Hills	Top front of carapace badly damaged. Old wound
21	*	OMM	27 cm	3.500	Mainland Hills	Normal
22		YMF	22.5cm	1.800	Mainland Hills	Normal
23	*	OMF	24 cm	2.150	Mainland Hills	Normal
24		YMF	18.5cm	1.250	Mainland Hills	Normal

J=Juvenile. YMF=Young Mature Female. YMM=Young Mature Male.

OMF=Older Mature Female. OMM=Older Mature Male. CSL=Maximum carapace straight length.

*=Tortoises taken to England.

At the villa the tortoises settled in well together with early morning activity dependent upon temperature and weather conditions. All fed well on a natural diet, but not so well on substitute foods. Males tended to shy away, but attempts at mating were observed. Faeces were inspected for worms resulting in a number of confirmed cases. Of the six tortoises taken back to England, worm infections were cleared within a period of two weeks by chemotherapy.

MAINTENANCE AND BREEDING IN ENGLAND

Housing

Housing consists of an indoor unit of open plan design covering an area of 2.75m². Underfloor heating is provided by means of tubular heaters at night with additional overhead heating and lighting by day. This maintains a thermostatically controlled temperature gradient with a range of 20°C to 40°C.

Floor covering consists of hay with a tub of sand set flush to the floor for nest digging if required. During the summer months there is access via a hinged door flap to an outdoor grass covered area of 36m².

Feeding

Items of food offered and eaten by tortoises in captivity in England include: dandelion, clover, grass, prickly and smooth sowthistle, parsley, chamomile, thyme, bedding hay, cabbage, lettuce, parsnip, carrot, apple, pear, banana with skin, Winalot dogmeal, vitamin and mineral supplement containing vitamin D3. Prepared food is given twice weekly. Weather permitting, natural food is obtained each day by browsing in outdoor units. Water is available both in outdoor and indoor units.

Hibernation

Table 2. Pre- and post-hibernation weights

Specimens	Sex	Placed into	Taken out of	Weight Loss (kg)
		hibernation 22.10.80	hibernation 14.5.81	
		Weight (kg)	Weight (kg)	
1	F	2.062	1.800	0.242
12 not hibernated	J	0.162	0.162	—
13	F	2.012	1.800	0.212
14 not hibernated	M	2.950	2.950	—
21	M	2.725	2.500	0.225
23	F	2.500	2.037	0.463

Juvenile No. 12 was not hibernated because of its size and weight but was allowed to go through a period of torpor brought about by a reduction in temperature and lighting. The adult male, No. 14, was not hibernated because it had not gained a satisfactory weight increase. This, we believe, was because this specimen was rather unsettled and preoccupied with mating attempts rather than feeding.

MATING, EGG-LAYING AND INCUBATION

All tortoises soon settled into their new accommodation after hibernation. The males were no longer so shy and were very active. Aggressive attempts at mating occurred regularly with preliminaries of chasing, butting of shell and biting of the head and limbs of females. When mating, a guttural noise is made by the male and the female reacts with deliberate head movements from side to side.

On 30.7.81 one of the three female tortoises started to excavate a nest in the soft soil of the outdoor unit during the late, warm afternoon. Using her rear legs alternately a small hole was soon excavated, which was about 10cm deep. After a brief rest the first egg appeared from the cloaca and then dropped into the nest. The use of her rear legs and alternate foot movements resulted in the eggs being pushed inside the nest and packed firmly together. A total of six, variably sized, eggs were laid before the nest was finally re-filled and the soil trampled down. By the 13.8.81 all three female tortoises had laid a total of 23 eggs (see Table 3).

All the eggs were collected, washed, measured and weighed before being placed in the incubator.

Table 3. Nesting and egg-laying

Female	Date	Start of Nesting	Start of Egg-laying	Completion of Egg-laying	Ground Temp.	Weather	Soil	No. of Eggs
1	30.7.81	18.00	18.45	19.15	18°C	Warm)	Moist	10
23	2.8.81	10.15	11.15	11.40	21°C	Dry &)	"	6
13	13.8.81	17.15		18.15	20°C	Sunny)	"	7

Eggs varied in weight from 15.07-20.85g, and measured from 3.1-3.7cm in length by 2.7-3.5cm in width.

Table 4. Incubation details

	Specimen	Date of Egg-laying	Days	Temp. Range	Relative Humidity	No. of Eggs	
Batch 1	1	30.7.81	99	26-32°C	65-95%	10	9 eggs infertile 1 egg fertile, dead on inspection. Incubation terminated 6.11.81.
Batch 2	23	2.8.81	70	26-32°C	65-95%	6	6 eggs fertile. All hatched. Incubation terminated 11.10.81.
Batch 3	13	13.8.81	80	26-31°C	65-95%	7	4 eggs fertile, 3 infertile. 4 hatchlings. Incubation terminated 1.11.81.

HATCHLINGS

Hatchlings were removed from the incubator after the eggsack had been completely reabsorbed and placed in a dry, open plan unit with a floor covering of hay. The unit is well lit with a temperature gradient of 18°C to 23°C at night and 23°C to 45°C during the day. Attempts at eating were observed on the first day, and by the second day eating was regular. Water is provided and drinking often observed. To date all 10 hatchlings are doing well.

DISCUSSION

Much concern has been voiced about the ill-treatment and death of imported tortoises resulting from collecting methods, conditions of confinement and lack of general provision. However valid these points may be, I feel that these issues should not be generalised to such an extent that the total ban of all tortoise importations is justified.

All the specimens examined during the field trip were in reasonable condition, and despite their confinement and the twenty-one hours spent travelling to England they have settled into their new environment well, and successfully reproduced. This all goes to show that these tortoises are hardy and adaptable creatures that do well in captivity if properly catered for. The availability of tortoises should not be denied to those who can provide suitable facilities, as this will provide valuable knowledge and understanding of the biology of these animals, and may contribute to their future preservation in the wild.

ACKNOWLEDGEMENTS

I would like to express my gratitude for the assistance given by staff of the Greek Embassy in London, and to the Director-General Minister of Agriculture in Athens, Greece, for his co-operation and support.