Caring for Mediterranean tortoises

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LESA LONGLEY,ARK LONGLEY discuss the differences between various tortoise species and how best to treat any problems

THIS article seeks to provide an overview on Mediterranean tortoises (*Testudo* species), common ailments and treatment options.

Common and scientific names

Hermann's tortoise (*Testudo hermanni*), Afghan or Steppe tortoise (*T horsfieldi*), north African spur-thighed tortoise (*T graeca*), Greek or Turkish spur-thighed tortoise (*T ibera*) and the marginated tortoise (*T marginata*).

Geographical distribution

• ***T hermanni:*** wide distribution throughout the Mediterranean and eastern Europe.

• ***T horsfieldi:*** Middle East (Pakistan, Kazakhstan etc).

• ***T graeca:*** can be found in north Africa, southern Spain and the Balearic islands.

• ***T ibera:*** eastern Europe and the Middle East (this species used to be considered a subspecies of *T graeca*).

• ***T marginata:*** can be found in southern Greece.

Wild habitat

• ***T hermanni, T ibera and T marginata:*** evergreen Mediterranean oak forest (now rare), coarse arid scrub and hillsides.

• ***T horsfieldi:*** mostly sandy steppe. This species digs very long burrows (up to 2m).

• ***T graeca:*** forests of north Africa, now mostly destroyed.

Diet in the wild

• ***T hermanni, T ibera and T marginata:*** herbaceous and succulent plants.

• ***T horsfieldi:*** as *T hermanni,* but they also enjoy grass shoots.

• ***T graeca:*** as *T hermanni,* but flowers are more important. They are coprophagic, feeding on mammalian herbivore dung. *T graeca* also eat snail shells.

Captive environment

An indoor enclosure is essential to allow for periods of poor weather in the UK, as is adequate warmth and UVB lighting. Appropriate amounts of substrate should be provided, to a depth that allows normal digging or scraping behaviour (minimum 5cm depth). A mixture of play sand and loamy topsoil is probably best, as proportions can be adjusted to mimic the natural environment of the particular species. A hide should also be provided.

Depending upon the animal's geographical location, an outdoor enclosure can be used in summer. In cooler climates, a greenhouse or cold frame with appropriate edible plants can be used to very good effect if it has free access to an outside area (ideally sloping and south facing) via a hole in the side.

Most glass or polycarbonates block UV light, but UV lights (bulbs or strips) can be used within enclosures. Exposure to natural unfiltered sunlight in summer is very beneficial, as this provides far greater exposure to UVB than artificial lighting. Supplemental heating may be necessary to ensure the species' preferred optimum temperature range is provided (20°C to 30°C for most species). It is essential that any enclosure (inside and out) is secure – both to keep the tortoises in, and to keep potential predators out (such as dogs, foxes, birds and rodents). Outdoor enclosures should be covered with wire mesh.

T hermanni, T marginata and *T ibera* tolerate arid to moderately damp environments, and must have plenty of warmth and sun. *T hermanni* are probably the most adaptable species; *T ibera* also adapt well to captivity.

T horsfieldi should be kept in a similar fashion to *T hermanni,* but they do not tolerate damp conditions. This species is very good at digging and climbing, so allowances must be made for this. *T graeca* are highly environmentally sensitive, do not tolerate cold well and become aestivate when temperatures rise above 28°C. Some subspecies do not hibernate, and mixing *T graeca* with other species (or even subspecies) is likely to result in disease. These difficulties make them a poor choice to be kept in captivity – few survive long term.

Captive diet

T hermanni, T horsfieldi, T ibera and *T marginata* can eat a wide range of weeds and green vegetation, such as dandelions, sow thistle, plantains, vetch, mallows, clovers, grapevine leaves, succulents (such as *Sedum* species and *Aloe vera* species), *Hibiscus* species (available in many garden centres), *Rubus* species (raspberry and blackberry), dead nettles and bindweeds.

Edible flowers are appreciated when available, as are flowers from the plants mentioned previously, and honeysuckle.

Only small quantities of fruits (less than five per cent of the total diet) should be allowed, and salad-based diets are a poor substitute. Sources of animal protein should not be fed. *T graeca* need more flowers in their diet in comparison to *T hermanni,* and require a high calcium intake. Therefore, supplements should be used and/or cuttlefish or broken snail shells provided.

Physiology

Tortoises are members of the Chelonia order, characterised by a shell composed of bony plates that have evolved from the rib cage. The shell comprises a dorsal, curved carapace and a ventral, flat plastron. Individual bony plates are covered in keratin (scutes).

The lungs lie in the dorsal part of the body cavity and are separated from the rest of the organs by a thin post-pulmonary septum – there is no diaphragm. Ventilation is achieved by moving the legs forwards and backwards.

Like all reptiles, tortoises are ectotherms – relying upon an external heat source to warm their bodies. Achieving adequate temperatures is essential for normal physiological function (such as digestion, immune function and calcium metabolism). UVB radiation is also essential for cutaneous production of vitamin D, which is necessary for absorption of calcium from the gastrointestinal tract. Gut transit time is slow (the process may take weeks) and depends on temperature, species and individual health status.

Tortoise eggs are subject to environmental sex determination, with females usually resulting from higher incubation temperatures and males from lower temperatures. Females are often larger than males and have much shorter tails. Generally, males also have a concave plastron, while the female's is flat or convex.

Identification

T hermanni have a thorny tip to their tail, with no tubercles on the thighs. Subspecies-variable characteristics include markings and size. For example, *T hermanni hermanni* possess two solid black bands longitudinally on the plastron, and are generally smaller than the other subspecies (average 120mm to 130mm straight carapace length – SCL). *T horsfieldi* have a flattish dorsoventral carapace, which is round and yellow-green and/ or olive in colour. The plastron has black blotches, and the tail has a horned tip. Enlarged scales or tubercles can be presented on either side of the tail.

T graeca are small tortoises – females average 180mm straight and 1.3kg and males average 130mm and 550g. Some subspecies may be larger, and there are tubercles on their thighs, either side of the tail.

T ibera are larger than *T graeca.* Average females are 200mm SCL, while males are 180mm SCL. Their thighs have either a single or double spur.

T marginata have obvious flaring of the marginal scutes and soft skin on the upper limbs. Adult females are about 240mm to 280mm SCL, while males are 250mm to 295mm SCL. Females are wider, and both genders weigh in at 2kg to 3kg.

Veterinary care

Blood sampling is carried out via the jugular vein or the subcarapacial sinus (in effect, the brachial vein or dorsal coccygeal vein).

The correct method for physical restraint involves holding the patient with one hand either side of the carapace, otherwise known as the hamburger grip.

Methods for anaesthesia include propofol IV (5mg/kg to 10mg/kg), alfaxalone IV or IM – (5mg/kg to 15mg/kg, IM response variable), or medetomidine + ketamine IM (0.05mg/ kg to 0.1mg/kg + 5mg/kg).

For preventive medicine, an annual pre-hibernation check-up visable, including faecal examination for parasites. Blood sampling, to assess hepatic, renal, immune and (in females) reproductive status, is also wise. Owners should regularly bathe their tortoise to ensure hydration and to encourage voiding of faeces and urine.

Common problems

When presented with any tortoise, it is essential to thoroughly investigate husbandry (both past and present), as most diseases are predisposed by, or are directly due to, inadequate conditions. Anorexia is a common presenting sign, often following hibernation. Husbandry should be throroughly investigated before further diagnostics (such as radiography, haematology and biochemistry). If anorexia occurs after hibernation, then hibernation conditions should also be investigated.

Nutritional secondary hyperparathyroidism (one cause of metabolic bone disease) is caused by inadequate dietary calcium intake, an inappropriate dietary calcium-to-protein ratio, and/or inadequate UVB exposure.

Tortoises are often anorexic or are presented with shell damage. The worst cases have a “rubbery” shell and may have pathological fractures; radiography will show reduced bone density. Upper respiratory tract disease, or “runny nose syndrome”, is likely to be a multifactorial disease. It is common post-hibernation and where group mixing has occurred. Potential agents are viral (herpes), *Mycoplasma* species, bacteria (often secondary), fungal (secondary) and hypovitaminosis A. Serous to purulent nasal discharge can also be seen, though a differential can be excess salivation with stomatitis.

Trauma is common following dog bites, accidental crushing by owners or lawnmower injuries. It is also seen when the animal has been hibernated in an insecure container that allows rodent access. Reduced shell wounds and fractures may heal in six to 18 weeks, but large defects require longer before closure is complete (12 months or more).

Low numbers of endoparasites are normal and are thought to aid digestion. Pathological build-up may occur when animals are kept in relatively intensive conditions with poor hygiene, or secondary to immunosuppressive conditions (such as systemic disease).

In females, pre-ovulatory follicular stasis or post-ovulatory egg stasis is often associated with husbandry inadequacies (such as the lack of a nest site or insufficient heat supplementation), reproductive tract inflammation and/or infection or systemic disease (such as hypocalcaemia). Dystokia may be caused by these problems, but the presence of oversized egg (s), cystic calculi or pelvic canal narrowing (such as after fracture) should also be considered.

With regards to prolapses, identify the organ in question (colon or cloaca, bladder, penis or oviduct) and investigate the underlying aetiology of the straining. Replace the organ if the tissue is viable, but resect if it is not. A prolapsed oviduct may require coelomic surgery to replace or perform ovariosalpingectomy. The penis is required for reproduction, but it is not used for urination.

• Please note that no drugs mentioned in this article are licensed for use in tortoises.

Further reading

- Highfield A C (1996). *Practical Encyclopaedia of Keeping and Breeding Tortoises and Freshwater Turtles,* Carapace Press, London.
- McArthur S, Wilkinson R and Meyer J (2004). *Medicine and Surgery of Tortoises and Turtles,* Blackwell, Oxford.
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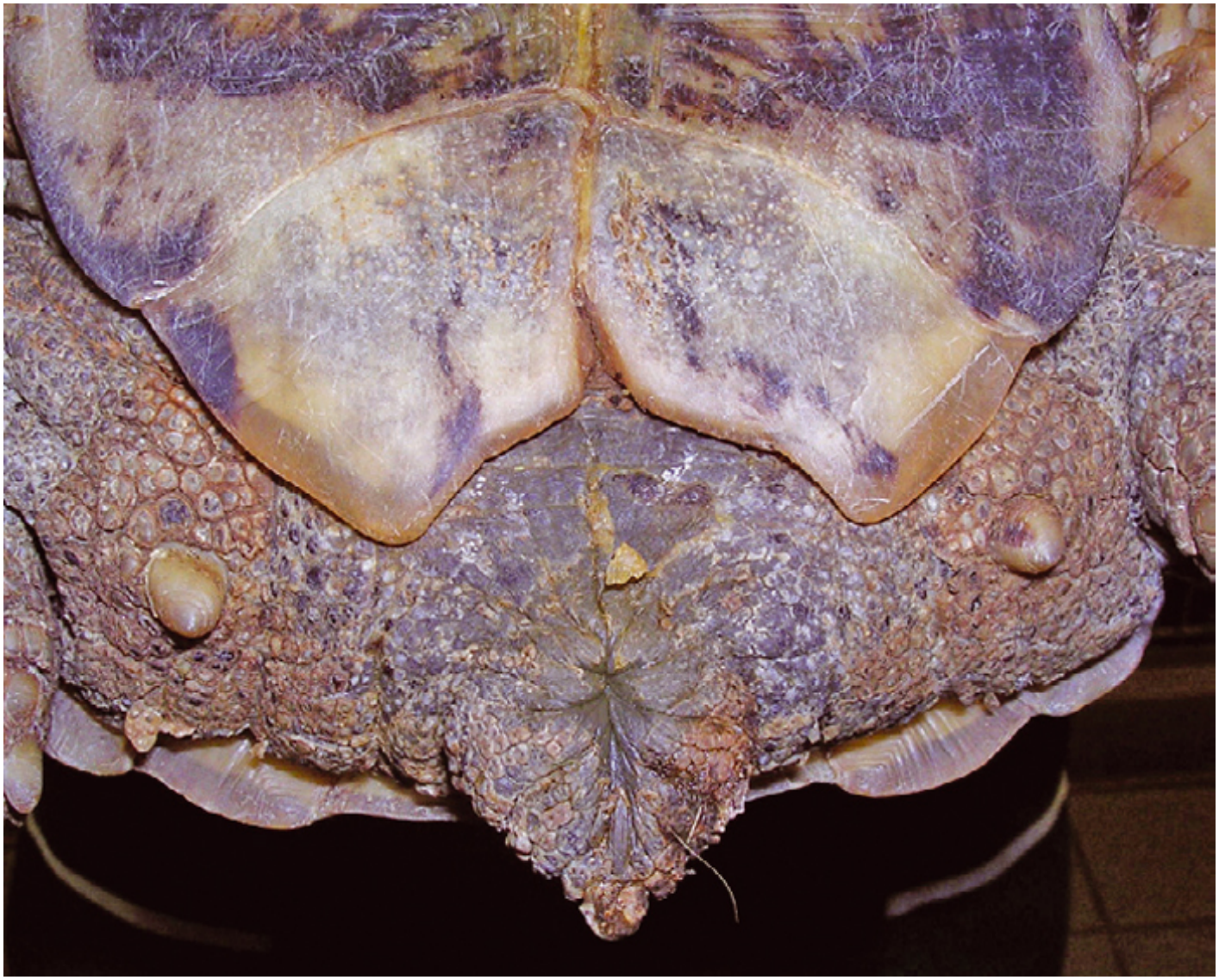
- British Chelonia Group website (www.britishcheloniagroup.org.uk).
- Tortoise Trust website (www.tortoisetrust.org).

Testudo hermanni *diets are a selection of flowers (such as this* Hibiscus *) and leaves (such as dandelions and vine leaves).* T graeca *need more flowers in their diet; they also eat snail shells.*

A dorsoventral radiograph of a tortoise with metabolic bone disease. The digits cannot be clearly seen due to the reduced bone density. The line diagonally across the image is an oesophagostomy tube.

Left: inducing anaesthesia by injecting alfaxalone into the jugular vein. Blood sampling is carried out via the jugular vein or the subcarapacial sinus.



Right: a caudo-ventral view of a mature female spur-thighed tortoise. Note the short tail, lack of tail spur and presence of thigh tubercles.