The Namaqualand speckled padloper, *Homopus signatus*: smallest tortoise species in the world

The Namaqualand speckled padloper is a threatened reptile that occurs only in the Succulent Karoo. Its habitat is declining as a result of changes in land use (e.g., agriculture, road construction, mining) and overgrazing. Predicted climate change may wreak further havoc. To facilitate conservation, a population near Springbok has been investigated each spring since 2000 to reveal the species' ecology.

Morphology

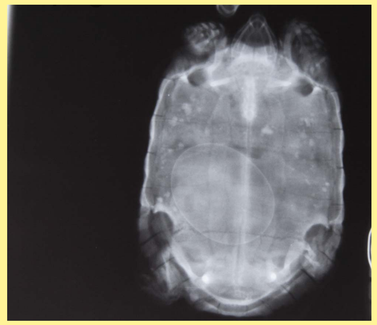
The maximum shell length of *H. signatus* is only 110 mm. Small body dimensions enable the tortoises to shelter in small rock crevices and match the limited resource availability in their arid environment. Carapaces of *H. signatus* have a dark pattern on a lighter background, but males have lighter overall colours with fewer rays and more speckles than females. Males also have smaller plastrons than females, presumably to facilitate locomotion and copulation.

Growth

The tortoise shell resembles a rigid, bony box, but *H. signatus* is capable of temporarily shrinking its shell during drought, resuming shell growth when resources are available again. The species grows slowly, females taking 11-12 years to mature, depending on rainfall. Aridification due to climate change may extend the growth period to maturity to 30 years, but it is questionable if populations would be able to deal with any increase.

Behaviour and thermoregulation

Homopus signatus is most active in spring, because this period provides rain and food. In the cool spring season, the tortoises use solar radiation to maintain high body temperatures of 29-31°C. To reach these, the small body size helps, but tortoises nevertheless spend most of their active time basking. They manage to complete other activities in little time, probably because resources and mates are abundant.



Reproduction

Female *H. signatus* produce only one egg at a time. Eggs are large, up to 12% of the female body volume. To accommodate such a large egg, females are larger than males, expand their shell when gravid, and expand their pelvis during egg-production. Large eggs produce large hatchlings, and a large hatchling size appears important to survive the harsh Namaqualand environment.

Diet

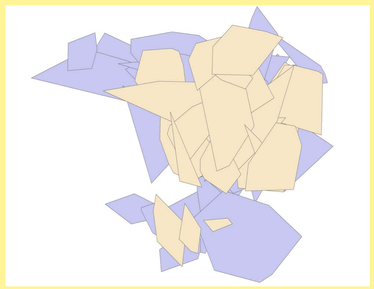
Like most tortoises, *H. signatus* is herbivorous. Although this species will eat a wide variety of plant species, four items make up a large proportion of the diet: *Oxalis* spp., *Leysera tenella*, *Grielum humifusum* and *Crassula thunbergiana*. Tortoises eat mostly flowers, and fewer leaves and stems.

Population dynamics

The study population is dense with 16-21 resident tortoises per hectare and contains equal frequencies of males, females and juveniles. When *H. signatus* grows, annual (apparent) survival increases to 99% for the largest individuals. Drought has little effect on survival.

Home ranges

The generally lush spring plant growth in Namaqualand enables the tortoises to use small home ranges. On average, each tortoise uses only 0.35 hectare, and resident tortoises often seem to remain in the same range for more than a decade. During drought, *H. signatus* increases its home range to find all resources required.



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