

Proposal for a captive study on the greater padloper, *Homopus femoralis*

Introduction

The genus of the padlopers (*Homopus*) is endemic to South Africa (4 species) and Namibia (1 species), and all species have relatively small distribution ranges (Branch, 1998). They have been little studied, and as a result their biologies are almost entirely unknown. One of the few studies, on the Namaqualand speckled padloper *H. s. signatus*, shows that the species may be bound to specific habitats (Loehr, 2002a), and therefore the occupied area within their distribution ranges may even be smaller.

Several climate models predict drastic environmental changes to South Africa in the next 50 years (Midgely et al., 2001). Maintaining South Africa's rich biodiversity through these changes will be a challenge, and it will certainly be impossible without ecological knowledge of many species. Field studies are the preferred method to gather this knowledge, but due to financial and other constraints this is not always feasible. For some species, several characteristics can also be researched in captive situations. This information can either be used directly for nature conservation purposes, or can serve as a basis to efficiently plan subsequent field studies.

Case: The Namaqualand speckled padloper, *H. s. signatus*

Between 1995 and 2001, the Western and Northern Cape Provinces have granted permits to collect and export a total of 6 male and 6 female *H. s. signatus*. These specimens and their offspring remain the formal property of the South African authorities, but are being managed by the Homopus Research Foundation. Rather than having all different keepers as contacting persons, the Homopus Research Foundation acts as intermediary. All tortoises have been registered in a studbook, maintained in specialised zoo software (SPARKS, licensed by ISIS, the International Species Information System). This allows to track any specimen at any time, as well as all genetic relationships between the tortoises, in order to breed a captive population that is genetically healthy. A genetically healthy population does not need constant inflow of wild-caught specimens, and may even be used for reintroductions might this be desired at some point in the (far) future. The studbook is co-supervised by the European Studbook Foundation.

The biology of the Namaqualand speckled padloper was virtually unknown in 1995. Only one short-term field study existed (Bayoff, 1995), and several popular books mentioned that the species required a specialised diet and therefore could not survive in captivity. The studbook proved differently, with 39 specimens being born at 3 locations between 1996 and 2004, including second generation breeding! Mortality has generally been low. The developments of the population, as well as other activities in the Homopus Research Foundation have been reported to the South African authorities in annual reports (attached find the 2003 report).

More importantly, the captive population has yielded a wealth of information regarding diet, behaviour, reproduction, etc. (see literature list below). Among this information are data that would have been nearly impossible to gather in the wild, such as relationships between female, egg, and hatchling characteristics (e.g., do large females produce large eggs, and do these result in large hatchlings?). This kind of information is of importance to understand evolutionary selection pressures experienced by the tortoises, and to try to predict the effect of climatic change on the natural populations. The gathered information consists of a mixture of scientific and popular articles and presentations, and the Homopus Research Foundation considers it an obligation to persuade all keepers in the studbook to make recordings, and to publish/present those as much as possible.

Proposal: The greater padloper, *Homopus femoralis*

In 1999, the British Tortoise Trust donated 3 male *H. femoralis* to the Homopus Research Foundation. These specimens had been collected as hatchlings in the Free State in 1989, and were donated to the Tortoise Trust in 1998. Although there are accounts that mention that *H. femoralis* cannot be kept successfully in captivity, the males do extremely well at two locations.

The Homopus Research Foundation would like to use these specimens to gather and publish information on *H. femoralis*, similarly as has occurred for *H. s. signatus*. Unfortunately, the males have to be kept separated due to their mutual aggression, and females are required to allow the tortoises to show their behavioural pattern. In order to prevent the removal of specimens from the wild, I have contacted a large number of zoos and institutions in South Africa and elsewhere, in order to find out if any surplus *H. femoralis* females were present. Unfortunately this was not the case. One female appeared to be present in Pretoria Zoo and would be made available to the Homopus Research Foundation, but this specimen had escaped from its enclosure.

Although I am not in favour of removing tortoises from the wild, in this case it might be the only possibility if a captive study is to be used to gather ecological information on the species.

Materials and methods

Housing and care

Initially, the three female *H. femoralis* will be housed together in an enclosure measuring 150 x 80 cm. This enclosure will be placed in an existing, quiet terrarium room (heated during the days and cooled during summer nights). It will be heated and illuminated by means of two 40 W spot lights, and a 36 W tube light, and the tortoises will be adjusted gradually from southern hemisphere to northern hemisphere conditions, by shortening the first southern hemisphere summer and northern hemisphere winter (in terms of temperatures, photoperiod, and spraying regime). Expert veterinary care will be provided, and the specimens will be treated against internal parasites (i.e., Nematoda) if necessary.

The terrarium will be decorated to imitate the natural habitat, by means of sand, rocks and wood, also forming hiding places and egg-laying sites. Temperatures will be maintained at approximately 20-35°C (respectively winter and summer days), and 10-20° (respectively winter and summer nights), with higher day temperatures under the spotlights. The enclosure will be sprayed four times weekly in summer, and once weekly in winter. A water bowl will always be present.

Feeding will consist of greens (e.g., *Taraxacum*, *Bellis*, *Plantago*, *Vicia*, *Trifolium*) collected outside from spring till autumn, and vegetables (e.g., endive, chicory, salad) in winter (this is the current diet for the captive male tortoises). All food will be supplemented with a calcium/vitamin additive. In order to provoke feeding on a captive diet, initially food items such as succulent plants, flowers, sprouted seeds, etc. may be attempted.

Once the tortoises will have adjusted to northern hemisphere climatic conditions, and a captive diet, they will be transferred to two different enclosures. These enclosures measure 150 x 120 cm and 110 x 80 cm, and are currently inhabited by the solitary males. They are similarly constructed and decorated as the first enclosure. Photoperiod in these enclosures is regulated via an astrotimer, adjusting the photoperiod automatically to South African latitude.

Eggs will be incubated embedded in Seramis in an existing incubator that has specifically been developed for the incubation of reptilian eggs. It is heated by heating cables switched via digital thermostats, to maintain a day temperature of 32°C and a night temperature of 26°C. Hatchlings will be raised in small enclosures that will be decorated similar to the adult terrariums. Diet will also be similar.

Aspects to be studied, and publishing schedule

As is the case in *H. s. signatus*, continuous observations will be made in order to increase the understanding of the behavioural pattern of the species. Daily notes will be made. Special attention will be paid to diurnal activity pattern, hiding place use, dietary preferences, sexual differences, and courtship and nesting behaviour. This qualitative information will be published in a comprehensive paper (in an international journal), approximately 3 years after importing the females.

Quantitative data on tortoise size, egg size, egg mass, hatchling size, hatchling mass, incubation period, and hatchling growth will be made. It may take longer to gather a sufficient sample size, and it will be attempted to publish this information in an (international) scientific journal.

Apart from these two publication, any additional observations that may be of interest will be recorded and published as smaller notes. Annually, all results will be summarised in the annual report of the Homopus Research Foundation.

Budget

The most expensive equipment, to maintain climatic conditions, is already present. All other costs (enclosures, decoration, food, electricity, etc.) will be paid from the personal resources of the applicant. This means that no additional funding is required.

“Green electricity” (generated by wind turbines, solar panels, etc.) will be used. This means that the study will not contribute to climate change, as no CO₂ emitting energy sources will be used.

Benefits for South Africa

This study has two main benefits for South Africa:

1. South African nature conservation authorities will need ecological information on *H. femoralis* at some point in the future, to determine its conservation needs, and to implement these in conservation plans. The proposed captive study can help to gather some of this information, at zero costs for the South African government.
2. If successful, the study may result in a captive insurance colony, owned by the South African authorities, and managed by the Homopus Research Foundation.

Literature

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Internet

The Homopus Research Foundation has an internet site that contains almost all available information on *Homopus*, as well as actual overviews of the current studbook populations. The address is <http://www.homopus.org>

Applicant

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