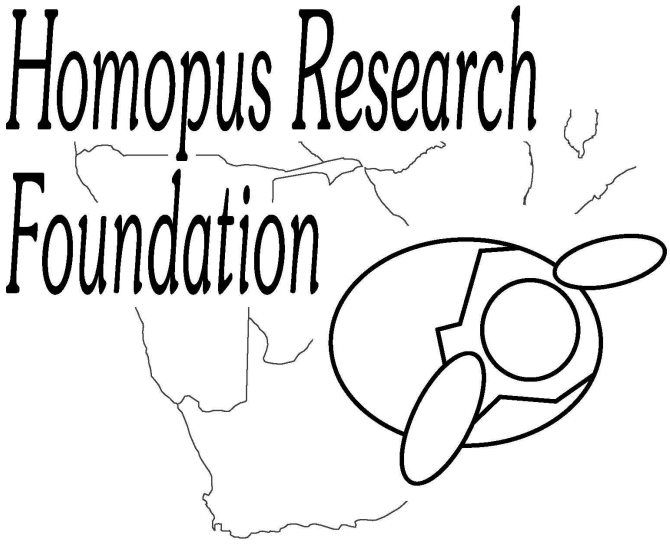
Homopus Research Foundation



Annual Report

2003

Victor Loehr
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The Homopus Research Foundation was founded in January 2001, aiming to gather and distribute information on *Homopus* in the benefit (directly or indirectly) of the species in the wild. This aim is realised by carrying out activities such as setting up captive studbook populations, studying captive populations and conducting research in the field. Unofficially, these efforts started as early as 1995 when the foundation's precursor, the Studbook Breeding Programme Homopus started.

The current report will focus in detail on the studbooks coordinated within the foundation. The aims of the studbooks are:

- To inform the herpetological community with data and publications generated from captive situations
- Procuring, maintaining, and reproducing genetically healthy captive individuals for future loans to recognised individuals and institutions

These conservation goals are particularly relevant today as wild populations of many reptiles and amphibians experience increasing survival pressures. Establishing working programs that emphasise captive husbandry in conjunction with fieldwork is crucial in developing sound wildlife management. A significant contribution that captive animals may perform is through the concept of re-introduction of their potential offspring. Although re-introduction of species is at a very early stage and occasionally controversial, there may come a time when the offspring of captive animals are the sole source for re-introducing species into previously suitable habitat where the natural population has become extinct. More importantly re-introduction has the potential of insuring genetic diversity to populations that have become unnaturally isolated due to human interference.

1. INTRODUCTION AND ACTIVITIES IN 2003

This report updates the 2002 annual report of the Homopus Research Foundation, drawn up in January 2003. The Homopus Research Foundation aims to form captive populations and to study these, to carry out research in the field, and to gather and distribute as much information as possible about species of the genus *Homopus*. The current report summarises the activities of the foundation in 2003, its plans for 2004, and it gives an overview of the actual composition and changes in the captive populations: *H. signatus signatus*, *H. areolatus*, and *H. femoralis*.

Additional information may be obtained from the internet site of the Homopus Research Foundation, http://www.homopus.org, or from the author of this report. Previous annual reports can be downloaded from the literature section of the website.

In the next paragraphs an overview of the main activities in 2003 is presented.

1.1. Publications and presentations Homopus Research Foundation (see also chapter 12)

Two articles were published in 2003, on temperature fluctuations in the natural habitat of *H. s. signatus* (*Radiata*, in English and German), and on the ongoing *H. s. signatus* field research (*Trionyx*, in Dutch). An unpublished M.Sc. thesis on temperature-dependent metabolism in *H. s. signatus* and *Malacochersus tornieri* was produced by Frankfurt University (Germany) in collaboration with the Homopus Research Foundation. The leaflet with general information on the work of the Homopus Research Foundation that had initially been drawn up in Dutch was translated in English. A German version is still in preparation.

Several manuscripts were submitted for publication: one on reproduction in wild *H. s. signatus* (resubmitted), and a second on growth. The growth manuscript has been accepted for publication (*African Zoology*). The manuscript on thermoregulation in wild *H. s. signatus* that was announced in the 2002 annual report, as well the short manuscripts on scute aberrations and tick infections, have been postponed to a later date. The reason for this is that these manuscripts may benefit from a larger sample size, which is feasible since the field project on this species is continuing. Captive observations have led to the submission of a third manuscript, with preliminary data on reproduction in captive *H. s. signatus*, a third containing captive husbandry and breeding accounts for *Homopus* spp. in Europe, and a fourth on second generation breeding in *H. s. signatus*. The last one is currently in press (*Radiata*).

The manuscripts on natural diet of *H. s. signatus*, and on a new thread-trailing technique for small tortoises in densely structured habitats, that had been submitted in 2002, are still under review.

In addition, a sheet about relationships between *in* and *ex situ* conservation efforts on *H. s. signatus* was completed for the World Association of Zoos and Aquaria. A field report of the 2003 fieldwork on *H. s. signatus* was distributed among sponsors and other parties.

Reprints were requested (among others) by SOS Tibor (Romania), Sauria editor (Germany), and Knoxville Zoological Gardens (USA). Most of the published information is also available at http://www.homopus.org, literature section.

Oral communications were presented at the following locations or meetings:

- Second international congress on chelonian conservation (Senegal):
  - Reproduction in *H. s. signatus*
  - Environmental and body temperatures in *H. s. signatus* in spring
  - Egg and hatchling characteristics in *H. s. signatus*: Preliminary data from a captive population (poster)
- Frankfurt University, zoological department (Germany):
  - Research on temperature-dependent metabolism in *Homopus s. signatus* and *Malacochersus tornieri* (German)
  - Environmental and body temperatures in *H. s. signatus* in spring (German)
- Local herpetological society Karlstad (Sweden):
  - Slideshow *H. s. signatus* fieldwork 2001 (Swedish)
- Colleagues Ministry of Transport, Public Works, and Water Management (Netherlands):
  - Fieldwork on *H. s. signatus*: why and how (Dutch)

Furthermore, an interview was done for the Dutch national radio. Information on wild and captive observations on *H. s. signatus* was used in a programme on senescence in turtles.

1.2. Homopus photographs

Two book publishers and authors requested photographs of *Homopus* spp. and other southern African tortoises, for inclusion in a book on *Geochelone sulcata* (in Spanish), and a book on captive breeding of tortoises (in German). Furthermore, photographs of southern African turtles were provided to be used in a course to make north-eastern South African game rangers familiar with the species.

1.3. Internet site

The internet site of the Homopus Research Foundation was upgraded with a page that gives a photographic impression of the *H. s. signatus* fieldwork. The existing page with high quality photographs of African turtles and their habitats was updated with pictures of *Psammobates tentorius trimeni* in its habitat. A page that acknowledges all sponsors of the Homopus Research Foundation was also added.

Minor changes of the internet site concern updates of the literature listing and research activities, as well as a review of all other pages.

Over 10,000 page views have been counted since June 1998 (approximately 2100 in 2003, similar to 2002). South Africa has maintained its 7th position in terms of number of visitors per country.

1.4. Journeys

South Africa was visited for six weeks in September and October 2003, within the scope of the field research on *H. s. signatus* (see also paragraph 1.5). Two delegates of the Homopus Research Foundation participated in this fieldwork. One delegate returned in December for additional (summer) *H. s. signatus* fieldwork.

1.5. Research

The 2000 - 2002 ecological study on *H. s. signatus* was continued in 2003, with fieldwork in September - October. This fieldwork was conducted by a South African (Tamara Harris-Smith: Western Cape Nature Conservation), Dutch (Victor Loehr: Homopus Research Foundation), two Belgians (Frank van Loon and Marscha Tilborghs), a Mexican (Jacobo Reyes), and an American (Cindy Woodhead). Two South Africans (Retha Hofmeyr and Brian Henen: University of the Western Cape) participated to gather reproductive data through ultrasound measurements, and a Western Cape Nature Conservation officer (Ernst Baard) spent some days in the field with the research team.

Additional fieldwork was conducted in early December by Retha Hofmeyr and Brian Henen (reproductive study), and late December by Victor Loehr.

In 2003, radio-tracking, permanent marking (notching), and the use of iButtons was introduced in the project. These new aspects allow to gather new, detailed information, over longer periods of time. A brief field report of the 2003 spring fieldwork is available at http://www.homopus.org (literature section).

The *H. s. signatus* project was registered as a Ph.D. project at the University of the Western Cape in 2003 (supervisors Retha Hofmeyr and Brian Henen). Details about the set-up of all studies can be found in the project proposals. These may be obtained from the Homopus Research Foundation, or can be downloaded from its internet site. Information about results can be found in this annual report, in paragraphs 1.1 and 2.1, and in chapter 12.

The 2003, field studies would not have been possible without donations of money (National Research Foundation, Royal Society of London, University of the Western Cape [all supporting Retha Hofmeyr and Brian Henen's efforts], and Chelonian Research Foundation/Linnaeus Fund, Dutch Foundation for the Advancement of Herpetology, various private individuals), and research materials or services (CamCode/Statsdirect, Onderstepoort Veterinary Institute, South African Weather Services, Springbok Hospital, Springbok State Veterinarian). Permits were provided by Northern Cape Nature Conservation.

Apart from the *H. s. signatus* field project and the continuing long term captive study on *H. s. signatus* (as described in the 1999 annual studbook report), the Homopus Research Foundation was involved in two other projects:

- *Homopus s. signatus egg shells*
  Declan Nolan (previously employed at Nijmegen University, Netherlands) has been studying shells of tortoise eggs. Electron microscope scans from shells of captive hatched and non-hatched *H. s. signatus* eggs have been performed to study differences in calcium crystal shape and size. The practical work has been finished several years ago, and a manuscript is almost ready for submission.
- *Temperature-dependent metabolism in H. s. signatus and Malacochersus tornieri*
  Fabian Schmidt at Frankfurt University (Germany) has completed the above study as a M.Sc. graduation project. Metabolism (oxygen consumption) in *H. s. signatus* at different temperatures was compared to that of an ecologically related species, *Malacochersus tornieri*. Captive-bred *H. s. signatus* specimens were loaned to Frankfurt University in May 2002, and all specimens (see chapter 4) have been transferred to their final destinations in the studbook, upon completion of the experiments in Frankfurt. Unfortunately two specimens died during their stay at Frankfurt University.

1.6. Contacts

The Homopus Research Foundation was contacted by various persons and organisations in 2003. Among others: Spoornet (South Africa), requesting information for awareness training; Free State farmer (South Africa), questioning what she could do for the well-being of the tortoises on her farm; West Coast inhabitant (South Africa), asking how to take care of a baby *H. areolatus* found in her garden; various persons and institutions to request reprints of articles or photographs.

The letter sent out by the Homopus Research Foundation to the European Commission in 2002 (response on report RSPCA and Pro Wildlife, with incorrect information about feasibility of captive husbandry of *Homopus* spp.), was followed up with a manuscript submission by the Homopus Research Foundation in 2003. Detailed and correct accounts of European husbandry of *Homopus* spp. will be published in a special (English) edition of *Mertensiella*.

The Homopus Research Foundation has gratefully accepted the opportunity to provide information about its studbooks and methods to the Namibian Ministry of Environment and Tourism. This contact was established in the process of arranging a transfer of captive-bred *H. areolatus* from Namibia to Europe (see also chapter 6).

To reward individuals that contribute to the Homopus Research Foundation, baseball caps with the logo of the foundation were purchased for donation to such persons. In addition, the screensaver that was mentioned in the 2002 annual report was updated with new pictures. It can be obtained at http://www.chimaira.de.

1.7. Finances

The Homopus Research Foundation is a non-profit, tax-exempt organisation. A financial report of the year 2003 can be found in appendix 4. All expenses were covered by external sources of income, mostly remaining from 2002 (Chelonian Research Foundation [Linnaeus Fund], Dutch Foundation for the Advancement of Herpetology). A donation from Victor Loehr covered all overhead costs of the foundation and the international travel expenses of the person concerned.

Appendix 4 also contains an estimate of private expenses of persons involved in the Homopus Research Foundation. These concern costs made for, but not through the foundation. To calculate the actual costs for the 2003 field research project, most of these costs have to be added to the foundation's expenses.

2. PLANS FOR ACTIVITIES IN 2004

Below, the planned activities for 2004 are listed. Only a portion of the activities can be planned in advance, and therefore this list is not comprehensive.

2.1. Publications and presentations Homopus Research Foundation

The Homopus Research Foundation is contributing to two manuscripts that will soon be completed for submission in peer-reviewed journals. These deal with egg shell morphology, and reproduction in *H. s. signatus*. In addition, a short manuscript on humidity in the natural habitat of *H. s. signatus* will be submitted. The data gathered during the currently running field project on *H. s. signatus* will be processed for publication in several comprehensive papers at a later date.

The Dutch/English leaflet for acquisition of funding will be translated into German. After each *Homopus* fieldwork episode, a short field report will be drafted.

A presentation on the work of the Homopus Research Foundation (including fieldwork) will be held at a meeting of the German tortoise society in April, and a second presentation (topic not yet known) will be held at the symposium of the Herpetological Association of Africa in October.

2.2. Internet site

The internet site of the Homopus Research Foundation will continue to grow. Papers and other information published within the foundation will be posted on the site when copyrights will permit, and changes in studbook composition will be updated frequently. Moreover, it will be attempted to post information about *Homopus* from outside of the foundation, when available.

The page with fieldwork impressions will be updated after the 2004 fieldwork, and several new pictures of southern African tortoises will be added.

2.3. Journeys

The December 2003 fieldwork on *H. s. signatus* (see paragraph 1.5) will extend into January 2004. During this journey several researchers on *Homopus* and other species in Namibia and South Africa will be visited, in order to exchange information.

In September and October 2004, a group of research participants (including at least two studbook participants) will visit South Africa for more *H. s. signatus* fieldwork (see paragraph 2.4). During this journey, the symposium of the Herpetological Association of Africa will be attended.

2.4. Research

As was predicted in the 2002 annual report, the field study on *H. s. signatus* is continuing. This Ph.D. project will run until 2005, but the monitoring of the population will continue after 2005. The detailed project proposal will be posted on the internet site of the Homopus Research Foundation as soon as it will formally have been approved by the University of the Western Cape. Until that time, information can be found in previous proposals that can be downloaded from the site. Several volunteers have applied for participation in the fieldwork in 2004, so that capacity should not be a problem.

There are no plans for participation (making captive tortoises available for research purposes, or other) in external research projects, but applications will always be considered.

Part 1:

Studbook *Homopus s. signatus*

3. CURRENT LIVING STUDBOOK POPULATION AND TRANSFERS

The number of locations where live *Homopus s. signatus* specimens were housed in 2003 grew from 12 to 16. These locations are in the Netherlands (5), Germany (6), USA (1), Sweden (2), Belgium (1), and Czech (1), and include two zoos. Six new locations were added in the Netherlands, Germany, Sweden, and Czech, when captive-bred specimens were transferred to permanent housing locations. It was attempted to house related specimens of different sex at different locations, to prevent accidental inbreeding. Locations will be supplied with unrelated offspring as soon as this will be available. Two locations in the Netherlands and Germany were removed, respectively when the specimen kept had died, or when all specimens had been transferred.

The total number of live specimens in the studbook population grew from 37 to 44: Nine specimens were born, at two locations, and two specimens died. With the exception of two specimens (studbook numbers 17 and 47), all founder specimens originate from a single population in South Africa. In December 2003 it was noted that the exact stretch of land was still for sale and it is not known what effect this might have on the tortoise population.

Specimens 40, 41, 42, 43, 50, 51, 52, 54, and 55 (all captive-bred at location A02) were transferred from location A02 to various other locations. Additional transfers were not realised in 2003. All transfers were in accordance with national and international legislation.

Table I: Current living studbook population *Homopus s. signatus* per location as registered in the studbook. Numbers far right are relative numbers per location, indicating which specimens are housed together. MULT1 are specimens 18 and 19, MULT2 specimens 20 and 21. UNK1 and UNK2 are unknown specimens outside of the studbook.

Location: A02

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
1	M	????	WILD	WILD	SPRINGBOK	27 Sep 1995	NONE	Capture	
					A02	30 Sep 1995	I	Loan to	1
2	F	????	WILD	WILD	SPRINGBOK	26 Sep 1995	NONE	Capture	
					A02	30 Sep 1995	II	Loan to	1
3	F	????	WILD	WILD	SPRINGBOK	26 Sep 1995	NONE	Capture	
					A02	30 Sep 1995	III	Loan to	1
5	F	27 Feb 1996	WILD	3	A02	27 Feb 1996	III-1	Hatch	2
9	F	30 Nov 1996	1	2	A02	30 Nov 1996	II-1	Hatch	2
13	M	26 Sep 1998	1	2	A02	26 Sep 1998	II-5	Hatch	
					A07	22 Nov 1998	______	Loan to	
					A18	14 Dec 2001	______	Loan to	
					A31	6 May 2002	______	Loan to	
					A02	8 Dec 2002	II-5	Loan to	2
53	?	20 Jul 2003	13	5	A02	20 Jul 2003	030720	Hatch	3

Totals: 2.4.1 (7)

Location: A07

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
35	M	????	WILD	WILD	SPRINGBOK	4 Oct 2001	NONE	Capture	
					A02	6 Oct 2001	______	Loan to	
					A07	16 Dec 2001	______	Loan to	1

36	F	????	WILD	WILD	SPRINGBOK	3 Oct 2001	NONE	Capture	
					A02	6 Oct 2001	______	Loan to	
					A07	16 Dec 2001	______	Loan to	1
44	?	31 Oct 2002	35	36	A07	31 Oct 2002	______	Hatch	2

Totals: 1.1.1 (3)

Location: A08

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
41	?	25 Jul 2002	1	3	A02	25 Jul 2002	III-14	Hatch	
					A08	19 Apr 2003	______	Loan to	1
42	?	20 Aug 2002	1	2	A02	20 Aug 2002	II-11	Hatch	
					A08	19 Apr 2003	______	Loan to	1

Totals: 0.0.2 (2)

Location: A10

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
6	M	8 Nov 1996	1	3	A02	8 Nov 1996	III-2	Hatch	
					A10	4 Aug 2001	______	Loan to	
					A31	7 May 2002	______	Loan to	
					A10	8 Dec 2002	______	Loan to	1
7	F	24 Dec 1996	1	3	A02	24 Dec 1996	III-3	Hatch	
					A06	22 Nov 1998	______	Loan to	
					A07	5 Jul 2000	______	Loan to	
					A18	14 Dec 2001	______	Loan to	
					A31	6 May 2002	______	Loan to	
					A10	8 Dec 2002	______	Loan to	2

Totals: 1.1.0 (2)

Location: A12

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
17	M	????	WILD	WILD	A12	8 Sep 1999	______	Transfer	1
18	M	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture	
					A12	~16 Sep 1999	VIEJO	Transfer	2
19	M	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture	
					A12	~16 Sep 1999	STUMPY	Transfer	3
20	F	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture	
					A12	~16 Sep 1999	MIDGE	Transfer	3
21	F	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture	
					A12	~16 Sep 1999	BERTHA	Transfer	2
27	?	17 Oct 2000	MULT1	MULT2	A12	17 Oct 2000	SASHI	Hatch	4
28	?	15 Nov 2000	MULT1	MULT2	A12	15 Nov 2000	PEANUT	Hatch	4
30	?	26 Jul 2001	MULT1	20	A12	26 Jul 2001	______	Hatch	5
32	?	10 Aug 2001	MULT1	20	A12	10 Aug 2001	______	Hatch	5
47	M	????	UNK1	UNK2	A12	~ Jan 2002	ERNST	Transfer	6
56	?	22 Aug 2003	MULT1	20	A12	22 Aug 2003	______	Hatch	7
57	?	17 Sep 2003	MULT1	20	A12	17 Sep 2003	______	Hatch	7

58	?	20 Sep 2003	MULT1	20	A12	20 Sep 2003	_____	Hatch	7

Totals: 4.2.4 (10)

Location: A16

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
11	M	10 Nov 1997	1	3	A02	10 Nov 1997	III-4	Hatch	
					A06	22 Nov 1998	_____	Loan to	
					A07	5 Jul 2000	_____	Loan to	
					A16	16 Sep 2000	_____	Loan to	1
14	M	22 Oct 1998	1	3	A02	22 Oct 1998	III-5	Hatch	
					A07	22 Nov 1998	_____	Loan to	
					A16	16 Sep 2000	_____	Loan to	2

Totals: 2.0.0 (2)

Location: A18

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
15	F	20 Sep 1999	1	2	A02	20 Sep 1999	II-6	Hatch	
					A31	6 May 2002	_____	Loan to	
					A18	8 Dec 2002	_____	Loan to	1

Totals: 0.1.0 (1)

Location: A25

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
37	M	????	WILD	WILD	SPRINGBOK	3 Oct 2001	NONE	Capture	
					A25	6 Oct 2001	_____	Loan to	1
38	F	????	WILD	WILD	SPRINGBOK	3 Oct 2001	NONE	Capture	
					A25	6 Oct 2001	_____	Loan to	1

Totals: 1.1.0 (2)

Location: A33

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
10	M	22 Oct 1997	1	2	A02	22 Oct 1997	II-3	Hatch	
					A10	4 Aug 2001	_____	Loan to	
					A31	7 May 2002	_____	Loan to	
					A33	8 Nov 2002	UHURU	Loan to	1

Totals: 1.0.0 (1)

Location: A35

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
31	F	3 Aug 2001	1	2	A02	3 Aug 2001	II-10	Hatch	
					A31	6 May 2002	_____	Loan to	
					A35	30 Nov 2002	_____	Loan to	1
34	F	30 Sep 2001	1	3	A02	30 Sep 2001	III-11	Hatch	
					A31	6 May 2002	_____	Loan to	
					A35	30 Nov 2002	_____	Loan to	1

Totals: 0.2.0 (2)

Location: A37

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
25	M	12 Sep 2000	1	3	A02	12 Sep 2000	III-8	Hatch	
					A31	6 May 2002	_____	Loan to	
					A37	11 Dec 2002	_____	Loan to	1

Totals: 1.0.0 (1)

Location: A39

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
40	?	2 Jul 2002	1	3	A02	2 Jul 2002	III-13	Hatch	
					A39	12 Apr 2003	_____	Loan to	1

Totals: 0.0.1 (1)

Location: A40

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
43	?	29 Sep 2002	1	2	A02	29 Sep 2002	II-12	Hatch	
					A40	6 Jun 2003	_____	Loan to	1

Totals: 0.0.1 (1)

Location: A41

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
51	?	1 Jul 2003	1	2	A02	1 Jul 2003	II-13	Hatch	
					A41	2 Nov 2003	_____	Loan to	1

Totals: 0.0.1 (1)

Location: A42

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
54	?	5 Sep 2003	1	3	A02	5 Sep 2003	III-17	Hatch	
					A42	7 Nov 2003	_____	Loan to	
55	?	3 Sep 2003	1	2	A02	3 Sep 2003	II-14	Hatch	
					A42	7 Nov 2003	_____	Loan to	1

Totals: 0.0.2 (2)

Location: PRAHA

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
50	?	17 Jun 2003	1	3	A02	17 Jun 2003	III-15	Hatch	
					PRAHA	20 Dec 2003	_____	Loan to	1
52	?	9 Jul 2003	1	3	A02	9 Jul 2003	III-16	Hatch	
					PRAHA	20 Dec 2003	_____	Loan to	1

Totals: 0.0.2 (2)

Location: WUPPERTAL

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	

```
 26    F     7 Oct 2000       1       2  A02         7 Oct 2000   II-9     Hatch
                                         A31         6 May 2002 ______     Loan to
                                         WUPPERTAL  18 Dec 2002 ______     Loan to   1

Totals: 0.1.0 (1)
```

Together, all specimens make the total living studbook population 13 males, 13 females, and 18 unknown, housed at 16 locations. Five (potential) bloodlines are present, with founders at locations A02 (1 bloodline), A07 (1), A12 (2), and A25 (1). One couple (18 and 21) at location A12 appears old and has not produced any viable eggs until now. Location A12 requested an alternative male in 2002. In 2003 no wild-caught surplus males from the same locality have become available. Coupling female 21 to a captive-bred male is not advisable, as it would decrease the potential number of unrelated bloodlines by 20%. In the 2002 annual report, location A12 has been proposed to consider transferring the couple (specimens 18 and 21) to another location on breeding loan, to see if this might bring about a change in the behaviour of the tortoises. Unfortunately no response has been received to this proposal, and location A12 will be contacted directly in 2004.

The couple at location A25 (specimens 37 and 38) has not shown any mating activity so far. If this situation will persist in 2004, location A25 will exchange its couple with specimens 1 and 2 that are currently housed at location A02, in an attempt to induce reproduction at location A02, and to find out if the other couple will continue to reproduce at location A25. In this scenario, female 3 will be kept at location A02 to test if sperm storage occurs in *H. s. signatus*. This female will remain available for formation of an unrelated bloodline if a wild-caught male from the same locality became available.

Five single captive-bred females (7, 15, 26, 31, and 34) and 5 single males (6, 10, 11, 14, and 25) fit for breeding purposes are present, at locations A10 (6 and 7), A16 (11 and 14), A18 (15), A33 (10), A35 (31 and 34), A37 (25), and WUPPERTAL (26). All these originate from the same 1.2 founder population and thus are genetically related (same sire). Female 9 is kept together with related male 13, but all produced eggs are being destroyed, and the female will only be bred with an unrelated male after it will have been separated from the related male for a period of 3 years. This way, inbreeding due to sperm storage will likely be avoided. The unrelated captive-bred males that will become available from other bloodlines in the next years will first be combined with the other solitary females (locations A10, A18, A35, and WUPPERTAL), leaving sufficient time for separation of female 9 before a sufficiently large number of males will be available.

Wild-caught specimens 18, 19, 20, and 21 were originally housed as a 2.2 group at location A12. They were separated to form different bloodlines in 2001. Until 2005, all hatchlings will be considered related to both males (due to possible sperm storage), unless it is possible to prove otherwise by DNA analysis.

Males 17 and 47, fit for breeding, are available at location A12. These males originate from unknown wild locations and founders (47) and therefore will only be paired with females that are from unknown original location or otherwise surplus.

4. IMPORTS, BIRTHS, AND DEATHS

In 2003, no imports of *H. s. signatus* have taken place. A strategy for future imports has been drawn up in the previous annual reports. At this point there are no reasons to change this strategy, meaning that additional imports of wild-caught specimens will only be required in 10-15 years from now.

The studbook population *H. s. signatus* produced eggs and hatchlings at two locations in 2003. At a third location (A07) two produced eggs yielded fully developed but dead embryos. This was possibly the result of a changed composition of the calcium/vitamin supplement used. At location A02, females 3, 2, 5, and 9 produced respectively 4, 4, 3, and 2 eggs. All were buried at protected sites. The eggs from female 9 were destroyed because they would result in inbred specimens (see chapter 3). The others were incubated in Seramis (weight ratio Seramis:water = either 4.4:1 or 2.2:1; buried completely). Three eggs produced by female 2 failed to develop, and one egg from female 5 produced a fully developed dead embryo. A second egg from female 5 was produced in December (winter), and is still being incubated. All other eggs hatched successfully. It will be monitored if the hatching rate of the eggs from female 2 will increase again in 2004. The change from incubating in vermiculite to Seramis did not result in failing egg development (for instance, all eggs from female 3 hatched), but it is still too early to draw conclusions about the suitability of Seramis relatively to vermiculite. The hatchling produced by female 5 is the first known F2 breeding in *H. s. signatus*. A short article is in press.

In the enclosure of specimens 1, 2 and 3 (location A02) an egg with a dead embryo was found on 12 March. This egg had probably been overlooked in the previous year, and it is not known which female has produced the egg. The environmental conditions in the enclosure are probably unsuitable for successful egg development.

Location A12 produced five eggs, four from female 20, and one from female 21. The latter egg did not show any development. Out of the remaining eggs, three hatchlings were born, and the fourth egg failed to develop. It is still not sure if female 20 is capable of producing clutches of two eggs. Three eggs were found at the same spot in female 20's enclosure on 1 June, and two of these hatched after 108 and 111 days. In 2004 this female will be x-rayed when a mass increase is detected.

Additional husbandry information is present in the appendices.

Table II: Births of *Homopus s. signatus* in 2003. MULT1 is specimen 18 or 19.

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event
53	?	20 Jul 2003	13	5	A02	20 Jul 2003	030720	Hatch
54	?	5 Sep 2003	1	3	A02	5 Sep 2003	III-17	Hatch
					A42	7 Nov 2003	______	Loan to
56	?	22 Aug 2003	MULT1	20	A12	22 Aug 2003	______	Hatch
57	?	17 Sep 2003	MULT1	20	A12	17 Sep 2003	______	Hatch
58	?	20 Sep 2003	MULT1	20	A12	20 Sep 2003	______	Hatch
51	?	1 Jul 2003	1	2	A02	1 Jul 2003	II-13	Hatch
					A41	2 Nov 2003	______	Loan to
55	?	3 Sep 2003	1	2	A02	3 Sep 2003	II-14	Hatch
					A42	7 Nov 2003	______	Loan to
50	?	17 Jun 2003	1	3	A02	17 Jun 2003	III-15	Hatch
					PRAHA	20 Dec 2003	______	Loan to
52	?	9 Jul 2003	1	3	A02	9 Jul 2003	III-16	Hatch
					PRAHA	20 Dec 2003	______	Loan to

Totals: 0.0.9 (9)

One specimen that was born in 1997 at location A02 died on 20 October at location A36. Autopsy at Utrecht University revealed obvious nutritional problems, possibly related to calcium and/or vitamin D. A second tortoise bred at the same location in 2001 died on 26 December at location A37. This specimen had recently lost some bone tissue of the carapace, and had been veterinary inspected. It was concluded that the carapace had probably been damaged by physical trauma (e.g., falling from a rock) at an early age, and the wound had healed nicely. The carcass has been preserved for later autopsy.

Based on the death of specimen 12, a message has been distributed among all former keepers of this specimen, in order to review the calcium and vitamin D supplementation.

Table III: Deaths of *Homopus s. signatus* in 2003.

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event
12	M	21 Nov 1997	1	2	A02	21 Nov 1997	II-4	Hatch
					A07	22 Nov 1998	______	Loan to
					A18	14 Dec 2001	______	Loan to
					A31	6 May 2002	______	Loan to
					A36	8 Dec 2002	______	Loan to
						20 Oct 2003		Death
[Death by: Env. or Beh. Conditions Unknown Generalized Nutrition (after autopsy)]								
33	M	19 Aug 2001	1	3	A02	19 Aug 2001	III-10	Hatch
					A31	6 May 2002	______	Loan to
					A37	11 Dec 2002	______	Loan to
						26 Dec 2003		Death
[Death by: Other/Unknown Mounted or Preserved: MARKUS BAUR Autopsy Planned Later]								

Totals: 2.0.0 (2)

5. TOTAL STUDBOOK POPULATION AND FUTURE PERSPECTIVES

The current total *H. s. signatus* studbook population consists of 58 specimens. From these, 13 are wild-caught specimens (12 collected and imported by the Homopus Research Foundation), and 45 are captive-bred (44 within the studbook). Forty-four tortoises (12 wild-caught, and 32 captive-bred) are currently alive, housed at 16 locations, in Europe and the USA.

Reproduction is continuing in the studbook population, and all founders are healthy and stable. At this point, the main challenge is to increase reproductive success in the founders at locations A07, A12 (specimens 18 and 21), and A25. Some initiatives to this have been proposed in chapter 3. The sex ratio of the captive population is reasonably close to 1:1, and the overall perspectives of this studbook are very good.

The studbook participants generally form a group of active and involved enthusiasts. With the growing number of locations, the required responsibility of each of the participants is growing too. For instance, it is becoming too time-consuming to ask each participant repeatedly for the sex of maturing juveniles (for instance, specimens 27, 28, 30, and 32 should have known sexes by now), or for any newly born tortoises to be registered. The participants are expected to be assertive in informing the studbook coordinator about any changes, and to be responsive if any information is requested. This will be the only way to expand the studbook to a stable size for the next decades. The Homopus Research Foundation has a formal agreement (see appendix 5) with all studbook participants, except location A12, which has refused to sign the agreement until now.

Table IV: Total studbook population *Homopus s. signatus*. MULT1 are specimens 18 and 19, MULT2 specimens 20 and 21. UNK1 and UNK2 are unknown specimens outside of the studbook.

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event
1	M	????	WILD	WILD	SPRINGBOK	27 Sep 1995	NONE	Capture
					A02	30 Sep 1995	I	Loan to
2	F	????	WILD	WILD	SPRINGBOK	26 Sep 1995	NONE	Capture
					A02	30 Sep 1995	II	Loan to
3	F	????	WILD	WILD	SPRINGBOK	26 Sep 1995	NONE	Capture
					A02	30 Sep 1995	III	Loan to
4	M	????	WILD	WILD	SPRINGBOK	28 Sep 1995	NONE	Capture
					A02	30 Sep 1995	IV	Loan to
						24 Dec 1995		Death
5	F	27 Feb 1996	WILD	3	A02	27 Feb 1996	III-1	Hatch
6	M	8 Nov 1996	1	3	A02	8 Nov 1996	III-2	Hatch
					A10	4 Aug 2001	_____	Loan to
					A31	7 May 2002	_____	Loan to
					A10	8 Dec 2002	_____	Loan to
7	F	24 Dec 1996	1	3	A02	24 Dec 1996	III-3	Hatch
					A06	22 Nov 1998	_____	Loan to
					A07	5 Jul 2000	_____	Loan to
					A18	14 Dec 2001	_____	Loan to
					A31	6 May 2002	_____	Loan to
					A10	8 Dec 2002	_____	Loan to
8	?	26 Jan 1997	1	2	A02	26 Jan 1997	II-2	Hatch
						2 Feb 1997		Death
9	F	30 Nov 1996	1	2	A02	30 Nov 1996	II-1	Hatch
10	M	22 Oct 1997	1	2	A02	22 Oct 1997	II-3	Hatch
					A10	4 Aug 2001	_____	Loan to
					A31	7 May 2002	_____	Loan to
					A33	8 Nov 2002	UHURU	Loan to

11	M	10 Nov 1997	1	3	A02	10 Nov 1997	III-4	Hatch
					A06	22 Nov 1998	______	Loan to
					A07	5 Jul 2000	______	Loan to
					A16	16 Sep 2000	______	Loan to
12	M	21 Nov 1997	1	2	A02	21 Nov 1997	II-4	Hatch
					A07	22 Nov 1998	______	Loan to
					A18	14 Dec 2001	______	Loan to
					A31	6 May 2002	______	Loan to
					A36	8 Dec 2002	______	Loan to
						20 Oct 2003		Death
13	M	26 Sep 1998	1	2	A02	26 Sep 1998	II-5	Hatch
					A07	22 Nov 1998	______	Loan to
					A18	14 Dec 2001	______	Loan to
					A31	6 May 2002	______	Loan to
					A02	8 Dec 2002	II-5	Loan to
14	M	22 Oct 1998	1	3	A02	22 Oct 1998	III-5	Hatch
					A07	22 Nov 1998	______	Loan to
					A16	16 Sep 2000	______	Loan to
15	F	20 Sep 1999	1	2	A02	20 Sep 1999	II-6	Hatch
					A31	6 May 2002	______	Loan to
					A18	8 Dec 2002	______	Loan to
16	?	4 Oct 1999	1	3	A02	4 Oct 1999	III-6	Hatch
						4 Oct 1999		Death
17	M	????	WILD	WILD	A12	8 Sep 1999	______	Transfer
18	M	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture
					A12	~16 Sep 1999	VIEJO	Transfer
19	M	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture
					A12	~16 Sep 1999	STUMPY	Transfer
20	F	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture
					A12	~16 Sep 1999	MIDGE	Transfer
21	F	????	WILD	WILD	SPRINGBOK	~16 Sep 1999	NONE	Capture
					A12	~16 Sep 1999	BERTHA	Transfer
22	M	19 Jun 2000	1	2	A02	19 Jun 2000	II-7	Hatch
					A31	6 May 2002	______	Loan to
						14 Sep 2002		Death
23	?	19 Jul 2000	1	2	A02	19 Jul 2000	II-8	Hatch
						29 Jun 2001		Death
24	?	2 Aug 2000	1	3	A02	2 Aug 2000	III-7	Hatch
						2 Aug 2000		Death
25	M	12 Sep 2000	1	3	A02	12 Sep 2000	III-8	Hatch
					A31	6 May 2002	______	Loan to
					A37	11 Dec 2002	______	Loan to
26	F	7 Oct 2000	1	2	A02	7 Oct 2000	II-9	Hatch
					A31	6 May 2002	______	Loan to
					WUPPERTAL	18 Dec 2002	______	Loan to
27	?	17 Oct 2000	MULT1	MULT2	A12	17 Oct 2000	SASHI	Hatch
28	?	15 Nov 2000	MULT1	MULT2	A12	15 Nov 2000	PEANUT	Hatch
29	?	15 Jul 2001	1	3	A02	15 Jul 2001	III-9	Hatch
					A31	6 May 2002	______	Loan to
						14 Aug 2002		Death
30	?	26 Jul 2001	MULT1	20	A12	26 Jul 2001	______	Hatch

31	F	3 Aug 2001	1	2	A02	3 Aug 2001	II-10	Hatch
					A31	6 May 2002	______	Loan to
					A35	30 Nov 2002	______	Loan to
32	?	10 Aug 2001	MULT1	20	A12	10 Aug 2001	______	Hatch
33	M	19 Aug 2001	1	3	A02	19 Aug 2001	III-10	Hatch
					A31	6 May 2002	______	Loan to
					A37	11 Dec 2002	______	Loan to
						26 Dec 2003		Death
34	F	30 Sep 2001	1	3	A02	30 Sep 2001	III-11	Hatch
					A31	6 May 2002	______	Loan to
					A35	30 Nov 2002	______	Loan to
35	M	????	WILD	WILD	SPRINGBOK	4 Oct 2001	NONE	Capture
					A02	6 Oct 2001	______	Loan to
					A07	16 Dec 2001	______	Loan to
36	F	????	WILD	WILD	SPRINGBOK	3 Oct 2001	NONE	Capture
					A02	6 Oct 2001	______	Loan to
					A07	16 Dec 2001	______	Loan to
37	M	????	WILD	WILD	SPRINGBOK	3 Oct 2001	NONE	Capture
					A25	6 Oct 2001	______	Loan to
38	F	????	WILD	WILD	SPRINGBOK	3 Oct 2001	NONE	Capture
					A25	6 Oct 2001	______	Loan to
39	?	11 Jun 2002	1	3	A02	11 Jun 2002	III-12	Hatch
						20 Jun 2002		Death
40	?	2 Jul 2002	1	3	A02	2 Jul 2002	III-13	Hatch
					A39	12 Apr 2003	______	Loan to
41	?	25 Jul 2002	1	3	A02	25 Jul 2002	III-14	Hatch
					A08	19 Apr 2003	______	Loan to
42	?	20 Aug 2002	1	2	A02	20 Aug 2002	II-11	Hatch
					A08	19 Apr 2003	______	Loan to
43	?	29 Sep 2002	1	2	A02	29 Sep 2002	II-12	Hatch
					A40	6 Jun 2003	______	Loan to
44	?	31 Oct 2002	35	36	A07	31 Oct 2002	______	Hatch
45	?	~ Jun 2002	MULT1	20	A12	~ Jun 2002	______	Hatch
						~ Jun 2002		Death
46	?	~ Jun 2002	MULT1	20	A12	~ Jun 2002	______	Hatch
						~ Jun 2002		Death
47	M	????	UNK1	UNK2	A12	~ Jan 2002	ERNST	Transfer
48	?	~ Jul 2002	MULT1	20	A12	~ Jul 2002	______	Hatch
						~ Jul 2002		Death
49	?	~ Jul 2002	MULT1	20	A12	~ Jul 2002	______	Hatch
						~ Jul 2002		Death
50	?	17 Jun 2003	1	3	A02	17 Jun 2003	III-15	Hatch
					PRAHA	20 Dec 2003	______	Loan to
51	?	1 Jul 2003	1	2	A02	1 Jul 2003	II-13	Hatch
					A41	2 Nov 2003	______	Loan to
52	?	9 Jul 2003	1	3	A02	9 Jul 2003	III-16	Hatch
					PRAHA	20 Dec 2003	______	Loan to
53	?	20 Jul 2003	13	5	A02	20 Jul 2003	030720	Hatch
54	?	5 Sep 2003	1	3	A02	5 Sep 2003	III-17	Hatch
					A42	7 Nov 2003	______	Loan to

55	?	3 Sep 2003	1	2	A02	3 Sep 2003	II-14	Hatch
					A42	7 Nov 2003	_____	Loan to
56	?	22 Aug 2003	19	20	A12	22 Aug 2003	_____	Hatch
57	?	17 Sep 2003	19	20	A12	17 Sep 2003	_____	Hatch
58	?	20 Sep 2003	19	20	A12	20 Sep 2003	_____	Hatch

Totals: 17.13.28 (58)

Part 2:

Studbook *Homopus areolatus*

6. CURRENT LIVING STUDBOOK POPULATION AND TRANSFERS

Live *Homopus areolatus* are located at seven studbook locations, one more than last year: Netherlands (2), Belgium (1), USA (1), Sweden (1), Switzerland (1), and Germany (1). Location A02 has transferred one specimen bred in 2001 to (new) location A10. No other transfers were registered. The transfer was in accordance with national and international legislation.

The total number of live specimens grew from 19 to 20 in 2003. Three specimens were born, and two specimens died. Location A26 in Switzerland has not sent any updates in 2003, despite requests via e-mail, fax, and letter. Therefore, this location's information as presented here may be outdated. Because the specimens kept at this location were imported from South Africa with formal agreement of the Homopus Research Foundation, the permit sections of South African Western and Northern Cape Nature Conservation have been notified regarding the lack of response by this keeper.

Husbandry conditions and additional information is available in appendix 2.

Table I: Current living studbook population *Homopus areolatus* as registered in the studbook. Numbers far right are relative numbers per location, indicating which specimens are housed together. MULT1, MULT2, and MULT3 are groups of unregistered specimens at a location outside of the studbook. UNK1 and UNK2 are two specimens at a location outside of the studbook.

Location: A02

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
4	F	????	MULT1	MULT2	KRAAIFONT	????	_____	Hatch	
					A02	21 Nov 1997	IV	Transfer	1
5	M	????	MULT1	MULT2	KRAAIFONT	????	_____	Hatch	
					A02	21 Nov 1997	V	Transfer	1
37	?	7 Aug 2003	5	4	A02	7 Aug 2003	IV-3	Hatch	2

Totals: 1.1.1 (3)

Location: A03

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
6	M	????	MULT1	MULT2	KRAAIFONT	????	_____	Hatch	
					A02	21 Nov 1997	VI	Transfer	
					A03	14 Apr 2001	HZ0738	Transfer	1

Totals: 1.0.0 (1)

Location: A10

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
25	F	15 Sep 2001	5	4	A02	15 Sep 2001	IV-1	Hatch	
					A10	24 May 2003	_____	Loan to	1

Totals: 0.1.0 (1)

Location: A12

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
10	M	????	WILD	WILD	A13	????	_____	Transfer	
					A12	~16 Sep 1999	ERNST	Transfer	1
11	F	????	WILD	WILD	KRAAIFONT	????	_____	Transfer	
					A12	~16 Sep 1999	A5	Transfer	2?

12	F	????	WILD	WILD	KRAAIFONT		????	______	Transfer	
					A12	~16	Sep 1999	A6	Transfer	2?
14	F	????	WILD	WILD	KRAAIFONT		????	______	Transfer	
					A12	16	Sep 1999	BABY	Transfer	2?

Totals: 1.2.1 (4)

Location: A16

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
16	M	????	WILD	WILD	A16	30 Aug 1994	______	Transfer	1
17	F	????	WILD	WILD	A16	30 Aug 1994	______	Transfer	1
34	?	30 Jun 2002	16	17	A16	30 Jun 2002	______	Hatch	2
35	?	9 Jul 2002	16	17	A16	9 Jul 2002	______	Hatch	2
38	?	5 Apr 2003	16	17	A16	5 Apr 2003	______	Hatch	2?
39	?	9 Apr 2003	16	17	A16	9 Apr 2003	______	Hatch	2?

Totals: 1.1.4 (6)

Location: A26

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
27	M	????	WILD	WILD	KRAAIFONT	????	______	Transfer	
					A26	9 Jul 2001	______	Transfer	1
28	F	????	WILD	WILD	KRAAIFONT	????	______	Transfer	
					A26	9 Jul 2001	______	Transfer	1

Totals: 1.1.0 (2)

Location: A37

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
22	M	????	WILD	WILD	A20	????	______	Transfer	
					A21	17 Oct 2000	______	Transfer	
					A37	15 Sep 2002	______	Loan to	1
23	F	????	WILD	WILD	A20	????	______	Transfer	
					A21	17 Oct 2000	______	Transfer	
					A37	15 Sep 2002	______	Loan to	1
24	?	????	UNK1	UNK2	A20	????	______	Hatch	
					A21	17 Oct 2000	______	Transfer	
					A37	15 Sep 2002	______	Loan to	2

Totals: 1.1.1 (3)

Together, all specimens make the total living studbook population 20 specimens, forming five (potential) bloodlines. Solitary specimens fit for breeding are present at locations A03 (6) and A10 (25). It is preferred not to combine these two specimens, but rather to pair male 6 to a specimen not related to the rest of the studbook animals, to form an additional bloodline. The females at location A12 are subadult specimens, not yet fit for breeding. However, three new female tortoises have been donated by a Namibian breeder, and will be imported into Europe in 2004. One of these females could be housed with male 6 (not necessarily at location A03). The other two are available for further combinations.

7. IMPORTS, BIRTHS, AND DEATHS

In 2003 no imports of *H. areolatus* have taken place. Three captive-bred surplus females have been donated to the Homopus Research Foundation by a Namibian tortoise breeder. These specimens will be imported into Europe in 2004. An exporting permit has already been granted. Since the breeding results are still relatively meagre, and several bloodlines are already present, there are no plans to import additional *H. areolatus*.

Breeding at location A16 was continued in 2003, and two hatchlings were born at this location. Two eggs (8 and 9 g) were laid on 9 January, and both hatched, on 5 and 9 April (mass hatchlings 5 and 6 g).

Female 4 at location A02 produced two clutches in 2003, one containing two eggs (15 April) and one containing three eggs (10 May). Due to the mostly unsuccessful incubation attempts in the previous years, all eggs were incubated in Seramis rather than vermiculite. The first clutch was buried completely in Seramis (weight ratio Seramis:water = 4.4:1) in a closed container with air holes, whereas the second clutch was incubated in more humid Seramis (weight ratio Seramis:water = 3.3:1) in an open container. One egg of the first clutch had already cracked on 10 May, presumably due to too high substrate humidity. No embryonic development was visible in this egg. From 10 May the container with the remaining egg was kept opened. The second egg smelled bad on 24 June, and had a cracked shell and contained a dead underdeveloped embryo. The second clutch contained one egg with a cracked shell (no embryonic development visible) on 31 July, one egg hatched on 7 August, and the remaining egg was opened on 23 August and contained a fully developed but dead and dehydrated embryo. Any clutches in 2004 will be incubated similar to the second clutch of 2003. However, the eggs will not be buried entirely, and the substrate will be maintained at the same humidity throughout the incubation period. Details about the incubation method used until now can be found in the 2001 annual report.

Table II: Births of *Homopus areolatus* in 2003.

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event
37	?	7 Aug 2003	5	4	A02	7 Aug 2003	IV-3	Hatch
38	?	5 Apr 2003	16	17	A16	5 Apr 2003	_____	Hatch
39	?	9 Apr 2003	16	17	A16	9 Apr 2003	_____	Hatch

Totals: 0.0.3 (3)

Two specimens died, one captive-bred (location A16) and one wild-caught (A03). The captive-bred specimen had grown very fast, and it is possible that this has contributed to its death. The other specimens that have been bred at location A16 are doing well, and husbandry techniques appear to be fine. The cause of death of the wild-caught tortoise also remains unknown, as it died unexpectedly. At location A03 winter climatic conditions (temperature 27°C, and under the spotlight 35°C, low night temperatures, and short photoperiod) prevailed when the tortoise died. Both specimens were too much decomposed for autopsy when found.

Table III: Deaths of *Homopus areolatus* in 2003.

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event
18	M	23 May 2000	16	17	A16	23 May 2000	_____	Hatch
						30 Mar 2003		Death
			[Death by: Other/Unknown		Incinerate	No Autopsy Planned]		

```
    33    F       ????        WILD    WILD  LONDON RP     ????      ______      Transfer
                                            A03        23 Dec 2001 HZ0793      Transfer
                                                       28 Jul 2003             Death
                                  [Death by: Unknown means]

Totals: 1.1.0 (2)
```

8. TOTAL STUDBOOK POPULATION AND FUTURE PERSPECTIVES

The current studbook population of the studbook *H. areolatus* consists of 39 specimens. From these, 21 are wild-caught (15 handed to Tygerberg Zoopark by visitors, 1 caught in the Pretoria area in South Africa, 1 had been in captivity in the Netherlands for about 15 years, and 4 originate from unknown locations) and 18 are captive-bred. Twenty tortoises are alive, housed at 6 locations.

Although reproduction is taking place, it is obvious that the studbook population *H. areolatus* is still not safe. Breeding success should increase, and offspring should be produced at more locations. These are the (persisting) challenges for the studbook. Since there are already five potential bloodlines, additional specimens are not required for the studbook to function.

There is a marked difference in responsiveness of the participants in the studbooks on *H. areolatus* and *H. s. signatus*, with participants responding much quicker and more elaborate in the latter studbook. Perhaps this is the result of the difference in ownership: Whereas almost the entire studbook population *H. s. signatus* is the formal property of the Homopus Research Foundation, the studbook on *H. areolatus* consists of many different *H. areolatus* owners. Regardless, it is of the utmost importance that participants realise how important their contributions are to the functioning of the studbook.

Table IV: Total studbook population *Homopus areolatus*. MULT1, MULT2, and MULT3 are groups of unregistered specimens at a location outside of the studbook. UNK1 and UNK2 are two specimens at a location outside of the studbook.

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event
1	F	????	WILD	WILD	KRAAIFONT	~ Jul 1997	______	Transfer
					A02	21 Nov 1997	I	Transfer
					A03	14 Dec 1997	HZ0525	Transfer
						9 Nov 1998		Death
2	F	????	WILD	WILD	KRAAIFONT	~ Jul 1997	______	Transfer
					A02	21 Nov 1997	II	Transfer
					A03	14 Dec 1997	______	Transfer
						13 Aug 1999		Death
3	?	????	MULT1	MULT2	KRAAIFONT	????	______	Hatch
					A02	21 Nov 1997	III	Transfer
						29 Oct 1999		Death
4	F	????	MULT1	MULT2	KRAAIFONT	????	______	Hatch
					A02	21 Nov 1997	IV	Transfer
5	M	????	MULT1	MULT2	KRAAIFONT	????	______	Hatch
					A02	21 Nov 1997	V	Transfer
6	M	????	MULT1	MULT2	KRAAIFONT	????	______	Hatch
					A02	21 Nov 1997	VI	Transfer
					A03	14 Apr 2001	HZ0738	Transfer
7	M	????	WILD	WILD	ROTTERDAM	????	______ ltf	Transfer
					A03	????	HZ0457	Loan to
						5 Jul 1998		Death
8	F	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A12	~16 Sep 1999	A1	Transfer
						19 Mar 2000		Death
9	F	????	WILD	WILD	A13	????	______	Transfer
					A12	~16 Sep 1999	BLACKY	Transfer
						30 Apr 2000		Death
10	M	????	WILD	WILD	A13	????	______	Transfer
					A12	~16 Sep 1999	ERNST	Transfer

11	F	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A12	~16 Sep 1999	A5	Transfer
12	F	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A12	~16 Sep 1999	A6	Transfer
13	M	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A12	~16 Sep 1999	A7	Transfer
						15 Feb 2000		Death
14	F	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A12	16 Sep 1999	BABY	Transfer
15	F	????	WILD	WILD	A13	????	______	Transfer
					A12	~16 Sep 1999	A4	Transfer
						15 Feb 2000		Death
16	M	????	WILD	WILD	A16	30 Aug 1994	______	Transfer
17	F	????	WILD	WILD	A16	30 Aug 1994	______	Transfer
18	M	23 May 2000	16	17	A16	23 May 2000	______	Hatch
						30 Mar 2003		Death
19	?	5 Feb 2000	MULT3	11	A12	5 Feb 2000	______	Hatch
						5 Feb 2000		Death
20	?	16 Mar 2000	MULT3	11	A12	16 Mar 2000	______	Hatch
						16 Mar 2000		Death
21	?	16 Mar 2000	MULT3	11	A12	16 Mar 2000	______	Hatch
						16 Mar 2000		Death
22	M	????	WILD	WILD	A20	????	______	Transfer
					A21	17 Oct 2000	______	Transfer
					A37	15 Sep 2002	______	Loan to
23	F	????	WILD	WILD	A20	????	______	Transfer
					A21	17 Oct 2000	______	Transfer
					A37	15 Sep 2002	______	Loan to
24	?	????	UNK1	UNK2	A20	????	______	Hatch
					A21	17 Oct 2000	______	Transfer
					A37	15 Sep 2002	______	Loan to
25	F	15 Sep 2001	5	4	A02	15 Sep 2001	IV-1	Hatch
					A10	24 May 2003	______	Loan to
26	?	15 Oct 2001	5	4	A02	15 Oct 2001	IV-2	Hatch
						26 Apr 2002		Death
27	M	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A26	9 Jul 2001	______	Transfer
28	F	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A26	9 Jul 2001	______	Transfer
29	M	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A27	9 Jul 2001	______	Transfer
						9 Nov 2001		Death
30	F	????	WILD	WILD	KRAAIFONT	????	______	Transfer
					A27	9 Jul 2001	______	Transfer
						11 Nov 2001		Death
31	?	11 Nov 2001	5	4	A02	11 Nov 2001	______	Hatch
						11 Nov 2001		Death
32	F	????	WILD	WILD	A29	~ Jun 2000	______	Transfer
					A03	15 Jun 2001	HZ0752	Transfer
						16 May 2002		Death

33	F	????	WILD	WILD	LONDON RP	????	______	Transfer
					A03	23 Dec 2001	HZ0793	Transfer
						28 Jul 2003		Death
34	?	30 Jun 2002	16	17	A16	30 Jun 2002	______	Hatch
35	?	9 Jul 2002	16	17	A16	9 Jul 2002	______	Hatch
36	?	12 Oct 2002	5	4	A02	12 Oct 2002	______	Hatch
						12 Oct 2002		Death
37	?	7 Aug 2003	5	4	A02	7 Aug 2003	IV-3	Hatch
38	?	5 Apr 2003	16	17	A16	5 Apr 2003	______	Hatch
39	?	9 Apr 2003	16	17	A16	9 Apr 2003	______	Hatch

Totals: 10.15.14 (39)

Part 3:

Studbook *Homopus femoralis*

9. CURRENT LIVING STUDBOOK POPULATION AND TRANSFERS

Live *Homopus femoralis* are located at two studbook locations in the Netherlands, the same as in 2002. The total number of live specimens has remained three. All have been obtained from the British Tortoise Trust, that had rescued the specimens from a private keeper in the UK.

Table I: Current living studbook population *Homopus femoralis* as registered in the studbook. Cage numbers are relative numbers per location, indicating which specimens are housed together.

Location: A02

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
3	M	????	WILD	WILD	A28	~ Jan 2001	_____	Transfer	
					A02	23 Dec 2001	III	Loan to	1

Totals: 1.0.0 (1)

Location: A08

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event	
1	M	????	WILD	WILD	A28	~ Jan 2001	_____	Transfer	
					A02	23 Dec 2001	I	Loan to	
					A08	17 Apr 2002	_____	Loan to	1
2	M	????	WILD	WILD	A28	~ Jan 2001	_____	Transfer	
					A08	23 Dec 2001	_____	Loan to	2

Totals: 2.0.0 (2)

All specimens together make the total living studbook population three single male specimens, all fit for breeding purposes.

10. IMPORTS, BIRTHS, AND DEATHS

In 2003, no imports, births or deaths have occurred.

11. TOTAL STUDBOOK POPULATION AND FUTURE PERSPECTIVES

The current studbook population of the studbook *H. femoralis* consists of three specimens, all wild-caught (rescued long-term captive animals). All three are still alive, housed at two locations.

Since the current three specimens appear to do very well, it is planned to obtain partners for these specimens to try to breed them in captivity, and to gather and publish information about this poorly known species. In 2002 many zoos and similar organisations in South Africa have been asked if they had surplus specimens available. Not only were no surplus specimens present, no specimens were present at all. Based on this result, it may be required to collect a small number of specimens in the wild, rather than to transfer captive animals. Despite of studbook participants travelling to South Africa on a regular basis, and a certain likelihood to obtain the necessary permits, it will be difficult to find a suitable collecting location. Searches for this and other *Homopus* species have shown that even at locations where the species is known to occur, it is difficult to locate them.

12. LITERATURE ABOUT *HOMOPUS*

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Annual report 1995-1997
Annual report 1998
Annual report 1999
Annual report 2000

Annual report 2001
Annual report 2002

Onderzoek aan landschildpadden: Waarom sponsoren?
Research on tortoises: Why should you sponsor it?
General information leaflet Homopus Research Foundation in Dutch
General information sheet Homopus Research Foundation
Studbook information sheet Homopus Research Foundation
Caresheet *Homopus areolatus* in Dutch
Caresheet *Homopus areolatus* in English
Caresheet *Homopus s. signatus* in Dutch
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Population dynamics, behaviour and natural diet of the Namaqualand speckled padloper (*Homopus s. signatus*) - 2000
Population dynamics, behaviour and reproduction of the Namaqualand speckled padloper (*Homopus s. signatus*): Enhancing our knowledge - 2001
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Appendix 1

Husbandry conditions and additional information per location *Homopus s. signatus*

The information below is an update on the information presented in appendix 1 of the previous annual report.

Location A02

There are no changes since last year.

Location A07

Terrarium

Terrarium 1 measures 120 x 60 cm. It has a sandy soil and is decorated with a pile of rocks. Illumination occurs by means of a 36 W tube light, and two 50 W halogen spots. The temperature in the enclosure is 30°C, and under the spot lights > 45°C. The photoperiod is automatically reduced to 9 hours in autumn by means of an Astrotimer time control unit. It increases the photoperiod to 13 hours in summer. Specimens 35 and 36 are housed in this enclosure (see photograph).

Terrarium 2 measures 60 x 27 cm, with a soil layer consisting of sand. In this enclosure there is also a pile of stones available. The enclosure is illuminated and heated using a 50 W halogen spot, providing the same temperatures as in the first enclosure. Photoperiod is also controlled in the same way. This enclosure is used for keeping offspring.

Feeding

The specimens are fed daily with fresh green leaves collected outside (*Taraxacum*, *Trifolium*, grasses, et cetera), but in the dry season they are fed every three days. Once weekly they receive salad or endive, vegetables (cucumber, zucchini, paprika), and small pieces of fruits (apple, berries, melon), enriched with a calcium and vitamin additive, Vitakalk.

Water

Once weekly a water bowl is offered to the tortoises (with no additives). In the dry season (summer) the water bowl is offered only once every two weeks, and fewer and drier food types are fed.

Climatic cycle

May - June:	Introduction to dry season, with reduction of food and water
July - October:	High temperatures and dry conditions; the specimens appear from their hiding places only once every few days

November - May: Gradually decreasing (until approximately 30°C) temperatures. Night temperatures 15-20°C. Spraying of the enclosure, twice weekly. Water and food available. The specimens are very active.

Growth

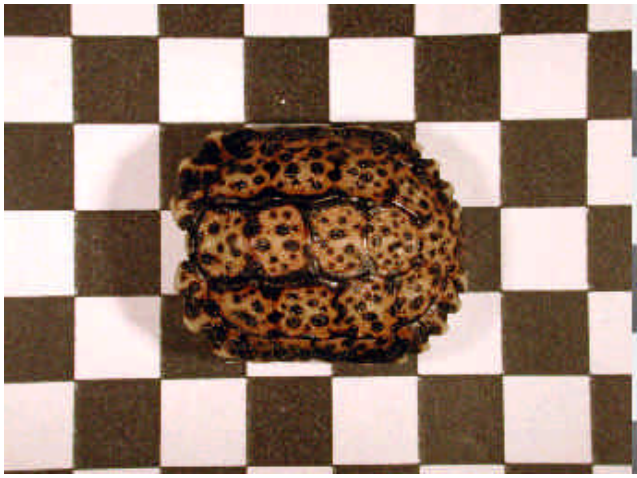
Date	35 Mass (g)	35 SCL (mm)	36 Mass (g)	36 SCL (mm)	44 Mass (g)	44 SCL (mm)
31-10-02	-	-	-	-	8	34
07-11-02	93	80	144	90	8	36
16-12-02	95	80	143	90	12	38
20-01-03	96	80	144	90	14	38
17-02-03	96	80	135	90	18	39
16-03-03	97	80	145	90	23	44
20-04-03	98	80	142	90	26	47
15-05-03	98	80	140	90	28	49
13-06-03	94	80.5	140	90	29	52
29-07-03	90	80.5	141	90	31	56
11-08-03	90	80.5	138	90	31	57
18-09-03	91	80.5	138	90.5	31	59
16-10-03	94	80.5	135	90.5	32	59
13-11-03	93	80.5	135	90.5	32	60
24-12-03	96	80.5	131	90.5	31	60.5

Oviposition

On 06-07-02, 16-02-03, and 02-04-03 a single egg clutch (35 x 26 mm) was buried circa 5 cm of sand. The eggs were incubated in an incubator at 21 (night) - 34 (day) °C in slightly humid lava gravel.

Hatching

The first egg hatched on 31-10-02 (8 g, 34 mm). After hatching the specimen remained in the egg for three days. After this, the yolk sac was completely absorbed. Seven days after hatching the tortoise was housed in terrarium 2.



November 2002

July 2003

The other eggs did not result in hatchling. When the eggs were opened, they contained fully developed but dead embryos.

Remarks

Apart from the *Homopus* eggs, only nine out of ten *Pyxis arachnoides* eggs hatched (hatching rate over the last 10 years: 93%). Two female *P. arachnoides* died from egg retention (no other losses in the past 10 years). Seven out of thirteen *Trachydosaurus* sp. were stillborn or died within two days. The living offspring were unable to move after birth. The problems of two offspring could be solved within 48

hrs by feeding a mineral/vitamin mixture. The remaining four gravid females produced viable offspring after providing vitamins and minerals.

It is a possibility that the composition of the mineral/vitamin mixture that has been used successfully throughout the past years (Vitakalk) has been changed. The manufacturer has stated that there has not been such a change.

Location A10

Besides a change in animals (the previous animals returned from Frankfurt University on 21-12-2002), hardly anything is to be reported. The animals are still kept separately.

Feeding

During the spring, summer, and most of the autumn months, the animals are fed with wild herbs from the garden. During the other months the animals receive a diet that mainly consists of endive (finely chopped), heucobs (soaked in hot water and then squeezed out thoroughly), and vitamins. The vitamin supplement is a mixture of Gistocal and calcium lactate (1:1) and will make up for 1.5% of the total amount of food (weight based). If the food is not soiled it is left in the terrarium to dry, and the tortoises will feed on it the next day.

Drinking

The water is supplemented with vitamin D_3 (3 drops of a 50,000 IU/ml solution).

Location A12

One adult pair is still being maintained in the same 183 x 61 x 61 cm wooden enclosure that has been their home since they were imported. (0019 &0020). Specimens 0018 & 0021 are now being housed in a glass aquarium (61 x 122 x 48 cm) that has been laid on its side and a false front created to give them the maximum amount of surface area. The pair were seperated in order to determine the lineage of each hatchling. First year hatchlings are being kept in a glass enclosure measuring 92 x 46 x 43 cm. Year two in a glass enclosure measuring 61 x 46 x 43 cm, and this years (year four) hatchlings (3 total) in a glass enclosure measuring 76 x 31 x 31 cm. I am maintaing one lone male (0017) in a glass enclosure 92 x 46 x 43 cm, and another lone male (captive born, purchased from Louise Silverman) in a glass enclosure 122 x 51 x 71 cm. All have overhead UVB lighting (located 31 cm from the substrate) provided by various high quality fluorescent bulbs (12 hours on, 12 off), and incandescent "hot spots" are located in one corner of each enclosure. Wattages on the incandescent bulbs range from 60-100 watts depending on the size of the enclosure.

For the first two years hatchlings are maintained on a substrate of paper towels allowing me to keep a better eye on fecal condition as well as allowing hatchlings excellent hiding opportunities. It is changed easily and frequently. All other tortoises are maintained on "play ground quality" sand. Rock shelters are provided in these tanks as well, but not for the younger hatchlings.

Water is made available 3 times a week. All are fed every other day. Diet consists primarily of commercially grown dandelion greens. Other greens sometimes used in combination are collards, mustard, swiss chard, romaine, kale and spinach. Feedings are supplemented with squash, tomato, grated carrot, seedless cucumbers, rose of sharon, dandelion and rose blossoms and mulberry leaves when in season. All are supplemented with calcium and vitamin powders.

Breeding activity has been noted in both adult pairs, but only 0019 & 0020 are producing "viable" eggs at this point. They produced four eggs this year resulting in three hatchlings while 0018 & 0021 only produced one egg that (using candling) never appeared to be fertile. I am cautious to say eggs have never been fertile having no reliable means of determining this at this point. One egg was found in the 0019/0020 tank on 5/4, buried in the "usual" place. (One corner with deeper loam substrate, up against a large rock.) The egg was moved to a Hovibator incubator as is the practice with all of my eggs, and hatched in 110 days. Three eggs were found together under a hide spot unburied on 6/1. One hatched after 108 days, the other after 111 days. The third failed to hatch. This year I will weigh and xray 0020 if I notice any signs that she may be close to laying in an attempt to determine if she is multiple clutching. Last year this female produced the egg that ended up hatching twins sharing a common yolk. Unfortunately they did not survive. This is the first known case of twins in Homopus s. signatus that the studbook coordinator or I are aware of.

Back to this year, I failed to record the date of the single egg produced by the other adult pair. It was around the 6/1 time frame. It showed no signs of fertility and never hatched. This pair is quite old.

Copulation is taking place. I will introduce one of the loan males for brief supervised visits this year and play with light cycles to see if it has a positive effect on frtility in this pair. All hatchlings drank two days after hatching. Relatively small residual yolk sacks remained on all. All fed within the first week and are progressing well as of this writing.

Location A16

Both male *Homopus s. signatus* were kept under identical conditions as previous years (2001 and 2002 reports). We have changed the light system and now we use Arcadia 7% UVB 23 W, and normal spotlight bulbs for heating and to create a hotspot.

The following masses (g) were measured in the end of 2003:

Date	0011	0014
16-11-03	68	74 g

Location A18

Growth

Date	Parameter	0015
25-04-03	Mass (g)	134
	SCL (mm)	92.1
	SPL (mm)	74.7
	MSW (mm)	67.9
	MSH (mm)	33.6
03-11-03	Mass (g)	142
	SCL (mm)	92.1
	SPL (mm)	74.5
	MSW (mm)	68.0
	MSH (mm)	35.2

Keeping conditions

The enclosure measures 150 x 40 cm. It is illuminated by a 150 W HQI TS Power Star, and two 50 W Halogen spots (Halopar 20). As substrate sand is used, and the terrarium is decorated with stones and a few pieces of bark. In total, four different crevices are provided. A water bowl provides water at all times.

During the hotter season (from June to September) an additional ground heating is used in some parts of the enclosure. The duration of the light is 14 hours during the hot, dry season from June to September. Then it decreases gradually and reaches 10 hours in the cooler and wet season, from December to February. The terrarium is sprayed once in the hot, dry season, five times a week from December to February, and two to three times from March to June, and from October to December. The temperatures during June to September are about 28-35°C during daytime, and 22-25°C during the night. In the cooler and wet season, they drop to about 22-26°C during the day, and 16-20°C during the night. However at all times, high temperatures up to about 50°C are provided directly under the halogen spots.

Food is provided about three times per week during the hot and dry season, as well as during the cool and wet season, and about six times weekly during spring and autumn. Food consists of herbs as *Taraxacum*, *Plantago*, *Tussilago*, and *Trifolium*, as long they are available. When they are not available, different lettuce species are fed, such as endive and romaine, and some carrots. The food is supplemented with Vitakalk, or alternatively with Davinova.

Location A25

The following changes have been made in comparison to the description in the 2002 annual report:

Housing

Decoration

More structure has been added in the enclosure, by constructing a small pile of sand and more depth in a crevice.

Heating

1 X 60 W Philips bulb positioned lower as former light bulbs
1 X 150 W halogen

Climate

Temperature

25-35°C at daytime, 12-20°C at night. The 2002 summer was exceptionally hot, and as a result the room temperature was high in the afternoon and early evening. To prevent overheating I use an thermostat. On the hottest days, heating sources were shut down.

Also the room (actually the house) is adjusted to have more ventilation. Because of this, night temperatures are lower as in previous years.

Humidity

In 2002 more sand has been added to create a more solid substrate. The reconstruction of the house and consequent increased ventilation has decreased the average air humidity.

Feeding

Dried dandelion flowers were added to the diet. These were imported from Germany (Galke company).

Behaviour

Still no mating behaviour has been observed. After the installation of the 150 W halogen lamp the male appeared to bask more often. Stress behaviour has not been observed.

Location A33

Terrarium

The terrarium measures 1.5 x 1.0 m, and is divided in two compartments. One half is available to the tortoise. For ventilation, one third of the surface has an open top. This can also be closed by means of Plexiglass, in order to obtain higher temperatures in summer.

Technique

Illumination takes place by means of one 70 W HQI spotlight, and an additional (70 or 120 W) HQL lamp. Furthermore, two spotlights (25 W in winter; 40 W in summer) provide basking sites.

Temperature

Since the enclosure is situated in a cellar, it is possible to provide noticeably lower night temperatures. The average temperatures are as following: Winter 22-28°C (day), 12-18°C (night); summer 25-35°C (day), 18-20°C (night). The temperatures under the spotlights are higher.

Relative humidity and water

Winter 40-70%; summer 20-50%. This humidity is maintained by spraying the enclosure (once weekly in summer, and three times weekly in winter), and watering the plants in it. Immediately after spraying, the relative humidity is temporarily higher than indicated above. A shallow water bowl is available at all times. In summer I let it dry out occasionally for one or two days.

Decoration of the terrarium

The soil layer consists of loamy sand. Stone plates form two hiding places, of which the deeper one is obviously preferred by the tortoise. The enclosure is planted with two Agava sp., and some other succulents. The decoration is completed by dried grasses.

Behaviour

When the specimen was first released in the enclosure in November 2002, it tended to be hyperactive and very shy. As soon as I would enter the room, it would hide in one of the hiding places. In order to allow observation, I have installed a camera. Since February 2003 the specimen has become more quiet, and started showing a diurnal activity rhythm. Now it was also possible to move about in the room, without triggering the tortoise to hide. I have observed extensive soaking and drinking out of the water bowl, but in addition the specimen will take drops from the stone plates after spraying the enclosure. Once I have observed the tortoise turning upright, after laying on its back. In order to accomplish this, it bit in the soil.

In July 2003, I reduced food availability, and increased the portion of dried plant material in the diet (e.g., AGROBS, dried greens collected outside). I also reduced the relative humidity. The activity of the tortoise decreased markedly, without any activity between mid August and mid September. Mid September I increased the humidity (both in the diet and in the enclosure), and this resulted in increased activity. However, the tortoise is not active throughout the day, but rather has activity periods of several hours, after which it disappears in a hiding place. During the night, it withdraws in the deepest hiding place.

Diet

Spring/autumn: Fresh greens collected outside. These include dandelion, clover, plantain, et cetera.

Summer: Dried greens collected outside, and AGROBS Pre Alpin Testudo.

Winter: Endive, chicory, Roman salat, with AGROBS, and once weekly with calcium and minerals (Davinova).

A cuttlebone is always present in the enclosure, and is sometimes taken.

Weight

In the course of the year, the weight of the specimen has remained fairly stable. During the inactivity period in summer it lost 4 g. I assume that the specimen is adult.

Location A35

I am keeping two specimens, both growing well. They are healthy and in good physical condition. I believe that the main reason for this is the terrarium that has been especially adjusted for them. The sex of the specimens is not yet certain, but I believe that they are a couple. I will separate them as soon as I will be able to tell the sex with certainty. Separating will be easy, since I have already prepared two exactly identical terrariums for them. In the future I would like to keep one pair in each of the enclosures.

The enclosures are located next to each other in a greenhouse attached to my house, and are therefore experiencing a seasonal cycle. Usually I feed the tortoises with green leaves, usually collected outdoors. Once weekly I soak the tortoises. They show a normal behaviour, and nothing striking is to be reported.

Location A37

Open enclosures

Initially, both tortoises were housed together in an enclosure measuring 75 x 75 cm. One 160 W Powersun UV and a 60 W Neo Plus were used as light and heat source. In addition, the enclosure was placed close to a window, so that it received daylight and sun. Day temperatures were 25-35°C, and night temperatures around 20°C. The soil consisted of garden soil and course pine bark pieces. Because the garden soil turned out to dust, and the pine material not to be stable when the tortoises walked over it, I have changed the substrate within a few days for "Namibia sand". This forms a stable material, and dries easily after spraying. But the best thing is that it does not dust.

There are several potted succulents in the enclosure, and rocks and roots provide hiding places and visual barriers. One corner has a moss tuft that is maintained humid, and the tortoises have been seen feeding from this. They will hide under it when the temperatures are very high. There is also a small water bowl for drinking and soaking. The enclosure is sprayed with warm water every other morning, and the specimens appear to appreciate this.

After a while, I had the impression that both males were stressed by each other's presence, and therefore I transferred the larger male to an enclosure measuring 100 x 65 cm. This enclosure has the same decoration and illumination.

Because I am keeping the tortoises in the living room, the open enclosures suffer from temperature changes in the coldest season. In order to limit these, the enclosures were closed at the top. As a result, the specimens became inactive, stopped feeding, and remained in their hiding places. When I removed the tops, the activity increased again, and the tortoises fed normally.

Social interaction

After separating the tortoises, the smaller male stopped feeding and became inactive. Therefore, I placed both of them in the largest enclosure, and added hiding places. The smallest male resumed feeding immediately. Its weight increased from 60 to 64 g. The weight of the large male increased from 72 to 84 g. Nevertheless, I could observe several times that the large male forced the small male into a corner and threatened it.

I believe that it is better to raise tortoises in groups. This means either as a couple, or (better) a male with two females. Two males should not be kept together, to reduce stress.

Feeding

Usually succulents and green leaves collected outside (fresh and dried), romaine salad, radiccio, chicory, sometimes a mixture of cucumber and carrot.

Outdoor husbandry in summer

The specimens were kept in an outdoor enclosure for some time in summer. This enclosure had many hiding places, and was planted with succulents and herbs. Unfortunately the tortoises remained in their retreat, and no feeding was observed. Handling and transferring had stressed them, and the afternoon heat has resulted in a strange behavioural pattern. Although sunlight is desirable, outdoor keeping of *H. s. signatus* was not a success.

Mortality

One 26 December one of the males died (see also chapter 4). The specimen has been preserved for autopsy.

Location A39

Husbandry conditions

Terrarium

The terrarium measures 80 x 40 cm. It is decorated with wood stumps, flat rocks which are placed in a manner that forms different crevices (differing in size and height). The soil consists of fine gravel sand. The illumination consists of two 18 W tube lights, and two halogen spots (one 40 W and one 20 W). The temperature in the enclosure is between 24-31°C, under the halogen spots 32-42°C. During the summer-period, the illumination is switched on between 08:00 and 20:30 hrs, the halogen lights between 08:45 - 18:45 (20 W), respectively 09:15 - 19:15 (40 W). In steps of 15 minutes the illumination time

changes to the winter period (09:00 - 19:00 hrs). During the winter period, only the 20 W halogen spot is in use (09:45 - 17:45 hrs).

Feeding

The specimen are fed daily, or twice weekly. A mixture from green leaves (*Taraxacum*, *Plantago*, *Trifolium*, *Stellaria*, *Bellis*, and grasses) which are collected outside. From the garden I feed *Thymus* and *Sedum* (*Sedum reflexum*, *Sedum acre*, *Sedum spectabile*). From time to time (mainly during the winter time) zucchini, endive, chicory, and romain salad are fed. Twice a week the food is supplemented with a calcium and vitamin mixture (Vitakalk).

I could observe that the specimen prefer *Sedum reflexum* if available within the food.

Water

A water bowl is always available. The wood stumps and stones (including the crevices) are sprayed two or three times a week. I observed only once, that the specimen drank from the bowl. The tortoise has regularly drunk after the spraying of the enclosure. The water is mixed with a vitamin additive (Nekton-Rep) once a week.

Shell dimensions (mm) on 21 December

Specimen	SCL	CW	SH	PL
40	60.1	20.2	46.0	50.1

Mass (g)

13 June: 42.1
12 August: 46.6
17 October: 48.9
21 December: 50.1

Location A40

The specimen is housed in a small temporary enclosure. It feeds and drinks normally, but growth has not been observed until now. A new enclosure will be ready in January 2004.

Appendix 2

Husbandry conditions and additional information per location *Homopus areolatus*

The information below is an update on the information presented in appendix 2 of the previous annual report.

Location A02

No changes in husbandry methods were made in comparison to the description in the 2002 annual report.

Location A10

This year I received a female *Homopus areolatus* on 25 May. The care for this tortoise is closely related to the care of the *Homopus signatus signatus* in my enclosures. The enclosure measures 120 x 120 cm and is densely planted (as is the species' natural habitat in South Africa) with dried grasses, dried *Carex* tufts, plastic *Carex* plants, plastic grasses, small plastic flowers (to meet the eye), a large piece of petrified wood, a rock, and a few small branches. It is not always easy to find the animal. Be aware though that this animal is fast, and an excellent climber. The soil is a 12 to 15 cm thick layer of Thames sand (diameter 0/5 mm, with a beautiful yellow colour) to provide future nesting sites.

Lighting

Lighting is provided by means of a 36 W tube light and a halogen spot of 60 W. The spot is controlled via a temperature controller that starts dimming at 33.5°C in the terrarium room (to prevent overheating of the room when the sun shines through the window). All the lights are switched on and off via a mechanical clock. In winter, the lights are switched on at 08:00 hrs, and off at 18:00 hours. During summer the lights are switched on at 06:00 hrs, and off at 20:00 hours, thus providing an annual and seasonal cycle. The photoperiod decreases/increases gradually with 15 minutes per week (manually). During colder months the spotlights are never dimmed.

Heating

Heating is provided by the sun (during the hotter months), central heating (during the rest of the year), and the 60 W spot. Since the enclosure is not situated at ground level, heating cables and mats are not used. Temperatures may reach 35°C (day) and 26°C (night) during the summer; 27°C (day) and 19°C (night) during the winter. Locally (under the spot), the temperature may reach 45°C.

Misting

Since this species occurs in more humid areas in comparison to for example *Homopus signatus signatus*, regular misting of the enclosure is provided (five times per week). This is done at irregular times of the day. When I spray at night, it remains humid longer, and imitates mist. Diurnal spraying imitates rainfall. During the weekends the enclosure is left to dry. Only half of the enclosure is sprayed at a time so that the animal can always choose a dry spot in the vegetation. I only use demineralised water to spray (and only to spray, as it has no minerals and it will deplete the body of minerals if drinking is allowed during prolonged periods). If normal water is used to spray, the colouration of the animals will fade over the years. This is not noticeable in the terrarium, but if the animal is compared to a wild living specimen the difference is shocking.

Feeding

The animal is fed with a variety of wild (garden) greens during the warmer months. During the cold months, the diet is based on (mainly) endive and heucobs (soaked in hot water and then squeezed out). Sometimes a mixture of salads or chicory is used instead of endive. These greens are always chopped, and a mixture of vitamins and minerals is used. Gistocal is used as a vitamin/mineral (50/50) supplement, and calcium lactate is used to provide extra calcium. These supplements make out 1.5% of the total amount (weight) of food.

Drinking

Water is provided during most of the week. The drinking water is supplemented with a vitamin D_3 solution. I use a water soluble solution of 50,000 IU per ml, of which I use three drops per litre drinking water. This species seems to have a higher need for water than for instance *Homopus signatus signatus* (personal observation).

Location A16

All *Homopus areolatus* were kept under identical conditions as previous years (2001 and 2002 reports). We have changed the light system to Arcadia 7% UVB 23 W, and normal spotlight bulbs for heating and to create a hotspot.

Our female *H. areolatus* produced two eggs on 9 January. The tortoise had done some digging in December 2002, but stopped and started to act like it was going to be winter soon. On 8 January, the female started to dig again, but the lights switched off only a few hours after she had started, so she did not produce any eggs. On 9 January we made a wet area in the sand. At 14:00 hrs she started to dig again, and at approximately 17:00 hrs she had made a good nest. Since the lights would switch off soon, we stopped the time control units with lights on. At 19:00 hrs the female was basking and had laid two eggs. Temperatures on 12 January were 36°C under the spot light, and 29-32°C at 10-15 cm from that spot. The coolest part of the enclosure was 22-24°C (in the afternoon, the hottest time in room). During night it dropped to about 18-20°C (usually 18°C). The spot light is switched on during 7 hours.

The female can be very aggressive towards the keeper (see picture).

Eggs were incubated using the same technique as before. This year yielded our shortest incubation time so far. The female will probably lay eggs again in end of the year, or the beginning of the next. It has done some digging, and shows the same pattern as before.

The mass (g) as recorded in the end of the year:

Date	Male	Female	Juvenile 34	Juvenile 35	Juvenile 38	Juvenile 39
16-11-03	126	218	64	37	43	37

Appendix 3

Husbandry conditions and additional information per location *Homopus femoralis*

Location A02

No changes in husbandry methods were made in comparison to the description in the 2002 annual report.

Location A08

In April a computer programmable time control unit was installed, programmed to adjust the photoperiod to 30 degrees North latitude (maximum change in photoperiod between two days is 5 minutes). Although the unit has had some problems, I am very satisfied with it due to its extensive programming options and support. I am currently considering to automate the spraying of the enclosures a well.

Appendix 4

Financial report Homopus Research Foundation

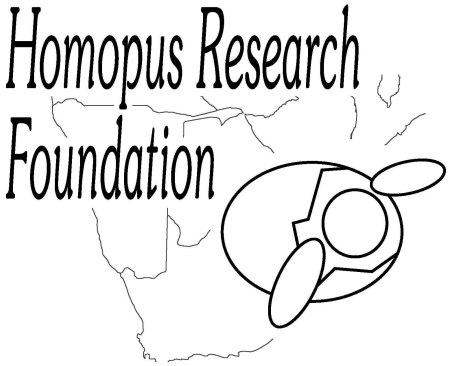
The financial report has been removed from this internet version of the annual report.

Appendix 5

Example agreement HRF and studbook participants

Agreement studbook participant

Version 3, 14 January 2003



Introduction

The studbooks under auspices of the Homopus Research Foundation have entirely or partially (depending on the species) been set up with tortoises obtained from southern African organisations or collected in the wild, permitted by the local governments. The exporting permits provided contain a number of conditions and in the case of permits issued by Northern Cape Nature Conservation (South Africa), an agreement between the latter organisation and the Homopus Research Foundation has been drawn up. In all cases, the main conditions are that specimens and their offspring may not be used for commercial purposes, should remain registered in the studbook and the permit issuing organisation should be informed on developments with regard to the specimens. Since the very beginning, the *Homopus* studbooks have been set up as strictly non-commercial activities and annually studbook reports are drawn up to inform others.

The studbooks are growing and becoming increasingly difficult to manage with so many locations in different countries. At the same time, the Homopus Research Foundation wishes to meet all permit conditions and agreements. This makes it important to translate these into an internal agreement. If the foundation fails to meet the conditions and agreements, this might result in denial of any future permits. All studbook participants are supposed to take their responsibility not to carry out any activities that might harm the interests of the Homopus Research Foundation.

The following summarises the most important do's and don'ts. Adding your name, signature and date indicates that you agree with the conditions to participate in the studbooks supervised by the Homopus Research Foundation.

Agreement

I agree with the following:

All specimens:

- Tortoises in the studbook may not be used for any commercial purposes
- All genetically related offspring should be registered in the studbook
- Changes in the studbook data (births, deaths, transfers) should be send to the board of the foundation immediately
- Some brief information on husbandry and breeding should be send to the board annually on request

Specimens property of the Homopus Research Foundation (currently all *Homopus s. signatus*, except the US population):

- Tortoises and all genetically related offspring remain property of the foundation, the board will act as a formal owner
- Keepers must register all other specimens of the same species (if they keep those) if they also keep studbook animals
- Directions from the board of the foundation regarding (re)combinations of specimens, transfers and whether or not to breed with specific specimens, must be followed
  Note: In all cases it will be attempted to reach a decision in good harmony by discussing the issue
- In case a participant wishes to stop keeping tortoises, the foundation should be given a reasonable period of time to find alternative locations for the tortoises

- Deviations from these conditions are only possible with explicit consent of the board of the Homopus Research Foundation

Name:

Signature:

Date:

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