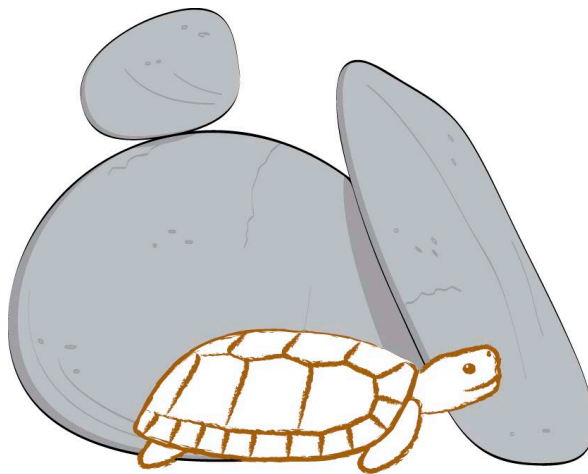


Dwarf Tortoise Conservation



Dwarf Tortoise Conservation

Annual Report 2019

*Victor Loehr
January 2020*

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Dwarf Tortoise Conservation (previously Homopus Research Foundation) is a non-commercial organisation entirely run by volunteers. The aim of the foundation is to gather and distribute information on dwarf tortoises, to facilitate their survival in the wild. This aim is achieved through scientific field studies, and through the development and study of captive studbook populations. Our results are published in scientific and popular outlets.

1. INTRODUCTION AND ACHIEVEMENTS IN 2019

Dwarf Tortoise Conservation aims to facilitate the long-term survival of dwarf tortoises (*Chersobius* spp. and *Homopus* spp.) in the wild, by gathering and distributing information about their biologies and by the formation of genetically healthy *ex situ* populations. Dwarf Tortoise Conservation is the successor of the Homopus Research Foundation, which was renamed in 2018, following the resurrection of the genus *Chersobius* (previously *Homopus*). In 2019, several activities contributed to the aim of Dwarf Tortoise Conservation. The current report presents an overview of achievements in 2019, as well as activities planned for 2020 and thereafter. Moreover, the actual studbook populations for *Chersobius signatus*, *Homopus areolatus* and *Homopus femoralis* are described, focussing on changes that occurred in 2019. All [previous annual reports since 1995](#) can be found on the website of Dwarf Tortoise Conservation.

1.1. Policies and permanent action points

From time to time, Dwarf Tortoise Conservation communicates policies and permanent action points to the participants in the *Chersobius* and *Homopus* studbooks and to other stakeholders. To avoid losing sight of actual issues, they are listed here.

- *Dwarf Tortoise Conservation and illegal activities (1 May 2011)*
Dwarf Tortoise Conservation strongly condemns illegal activities. All *Chersobius* and *Homopus* registered in the studbooks and at studbook participants have legal and traceable origins. Each participant is responsible for the paperwork for his or her tortoises and will not fraud. Dwarf Tortoise Conservation will fully collaborate with authorities in case of legal investigations, providing backgrounds of studbook tortoises, DNA samples, etc. Moreover, illegal activities noted within the studbooks will be actively reported to the authorities, to facilitate prosecution. Obviously, participants involved in illegal activities will be unable to continue their participation.
- *Incubation of C. signatus eggs (January 2016)*
The sex ratio of the *C. signatus* population is skewed towards males. Breeders need to use the following incubation protocol to reduce the production of males:
 - Day 1–29: diurnal temperature cycle of 33°C and 28°C
 - Day 30–50: constant temperature of 33°C
 - Day 51–hatching: diurnal temperature cycle of 33°C and 28°C
- All temperatures should be measured with a calibrated thermometer.
- *Information exchange with the studbook coordinator (20 December 2017)*
Changes (births, deaths, transfers, physical and e-mail addresses, etc.) should be sent to the studbook coordinator by e-mail, and not via social media. The e-mail address that should be used is studbookhomopus@gmail.com.
- *Registration of H. areolatus (January 2018)*
Because offspring *H. areolatus* produced in the studbook has been transferred outside the studbook (i.e., were lost to follow-up), there is a risk that genetically related tortoises will be registered in the studbook as unrelated founders. To avoid this, the studbook will not accept new founders with unknown or uncertain origin.
- *Outdoor husbandry of C. signatus (February 2019)*
Outdoor husbandry of *C. signatus* in Europe has yielded unacceptable mortality rates, possibly due to climatic mismatches or due to stress involved with frequent transfers among indoor and outdoor enclosures. Since *C. signatus* does well in indoor enclosures, tortoises loaned from Dwarf Tortoise Conservation should be housed indoors year-round. Exceptions require written consent.

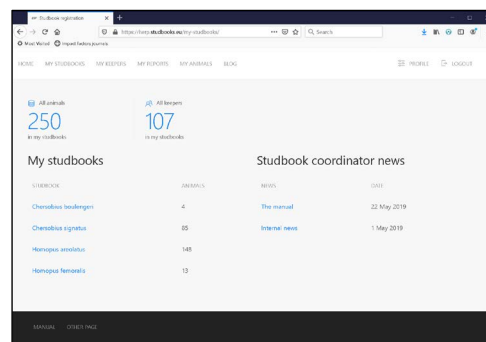
1.2. Outstanding action points in the 2018 annual report

The following table summarises plans in the 2018 annual report, with results obtained in 2019.

Outstanding action points in 2018 annual report and results in 2019	Due
Manuscripts submitted on: <ul style="list-style-type: none"> • parasite infestations in wild <i>C. signatus</i>; • captive husbandry and breeding of <i>C. signatus</i> (Mertensiella); • thermoregulatory behaviour in <i>Chersobius boulengeri</i>. 	31-12-2019 31-12-2019 31-12-2019
2019: A manuscript on eggshell ultrastructure in wild and captive <i>C. signatus</i> was published in 2019. In addition, manuscripts on thermoregulatory behaviour in <i>C. boulengeri</i> and adapting laboratory incubators for dwarf tortoise egg incubation were submitted for publication, and a note on captive reproduction and growth in <i>H. femoralis</i> was accepted for publication. The two manuscripts on parasite infestations in wild <i>C. signatus</i> , and captive husbandry and breeding of <i>C. signatus</i> have not yet been submitted. See also chapter 6.	
Third sampling period in field study on <i>C. boulengeri</i> conducted	Feb/Mar-2018
2019: In February–March, 6-weeks of sampling was conducted. Due to weather conditions (i.e., drought versus heavy rainfall in February–March 2018), an additional week of sampling was conducted in October to monitor body conditions and reproductive statuses of females. See paragraph 1.5.	
Genetic relationships between <i>H. areolatus</i> 234, 123, 128 and 129 investigated	31-12-2019
2019: Genetic relationships were investigated, and it was established that <i>H. areolatus</i> 234 is unrelated to 123, 128 and 129. The studbook registration was changed accordingly.	
The importance of each live <i>C. signatus</i> categorised relatively to the goal of the studbook, to facilitate management	31-12-2019
2019: This action was not yet been started. Due to the amount of time required for the finalisation of the <i>C. boulengeri</i> field study, it will be postponed to 2021.	

Further achievements that are worth listing:

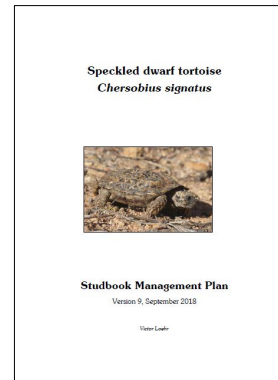
- Reprints of papers produced by Dwarf Tortoise Conservation were distributed through [ResearchGate](#) and directly to several researchers.
- Information requests were received regarding:
 - identification of a dwarf tortoise (*H. areolatus*) found near Prince Albert, South Africa;
 - suitable research equipment (e.g., transmitters and receivers) for *Chersobius solus*;
 - background of the formula used in dwarf tortoise publications for shell volume;
 - availability of *C. signatus* and construction of an exhibit for the species at Zagreb Zoo;
 - walking speed of *C. signatus*;
 - procedure to administer fenbendazole orally to *C. signatus*.
 - survey regarding trade-offs in efforts to promote human well-being and the conservation of biological diversity;
 - joining the editorial board of the International Journal of Environmental Research and Public Health, section Ecology and the Environment.
- Photographic material was provided to Knoxville Zoological Gardens as inspiration for an exhibit design, to a Chinese author of a tortoise atlas, and to another author of a tortoise book.
- The South African National Biodiversity Institute published conservation assessments, mostly co-authored by Dwarf Tortoise Conservation, for [C. boulengeri](#), [C. signatus](#), [H. areolatus](#) and [H. femoralis](#).
- Extensive input was provided to the European Studbook Foundation:
 - Structuring and fine-tuning a new online database (HERP) for private studbook management;
 - developing policies and actions to improve the effectiveness of the foundation;
 - updating information regarding the dwarf tortoise studbooks on the foundation's website.



- The Dwarf Tortoise Conservation website received updates regarding the [C. boulengeri field project](#), [C. signatus husbandry guidelines](#), and adding items to the [list of publications](#).

1.3. Studbook management plan *Chersobius signatus*

The first version of the [studbook management plan for C. signatus](#) was finished in 2013, and the plan was updated in 2016 and in 2018. It provides directions for the development of the studbook in the next years and decades and will be updated every five years. The plan will also be updated after every supplementation of the studbook with new founders and after each change in the IUCN conservation status of the taxon. The annual reports of Dwarf Tortoise Conservation will report annual progress of the realisation of the studbook management plan.



Only one of the five available founder couples reproduced in 2019, although all couples had reproduced previously. Moreover, four founders died (see chapters 3 and 5 for details), leaving just two founder couples. Three new (partial) founder couples will be formed in 2020–2021 by combining the only two (female) offspring from deceased founder (WILD3 x) 159, and female 156, with males 150 and 154. No bloodlines went extinct in 2019, but several will remain rarer than anticipated in the studbook management plan, irreversibly decreasing the genetic basis of the studbook population.

The table below shows how well the genes of each founder are represented in the captive population (currently two generations). The deaths of some founders that had been imported in 2015 (i.e., 150–159) places a large responsibility on studbook participants keeping their offspring. These participants will be explicitly informed about this responsibility and instructed to adhere to the [husbandry guidelines](#) for *C. signatus*.

The focus of the studbook remains on optimising husbandry conditions and incubation techniques to reduce mortality and to annually breed all present founder couples and all F1 couples for which offspring is needed. Participants with adult couples and consent to breed should optimise husbandry, and if necessary exchange individuals, to promote breeding results. In case of unsuccessful incubation, possible causes that should be considered are too high incubation temperatures (e.g., not using a calibrated

Founder	F1 offspring		F2 offspring		Participants	Remark
	All	Available	All	Available		
WILD1	1	0	1	0		Founder in the wild
WILD2	3	0	3	0		Founder in the wild
WILD3	2	2	0	0	1392, 14195	Founder in the wild
1	34	8	65	30		
2	14	3	25	13		
3	21	5	46	17		
4	0	0	0	0		Bloodline extinct
35	30	20	30	15		
36	30	20	30	15		
37	23	15	8	6		
38	13	9	8	6		
60	13	2	0	0	14178, 14231	
150	0	0	0	0	1276	
151	5	2	0	0	1276, 14125,	
152	2	2	0	0		
153	8	7	0	0	14121, 14125, 14216	
154	0	0	0	0	14195	
155	0	0	0	0		Bloodline extinct
156	5	2	0	0		
157	2	2	0	0		
158	8	7	0	0	14121, 14125, 14216	
159	2	2	0	0	1392, 14195	

Grey numbers indicate unavailable founders. Unavailable founders without offspring have been removed from the table. Participants column indicates participants with elevated responsibilities for the conservation of genes. Note that each offspring has at least two founders, so numbers of offspring in a column should not be summed.

thermometer) and too high humidity (e.g., resulting in cracked eggshells). All participants should regularly review their husbandry conditions and incubation techniques, using the information in chapter 5 (see also [previous annual reports](#)) and current [husbandry guidelines](#).

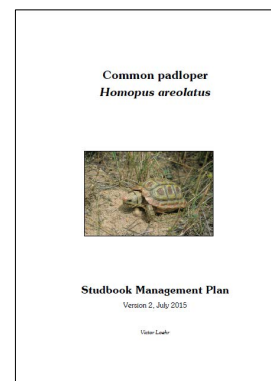
Overall, the genetic quality of the studbook population is good (i.e., no inbreeding and reasonable genetic variation), but genetic diversity that was lost when founders died before producing sufficient offspring can only be replaced by adding more founders compared to what was anticipated in the studbook management plan. Based on the current results of the studbook, imports of additional founders will be put on hold until studbook participants consistently produce offspring.

1.4. Studbook management plan *Homopus areolatus*

The first version of the [studbook management plan for *H. areolatus*](#) was finished in 2015 and the plan will be updated every five years. It follows the same format as the studbook management plan for *C. signatus*. A major difference between the two plans is that nearly all tortoises in the studbook on *H. areolatus* are privately owned, meaning that the development of the captive population (i.e., the execution of the studbook management plan) is directly in hands of the studbook participants, whereas the studbook coordinator has only a facilitating role.

As a result of clarification of the genetic relationships among studbook numbers 234, 123, 128 en 129, it was established that the percentage live studbook tortoises resulting from inbreeding was only 1% on 31 December 2018. In 2019, all founders survived, but two (16 and 17) were withdrawn from the studbook. Seven (F1) and twenty-four (F2) offspring that carry genes from founders 16 and 17 remain available for the studbook (table at the right). Two new, unrelated founders (282 and 283) were added to the studbook, and two studbook participants have mentioned the presence of additional unrelated founders in their collections that might be registered in the studbook in the future.

The studbook population contains a reasonable number of genetically unrelated founders, but several have produced little or no offspring (table). Participants that keep live founders, or offspring from founders that are unavailable, and have produced few young, will be notified of their responsibility in the conservations of the genes of these founders. Founders 190, 191 and 210 are kept in South Africa, complicating combinations with other founders. Based on the current studbook management plan, the general advise to all studbook participants remains to not combine offspring from the same bloodline and to avoid inbreeding. The studbook coordinator will continue to monitor and make recommendations regarding genetically preferred combinations of tortoises.



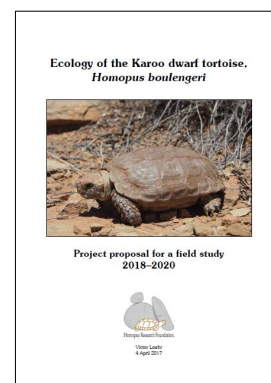
Founder	F1 offspring		F2 offspring		Participants
	All	Available	All	Available	
4	7	1	39	26	
5	7	1	39	26	
10	11	4	0	0	
11	14	4	0	0	
16	33	7	37	24	
17	34	7	37	24	
22	22	20	0	0	
23	0	0	0	0	14178
24	22	20	0	0	
40	0	0	0	0	14204
47	9	2	8	0	14178
58	89	46	30	22	
59					
60	88	46	30	22	
63	1	1	24	22	
64	1	1	24	22	
190					
191	7	5	0	0	16915
192	7	5	0	0	16915
210	0	0	0	0	16915
223	0	0	0	0	14121
282	0	0	0	0	14158
283	0	0	0	0	14158
288	1	1	0	0	14158
289	1	1	0	0	14158

Grey numbers indicate unavailable founders. Unavailable founders without offspring have been removed from the table. Participants column indicates participants with elevated responsibilities for the conservation of genes. Note that each offspring has at least two founders, so numbers of offspring in a column should not be summed.

1.5. Progress field study *Chersobius boulengeri*

Upon the unexpected discovery of a wild *C. boulengeri* population in February 2017 (currently the only verified population of this species), great efforts were made to instantly prepare a broad ecological field study. As was the case in 2018, much of the available time at Dwarf Tortoise Conservation in 2019 was invested in the preparation (e.g., fund raising, recruiting volunteers, planning, purchasing research materials) and execution of three sampling periods, in February–March 2019, October 2019 and February–March 2020. Both 2019 periods were successfully completed. For the study as a whole, 89 *C. boulengeri* have been found and marked, for 986 observations. Data gathered until now suffices for manuscripts on summer behaviour, thermoregulation, body condition and reproduction, and a first manuscript was written and submitted (see chapter 6). Drought conditions in 2019 will enable comparisons between wet (February–March 2018) and dry conditions. Two illustrated progress reports were produced and posted on the [project website](#).

Because the large amount of field time required to locate *C. boulengeri* disabled simultaneous morphological analysis of faeces to reveal the species' diet, a European laboratory was selected for genetic analysis. In October 2019, different methods were tested to determine which would preserve most DNA in



collected faecal material. Faecal material collected in October will identify plants eaten in spring, and faecal material that will be collected in February–March 2020 will identify plants eaten in summer. A student (Van Hall Larenstein University of Applied Sciences, Netherlands) was recruited to supplement genetic analysis with morphological analysis and focal observations.

The Dutch-Belgian Turtle and Tortoise Society made ear-marked funding available for a poster on Karoo tortoises, to make Karoo residents aware of tortoise diversity and to provide concrete suggestions that may help conserve tortoises. Collaboration was sought with the Endangered Wildlife Trust that will print and distribute the poster.

This study is a co-production of Dwarf Tortoise Conservation and an independent South African researcher (Toby Keswick). Moreover, the study collaborates with the University of the Western Cape (South Africa; Retha Hofmeyr), Utrecht University (Netherlands; Ineke Westerhof), Van Hall Larenstein University of Applied Sciences (Netherlands; Ralf Mullers) and the Northern Cape Department of Environment and Nature Conservation (South Africa). Several organisations and individuals have generously provided funds, discounted prices, or in-kind contributions to the project:

- [Knoxville Zoo](#) (Quarters for Conservation Program)
- [Turtle Conservation Fund](#) and [Conservation International](#)
- [Holohil Systems Ltd.](#)
- [Dutch-Belgian Turtle and Tortoise Society](#)
- [British Chelonia Group](#)
- [Turtle Survival Alliance Europe](#)
- [Pedak](#)
- Jan Barth
- Kurt Engl
- Sheryl Gibbons
- Silja Heller
- Brian Henen
- Retha Hofmeyr
- Courtney Hundermark
- Lutz Jakob
- Libor Kopecny
- Johann Klutz
- Martijn Kooijman
- Matthias Kupferschmid
- Koos and Coby Loehr
- Frank van Loon
- Marcel and Lydia Reck
- Peter Sandmeier
- Uwe Seidel
- Paul van Sloun



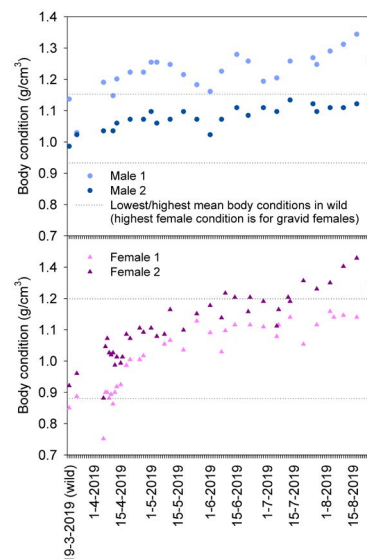
1.6. Progress captive study *Chersobius boulengeri*

During the field study on *C. boulengeri* (see paragraph 1.5), it became clear that the composition of the population and secretive behaviour of the species hampered collection of data on reproduction and growth. Consequently, a small-scale captive study was initiated.

Two males and two females were collected and transferred to captivity in February–March 2019. Habituating them to captivity proved very difficult, particularly females that had extremely low body conditions as a result of drought in their natural range. Force-feeding was required before tortoises started feeding, very few food types were (and are being) accepted, and restless climbing behaviour required



removal of all decorations that might cause damage to the tortoises. Furthermore, tortoises displayed intersexual and intrasexual aggression, necessitating separation of all individuals. At the end of 2019, the tortoises appeared sufficiently adjusted to captive conditions for the anticipated study.



2. PLANS FOR 2020 AND THEREAFTER

The table below lists results anticipated for 2020 and thereafter, with progress indicated:

Result	Due	Current status
Manuscripts submitted on:		
• parasite infestations in wild <i>C. signatus</i> ;	31-12-2020	Manuscript in preparation
• captive husbandry and breeding of <i>C. signatus</i> (Mertensiella);	31-12-2020	Data available
• tick infestation in a European indoor dwarf tortoise collection;	31-12-2020	Data available
• annual and seasonal behavioural variation in <i>C. boulengeri</i> ;	31-12-2020	Not yet started
• fieldwork on <i>C. boulengeri</i> (TSF/CI final report);	31-12-2020	Not yet started
• fieldwork on <i>C. boulengeri</i> (TSA EU newsletter);	31-12-2020	Not yet started
• fieldwork on <i>C. boulengeri</i> (BCG journal);	31-12-2020	Not yet started
• fieldwork on <i>C. boulengeri</i> (NBSV journal);	31-12-2020	Not yet started
• population composition and dynamics in <i>C. boulengeri</i> ;	31-12-2021	Data available
• body conditions and reproduction in <i>C. boulengeri</i> ;	31-12-2021	Data available
• habitat use in <i>C. boulengeri</i> .	31-12-2022	Data available
Fifth sampling period in field study on <i>C. boulengeri</i> conducted	Feb/Mar-2020	Sampling period prepared
Poster on Karoo tortoises co-produced with Endangered Wildlife Trust (South Africa) and funded by Dutch-Belgian Turtle and Tortoise Society	Feb/Mar-2020	Funding secured and poster elements prepared
Genetic relationships between <i>C. signatus</i> 7, 44, 72 and 118 verified	31-12-2020	Samples of 72 and 118 collected
Studbook management plan <i>H. areolatus</i> updated	31-12-2020	Not yet started
The importance of each live <i>C. signatus</i> categorised relatively to the goal of the studbook, to facilitate management	31-12-2021	Not yet started

3. STUDBOOK SUMMARIES

To keep the studbook registrations up to date, it is vital that all studbook participants keep the coordinator informed of any changes. In the studbooks on *C. signatus* and *H. femoralis*, each participant has accepted this obligation in a formal agreement between participant and Dwarf Tortoise Conservation. Regardless of the agreements, most participants are very motivated and inform the coordinator spontaneously when changes occur throughout the year. However, sometimes participants remain silent for an entire year or longer, despite repeated requests from the studbook coordinator. In order to keep track of where these communication flaws occur, the annual reports include a list of unresponsive participants. This will make it easier for the reader to assess the validity of studbook information per participant and will facilitate the coordinator when approaching a silent participant. In 2019, only participant 14158 (*H. areolatus*) has been unresponsive.

Chersobius signatus

Live specimens on 1 January 2019:

96 (excluding 17 specimens lost to follow-up)

Number of participants on 1 January 2019:

46 (14 countries, including 4 zoos)

New registrations:

0

Births:

6, at 5 participants

Deaths:

14 (4 wild-caught, 10 captive-bred), at 10 participants

Live specimens on 31 December 2019:

88 (excluding 17 specimens lost to follow-up)

Live inbred specimens on 31 December 2019:

0

Number of participants on 31 December 2019:

41 (13 countries, including 4 zoos)

The studbook population shrunk considerably, mainly due to unusually high mortality. A wild-caught couple died when it was frequently handled and exposed to stress to remove ticks (manuscript in preparation, see chapter 2). One wild-caught female died as a result of peritonitis. A final wild-caught male died unexpectedly after it appeared to have successfully recovered from an eye infection in 2018. A captive-bred female died as a result of reproductive issues, including the simultaneous formation of two shelled eggs and eggs breaking during oviposition. Another female died as a result of impaction, and a captive-bred male died after it had been kept under hot and humid conditions for too long. The causes of death could not be determined for seven captive-bred tortoises, but are likely husbandry-related.

One of six offspring produced originated from wild-caught founders. The remaining five represent a second generation. At three participants, single eggs were produced that failed to develop. Because five more participants received unrelated mates for their solitary tortoises in 2019, production of offspring should increase in the next years. Paragraph 1.3 interprets the 2019 results in light of the goal for the studbook described in the studbook management plan for *C. signatus*, and recommends that particularly participants keeping rare bloodlines should adhere to the [husbandry recommendations](#) drawn up for *C. signatus* to reduce mortality and improve breeding.

In 2019, the sex ratio of the population became less skewed due to male-biased mortality, and due to the production of female offspring since incubation methods were standardised for all participants in 2015 (see paragraph 1.1).

Homopus areolatus

Live specimens on 1 January 2019:

161 (excluding 34 specimens lost to follow-up)

Number of participants on 1 January 2019:

23 (10 countries, including 2 zoos)

New registrations:

6

Births:

21, at 6 participants

Deaths:

10, at 7 participants (1 wild-caught, 9 captive-bred)

Live specimens on 31 December 2019:

146 (excluding 66 specimens lost to follow-up)

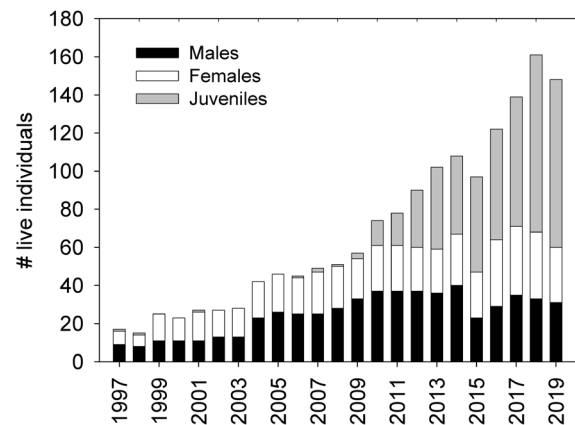
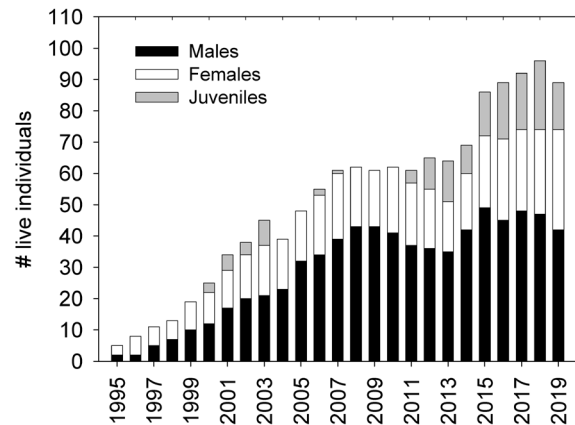
Live inbred specimens on 31 December 2019:

0 (excluding 6 specimens lost to follow-up)

Number of participants on 31 December 2019:

23 (10 countries, including 2 zoos)

The studbook population shrunk, mainly due to the withdrawal of 28 tortoises by one participant. The bloodline concerned remains present in the studbook through first- and second-generation offspring. A further four tortoises were lost to follow-up after entering the studbook as new registrations; these tortoises were already outside the studbook and were only registered to mark genetic relationships among their



offspring inside the studbook.

Despite the limited number of founders in the studbook, a relatively large number of offspring was born from genetically unrelated parents. Furthermore, two new and unrelated founders were registered. Paragraph 1.3 interprets the 2019 results in light of the goal for the studbook described in the studbook management plan for *H. areolatus*, and recommends that participants avoid combining genetically related individuals.

Mortality in the population was relatively low. A wild-caught male and a captive-bred hatchling died after having been fiercely attacked by a larger female. An underweight hatchling died soon after hatching, and a juvenile died having developed a prolapse. The causes of death for the remaining six tortoises remain unknown.

Homopus femoralis

Live specimens on 1 January 2019:

14

Number of participants on 1 January 2019:

6 (4 countries)

New registrations:

0

Births:

0

Deaths:

1

Live specimens on 31 December 2019:

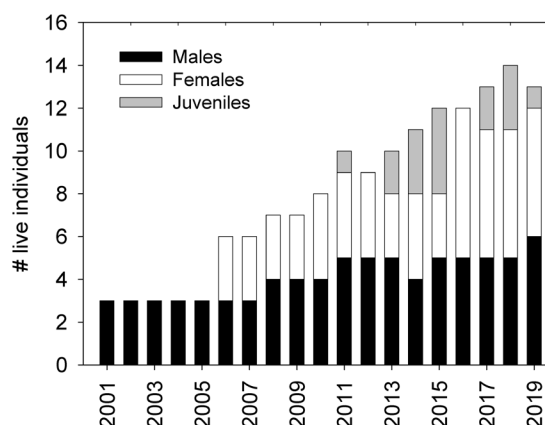
13

Live inbred specimens on 31 December 2019:

0

Number of participants on 31 December 2019:

6 (5 countries)



The studbook population of *H. femoralis* slightly shrunk in 2019, because the only reproducing female in the captive population died. Death was the result of egg-binding. Although genetic variation in the *H. femoralis* studbook population is extremely low (all offspring result from two founders), the current subadult couples kept at six participants provide good perspectives for the accumulation of reproductive and growth data for future publication.

4. ACTUAL STUDBOOK OVERVIEWS

The tables below give an overview of all live tortoises that are available in the studbooks on *C. signatus*, *H. areolatus* and *H. femoralis*. The tables do not include dead tortoises and tortoises lost to follow-up. Full overviews of all tortoises registered in the studbooks may be [downloaded from the website](#).

Chersobius signatus: live and available studbook population.

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
Amsterdam Zoo	77	Female	44	7	02-05-2014	Transfer	Amsterdam Zoo	Dwarf Tortoise Conservation
					14-08-2010	Transfer	14201	Dwarf Tortoise Conservation
					13-07-2006	Hatch - birth	14121	Dwarf Tortoise Conservation
	117	Male	37	9	06-11-2012	Transfer	Amsterdam Zoo	Dwarf Tortoise Conservation
					12-06-2011	Hatch - birth	1392	Dwarf Tortoise Conservation
14135	131	Male	35	36	12-09-2015	Transfer	14135	Dwarf Tortoise Conservation
					04-10-2013	Hatch - birth	14121	Dwarf Tortoise Conservation
14131	111	Male	37	38	~ 25-01-2015	Transfer	14131	Dwarf Tortoise Conservation
					17-03-2014	Transfer	14201	Dwarf Tortoise Conservation
					03-12-2011	Transfer	14180	Dwarf Tortoise Conservation
					13-05-2010	Hatch - birth	1392	Dwarf Tortoise Conservation

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
	187	Female	14	107	13-09-2019	Transfer	14131	Dwarf Tortoise Conservation
					26-03-2018	Hatch - birth	14133	Dwarf Tortoise Conservation
1268	137	Male	35	36	08-04-2016	Transfer	1268	Dwarf Tortoise Conservation
					21-06-2014	Hatch - birth	14121	Dwarf Tortoise Conservation
14148	144	Male	74	96	14-02-2018	Transfer	14148	Dwarf Tortoise Conservation
					20-06-2015	Hatch - birth	1276	Dwarf Tortoise Conservation
14116	115	Male	37	9	24-10-2019	Transfer	14116	Dwarf Tortoise Conservation
					06-11-2012	Transfer	Amsterdam Zoo	Dwarf Tortoise Conservation
					06-07-2011	Hatch - birth	1392	Dwarf Tortoise Conservation
	168	Female	35	36	20-04-2018	Transfer	14116	Dwarf Tortoise Conservation
					18-09-2016	Hatch - birth	14121	Dwarf Tortoise Conservation
14195	154	Male	Wild	Wild	30-03-2018	Transfer	14195	Dwarf Tortoise Conservation
					22-09-2015	Transfer	1392	Dwarf Tortoise Conservation
					~ 01-01-1900	Hatch - birth	Wild	Wild
	161	Female		159	05-07-2019	Transfer	14195	Dwarf Tortoise Conservation
					26-01-2016	Hatch - birth	1392	Dwarf Tortoise Conservation
14214	114	Male	37	9	~ 27-06-2011	Transfer	14214	Dwarf Tortoise Conservation
					04-07-2010	Hatch - birth	1392	Dwarf Tortoise Conservation
14121	169	Female	35	36	~ 27-04-2018	Transfer	14121	Dwarf Tortoise Conservation
					20-04-2018	Transfer	14152	Dwarf Tortoise Conservation
					07-09-2016	Hatch - birth	14121	Dwarf Tortoise Conservation
	176	Female	153	158	30-04-2017	Hatch - birth	14121	Dwarf Tortoise Conservation
	178	Female	153	158	11-11-2017	Hatch - birth	14121	Dwarf Tortoise Conservation
	190	Unknown	153	158	06-06-2018	Hatch - birth	14121	Dwarf Tortoise Conservation
	191	Unknown	153	158	21-08-2018	Hatch - birth	14121	Dwarf Tortoise Conservation
	193	Unknown	153	158	06-09-2018	Hatch - birth	14121	Dwarf Tortoise Conservation
14134	99	Male	37	38	14-09-2019	Transfer	14134	Dwarf Tortoise Conservation
					05-06-2010	Transfer	14206	Dwarf Tortoise Conservation
					21-05-2008	Hatch - birth	1392	Dwarf Tortoise Conservation
	110	Female	44	7	03-05-2015	Transfer	14134	Dwarf Tortoise Conservation
					22-02-2012	Transfer	14219	Dwarf Tortoise Conservation
					22-01-2012	Transfer	14121	Dwarf Tortoise Conservation
					10-11-2011	Transfer	14196	Dwarf Tortoise Conservation
					23-03-2010	Hatch - birth	14121	Dwarf Tortoise Conservation
14178	86	Male	25	60	~ 20-04-2006	Hatch - birth	14178	14178
14217	10	Male	1	2	17-05-2016	Transfer	14217	Dwarf Tortoise Conservation
					06-04-2008	Transfer	14195	Dwarf Tortoise Conservation
					08-11-2002	Transfer	14176	Dwarf Tortoise Conservation
					07-05-2002	Transfer	Frankfurt University	Dwarf Tortoise Conservation
					04-08-2001	Transfer	14121	Dwarf Tortoise Conservation
					22-10-1997	Hatch - birth	1392	Dwarf Tortoise Conservation
	79	Female	37	38	17-05-2016	Transfer	14217	Dwarf Tortoise Conservation
					05-11-2009	Transfer	14195	Dwarf Tortoise Conservation
					09-08-2006	Hatch - birth	1392	Dwarf Tortoise Conservation
	181	Unknown	10	79	01-05-2018	Hatch - birth	14217	Dwarf Tortoise Conservation
	189	Unknown	10	79	28-10-2018	Hatch - birth	14217	Dwarf Tortoise Conservation
	198	Unknown	10	79	21-04-2019	Hatch - birth	14217	Dwarf Tortoise Conservation
14127	138	Female	35	36	15-04-2016	Transfer	14127	Dwarf Tortoise Conservation
					22-08-2014	Hatch - birth	14121	Dwarf Tortoise Conservation
1103	132	Male	35	36	11-04-2015	Transfer	1103	Dwarf Tortoise Conservation
					~ 23-10-2013	Hatch - birth	14121	Dwarf Tortoise Conservation
14136	126	Male	37	9	13-06-2015	Transfer	14136	Dwarf Tortoise Conservation
					16-08-2012	Hatch - birth	1392	Dwarf Tortoise Conservation
14126	7	Female	1	3	12-05-2014	Transfer	14126	Dwarf Tortoise Conservation
					11-11-2012	Transfer	14203	Dwarf Tortoise Conservation
					08-12-2002	Transfer	14121	Dwarf Tortoise Conservation
					06-05-2002	Transfer	Frankfurt University	Dwarf Tortoise Conservation
					14-12-2001	Transfer	14163	Dwarf Tortoise Conservation
					05-07-2000	Transfer	14120	Dwarf Tortoise Conservation
					22-11-1998	Transfer	14119	Dwarf Tortoise Conservation
					24-12-1996	Hatch - birth	1392	Dwarf Tortoise Conservation
	44	Male	35	36	12-05-2014	Transfer	14126	Dwarf Tortoise Conservation
					11-11-2012	Transfer	14203	Dwarf Tortoise Conservation
					24-07-2004	Transfer	14121	Dwarf Tortoise Conservation
					31-10-2002	Hatch - birth	14120	Dwarf Tortoise Conservation
14191	1	Male	Wild	Wild	08-03-2009	Transfer	14191	Dwarf Tortoise Conservation
					12-06-2004	Transfer	14170	Dwarf Tortoise Conservation

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
					30-09-1995	Transfer	1392	Dwarf Tortoise Conservation
					~ 01-01-1900	Hatch - birth	Wild	Wild
	35	Male	Wild	Wild	16-07-2016	Transfer	14191	Dwarf Tortoise Conservation
					26-10-2012	Transfer	14121	Dwarf Tortoise Conservation
					16-12-2001	Transfer	14120	Dwarf Tortoise Conservation
					06-10-2001	Transfer	1392	Dwarf Tortoise Conservation
					~ 01-01-1900	Hatch - birth	Wild	Wild
	36	Female	Wild	Wild	16-07-2016	Transfer	14191	Dwarf Tortoise Conservation
					26-10-2012	Transfer	14121	Dwarf Tortoise Conservation
					16-12-2001	Transfer	14120	Dwarf Tortoise Conservation
					06-10-2001	Transfer	1392	Dwarf Tortoise Conservation
					~ 01-01-1900	Hatch - birth	Wild	Wild
	174	Female	35	36	31-08-2017	Hatch - birth	14191	Dwarf Tortoise Conservation
14125	94	Male	44	7	08-03-2014	Transfer	14125	Dwarf Tortoise Conservation
					18-03-2013	Transfer	14229	Dwarf Tortoise Conservation
					10-03-2012	Transfer	14220	Dwarf Tortoise Conservation
					27-08-2007	Hatch - birth	14121	Dwarf Tortoise Conservation
	177	Female	153	158	14-12-2019	Transfer	14125	Dwarf Tortoise Conservation
					18-08-2017	Hatch - birth	14121	Dwarf Tortoise Conservation
	182	Male	151	156	14-12-2019	Transfer	14125	Dwarf Tortoise Conservation
					12-04-2018	Hatch - birth	1276	Dwarf Tortoise Conservation
14204	11	Male	1	3	23-10-2016	Transfer	14204	Dwarf Tortoise Conservation
					14-03-2015	Transfer	14221	Dwarf Tortoise Conservation
					16-09-2000	Transfer	14161	Dwarf Tortoise Conservation
					05-07-2000	Transfer	14120	Dwarf Tortoise Conservation
					22-11-1998	Transfer	14119	Dwarf Tortoise Conservation
					10-11-1997	Hatch - birth	1392	Dwarf Tortoise Conservation
	149	Female	35	36	01-11-2017	Transfer	14204	Dwarf Tortoise Conservation
					17-09-2015	Hatch - birth	14121	Dwarf Tortoise Conservation
	194	Unknown	11	149	25-07-2019	Hatch - birth	14204	Dwarf Tortoise Conservation
14201	37	Male	Wild	Wild	17-04-2016	Transfer	14201	Dwarf Tortoise Conservation
					12-06-2004	Transfer	1392	Dwarf Tortoise Conservation
					06-10-2001	Transfer	14170	Dwarf Tortoise Conservation
					~ 01-01-1900	Hatch - birth	Wild	Wild
14231	88	Male	25	60	11-03-2017	Transfer	14231	Dwarf Tortoise Conservation
					17-03-2014	Transfer	14201	Dwarf Tortoise Conservation
					24-11-2011	Transfer	14180	Dwarf Tortoise Conservation
					30-08-2010	Transfer	14207	Dwarf Tortoise Conservation
					~ 15-11-2005	Hatch - birth	14178	Dwarf Tortoise Conservation
	120	Female	44	7	04-10-2013	Transfer	14231	Dwarf Tortoise Conservation
					~ 19-09-2011	Hatch - birth	14121	Dwarf Tortoise Conservation
	139	Female	35	36	11-03-2017	Transfer	14231	Dwarf Tortoise Conservation
					13-03-2016	Transfer	14201	Dwarf Tortoise Conservation
					01-09-2014	Hatch - birth	14121	Dwarf Tortoise Conservation
14143	145	Male	35	36	10-09-2016	Transfer	14143	Dwarf Tortoise Conservation
					20-06-2015	Hatch - birth	14121	Dwarf Tortoise Conservation
14228	123	Male	37	38	13-12-2014	Transfer	14228	Dwarf Tortoise Conservation
					24-06-2012	Hatch - birth	1392	Dwarf Tortoise Conservation
14206	9	Female	1	2	15-05-2014	Transfer	14206	Dwarf Tortoise Conservation
					30-11-1996	Hatch - birth	1392	Dwarf Tortoise Conservation
	100	Male	37	38	05-06-2010	Transfer	14206	Dwarf Tortoise Conservation
					24-06-2008	Hatch - birth	1392	Dwarf Tortoise Conservation
	195	Unknown	100	9	13-10-2019	Hatch - birth	14206	Dwarf Tortoise Conservation
14154	148	Male	35	36	03-04-2018	Transfer	14154	Dwarf Tortoise Conservation
					16-09-2015	Hatch - birth	14121	Dwarf Tortoise Conservation
	171	Female	73	42	14-09-2019	Transfer	14154	Dwarf Tortoise Conservation
					01-08-2017	Hatch - birth	14139	Dwarf Tortoise Conservation
14222	74	Male	1	3	12-03-2016	Transfer	14222	Dwarf Tortoise Conservation
					24-03-2007	Transfer	1276	Dwarf Tortoise Conservation
					31-07-2005	Hatch - birth	14170	Dwarf Tortoise Conservation
	96	Female	35	36	12-03-2016	Transfer	14222	Dwarf Tortoise Conservation
					12-09-2009	Transfer	1276	Dwarf Tortoise Conservation
					10-05-2009	Transfer	14202	Dwarf Tortoise Conservation
					13-04-2008	Transfer	14190	Dwarf Tortoise Conservation
					30-07-2007	Hatch - birth	14120	Dwarf Tortoise Conservation
	163	Female	74	96	10-08-2016	Hatch - birth	14222	Dwarf Tortoise Conservation
	196	Unknown	74	96	24-04-2019	Hatch - birth	14222	Dwarf Tortoise Conservation
	197	Unknown	74	96	01-09-2019	Hatch - birth	14222	Dwarf Tortoise Conservation

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner				
14137	124	Male	37	9	12-09-2015	Transfer	14137	Dwarf Tortoise Conservation				
					30-06-2012	Hatch - birth	1392	Dwarf Tortoise Conservation				
14139	73	Male	37	38	31-01-2016	Transfer	14139	Dwarf Tortoise Conservation				
					18-04-2009	Transfer	1277	Dwarf Tortoise Conservation				
					02-08-2005	Hatch - birth	1392	Dwarf Tortoise Conservation				
	125	Male	74	96	31-01-2016	Transfer	14139	Dwarf Tortoise Conservation				
					25-08-2015	Transfer	1276	Dwarf Tortoise Conservation				
					01-03-2013	Transfer	1199	Dwarf Tortoise Conservation				
	167	Female	35	36	07-07-2012	Hatch - birth	1276	Dwarf Tortoise Conservation				
					14-09-2019	Transfer	14139	Dwarf Tortoise Conservation				
					07-10-2018	Transfer	14154	Dwarf Tortoise Conservation				
	188	Female	73	42	01-04-2018	Transfer	14149	Dwarf Tortoise Conservation				
					26-08-2016	Hatch - birth	14121	Dwarf Tortoise Conservation				
					16-10-2018	Hatch - birth	14139	Dwarf Tortoise Conservation				
14183	41	Male	1	3	22-01-2010	Transfer	14183	Dwarf Tortoise Conservation				
					12-10-2009	Transfer	14198	Dwarf Tortoise Conservation				
					19-04-2003	Transfer	1277	Dwarf Tortoise Conservation				
	166	Female	35	36	25-07-2002	Hatch - birth	1392	Dwarf Tortoise Conservation				
					01-04-2018	Transfer	14183	Dwarf Tortoise Conservation				
Plzen Zoo	136	Female	37	9	07-06-2016	Hatch - birth	14121	Dwarf Tortoise Conservation				
					27-09-2016	Transfer	Plzen Zoo	Dwarf Tortoise Conservation				
1276	156	Female	Wild	Wild	02-09-2014	Hatch - birth	1392	Dwarf Tortoise Conservation				
					23-09-2015	Transfer	1276	Dwarf Tortoise Conservation				
					22-09-2015	Transfer	1392	Dwarf Tortoise Conservation				
					~ 01-01-1900	Hatch - birth	Wild	Wild				
184	Unknown	151	156	24-07-2019	Hatch - birth	1276	Dwarf Tortoise Conservation					
				17258	121	Male	35	36	16-12-2019	Transfer	17258	Dwarf Tortoise Conservation
17258	121	Male	35	36	19-03-2019	Transfer	14229	Dwarf Tortoise Conservation				
					19-01-2016	Transfer	14218	Dwarf Tortoise Conservation				
					18-11-2011	Transfer	14205	Dwarf Tortoise Conservation				
					23-09-2011	Hatch - birth	14120	Dwarf Tortoise Conservation				
					14133	14	Male	1	3	14-03-2015	Transfer	14133
14133	14	Male	1	3	16-09-2000	Transfer	14161	Dwarf Tortoise Conservation				
					22-11-1998	Transfer	14120	Dwarf Tortoise Conservation				
					22-10-1998	Hatch - birth	1392	Dwarf Tortoise Conservation				
					107	Female	35	36	11-03-2017	Transfer	14133	Dwarf Tortoise Conservation
									12-03-2016	Transfer	14231	Dwarf Tortoise Conservation
									08-03-2014	Transfer	14197	Dwarf Tortoise Conservation
					179	Unknown	14	107	13-03-2010	Transfer	14205	Dwarf Tortoise Conservation
									21-07-2009	Hatch - birth	14120	Dwarf Tortoise Conservation
					186	Unknown	14	107	15-12-2017	Hatch - birth	14133	Dwarf Tortoise Conservation
									12-08-2018	Hatch - birth	14133	Dwarf Tortoise Conservation
14216	71	Male	44	7	10-03-2012	Transfer	14216	Dwarf Tortoise Conservation				
					22-01-2012	Transfer	14121	Dwarf Tortoise Conservation				
					06-05-2008	Transfer	14196	Dwarf Tortoise Conservation				
					25-06-2005	Hatch - birth	14121	Dwarf Tortoise Conservation				
					170	Female	153	158	08-09-2019	Transfer	14216	Dwarf Tortoise Conservation
21-09-2016	Hatch - birth	14121	Dwarf Tortoise Conservation									
14153	106	Male	35	36	09-10-2018	Transfer	14153	Dwarf Tortoise Conservation				
					19-01-2016	Transfer	14218	Dwarf Tortoise Conservation				
					13-03-2010	Transfer	14205	Dwarf Tortoise Conservation				
					20-05-2009	Hatch - birth	14120	Dwarf Tortoise Conservation				
14203	142	Female	37	38	19-01-2018	Transfer	14203	Dwarf Tortoise Conservation				
					15-05-2015	Hatch - birth	1392	Dwarf Tortoise Conservation				
1776	147	Male	35	36	10-09-2016	Transfer	1776	Dwarf Tortoise Conservation				
					28-08-2015	Hatch - birth	14121	Dwarf Tortoise Conservation				
14197	51	Male	1	2	13-09-2008	Transfer	14197	Dwarf Tortoise Conservation				
					02-11-2003	Transfer	14182	Dwarf Tortoise Conservation				
					01-07-2003	Hatch - birth	1392	Dwarf Tortoise Conservation				
	113	Male	37	38	03-12-2011	Transfer	14197	Dwarf Tortoise Conservation				
					16-06-2010	Hatch - birth	1392	Dwarf Tortoise Conservation				
	152	Male	Wild	Wild	23-09-2015	Transfer	14197	Dwarf Tortoise Conservation				
					22-09-2015	Transfer	1392	Dwarf Tortoise Conservation				
	157	Female	Wild	Wild	~ 01-01-1900	Hatch - birth	Wild	Wild				
					23-09-2015	Transfer	14197	Dwarf Tortoise Conservation				
					22-09-2015	Transfer	1392	Dwarf Tortoise Conservation				
	172	Unknown	152	157	~ 01-01-1900	Hatch - birth	Wild	Wild				
01-08-2017					Hatch - birth	14197	Dwarf Tortoise Conservation					

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
	183	Unknown	152	157	30-06-2018	Hatch - birth	14197	Dwarf Tortoise Conservation
1392	150	Male	Wild	Wild	30-03-2018	Transfer	1392	Dwarf Tortoise Conservation
					23-09-2015	Transfer	14195	Dwarf Tortoise Conservation
					22-09-2015	Transfer	1392	Dwarf Tortoise Conservation
					~ 01-01-1900	Hatch - birth	Wild	Wild
	162	Female		159	25-02-2016	Hatch - birth	1392	Dwarf Tortoise Conservation
Wroclaw Zoo	119	Male	44	7	19-05-2018	Transfer	Wroclaw Zoo	Dwarf Tortoise Conservation
					08-09-2012	Transfer	14222	Dwarf Tortoise Conservation
					~ 20-04-2011	Hatch - birth	14121	Dwarf Tortoise Conservation
Wuppertal Zoo	72	Male	13 37	9 38	03-09-2018	Transfer	Wuppertal Zoo	Dwarf Tortoise Conservation
					17-10-2009	Transfer	14203	Dwarf Tortoise Conservation
					24-07-2005	Hatch - birth	1392	Dwarf Tortoise Conservation
	118	Female	44	7	06-05-2018	Transfer	Wuppertal Zoo	Dwarf Tortoise Conservation
					22-02-2012	Transfer	14217	Dwarf Tortoise Conservation
					22-01-2012	Transfer	14121	Dwarf Tortoise Conservation
					10-11-2011	Transfer	14196	Dwarf Tortoise Conservation
					01-05-2010	Hatch - birth	14121	Dwarf Tortoise Conservation

Homopus areolatus: live and available studbook population.

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
14187	58	Male	Wild	Wild	09-09-1997	Transfer	14187	14187
					~ 01-01-1900	Hatch - birth	Wild	Wild
	59	Female	Wild	Wild	09-09-1997	Transfer	14187	14187
					~ 01-01-1900	Hatch - birth	Wild	Wild
	60	Female	Wild	Wild	25-03-1999	Transfer	14187	14187
					~ 01-01-1900	Hatch - birth	Wild	Wild
	277	Unknown	58	59 60	01-02-2019	Hatch - birth	14187	14187
	279	Unknown	58	59 60	01-02-2019	Hatch - birth	14187	14187
	280	Unknown	58	59 60	01-02-2019	Hatch - birth	14187	14187
14159	128	Female	58	59 60	09-03-2019	Transfer	14159	14159
					01-09-2016	Transfer	14236	14187
					03-02-2012	Hatch - birth	14187	14187
	246	Unknown	234	128	01-06-2019	Transfer	14159	14159
					09-09-2018	Transfer	14145	14145
					01-05-2018	Hatch - birth	14236	14236
	265	Male	16	17	23-01-2019	Transfer	14159	14159
					~ 01-01-1900	Hatch - birth	14161	14161
	266	Male	16	17	23-01-2019	Transfer	14159	14159
					~ 01-01-1900	Hatch - birth	14161	14161
	267	Male	16	17	23-01-2019	Transfer	14159	14159
					~ 01-01-1900	Hatch - birth	14161	14161
	268	Male	16	17	23-01-2019	Transfer	14159	14159
					~ 01-01-1900	Hatch - birth	14161	14161
	269	Male	16	17	23-01-2019	Transfer	14159	14159
					~ 01-01-1900	Hatch - birth	14161	14161
	292	Unknown	234	128	22-07-2019	Hatch - birth	14159	14159
	293	Unknown	234	128	22-07-2019	Hatch - birth	14159	14159
	294	Unknown	234	128	11-08-2019	Hatch - birth	14159	14159
14158	143	Male	58	59 60	09-12-2018	Transfer	14158	14158
					~ 01-10-2017	Transfer	14145	14187
					~ 01-09-2016	Transfer	14236	14187
					~ 10-03-2013	Hatch - birth	14187	14187
	282	Female	Wild	Wild	14-09-2019	Transfer	14158	14158
					~ 01-01-1900	Hatch - birth	Wild	Wild
	283	Male	288	289	~ 19-07-2017	Transfer	14158	14158
					18-07-2017	Hatch - birth	17295	17295
14157	252	Unknown	234	129	08-12-2018	Transfer	14157	14157
					27-09-2018	Hatch - birth	14236	14236
17255	242	Unknown	58	59 60	14-12-2019	Transfer	17255	17255
					12-12-2019	Transfer	14236	14236
					27-01-2018	Hatch - birth	14187	14187
	243	Unknown	58	59 60	14-12-2019	Transfer	17255	17255
					12-12-2019	Transfer	14236	14236
					28-01-2018	Hatch - birth	14187	14187
14147	142	Male	58	59 60	09-09-2017	Transfer	14147	14147

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
					~ 01-09-2016	Transfer	14236	14236
					~ 04-03-2013	Hatch - birth	14187	14187
14155	253	Unknown	234	129	21-10-2018	Transfer	14155	14155
					21-08-2018	Hatch - birth	14236	14236
	254	Unknown	234	129	21-10-2018	Transfer	14155	14155
					22-08-2018	Hatch - birth	14236	14236
14121	62	Female	5	4	25-07-2014	Transfer	14121	Dwarf Tortoise Conservation
					27-03-2011	Transfer	14185	Dwarf Tortoise Conservation
					~ 25-11-2007	Hatch - birth	14121	Dwarf Tortoise Conservation
	94	Male	16	17	~ 25-07-2014	Transfer	14121	14121
					05-06-2010	Transfer	14185	14185
					07-07-2009	Hatch - birth	14161	14161
	186	Female	94	62	15-09-2015	Hatch - birth	14121	14121
	201	Female	94	62	16-08-2016	Hatch - birth	14121	14121
	223	Female	Wild	Wild	~ 11-10-2017	Transfer	14121	European studbook foundation
					01-01-1900	Hatch - birth	Wild	Wild
	224	Unknown	94	62	29-04-2017	Hatch - birth	14121	Dwarf Tortoise Conservation
	225	Unknown	94	62	04-05-2017	Hatch - birth	14121	Dwarf Tortoise Conservation
	229	Unknown	94	62	15-07-2017	Hatch - birth	14121	14121
	230	Unknown	94	62	30-07-2017	Hatch - birth	14121	Dwarf Tortoise Conservation
	232	Unknown	94	62	19-09-2017	Hatch - birth	14121	Dwarf Tortoise Conservation
	233	Unknown	94	62	21-09-2017	Hatch - birth	14121	14121
	256	Unknown	94	62	11-06-2018	Hatch - birth	14121	14121
	257	Unknown	94	62	18-06-2018	Hatch - birth	14121	Dwarf Tortoise Conservation
	259	Unknown	94	62	17-08-2018	Hatch - birth	14121	Dwarf Tortoise Conservation
	260	Unknown	94	62	29-08-2018	Hatch - birth	14121	Dwarf Tortoise Conservation
	261	Unknown	94	62	01-10-2018	Hatch - birth	14121	14121
	262	Unknown	94	62	28-08-2018	Hatch - birth	14121	14121
	290	Unknown	94	62	06-06-2019	Hatch - birth	14121	Dwarf Tortoise Conservation
	291	Unknown	94	62	06-06-2019	Hatch - birth	14121	14121
14178	22	Male	Wild	Wild	15-09-2002	Transfer	14178	14178
					17-10-2000	Transfer	14166	14166
					~ 01-01-1998	Transfer	14165	14165
					~ 01-01-1900	Hatch - birth	Wild	Wild
	23	Female	Wild	Wild	15-09-2002	Transfer	14178	14178
					17-10-2000	Transfer	14166	14166
					~ 01-01-1999	Transfer	14165	14165
					~ 01-01-1900	Hatch - birth	Wild	Wild
	24	Female			15-09-2002	Transfer	14178	14178
					17-10-2000	Transfer	14166	14166
					~ 01-01-1993	Hatch - birth	14165	14165
	46	Male	22	24	30-09-2004	Hatch - birth	14178	14178
	107	Female	47	37	05-05-2010	Transfer	14178	14178
					08-03-2010	Hatch - birth	14185	14185
	111	Female	47	37	07-06-2010	Transfer	14178	14178
					29-03-2010	Hatch - birth	14185	14185
	172	Male	22	24	05-01-2014	Hatch - birth	14178	14178
	177	Male	22	24	15-02-2012	Hatch - birth	14178	14178
	178	Female	22	24	15-02-2009	Hatch - birth	14178	14178
	179	Female	22	24	15-02-2005	Hatch - birth	14178	14178
	180	Female	22	24	15-02-2004	Hatch - birth	14178	14178
	183	Female	22	24	11-08-2015	Hatch - birth	14178	14178
	211	Unknown	22	24	08-02-2016	Hatch - birth	14178	14178
	212	Unknown	22	24	17-03-2016	Hatch - birth	14178	14178
	213	Unknown	22	24	18-03-2016	Hatch - birth	14178	14178
	263	Unknown	22	24	~ 15-04-2018	Hatch - birth	14178	14178
	264	Unknown	22	24	~ 15-04-2018	Hatch - birth	14178	14178
14146	139	Unknown	58	59 60	~ 13-03-2017	Transfer	14146	14146
					~ 01-09-2016	Transfer	14236	14187
					~ 06-02-2013	Hatch - birth	14187	14187
	144	Unknown	58	59 60	~ 13-03-2017	Transfer	14146	14146
					~ 01-09-2016	Transfer	14236	14187
					~ 26-03-2013	Hatch - birth	14187	14187
	163	Unknown	58	59 60	13-03-2017	Transfer	14146	14146
					01-09-2016	Transfer	14236	14187
					29-01-2014	Hatch - birth	14187	14187
	168	Unknown	58	59 60	13-03-2017	Transfer	14146	14146
					01-09-2016	Transfer	14236	14187

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
					10-03-2014	Hatch - birth	14187	14187
17355	200	Unknown	58	59 60	15-12-2019	Transfer	17355	17355
					12-12-2019	Transfer	14236	14236
					06-02-2016	Hatch - birth	14187	14187
	203	Unknown	58	59 60	15-12-2019	Transfer	17355	17355
					12-12-2019	Transfer	14236	14236
					21-02-2016	Hatch - birth	14187	14187
	250	Unknown	234	123	15-12-2019	Transfer	17355	17355
					06-06-2018	Hatch - birth	14236	14236
	275	Unknown	234	129	15-12-2019	Transfer	17355	17355
					05-06-2019	Hatch - birth	14236	14236
	278	Unknown	58	59 60	15-12-2019	Transfer	17355	17355
					12-12-2019	Transfer	14236	14236
					01-02-2019	Hatch - birth	14187	14187
14145	127	Male	58	59 60	01-10-2017	Transfer	14145	14145
					01-09-2016	Transfer	14236	14187
					02-02-2012	Hatch - birth	14187	14187
	136	Female	58	59 60	01-10-2017	Transfer	14145	14145
					01-09-2016	Transfer	14236	14187
					~ 18-01-2013	Hatch - birth	14187	14187
	162	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					29-01-2014	Hatch - birth	14187	14187
	164	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					20-02-2014	Hatch - birth	14187	14187
	165	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					20-02-2014	Hatch - birth	14187	14187
	167	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					27-02-2014	Hatch - birth	14187	14187
	169	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					13-02-2015	Hatch - birth	14187	14187
	170	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					20-02-2015	Hatch - birth	14187	14187
	171	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					20-03-2015	Hatch - birth	14187	14187
	197	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					04-02-2016	Hatch - birth	14187	14187
	198	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					04-02-2016	Hatch - birth	14187	14187
	199	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					04-02-2016	Hatch - birth	14187	14187
	202	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					20-02-2016	Hatch - birth	14187	14187
	204	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					22-02-2016	Hatch - birth	14187	14187
	205	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					03-03-2016	Hatch - birth	14187	14187
	206	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					04-03-2016	Hatch - birth	14187	14187
	220	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					18-10-2017	Hatch - birth	14187	14187
	221	Unknown	58	59 60	09-09-2018	Transfer	14145	14145
					11-06-2018	Transfer	14236	14187
					02-02-2017	Hatch - birth	14187	14187

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
	235	Unknown	234	129	09-09-2017	Transfer	14145	14145
					05-09-2017	Hatch - birth	14236	14236
	239	Unknown	234	128	24-06-2018	Transfer	14145	14145
					16-03-2018	Hatch - birth	14236	14236
	240	Unknown	234	123	08-12-2018	Transfer	14145	14145
					27-03-2018	Hatch - birth	14236	14236
	241	Unknown	234	128	09-09-2018	Transfer	14145	14145
					26-04-2018	Hatch - birth	14236	14236
	245	Unknown	234	128	24-06-2018	Transfer	14145	14145
					16-03-2018	Hatch - birth	14236	14236
	247	Unknown	234	129	09-09-2018	Transfer	14145	14145
					25-05-2018	Hatch - birth	14236	14236
	248	Unknown	234	129	09-09-2018	Transfer	14145	14145
					26-05-2018	Hatch - birth	14236	14236
	249	Unknown	234	123	09-09-2018	Transfer	14145	14145
					29-05-2018	Hatch - birth	14236	14236
	251	Unknown	234	129	09-09-2018	Transfer	14145	14145
					20-06-2018	Hatch - birth	14236	14236
	270	Unknown	234	128	31-05-2019	Transfer	14145	14145
					06-05-2019	Hatch - birth	14236	14236
	271	Unknown	234	128	31-05-2019	Transfer	14145	14145
					26-04-2019	Hatch - birth	14236	14236
	273	Unknown	234	128	31-08-2019	Transfer	14145	14145
					02-06-2019	Hatch - birth	14236	14236
	274	Unknown	234	129	31-08-2019	Transfer	14145	14145
					05-06-2019	Hatch - birth	14236	14236
14122	96	Male	58	59 60	~ 13-07-2013	Transfer	14122	14122
					~ 01-06-2012	Transfer	14194	14187
					~ 18-01-2010	Hatch - birth	14187	14187
	138	Male	58	59 60	~ 19-03-2017	Transfer	14122	14122
					~ 01-09-2016	Transfer	14236	14187
					~ 27-01-2013	Hatch - birth	14187	14187
	141	Male	58	59 60	~ 19-03-2017	Transfer	14122	14122
					~ 01-09-2016	Transfer	14236	14187
					~ 17-02-2013	Hatch - birth	14187	14187
	145	Female	58	59 60	~ 14-11-2017	Transfer	14122	14122
					~ 01-09-2016	Transfer	14236	14187
					~ 26-03-2013	Hatch - birth	14187	14187
	173	Male	22	24	24-09-2016	Transfer	14122	14122
					12-01-2014	Hatch - birth	14178	14178
	174	Male	22	24	24-09-2016	Transfer	14122	14122
					15-08-2014	Hatch - birth	14178	14178
	226	Unknown	94	62	08-09-2018	Transfer	14122	14122
					11-05-2017	Hatch - birth	14121	14121
	228	Unknown	94	62	08-09-2018	Transfer	14122	14122
					13-07-2017	Hatch - birth	14121	14121
14204	4	Female			06-02-2018	Transfer	14204	Dwarf Tortoise Conservation
					13-09-2014	Transfer	Wuppertal Zoo	Dwarf Tortoise Conservation
					27-10-2004	Transfer	14121	Dwarf Tortoise Conservation
					21-11-1997	Transfer	1392	Dwarf Tortoise Conservation
					~ 01-01-1900	Hatch - birth	Tygerberg Zoopark	Tygerberg Zoopark
	40	Male	Wild	Wild	06-02-2018	Transfer	14204	Dwarf Tortoise Conservation
					18-01-2018	Transfer	Wuppertal Zoo	Dwarf Tortoise Conservation
					28-03-1991	Transfer	Wuppertal Zoo	Wuppertal Zoo
					~ 01-01-1900	Hatch - birth	Wild	Wild
	79	Male	58	59 60	~ 11-04-2015	Transfer	14204	Dwarf Tortoise Conservation
					~ 15-06-2008	Transfer	14193	Dwarf Tortoise Conservation
					~ 15-03-2007	Hatch - birth	14187	14187
	81	Female	58	59 60	~ 11-04-2015	Transfer	14204	Dwarf Tortoise Conservation
					~ 15-06-2008	Transfer	14193	Dwarf Tortoise Conservation
					~ 15-03-2007	Hatch - birth	14187	14187
14156	124	Male	58	59 60	08-12-2018	Transfer	14156	14156
					01-09-2016	Transfer	14236	14187
					24-01-2012	Hatch - birth	14187	14187
14231	185	Unknown	94	62	12-09-2016	Transfer	14231	Dwarf Tortoise Conservation
					12-09-2015	Hatch - birth	14121	Dwarf Tortoise Conservation
14236	126	Male	58	59 60	01-09-2016	Transfer	14236	14236
					01-02-2012	Hatch - birth	14187	14187

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
	129	Female	58	59 60	01-09-2016	Transfer	14236	14236
					04-02-2012	Hatch - birth	14187	14187
	234	Male	63	64	~ 01-05-2014	Transfer	14236	14236
					~ 01-11-2012	Hatch - birth	14224	14224
14183	35	Male	16	17	~ 30-09-2005	Transfer	14183	14161
					09-07-2002	Hatch - birth	14161	14161
14211	69	Male	58	59 60	19-06-2010	Transfer	14211	14211
					~ 21-05-2006	Transfer	14194	14187
					~ 22-04-2004	Hatch - birth	14187	14187
	71	Female	58	59 60	19-06-2010	Transfer	14211	14211
					~ 21-05-2006	Transfer	14194	14187
					~ 06-03-2004	Hatch - birth	14187	14187
	130	Female	94	62	05-04-2019	Transfer	14211	14211
					16-03-2012	Hatch - birth	14185	14185
	132	Male	94	62	05-04-2019	Transfer	14211	14211
					18-07-2012	Hatch - birth	14185	14185
	133	Female	94	62	05-04-2019	Transfer	14211	Dwarf Tortoise Conservation
					13-08-2012	Hatch - birth	14185	Dwarf Tortoise Conservation
	149	Male	94	62	05-04-2019	Transfer	14211	14211
					27-04-2013	Hatch - birth	14185	Dwarf Tortoise Conservation
14130	65	Unknown	22	24	28-09-2019	Transfer	14130	14130
					30-06-2018	Hatch - birth	14178	14178
	66	Unknown	22	24	28-09-2019	Transfer	14130	14130
					03-07-2018	Hatch - birth	14178	14178
	284	Unknown	22	24	28-09-2019	Transfer	14130	14130
					04-06-2019	Hatch - birth	14178	14178
	285	Unknown	22	24	28-09-2019	Transfer	14130	14130
					08-06-2019	Hatch - birth	14178	14178
	286	Unknown	22	24	28-09-2019	Transfer	14130	14130
					16-06-2019	Hatch - birth	14178	14178
	287	Unknown	22	24	28-09-2019	Transfer	14130	14130
					01-07-2019	Hatch - birth	14178	14178
16915	190	Female	Wild	Wild	08-04-2016	Transfer	16915	16915
					~ 01-01-1900	Hatch - birth	Wild	Wild
	191	Female	Wild	Wild	08-04-2016	Transfer	16915	16915
					~ 01-01-1900	Hatch - birth	Wild	Wild
	194	Female	192	190 191	08-04-2016	Hatch - birth	16915	16915
	196	Unknown	192	190 191	08-04-2016	Hatch - birth	16915	16915
	210	Female	Wild	Wild	01-12-2016	Transfer	16915	16915
					~ 01-01-1900	Hatch - birth	Wild	Wild
	214	Unknown	192	190 191	21-03-2017	Hatch - birth	16915	16915
	215	Unknown	192	190 191	21-03-2017	Hatch - birth	16915	16915
	216	Unknown	192	190 191	21-03-2017	Hatch - birth	16915	16915
Turtle Conservancy	207	Unknown	10	11	11-04-2016	Hatch - birth	Turtle Conservancy	Turtle Conservancy
	209	Unknown	10	11	15-05-2016	Hatch - birth	Turtle Conservancy	Turtle Conservancy
	236	Unknown	10	11	04-04-2017	Hatch - birth	Turtle Conservancy	Turtle Conservancy
	237	Unknown	10	11	17-04-2017	Hatch - birth	Turtle Conservancy	Turtle Conservancy
14215	84	Male	58	59 60	02-06-2011	Transfer	14215	14215
					~ 07-02-2008	Hatch - birth	14187	14187
	85	Male	58	59 60	02-06-2011	Transfer	14215	14215
					~ 07-02-2008	Hatch - birth	14187	14187
14197	187	Female	94	62	12-09-2016	Transfer	14197	Dwarf Tortoise Conservation
					17-09-2015	Hatch - birth	14121	Dwarf Tortoise Conservation

Homopus femoralis: live and available studbook population.

Keeper	Studbook number	Gender	Father	Mother	Date	Event	Keeper	Owner
14131	17	Female	3	4	25-07-2019	Transfer	14131	Dwarf Tortoise Conservation
					26-06-2017	Hatch - birth	1392	Dwarf Tortoise Conservation
	18	Male	3	4	25-07-2019	Transfer	14131	Dwarf Tortoise Conservation
					08-07-2017	Hatch - birth	1392	Dwarf Tortoise Conservation
	19	Unknown	3	4	25-07-2019	Transfer	14131	Dwarf Tortoise Conservation
					26-06-2018	Hatch - birth	1392	Dwarf Tortoise Conservation
14121	2	Male	Wild	Wild	06-07-2006	Transfer	14121	Dwarf Tortoise Conservation
					23-12-2001	Transfer	1277	Dwarf Tortoise Conservation
				~ 01-01-2001	Transfer	Tortoise Trust	Tortoise Trust	

Studbook									
Keeper	number	Gender	Father	Mother		Date	Event	Keeper	Owner
	15	Female	3	4	~	01-01-1900	Hatch - birth	Wild	Wild
						09-03-2019	Transfer	14121	Dwarf Tortoise Conservation
						10-09-2016	Transfer	14222	Dwarf Tortoise Conservation
						19-06-2014	Hatch - birth	1392	Dwarf Tortoise Conservation
14191	3	Male	Wild	Wild		30-05-2019	Transfer	14191	Dwarf Tortoise Conservation
						23-12-2001	Transfer	1392	Dwarf Tortoise Conservation
						01-01-2001	Transfer	Tortoise Trust	Tortoise Trust
					~	01-01-1900	Hatch - birth	Wild	Wild
	16	Female	3	4		09-09-2017	Transfer	14191	Dwarf Tortoise Conservation
						26-06-2015	Hatch - birth	1392	Dwarf Tortoise Conservation
14222	7	Male	3	4		09-03-2019	Transfer	14222	Dwarf Tortoise Conservation
						22-10-2014	Transfer	14121	Dwarf Tortoise Conservation
						07-06-2008	Transfer	1392	Dwarf Tortoise Conservation
	14	Female	3	4		10-09-2016	Transfer	14222	Dwarf Tortoise Conservation
						18-06-2014	Hatch - birth	1392	Dwarf Tortoise Conservation
1276	8	Male	3	4		26-06-2014	Transfer	1276	Dwarf Tortoise Conservation
						30-06-2010	Transfer	1392	Dwarf Tortoise Conservation
	10	Female	3	4		27-06-2015	Transfer	1276	Dwarf Tortoise Conservation
						28-05-2011	Transfer	1392	Dwarf Tortoise Conservation
14197	12	Male	3	4		02-08-2015	Transfer	14197	Dwarf Tortoise Conservation
						12-07-2013	Hatch - birth	1392	Dwarf Tortoise Conservation
	13	Female	3	4		10-09-2016	Transfer	14197	Dwarf Tortoise Conservation
						15-06-2014	Hatch - birth	1392	Dwarf Tortoise Conservation

5. SPECIFIC INFORMATION FROM STUDBOOK PARTICIPANTS

Participant 1392

In the end of March, a female *H. femoralis* unexpectedly produced three unburied, broken eggs. The eggs were unexpected because egg-production usually started later in the season. The compacted, loamy soil of the enclosure had not yet been loosened and moistened, probably disabling the female to dig a nest. Two days after producing the broken eggs, the female was found dead. Dissection showed that the cloaca was obstructed by a fourth egg, and the presence of a fifth egg in the body. Upon the death of the female, soils in other enclosures with female dwarf tortoises were replaced with softer substrates



Participant 1412

After a period of normal feeding (every 2–3 days), a female *C. signatus* became inactive and refused favourite food items (dandelion). When picked up, the tortoise was very weak in the hind limbs and they appeared slightly swollen. The tortoise was unable to walk. Since no reptile vet was available, the tortoise was soaked multiple times a day, after which it ate a little bit of dandelion coated in olive oil fearing impaction. Faeces were produced three times. Later, radiography showed slight impaction and some gas (blue and red marks on the photo, respectively). The vet administered a muscle relaxant (buprefelican) that also draws fluid to the gut and pain relief. Movicol granules were also tried. Unfortunately, the tortoise died soon thereafter.



Participant 14116

A male *C. signatus* was introduced for the first time to a female (86 mm, 114 g). The male was interested in the female and showed head-bobbing. It followed the female, but no copulation was observed until now.

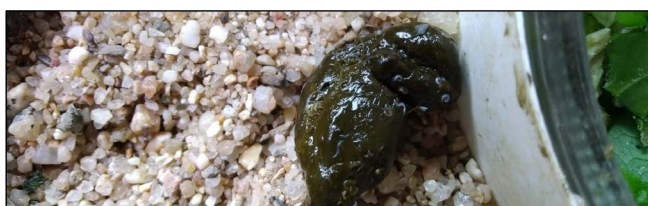
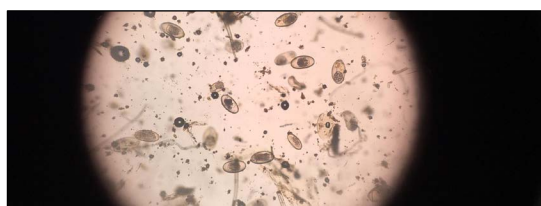
Participant 14131

An unrelated couple *C. signatus* is kept indoors year-round in separate enclosures. The tortoises spent much time basking. When dirt was removed from the enclosures, the tortoises showed curiosity. Three *H. femoralis* (an immature couple and a juvenile) were received in 2019 and distributed over two enclosures (male kept solitarily). These tortoises spent less time basking than *C. signatus*. The female appeared more active than the others, and the male appeared only every five days or so.



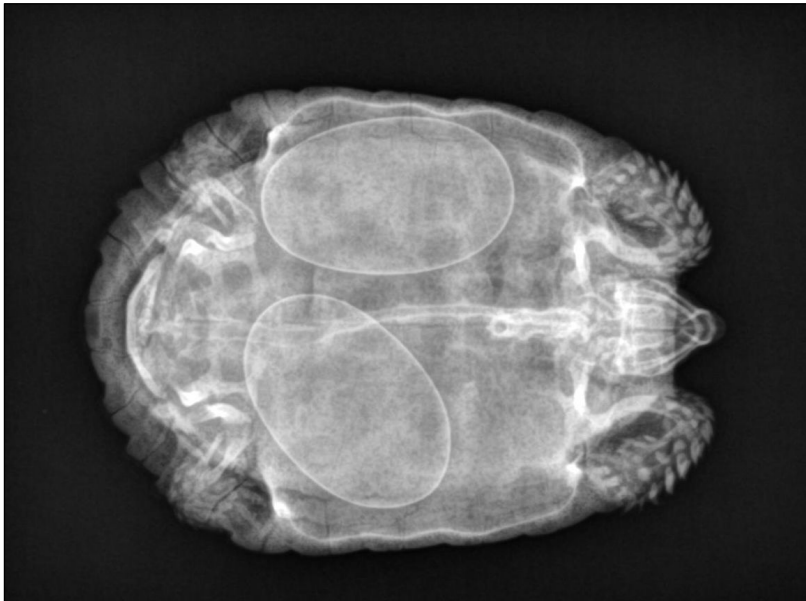
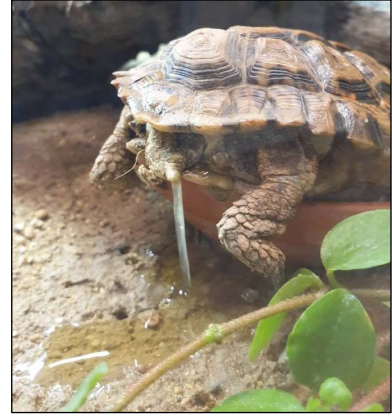
Participant 14133

Faecal analysis for *C. signatus* identified worms (*Strongylus* sp.) and their eggs. The tortoises were treated with fenbendazol (Panacur) and lost some worms. However, the faeces continued to contain worm eggs. This may have been caused by difficulties to administer fenbendazole orally, and repeated treatment might be necessary.



Participant 14139

A female *C. signatus* was observed producing a viscose fluid during drinking early March 2019. Because its behaviour was abnormally apathic, a radiograph was made. The female turned out to contain two fully-shelled eggs. Calcium and oxytocin were administered. This resulted in increased activity of the female, and the production of one egg two days later. Unfortunately, the egg broke during oviposition. In 2018, two eggs were also broken during oviposition. To reduce stress for the female as much as possible, the male was routinely removed from the enclosure and the enclosure was covered with newspaper. Nevertheless, the female died on 2 April 2019 without having produced the second egg. This appears to be the first documented case of a *C. signatus* female containing two full-sized and fully-shelled eggs.



Participant 14185

Two *H. areolatus* hatched from two eggs.



Participant 14187

A movie clip of a *H. areolatus* feeding on dehydrated *Crassula* leaves was posted on [YouTube](#).

Participant 14201

The abdomen of a deceased *C. signatus* female (right) was filled with inflamed tissue. Underneath were the organs and an egg with unrecognisable contents.



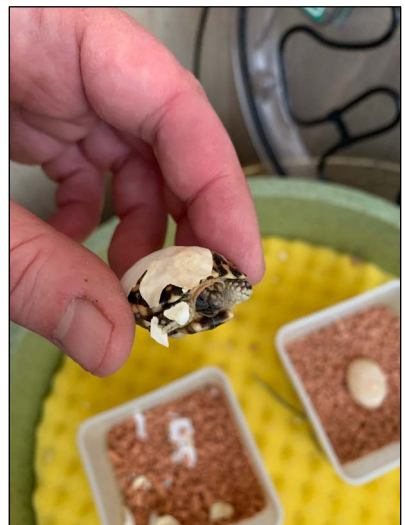
Participant 14206

For the first time at this participant, a *C. signatus* successfully hatched. It hatched in the adult enclosure after spraying.



Participant 14217

One egg cracked during incubation, and a second egg hatched successfully.



Participant 16915

Early in 2019, the largest of the female *H. areolatus* became extremely aggressive. At first it was only occasional; it followed the others and bit their hind limbs violently, especially the (smaller) male's. They

were separated each time, considering that it might be a phase where they needed to move apart and find their own parts of the property/garden. Then, during about one week, both the male and one of the older juveniles were found dead. The male was wedged up into a crack between the stems of a bush, while the juvenile was upside down. Both had what looked like bite wounds on their hind limbs. Two of the other juveniles could not be located, but no bodies were found either, so they were probably still alive in the thicker bushes. The large female was moved into a separate enclosure. Another female produced eggs in October. Eggs are left to hatch where they were laid.



Participant 17258

One male *C. signatus* was received and is doing well.



Turtle Conservancy

The offspring from 2017–2018 is surviving and doing well.



6. NEW PUBLICATIONS

The following overview summarises all manuscripts and articles that were submitted, accepted, published, or under review in 2019. A full list of publications authored or co-authored by Dwarf Tortoise Conservation is available [at the website](#).

Subject	Submitted	Accepted	Published	Journal
Ultrastructure of eggshells from wild and captive speckled dwarf tortoises, <i>Chersobius signatus</i>	2018	2018	2019	Herpetologica (English)
<i>Homopus femoralis</i> (greater padloper). Reproduction and growth.	2018	2019		Herpetological Review (English)
High-level summer inactivity despite favourable environmental conditions in the rock-dwelling dwarf tortoise <i>Chersobius boulengeri</i>	2019			Animal Behaviour (English)
Ombouw van een broedstroof (Rebuilding an incubator)	2019	2019		Trionyx (Dutch)

7. FINANCIAL REPORT

All project expenses in 2019 were spent on the field study of *C. boulengeri* (see paragraph 1.5), and were covered by funding that had been received from multiple NGO's and private individuals in 2017–2019 (see paragraph 1.5). Cost-efficiency has enabled us to save funds for a genetic study of the *C. boulengeri* diet using environmental DNA in faeces. Originally, a time-consuming morphological approach had been planned, but the secretive and inactive behaviours of *C. boulengeri* have necessitated to spend most time in the field. In February–March 2020, a student will perform smaller-scale morphological analysis and visual observations to complement the genetic study. Genetic studies will cost approximately € 7,000–10,000. A smaller amount was reserved to supplement volunteer contributions to car rental and fuel costs, because the harsh field conditions require vehicles that are more expensive than originally planned.

All non-project expenses were covered by a private donation by the board of Dwarf Tortoise Conservation.

Revenues		Expenses	
Net amount	Item	Amount	Item
€		€	
Projects		Projects	
			<i>Field ecology of Chersobius boulengeri</i>
6,607	Remaining funds from 2019	960	Contribution car rental and fuel
1,621	Donation Knoxville Zoological Gardens	284	Reference thermometer
1,000	Donation Turtle Survival Alliance EU	82	Calibration IR dataloggers
1,272	Donations (5) private individuals	91	Sample containers
		17	Radiography
		12	Field forms
		12	Permits
		7	Transport containers
		1,500	Reservation contribution car rental and fuel 2020
		7,534	Reservation dietary study (genetic) 2020
10,500	Subtotal	10,500	Subtotal
Other		Other	
109	Donation private individual to cover overhead costs	109	Annual costs bank account
109	Subtotal	109	Subtotal
10,609	Total	10,609	Total

8. PERMIT OVERVIEW

The activities reported in this annual report would not have been possible without the following permits issued by the South African and Namibian authorities:

Collecting and exporting of C. boulengeri

- Collecting permit FAUNA 0952/2018 (Northern Cape Department of Environment and Nature Conservation)
- CITES exporting permit 217387 (Northern Cape Department of Environment and Nature Conservation)

Collecting and exporting of C. signatus

- Collecting permit 331/95 (Western Cape Nature Conservation Board, South Africa)
- Collecting permit 28/2001 (Northern Cape Nature Conservation, South Africa)
- Collecting permit 053/2015 (Northern Cape Department of Environment and Nature Conservation)
- CITES exporting permits 16579 and 281/95C (Department of Environmental Affairs and Tourism, South Africa)
- CITES exporting permit 148487 (Northern Cape Department of Environment and Nature Conservation)
- Permit to move animals/animal products 2001/10/3/A (Department of Agriculture, South Africa)

Collecting and exporting of H. femoralis

- Collecting permit AAA004-00010-0035 (CapeNature, South Africa)
- CITES exporting permit 58679 (Department of Environmental Affairs and Tourism, South Africa)
- Health declaration dated 17-03-06 (Department of Agriculture, South Africa)

Exporting of H. areolatus

- Exporting permit 49683 (Ministry of Environment and Tourism, Namibia)
- CITES exporting permit 8830 (Ministry of Environment and Tourism, Namibia)
- CITES exporting permit 3558 (Ministry of Environment and Tourism, South Africa)
- Health certificate 13\1\4\2\ 09\2- 1676\04 (Ministry of Agriculture, Water and Rural Development, Namibia)
- Various additional permits issued to individual studbook participants (Namibia)

Field study and surveys on C. boulengeri

- Research permits 755/05, 43/2005 and 35/2005 (Northern Cape Nature Conservation, South Africa)
- Research permit 245/2/2015 (Northern Cape Department of Environment and Nature Conservation, South Africa)
- Research permit FAUNA 0950/2017 (Northern Cape Department of Environment and Nature Conservation, South Africa)
- Research permits FLORA 0066/2017 and FLORA 0067/2017 (Northern Cape Department of Environment and Nature Conservation, South Africa)
- Plant export permission NNO 1/10/3/6/ 39738

Field studies on C. signatus

- Research permits 137/99, 84/99, 019/2001, 010/2001, 46/2003, 26/2003, 8/2003, 168/2003, 43/2003, 158/2003, 633/2003, 25/2003, 158/2004 and 633/2004 (Northern Cape Nature Conservation, South Africa)
- Research permits 428/2002 and 41/2002 (Western Cape Nature Conservation Board, South Africa)
- Research permits 152/2012 and 153/2012, 460/2013 and 052/2015 (Northern Cape Department of Environment and Nature Conservation, South Africa)

Field study on H. femoralis

- Research permit AAA-004-000185-0035
- Research permit AAA-004-00020-0028
- Research permit AAA-004-000392-0035
- Research permit AAA-004-00027-0028

Appendix 1

Reports from participant 14204.

Am 23. Juli nach 113 Tagen war es soweit, hurra es öffnete sich ein Guckloch. Die Spannung stieg, wie sieht es wohl aus? Nach 115 Tagen wurde die ganze Schale weggesprengt.. Schade, es hat einen kleinen Schildfehler.



Kaum teilten wir Dwarf Tortoise Conservation dieses Ereignis mit, bekamen wir für dieses Jungtier bereits die Nummer 194
Zuerst blieb das Jungtier im Behälter noch 1 Tag im Brutapparat, danach 1 Tag im Terrarium zum Angewöhnen, Umgebung, Licht usw.



Nach 4 Tagen erkundete es bereits die ganze Gegend. In dieser Zeit habe ich es nie fressen gesehen. Am 1. August gab ich ihm ein kleines Lattichblatt, das schien ihm wohl sehr bekommen zu sein, denn plötzlich fehlte eine Ecke. In der Zwischenzeit frisst es Blüten, Disteln, Kalanchue, Spitzwegerich und Löwenzahn usw, dies alles auch gedörrt.



Am 1. August wurde es das erste Mal gemessen und wieder gewogen. Die Masse sind 33,0 / 28,9 x 26,5 x 16,1 mm und wog 7,42 g also hat es schon 0,17 g zugenommen.

Nachtrag Fütterung nach Angaben Dwarf Tortoise Conservation:

Um die Verdichtung des Darmtraktes mit Sand zu verhindern, Tiere nicht auf Sand füttern.

Jungtier von Luna

Futterplatz auf Steinboden



Naturfutter direkt ab Pflanze



Elterntiere

Futterplatz auf Steinboden



Naturfutter direkt ab Pflanze

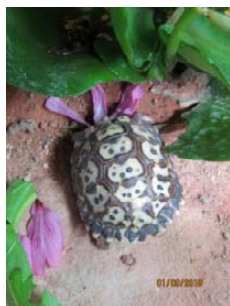


Im Mail an Dwarf Tortoise Conservation schicken wir auch noch die Bruttabelle. Gewichtsdaten und Masse, sowie Fotos auf cm Papier folgen Ende Jahr.

Haltebericht Chersobius signatus

August bis November 2019 von participant 14204

Die erwachsenen Chersobius Nr. 11 und 149 verstehen sich nach wie vor sehr gut, sie fressen auch regelmässig. Wie uns Dwarf Tortoise Conservation vorgeschlagen hat, waren die Tiere stressbedingt nicht im Aussengehege. Auch werden die Tiere nur noch halbjährlich, nicht wie früher Monatlich gemessen und gewogen. Leider wurde seit dem 5. Mai kein Ei mehr gelegt, was uns sehr erstaunt, denn es ist ja Frühjahr in Afrika. Die Homopus seinerzeit, legten ab August bis Dezember.



Jungtier Chersobius Nr. 194

Das Junge frisst eigentlich wenig, hat in vier Monaten nur ca. 2,5 g zugenommen. Es zeigt sich nur alle zwei Tage zum Fressen. Es fällt auf, dass es sich in den letzten zwei Monaten mehr in der Nähe des UV-Strahlers aufwärmt. Eine Wasserschale befindet sich im Terrarium, habe aber noch nie gesehen, dass es trinkt. Es klettert gerne alle zwei bis drei Tage über den Steinhügel und schläft auch dort in der hintersten Ecke. Abwechslungsweise schläft es auch in der Höhle und kuschelt sich im Sand dort ein.





Auf Foto links schläft er in der Ecke auf Steinhügel

Gedörertes Löwenzahn und Sprossen sind sehr lecker (Abwechslung)

Es gibt nicht immer frisches Futter, auch gedörktes Naturfutter und Blüten frisst sie gerne. Bis Ende November konnten wir auch noch frische Nachtkerzenblüten vom Garten füttern. Bei Lust und Laune kann auch direkt ab gesetzten Naturpflanzen gefressen werden.

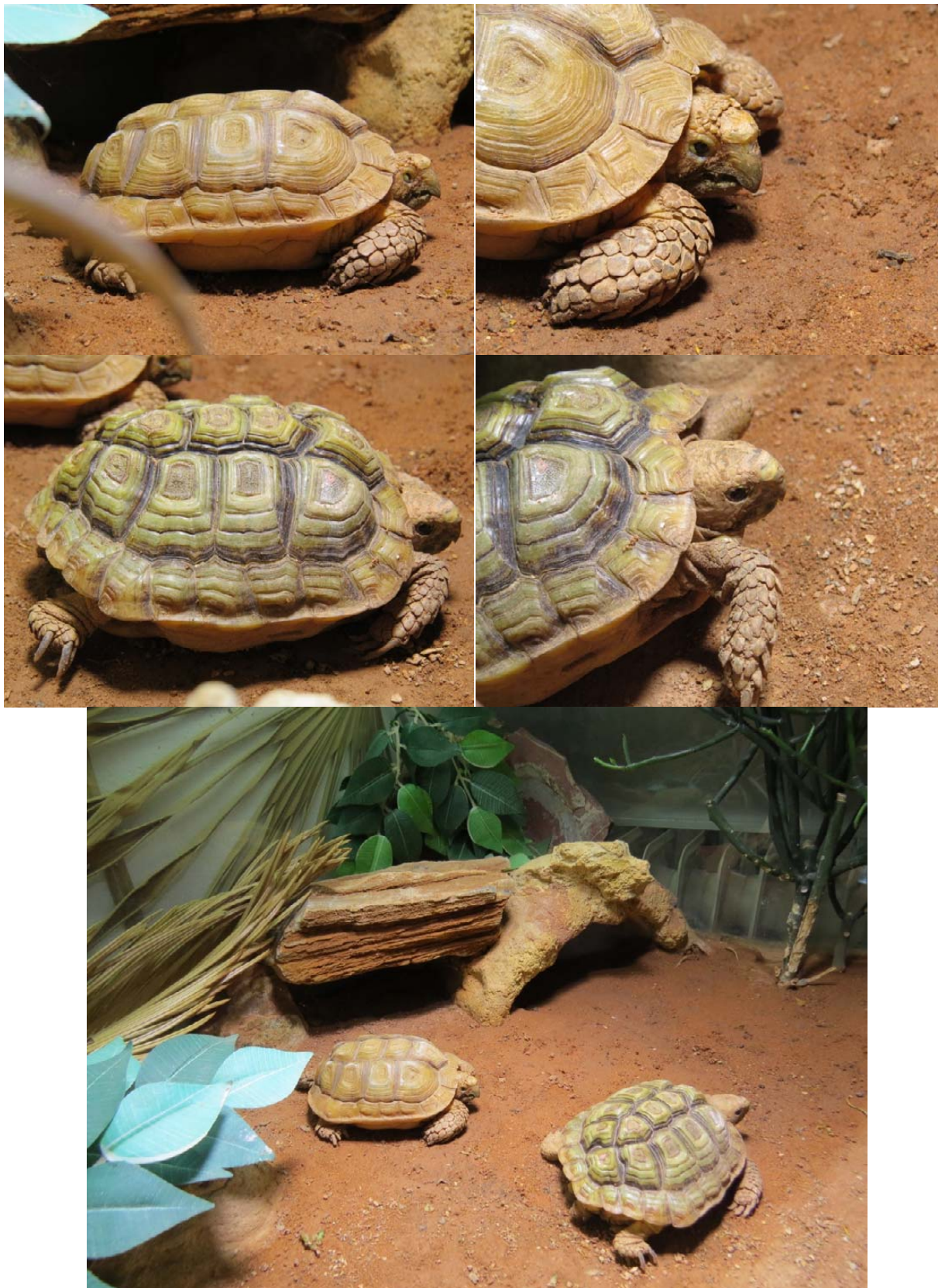


Hier noch das Jungtier auf cm Papier wie auf Ende Jahr versprochen.

Haltebericht Homopus areolatus

Januar – Dezember 2019 von participant 14204

Das Männchen Nr. 40 aus Wuppertal und das Weibchen Nr. 81 aus Namibia sind nach wie vor zusammen und vertragen sich sehr gut.



Haben auch dieses Jahr keine echte Kopulation gesehen und auch keine Grabversuche. Das Weibchen wird wohl vom Männchen beschnuppert, aber kaum richtig aufgestiegen.

Am 21. Juni haben wir sie im Aussengehege platziert.



Auch an der frischen Luft in der schönen Natur war das Verhalten nicht anders.

Das Tier Nr. 4, das Weibchen aus Wuppertal war ja seit dem 21. November 2018 beim Tierarzt Peter Sandmeier für die Behandlung des Prolaps wie im November 2018 beschrieben. Peter konnte das Tier nach der Behandlung besser überwachen und wird auch so bestätigen, dass es lebendig ist und gut frisst.

Am 29. Juli kam das Weibchen Nr. 4 wieder zu mir, ich platzierte es in einem separaten Aussengehege.



Möchte mich bei dieser Gelegenheit nochmal herzlich bei Peter bedanken.

Am 4. Oktober, als wir in den Ferien weilten, sanken die Temperaturen merklich, unsere Vertretung zu Hause, Sohn und Schwiegertochter, nahmen nach Absprache mit mir alle drei Homopus vereint ins Innenterrarium. Wir wagten das Experiment und siehe da, bis anhin geht es sehr gut.



Wichtig ist für mich, sehr gut zu überwachen, falls ein Ei gelegt wird, von welchem Weibchen es ist. Es erstaunt mich, dass Homopus 1.2 so gut harmonieren. Auch mit zwei Weibchen Nr. 4 und 81 konnte ich bis anhin keine Kopulation sehen.

Wir hoffen weiterhin!

Wir sagen immer, wenn es den Pflanzen gut geht, geht es auch den Tieren gut.

Nun noch zum einsamen Männchen Nr. 79 das wir seit 13. April 2015 pflegen, Nachkomme von Namibia. Dieses Männchen ist aktiver und frisst sehr gut, klein Vergleich zum Männchen Nr. 40 aus Wuppertal.

Auch dieses Tier durfte im Sommer in ein Aussengehege, im Herbst ins Innenterrarium, natürlich immer separat.

