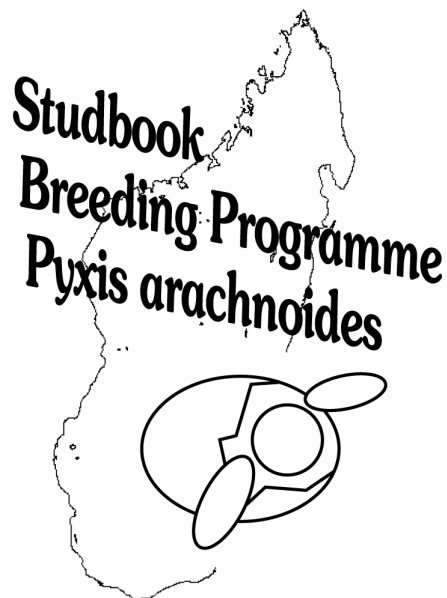


**Studbook**  
**Breeding Programme**  
***Pyxis arachnoides***



**Annual Report**  
**2000**

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## APPENDIX HUSBANDRY CONDITIONS AND ADDITIONAL INFORMATION PER LOCATION

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Since 1992 several Dutch herpetological societies have initiated a total of 60 studbook programmes on reptile and amphibian species. In 1997, all programmes were condensed into an independent foundation known as: 'Stichting Overkoepelend Orgaan Stamboeken' (SOOS). Early in its development, SOOS formulated the very important criteria that no studbook participant would jeopardise their important herpetological contributions and goals with any commercial enterprise from their specimens, either currently or in the future. The Studbook Breeding Programme *Pyxis arachnoides* is one of few studbooks operating internationally.

The aims of the studbook programmes in general are:

- To inform the herpetological community with data and publications generated from captive situations and field studies
- 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 2000

## 1.1. Introduction

This report is updating the first annual report of the Studbook Breeding Programme *Pyxis arachnoides*, published in 1999. The programme is aiming to form genetically healthy, reproducing captive populations and to study these, and to gather and distribute as much information about *P. arachnoides* as possible.

The year 2000 showed that the decision to start a studbook on *Pyxis arachnoides*, after making a first inventory of specimens present in Europe, was the right one, since the number of participants keeps increasing. In order to keep the studbook manageable, it has been decided that for the time-being the studbook will operate exclusively in Europe, despite of occasional applies from keepers of *P. arachnoides* in the USA. Repeated discussions about studbook management on (mainly American) mailing lists such as TortoiseTrust and AsianTurtleCrisis at Egroups.com, as well as numerous communications between the studbook co-ordinator and American keepers of *P. arachnoides* and other tortoise species, have resulted in a feeling that general attitude towards commercially selling of tortoises in the USA is different from the general situation in Europe. Commercial selling of tortoises often causes conflicting interests between what is best for the studbook population, and what is best for the financial situation of the owner; a location that is willing to pay the highest price for a tortoise is not necessarily the optimal location in terms of maintenance of genetic diversity, prevention of inbreeding and tracibility of specimens within the studbook. A difference in attitude, combined with the physical distance between Europe and the USA, would make a world-wide studbook difficult to manage. It would however be welcomed if someone in the USA would set up a studbook on *P. arachnoides*, similar to the Studbook Breeding Programme *Pyxis arachnoides*. Eventually, both studbooks could be connected in case they both would be successful.

This report will summarise the activities of the Studbook Breeding Programme *Pyxis arachnoides* in 2000, plans for 2001, and it will give an overview of the current composition and changes in the captive population *P. arachnoides*. Additional information may be obtained from the internet site of the programme, <http://home.kabelfoon.nl/~loehr/pyxis>, or from the studbook co-ordinator.

In the next paragraphs an overview of the main activities in 2000 is presented.

## 1.2. Internet site

In order to facilitate the exchange of information between participants and enthusiasts of the Studbook Breeding Programme *Pyxis arachnoides*, an internet site has been prepared in 2000 (<http://home.kabelfoon.nl/~loehr/pyxis>). The actual composition of the studbook population can be viewed on the site, as well as a literature list on *Pyxis*, links, et cetera. A small amount of general information (distribution of the species in Madagascar, husbandry, et cetera) about *P. arachnoides* is available on the site, and in addition husbandry information can be obtained by downloading the annual studbook reports, that will be posted every year.

## 1.3. Presentations and publications

In the 1999 annual studbook report, it was mentioned that in the report in 2000 a list of all publications and lectures published and presented in 2000 would be included. Although it seems that nor publications nor lectures were generated in 2000, there has been no effort to make an inventory among the studbook participants. Therefore, this activity will be postponed to 2001.

## 1.4. Contacts

In November 2000, the Studbook Breeding Programme *Pyxis arachnoides* was contacted by the German Federal Agency for Nature Conservation, German Scientific Authority to CITES. They had to judge an apply for importing wild-caught *P. arachnoides*, for conservation breeding, to prevent inbreeding. The opinion of the Studbook Breeding Programme *Pyxis arachnoides* was asked. Furthermore, the question was asked whether it was planned to start a studbook on *P. planicauda* also. They had come across the annual studbook report of 1999 on the internet, when locating background information.

The Federal Agency has been replied that within the studbook the current policy is to put most efforts in improving husbandry and breeding results within the existing captive population, as well as

supporting keepers to exchange information and if necessary animals, to improve success. It seems that there still is a relatively large number of specimens in Europe that is not yet registered, further decreasing the current need to import additional specimens. It would seem unreasonable to import wild-caught specimens to prevent inbreeding, when many present specimens in the studbook population are not even reproducing yet.

Obviously, it is unlikely that the captive population will be sufficiently large for long term genetic health. On the long term, it might be necessary to import (very) small numbers, preferably captive-bred from breeders in the USA or elsewhere, or otherwise long term captives, and in the last instance recently wild-caught specimens (preferably not collected for animal trade, but directly (non-commercially) for use within the studbook).

There is one exception that has been made. Large quantities of *Pyxis arachnoides* have been imported into the USA recently. In case there would be surplus captive specimens in the USA (for instance confiscated specimens), it would seem reasonable to apply for CITES-permits, in order to improve survival and breeding chances of these specimens within the studbook. Obviously not specimens that were imported in the USA recently, and are offered by American traders to Europeans! That would only support traders to import additional specimens, legally or illegally exported from Madagascar.

Regarding the question about *P. planicauda*, it was replied that at this moment there seems to be no need to establish a studbook on *P. planicauda* within the overall studbook foundation 'Stichting Overkoepelend Orgaan Stamboeken', since there are virtually no specimens in Europe. Because of the conservation status of this species, it would also seem more efficient to participate in existing initiatives to breed this species within the zoo community, rather than starting a parallel studbook. In other words, there are hardly perspectives for a studbook on this species.

## 2. PLANS FOR ACTIVITIES IN 2001

As was mentioned in the 1999 annual studbook report, continuing efforts of the studbook co-ordinator within the scope of a second and larger studbook programme on *Homopus*, emphasise the need of studbook participants to contribute to the aims of the Studbook Breeding Programme *Pyxis arachnoides*. It is delighting to notice that almost all studbook participants have responded to an apply by the studbook co-ordinator, to send husbandry information for inclusion in this annual report (see appendix)! The information presented in the appendix hopefully will stimulate discussion regarding optimal husbandry practises, allowing to eventually conclude what methods are most suitable for keeping and breeding each of the subspecies of *P. arachnoides*.

### 2.1. Internet site

In 2001 the internet site will continue to grow. It will be tried to post all papers that may be published within the Studbook Breeding Programme *Pyxis arachnoides* on the site in 2001. All authors within the studbook are kindly requested to assist, by sending such papers to the studbook co-ordinator. Although it is uncertain if this will be managed in 2001, it is planned to increase the amount of husbandry information available at the site. Furthermore, a link between the information section on the internet site, and the information in the annual studbook reports will be established. This will make it easier for visitors to locate this up to date information, and at the same time it will make (time-consuming) updating of the information on the site less urgent.

### 2.2. Publications and presentations

When collecting updated husbandry information among the studbook participants for inclusion in the 2001 annual report in the end of 2001, a list of possible lectures/publications that were generated will also be requested. The complete list will be included in the report.

### 2.3. Contacts

An increasing number of people and organisations find their way to the internet site of the Studbook Breeding Programme *Pyxis arachnoides*. This will yield an increasing number of contacts with people with an interest *Pyxis arachnoides* in 2001. Presumably it will also yield a growing number of registered specimens in the studbook.

### 3. CURRENT LIVING STUDBOOK POPULATION

The total number of registered live specimens *P. arachnoides* increased from 22 to 40 in 2000. These specimens are housed at 10 locations (6 in 1999) in the Netherlands (5), Belgium (1), and Germany (4). One of the (previously) 5 locations in Germany was removed. Unfortunately, the keeper at this location has no longer the possibility to work on captive tortoises, due to private circumstances. All three subspecies of *P. arachnoides* are represented in the studbook, but *P. a. oblonga* and *P. a. brygooi* are limited in numbers.

The location codes were changed in 2000, because new studbook software had to be implemented after the change of the millennium:

Old location code	New location code
LOCATION 0	A01
LOCATION 1	A02
LOCATION 2	A04
LOCATION 3	A03
LOCATION 4	A05
LOCATION 5	A06
LOCATION 6	A07
LOCATION 7	RD-ZOO
LOCATION 8	A08
LOCATION 9	A09
LOCATION 10	A10
LOCATION 11	A11
-	A15
-	A17
-	A18
-	A19

Location codes A01, A05, A07, A11 and A15 are virtual locations, outside of the Studbook Breeding Programme *Pyxis arachnoides*. These have been entered in the studbook registration system, in order to allow registration of relationships between specimens bred at these locations. Also studbook numbers 0010-0012 and 0044-0045 are virtual numbers, for parents at the virtual locations. Virtual specimen numbers may in fact represent groups of specimens, but unfortunately in the studbook registration all captive-bred specimens originating from the same location outside of the studbook should be considered related when there is doubt about parent-offspring relationships. Otherwise inbreeding may be introduced in the studbook population.

Not all specimens present at locations A03 have yet been registered in the studbook, due to so far incomplete registration information. An adult female *P. a. brygooi*, as well as four captive-bred specimens born at location A03, and one couple of unknown subspecies still need to be registered.

Specimens 0016 and 0017 were transferred from location A06 to location A18 in 2000. Specimens 0013-0015 were transferred from location A06 to location A17. All transfers were a result of the fact that keeping of tortoises was stopped at location A06. All transfers were in accordance with national and international legislation.

**Table I:** Current living studbook population *Pyxis arachnoides* per location as registered in the studbook. M is male, F is female, U is unknown, D is donation, L is loan, P is purchase and B is birth. Cage numbers are relative numbers per location, indicating which specimens are housed together.

STUD ID	SEX	SIRE ID	DAM ID	DATE OF ARRIVAL dd/mm/yy	LOCATION	HOUSE NAME	CAGE	FCOEF	SUB-SPECIES
LOCATION A02 (2.2.3)									
0001	U	0044	0045	09/09/96 22/11/98	A07 (B) A02 (L)	- Para960909	1	0.000	<i>arachnoides</i>
0002	U	0044	0045	16/11/96 22/11/98	A07 (B) A02 (L)	- Para961116	1	0.000	<i>arachnoides</i>



STUD ID	SEX	SIRE ID	DAM ID	DATE OF ARRIVAL dd/mm/yy	LOCATION	HOUSE NAME	CAGE	FCOEF	SUB-SPECIES
0003	U	0044	0045	16/09/97	A07 (B)	-		0.000	<i>arachnoides</i>
				22/11/98	A02 (L)	Para970916	1		
0026	M	WILD	WILD	?	A11 (P)	-		0.000	<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-I	2		
0027	M	WILD	WILD	?	A11 (P)	-		0.000	<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-II	2		
0028	F	WILD	WILD	?	A11 (P)	-		0.000	<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-III	2		
0029	F	WILD	WILD	?	A11 (P)	-		0.000	<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-IV	2		
LOCATION A03 (1.1.1)									
0030	M	WILD	WILD	14/01/91	RDZOO (D)	702004		0.000	<i>brygooi</i>
				04/01/95	A03 (L)	HZ0305	1		
0031	F	WILD	WILD	14/01/91	RDZOO (D)	702005		0.000	<i>brygooi</i>
				04/01/95	A03 (L)	HZ0306	1		
0032	U	0030	0031	10/10/94	RDZOO (B)	703152		0.000	<i>brygooi</i>
				25/04/98	A03 (L)	HZ0539	2		
LOCATION A04 (1.1.4)									
0004	M	WILD	WILD	17/05/99	A04 (P)	Uli	1	0.000	<i>arachnoides</i>
0005	F	WILD	WILD	17/05/99	A04 (P)	Esther	1	0.000	<i>arachnoides</i>
0006	U	WILD	WILD	19/09/98	A04 (P)	-	2	0.000	<i>brygooi</i>
0007	U	WILD	WILD	19/09/98	A04 (P)	-	2	0.000	<i>brygooi</i>
0008	U	WILD	WILD	19/09/98	A04 (P)	-	2	0.000	<i>brygooi</i>
0009	U	WILD	WILD	19/09/98	A04 (P)	-	2	0.000	<i>brygooi</i>
LOCATION A08 (1.0.0)									
0018	M	WILD	WILD	01/01/95	A08 (?)	-	1	0.000	<i>arachnoides</i>
LOCATION A09 (2.1.0)									
0019	M	WILD	WILD	08/12/90	A09 (P)	'Damaged'	1	0.000	<i>arachnoides</i>
0020	M	WILD	WILD	08/12/90	A09 (P)	-	1	0.000	<i>arachnoides</i>
0021	F	WILD	WILD	08/12/90	A09 (P)	-	1	0.000	<i>arachnoides</i>
LOCATION A10 (2.1.1)									
0022	M	WILD	WILD	?	A05 (B)	-		0.000	<i>arachnoides</i>
				28/06/99	A10 (P)	Paam1	1		
0023	M	WILD	WILD	?	A05 (B)	-		0.000	<i>arachnoides</i>
				28/06/99	A10 (P)	Paam2	1		
0024	F	WILD	WILD	?	A05 (B)	-		0.000	<i>arachnoides</i>
				28/06/99	A10 (P)	Paaf1	1		
LOCATION A17 (0.0.3)									
0013	U	0012	0010	24/10/97	A06 (B)	-		0.000	<i>oblonga</i>
				25/07/00	A17 (P)	-	1		
0014	U	0012	0010	28/05/97	A06 (B)	-		0.000	<i>oblonga</i>
				25/07/00	A17 (P)	-	1		
0015	U	0012	0011	26/06/97	A06 (B)	-		0.000	<i>oblonga</i>
				25/07/00	A17 (P)	-	1		
LOCATION A18 (0.0.2)									
0016	U	0012	0010	27/04/99	A06 (B)	-		0.000	<i>oblonga</i>
				25/07/00	A18 (P)	-	1		

STUD ID	SEX	SIRE ID	DAM ID	DATE OF ARRIVAL dd/mm/yy	LOCATION	HOUSE NAME	CAGE	F COEF	SUB-SPECIES
0017	U	0012	0010	20/07/99 25/07/00	A06 (B) A18 (P)	- -	1	0.000	<i>oblonga</i>
LOCATION A19 (0.0.4)									
0040	U	0044	0045	13/08/99 01/03/00	A07 (B) A19 (P)	- -	?	0.000	<i>arachnoides</i>
0041	U	0044	0045	13/08/99 01/03/00	A07 (B) A19 (P)	- -	?	0.000	<i>arachnoides</i>
0042	U	0044	0045	13/08/99 01/09/00	A07 (B) A19 (P)	- -	?	0.000	<i>arachnoides</i>
0043	U	0044	0045	13/08/99 01/09/00	A07 (B) A19 (P)	- -	?	0.000	<i>arachnoides</i>
LOCATION RDZOO (4.3.0)									
0033	M	WILD	WILD	14/01/91	RDZOO (D)	702003	?	0.000	<i>arachnoides</i>
0034	M	0046	0047	? 07/06/97	A15 (B) RDZOO (P)	- 703791	?	0.000	<i>arachnoides</i>
0035	M	0046	0047	? 07/06/97	A15 (B) RDZOO (P)	- 703792	?	0.000	<i>arachnoides</i>
0036	F	0046	0047	? 07/06/97	A15 (B) RDZOO (P)	- 703793	?	0.000	<i>arachnoides</i>
0037	F	0046	0047	? 07/06/97	A15 (B) RDZOO (P)	- 703794	?	0.000	<i>arachnoides</i>
0038	M	WILD	WILD	12/07/87 09/07/97	A15 (D) RDZOO (P)	- 703825	?	0.000	<i>arachnoides</i>
0039	F	WILD	WILD	12/07/89 09/07/97	A15 (D) RDZOO (P)	- 703826	?	0.000	<i>arachnoides</i>

Total population: (13.9.18)

All specimens together make the total living registered studbook population 13 males, 9 females and 18 unknown, housed at 10 locations. No females, but 1 solitary male *P. a. arachnoides* fit for breeding purposes is present, at location A08 (0018).

**Table II:** Current living studbook population *Pyxis arachnoides* as registered in the studbook.

LOCATION	MALES	FEMALES	UNKNOWN
LOCATION A02	2	2	3
LOCATION A03	1	1	1
LOCATION A04	1	1	4
LOCATION A08	1	0	0
LOCATION A09	2	1	
LOCATION A10	2	1	1
LOCATION A17	0	0	3
LOCATION A18	0	0	2
LOCATION A19	0	0	4
LOCATION RDZOO	4	3	0
<b>TOTAL</b>	<b>13</b>	<b>9</b>	<b>18</b>

At several locations groups containing multiple males are kept. This has the consequence that all offspring must be considered related to both males. Housing of unrelated specimens as a group with several males therefore does not fully exploit the genetic variability of the founder stock, and should not be considered an optimal breeding technique. All studbook participants keeping groups with multiple males should reconsider whether it is really necessary to do so. Breeding results at location A03 (not

included in the studbook registration yet) show that specimens kept as couples also reproduce, indicating that it is not necessary to keep more than one male with a female for successful breeding.

Although the studbook co-ordinator has not been informed in 2000, sex of some of the specimens listed as 'unknown sex' may be known by now. Studbook participants are kindly requested to forward this information, if applicable.

## 4. IMPORTS, BIRTHS AND DEATHS

Imports of *P. arachnoides*, organised by the Studbook Breeding Programme *Pyxis arachnoides*, did not take place in 2000. As there seems to be a relatively large number of specimens already present in captivity, efforts to import additional specimens from Madagascar, or secondarily from other countries, are not planned.

There is one location that bred *P. arachnoides* in 2000 (location A03, subspecies *P. a. brygooi*). However, due to incomplete registration information the specimens concerned still need to be registered. This will be carried out as soon as possible.

At location A02 three clutches containing single eggs were produced by female 0029 *P. a. arachnoides*, on 23/03/00, 22/06/00 and 05/10/00. These eggs still are being incubated. Female 0028 was found being gravid from two eggs on 31/03/00 (x-rays). One was overcalcified, and probably originated from the previous location where the tortoise had been kept. It had to be removed via the cloaca. After treatment with antibiotics, the female recovered. The second egg still has not been produced, and treatment is currently being worked out.

At location A10 an egg was found on 31/08/00 (probably produced one week earlier). This egg still is being incubated (see appendix for details).

One specimen *P. a. arachnoides* died in 2000, at location A10. This specimen was a captive-bred hatchling, suffering from disorders (see appendix). It was transferred from the hatching location (outside of the studbook) to location A10 shortly after hatching, and never commenced feeding. Primary death cause was overheating. Details are described in the appendix.

**Table III:** Deaths of *P. a. arachnoides* in 2000. U is unknown and B is birth.

STUD ID	SEX	SIRE ID	DAM ID	DATE OF ARRIVAL dd/mm/yy	LOCATION	DATE OF DEATH dd/mm/yy	AGE AT DEATH yy/mm	PRIMARY CAUSE
0025	U	0022 0023	0024	02/09/99	A05 (B)			
				18/09/99	A10 (P)	20/02/00	171 days	Overheating

Total number of deaths: (0.0.1)

## 5. TOTAL STUDBOOK POPULATION AND FUTURE PERSPECTIVES

The current total registered studbook population of the studbook *P. arachnoides* consists of 40 specimens: 28 *P. a. arachnoides*, 5 *P. a. oblonga* and 7 *P. a. brygooi*. From these, 22 are wild-caught specimens and 18 are captive-bred. Captive-bred specimens of all three subspecies are present. All but one tortoise are currently alive, housed at 10 (participating) locations. Studbook numbers 0010-0012 and 0044-0047 are virtual specimens, outside of the Studbook Breeding Programme *Pyxis arachnoides*.

The population is strongly biased towards subspecies *P. a. arachnoides*. The number of specimens of this subspecies is sufficiently large to offer a positive perspective for the studbook. Unfortunately this is not the case for the other two subspecies. Especially the situation regarding *P. a. oblonga* is critical, since all registered specimens are genetically related. Because it is clear that more specimens of all subspecies are present in Europe, it will be continued to convince keepers to register their specimens in the studbook registration. All studbook participants are requested to assist interest keepers of *P. arachnoides* outside of the studbook, to register their specimens. Obviously, they will need to understand, and support, the general idea about studbooks.

Although many registered specimens in the studbook are captive-bred, it has to be kept in mind that most of these breeding results have been accomplished years ago, and often the reproducing adult specimens are housed at other locations and have not been registered in the studbook population. In 2000 no breeding results have been registered (although they have been obtained at location A03, but these still need to be registered). Methods for successful breeding have been developed at locations A03 and A06. Exchange of information on husbandry and breeding will hopefully result in improved breeding results in the years to come. Location A03 is currently working on a detailed manuscript (in English) regarding captive breeding of *P. a. brygooi*. A positive factor is that the mortality in the studbook population is low.

Summarising, the studbook population *P. arachnoides* is far from safe. However, the breeding results present, low mortality, and continuing growth of the population by newly registered specimens provides a situation in which it is definitely worthwhile to continue the studbook. Also the status of the species in the wild, with habitat degradation and recent commercial mass exports to the USA, demands that the Studbook Breeding Programme *Pyxis arachnoides* will continue, and become more successful.

**Table IV:** Total studbook population *Pyxis arachnoides*. M is male, F is female, U is unknown, D is donation, L is loan, P is purchase and B is birth. Studbook numbers 0010-0012 and 0044-0047 are virtual specimens outside of the studbook.

STUD ID	SEX	SIRE ID	DAM ID	DATE OF ARRIVAL dd/mm/yy	LOCATION	HOUSE NAME	FCOEF	DATE OF DEATH	SUB-SPECIES
0001	U	0044	0045	09/09/96 22/11/98	A07 (B) A02 (L)	- Para960909	0.000		<i>arachnoides</i>
0002	U	0044	0045	16/11/96 22/11/98	A07 (B) A02 (L)	- Para961116	0.000		<i>arachnoides</i>
0003	U	0044	0045	16/09/97 22/11/98	A07 (B) A02 (L)	- Para970916	0.000		<i>arachnoides</i>
0004	M	WILD	WILD	17/05/99	A04 (P)	Uli	0.000		<i>arachnoides</i>
0005	F	WILD	WILD	17/05/99	A04 (P)	Esther	0.000		<i>arachnoides</i>
0006	U	WILD	WILD	19/09/98	A04 (P)	-	0.000		<i>brygooi</i>
0007	U	WILD	WILD	19/09/98	A04 (P)	-	0.000		<i>brygooi</i>
0008	U	WILD	WILD	19/09/98	A04 (P)	-	0.000		<i>brygooi</i>
0009	U	WILD	WILD	19/09/98	A04 (P)	-	0.000		<i>brygooi</i>
0013	U	0012	0010	24/10/97 25/07/00	A06 (B) A17 (P)	- -	0.000		<i>oblonga</i>
0014	U	0012	0010	28/05/97 25/07/00	A06 (B) A17 (P)	- -	0.000		<i>oblonga</i>
0015	U	0012	0011	26/06/97 25/07/00	A06 (B) A17 (P)	- -	0.000		<i>oblonga</i>

STUD ID	SEX	SIRE ID	DAM ID	DATE OF ARRIVAL dd/mm/yy	LOCATION	HOUSE NAME	FCOEF	DATE OF DEATH	SUB-SPECIES
0016	U	0012	0010	27/04/99	A06 (B)	-	0.000		<i>oblonga</i>
				25/07/00	A18 (P)	-			
0017	U	0012	0010	20/07/99	A06 (B)	-	0.000		<i>oblonga</i>
				25/07/00	A18 (P)	-			
0018	M	WILD	WILD	01/01/95	A08 (?)	-	0.000		<i>arachnoides</i>
0019	M	WILD	WILD	08/12/90	A09 (P)	'Damaged'	0.000		<i>arachnoides</i>
0020	M	WILD	WILD	08/12/90	A09 (P)	-	0.000		<i>arachnoides</i>
0021	F	WILD	WILD	08/12/90	A09 (P)	-	0.000		<i>arachnoides</i>
0022	M	WILD	WILD	?	A05 (B)	-	0.000		<i>arachnoides</i>
				28/06/99	A10 (P)	Paam1			
0023	M	WILD	WILD	?	A05 (B)	-	0.000		<i>arachnoides</i>
				28/06/99	A10 (P)	Paam2			
0024	F	WILD	WILD	?	A05 (B)	-	0.000		<i>arachnoides</i>
				28/06/99	A10 (P)	Paaf1		20/02/00	
0025	U	0022 0023	0024	02/09/99	A05 (B)	-	0.000		<i>arachnoides</i>
				18/09/99	A10 (P)	Paau1			
0026	M	WILD	WILD	?	A11 (P)	-	0.000		<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-I			
0027	M	WILD	WILD	?	A11 (P)	-	0.000		<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-II			
0028	F	WILD	WILD	?	A11 (P)	-	0.000		<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-III			
0029	F	WILD	WILD	?	A11 (P)	-	0.000		<i>arachnoides</i>
				29/12/99	A02 (L)	Para991229-IV			
0030	M	WILD	WILD	14/01/91	RDZOO (D)	702004	0.000		<i>brygooi</i>
				04/01/95	A03 (L)	HZ0305			
0031	F	WILD	WILD	14/01/91	RDZOO (D)	702005	0.000		<i>brygooi</i>
				04/01/95	A03 (L)	HZ0306			
0032	U	0030	0031	10/10/94	RDZOO (B)	703152	0.000		<i>brygooi</i>
				25/04/98	A03 (L)	HZ0539			
0033	M	WILD	WILD	14/01/91	RDZOO (D)	702003	0.000		<i>arachnoides</i>
0034	M	0046	0047	?	A15 (B)	-	0.000		<i>arachnoides</i>
				07/06/97	RDZOO (P)	703791			
0035	M	0046	0047	?	A15 (B)	-	0.000		<i>arachnoides</i>
				07/06/97	RDZOO (P)	703792			
0036	F	0046	0047	?	A15 (B)	-	0.000		<i>arachnoides</i>
				07/06/97	RDZOO (P)	703793			
0037	F	0046	0047	?	A15 (B)	-	0.000		<i>arachnoides</i>
				07/06/97	RDZOO (P)	703794			
0038	M	WILD	WILD	12/07/87	A15 (D)	-	0.000		<i>arachnoides</i>
				09/07/97	RDZOO (P)	703825			
0039	F	WILD	WILD	12/07/89	A15 (D)	-	0.000		<i>arachnoides</i>
				09/07/97	RDZOO (P)	703826			
0040	U	0044	0045	13/08/99	A07 (B)	-	0.000		<i>arachnoides</i>
				01/03/00	A19 (P)	-			
0041	U	0044	0045	13/08/99	A07 (B)	-	0.000		<i>arachnoides</i>
				01/03/00	A19 (P)	-			
0042	U	0044	0045	13/08/99	A07 (B)	-	0.000		<i>arachnoides</i>
				01/09/00	A19 (P)	-			
0043	U	0044	0045	13/08/99	A07 (B)	-	0.000		<i>arachnoides</i>
				01/09/00	A19 (P)	-			

Total population: (13.9.18)

## 6. LITERATURE ABOUT *PYXIS*

Below a list is printed of literature on *Pyxis*. Anyone who is aware of references, please send these to the studbook co-ordinator, for inclusion in the 2001 annual studbook report, and the internet site.

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# Appendix 1

## Husbandry conditions and additional information per location

### Location A02

#### Juveniles

Four juvenile specimens *P. a. arachnoides* are housed indoors in a 75 x 60 x 40 cm (l x w x h) glass enclosure, integrated in a scaffolding of enclosures. Front pane is transparent glass, all other sides are painted with sky blue paint. The enclosure is illuminated using a 18 W tube light (no UV emission). Heating occurs by means of two 40 W spot lights and heating mats under the enclosure, all switched via dimmers. Climatic conditions are as described for *H. s. signatus* at <http://www.homopus.org>, with the exception that summer rains are imitated by intensive spraying, every other day. In winter, the enclosure is sprayed lightly once weekly. A deeper soil depth provides some humidity at the bottom at all times.

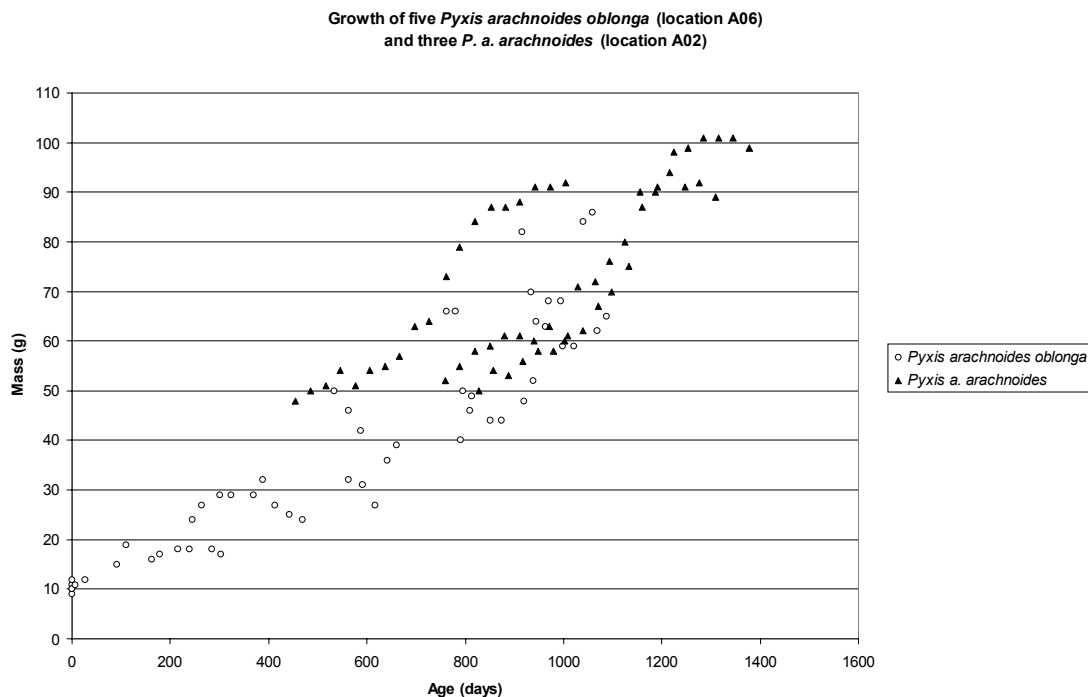
Soil consists of a 4 cm layer of fine gravel ( $\phi$  5 mm) and sand. The enclosure is furthermore decorated with a piece of bark and dry plane-tree leaves to provide hidings places, and some stones. The leaves are being eaten.

Tortoises are fed four times weekly, on green leaves (collected outside in summer, in winter endive and chicory). Twice per week cucumber and carrot is added, once per week also tomato or orange and apple is provided. In all cases a calcium/vitamin (Gistocal) supplement is added. A water bowl is available permanently, with water supplemented with 23  $\mu$ g vitamin D<sub>3</sub> per litre.

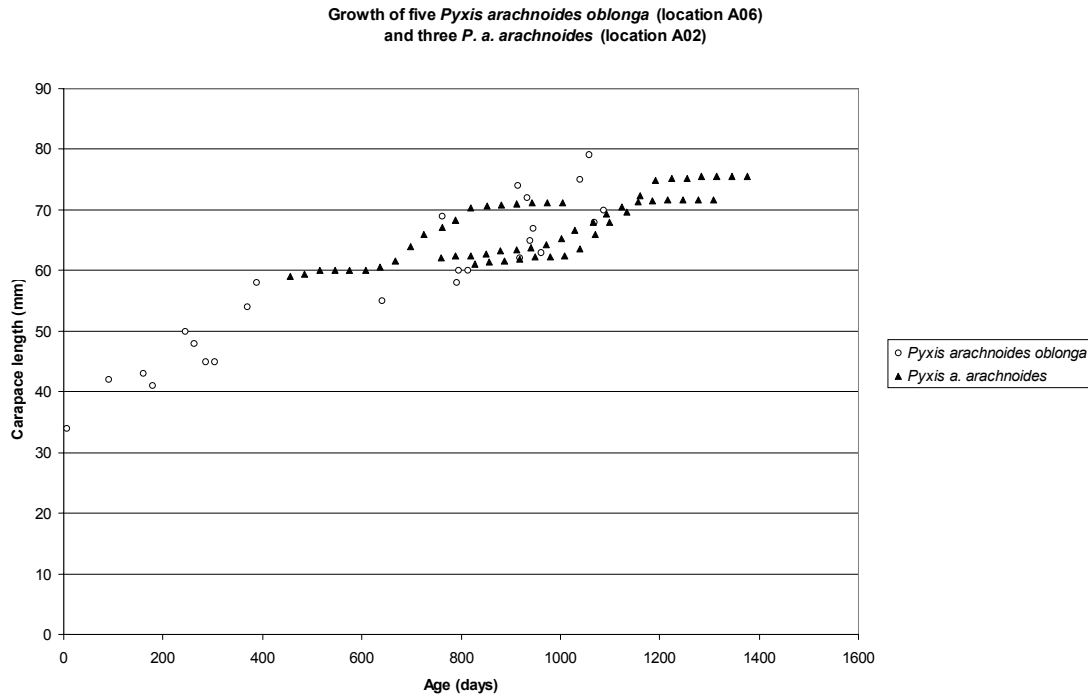
The tortoises typically become active immediately after the lights have switched on, searching for food. They are fed in the morning, before the lights switch on. After feeding they retreat (they remain active for a longer period of time, on days when they are not being fed). Both at that time, and during the night, they sometimes dig into the soil for a few centimetres, under the bark or dry leaves. In the evening, about 3 hours before the lights switch off, they become active again, and feed.

In winter the tortoises are less active, and sometimes remain hidden for several days. They continue to feed irregularly.

Growth results (including data from location A06) are shown below.







**Adults**

Four (2.2) adult specimens *P. a. arachnoides* are housed indoors in a 120 x 80 x 60 cm (l x w x h) chipboard enclosure, integrated in a scaffolding of enclosures. Front pane is transparent glass, all other sides are painted with sky blue paint. The enclosure is illuminated using a 18 W tube light (no UV emission). Heating occurs by means of a 80 W spot light and a heating wire in concrete in the bottom of the enclosure, all switched via dimmers. The transformer of the tube light is also integrated in the bottom of the enclosure, providing a site that is warm on all days. Climatic conditions are as described for *H. s. signatus* at <http://www.homopus.org>, with the exception that summer rains are imitated by intensive spraying, every other day. In winter, the enclosure is sprayed lightly once weekly.

Soil consists of a 4 cm layer of fine gravel ( $\phi$  5 mm) and sand. An egg laying site is provided by means of a plastic container (approximately 15 cm) filled with the same soil material, in the bottom of the enclosure. The enclosure is furthermore decorated with wood, bark, artificial plants and dry plane-tree leaves to provide hidings places. The leaves are being eaten.

Tortoises are fed four times weekly, on green leaves (collected outside in summer, in winter endive and chicory). Twice per week cucumber and carrot is added, once per week also tomato or orange and apple is provided. In all cases a calcium/vitamin (Gistocal) supplement is added. A water bowl is available permanently, with water supplemented with 23  $\mu$ g vitamin D<sub>3</sub> per litre.

The tortoises are generally inactive. They appear to feed in the morning or afternoon, and after that they retreat again. Activity is higher on days when the tortoises are not being fed. Mating activity is rare, but occurs in June-July, when the males seem slightly more active, traversing the enclosure. Eggs are produced after at most one week of digging test nest holes, and is induced by moistening the egg laying site with hot water. Sites that are protected by overhanging wood are favoured.

In winter the tortoises are less active, and sometimes remain hidden for several days or weeks. They continue to feed irregularly.

The average mass of the four adult specimens between 29/12/99 and 19/10/00 was as following:

Specimen	Mass
0026:	416 g
0027:	399 g
0028:	489 g
0029:	605 g

## Location A04

All following information is true for both subspecies kept at this location, if not mentioned otherwise.

### Housing

The specimens are kept in a greenhouse, situated indoors in the living room. In the greenhouse, there are open glass enclosures for *Pyxis*. In an enclosure measuring 145 x 55 cm one male and one female *P. a. arachnoides* are housed. The group of *P. a. brygooi* (four juvenile specimens) occupy a triangle shaped enclosure of 160 x 100 cm. They used to share the enclosure with two captive-bred juvenile *Kinixys belliana*, but these have been transferred to another enclosure. The decoration of the enclosure consists of live plants, roots, ceramic dishes and a drinking bowl.

The enclosures are heated by several halogen lamps, heating the entire greenhouse. Furthermore, each of the enclosures has a 150 W halogen spot as basking site. An additional heating source (depending on season, see below) is a heated water container of 80 l, heated up to 32°C. A fan mixes the air in the greenhouse (6 hours per day, with intervals).

### Climate

Between June and August the specimens are located in a greenhouse in the garden, to allow a 'winter period' of low activity. They are placed in a resting box, that they cannot exit. They start resting immediately. In the end of August/beginning of September, the tortoises are woken up by placing them in the garden during a sufficiently warm rain shower. After that, they are transferred to the indoor greenhouse. At this time, temperatures are relatively low, 28-30°C during the day, and >20°C during the night (nocturnal temperature drop is difficult to realise indoors). Relative humidity is kept low.

In the end of October till April, the water container in the greenhouse is filled and heated. An additional 300 W halogen lamp is switched on. As a result, the temperature and relative humidity rise (32-40°C (day); 24-28°C (night) and 100%, respectively).

In May preparations for the winter rest are made, by emptying the water container, and by maintaining temperatures and relative humidity as in September/October.

Artificial light in the house always is switched on for 11 hours per day. Sunlight is able to penetrate into the indoor greenhouse, via a window located south.

### Feeding

The tortoises are fed daily in the morning, exclusively on green leaves. If possible, they are fed on wild herbs and grasses (all species found on a local pasture land), in winter they receive Lattuga salad and endive, added with plenty of soaked straw pellets. They never are fed on meat or fruits, and they do not receive artificial vitamins.

## Location A08

### Housing

At the moment I have one single male that is kept in a glass terrarium sized 100 x 80 x 55 cm (l x w x h). The animal is kept together with two female *Oplurus cuvieri*, that originate from the same area. The terrarium is placed in a special reptile room. One 40 W tube light and three (12 V) 20 W halogen lamps (with their UV filters removed) light and heat the terrarium. In the terrarium is a small box, that is used as a hiding spot.

### Climate

I use the photoperiod of 30° latitude for the northern hemisphere. This means 8 hours daylight during winter and 14 during summer. The terrarium is essentially dry without a wet period (I plan to change that).

### Behaviour

The most obvious behaviour is the 'hibernation' during hot and cold periods. The animal does not loose more than 3% of its bodyweight during this 'hibernation'.

### Feeding

Standard feeding consists of greens (*Taraxacum* leaves and flowers, grated carrot and apple). The animal seems to be particularly fond of apple. Feeding is carried out every other day, although during resting periods the tortoise will not eat for several weeks up to two months. At first this behaviour certainly was not good for my health, but since it does not affect the health of the animal and in fact is recommended, I am not worried anymore.

**Location A10**

*Pyxis a. arachnoides* in captivity

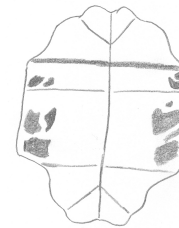
*Distribution*

The genus *Pyxis* occurs in a 100 km wide strip along the coast of western and south-western Madagascar. In this area, two species are distinguished, *P. arachnoides* and *P. planicauda*. The first species is further divided into three subspecies, *P. a. arachnoides*, *P. a. oblonga* and *P. a. brygooi*. Where *P. planicauda* occupies a limited number of locations in relatively humid forest, *P. arachnoides* occupies drier thornshrub areas.



Distribution of *P. planicauda* (\*) and *P. arachnoides* (///) in Madagascar

The difference between the three subspecies of *P. arachnoides* is as following: *P. a. arachnoides* has a yellow plastron with a hinge at the anterior side, enabling the shell to close at the front. Also subspecies *P. a. oblonga* has a similar hinge, but the plastron has black blotches at the sides. The plastron of the third subspecies, *P. a. brygooi*, does not have a hinge, nor black blotches. The movements of the hinge of the first two subspecies are enabled by connective tissue between the humeral and pectoral scutes.



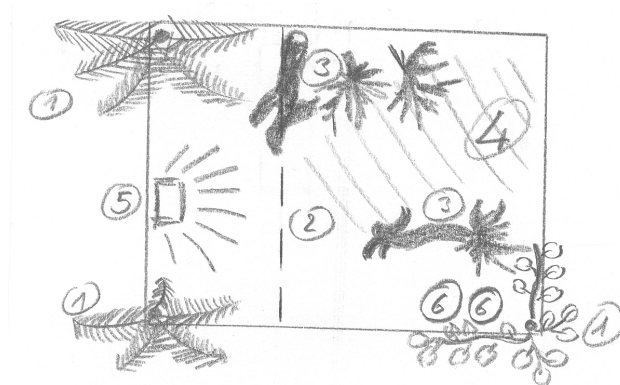
Plastron of *P. a. oblonga*

*History*

In June 1999 I was able to receive four *P. a. arachnoides* from another keeper. These were two adult males, one adult female, and one captive-bred specimen.

*Enclosure*

The adult specimens are kept in an enclosure measuring 120 x 120 x 60 cm (l x w x h). This enclosure is located in a separate room.



Schematic drawing of the enclosure of 2.1 *P. a. arachnoides*. 1 are plastic plants, 2 is rubber foil, 3 are bushes, 4 (///) peat/sand mixture (shaped as a small hill of 20 cm), 5 is a lamp, and 6 is a feeding corner

The enclosure is opened at the front, and at a part of one of the sides, in order to allow natural ventilation. Temperatures and relative humidity in the tortoise room are as showed in the table on the next page.

Date	Temperature (°C)		Relative humidity (%)	
	Minimum	Maximum	Minimum	Maximum
13/01	19	23.5	64	68
12/03	21	26		
01/06	23.5	31		
21/07	25.7	32.4	59	73
05/08	24.8	30.8	66	71
09/10	21.3	29.5	66	80
27/10	22.8	29.8	71	78
14/11	21.3	27	65	77

The lighting in the enclosure consists of a 100 W halogen spot. The standard glass cover has been removed in order to benefit from the UV radiation. The spot light is switched on between 7.00-19.00 hours throughout the year 2000. This means that outdoors it is light before the light switches on in summer, whereas it is still dark at that moment in winter. Nevertheless I have never noticed any stress due to the sudden switching on of the light, and therefore it has never been changed. The halogen spot light also provides a basking site for the tortoises. Soil heating by heating mats or wires is not provided, but the enclosure is placed on top of another enclosure, providing some additional heating. The main function of the artificial green plants and flowers is decoration, in order to make the terrarium more 'natural'. They also provide hiding places, that are used by the tortoises. The animals also seem to like to bask half under the spot light, in the security of an artificial fern plant.

The enclosure is roughly divided in two parts, a dry part (soil consisting of sand) and a more humid part (soil consisting of peat and sand).

Growth parameters of the tortoises				
Date	Mass (g)/Carapace length (cm)			
	0022	0023	0024	0025
10/07/99	271/11	322	423/13	9/3.5
01/10/99	311	343	459	
17/02/99	329	365	450	10
24/03/00	331	380	445	
03/07/00	304	346	465	

#### Activity

Annually, a period of activity, and a period of inactivity can be distinguished in the tortoises. The activity period takes from the beginning of April, till mid November. When the night temperature rises up to 21-22°C after winter, the activity of the tortoises increases.

During the day, the specimens are most active in the afternoon and late afternoon. After having sprayed the enclosure, activity increases immediately. In that case, the tortoises traverse the entire enclosure. In summer the enclosure is sprayed three times weekly. In the previous, and following, months, this frequency is gradually increased and decreased. In winter, the enclosure is sprayed hardly ever (1-2 times per month). All spraying is carried out in the humid (peat/sand) part of the enclosure, in which the chipboard of the enclosure is covered with rubber foil.

The favourite resting sites of the tortoises are located on the border between the dry and humid part in the terrarium, under the bushes. However, the female can be found more often in the humid part, especially during the egg laying season. That is the reason why the hill has been constructed here.

#### Feeding

The tortoises are fed exclusively on green leaves. In winter these consist of commercially grown greens such as endive, various types of salad, chicory, et cetera. In summer they receive herbs such as *Taraxacum*, *Plantago*, clover, et cetera. They are fed every 2-3 days, at variable times. Remains of the food are removed in the evening. In winter the food is supplemented with calcium and vitamins (Gistocal). Drinking water is provided throughout the year, and is regularly supplemented with calcium lactate.

#### Mating

As mentioned previously, two males and one female are housed together in one enclosure. Sexes are housed together throughout the year, without noticing fights between males. Also fights related to mating activity between males and female have never been noticed. Mating activity is observed between May-September. The female started digging in mid August. The actual oviposition started end August.



Date of oviposition	Egg number	Mass (g)	Size (mm)
06/11/99	1	22	39 x 31
31/08/00 <sup>†</sup>	2	19	37 x 30

<sup>†</sup> Egg found on 31/08/00. Date of oviposition unknown (probably 1 week earlier)

Both eggs were buried at a depth of approximately 8 cm in the peat/sand substrate, under the bushes.

### Incubation

The eggs are being incubated in a home-built incubator. It consists of a plastic container with a double Plexiglas top. On the bottom a 55 W heating wire is located, connected via a thermostat, switched via a time control unit. In off-position of the time control unit, the thermostat adjusts the day temperature in the incubator (31.5°C). In on-position, the night temperature is adjusted at 26.5°C. The day temperature is maintained between 9.00-21.00 hours, the night temperature during the remaining hours. In summer it happens occasionally that ambient night temperature is higher than 26.5°C.

The eggs are placed on top of moist vermiculite (vermiculite:water=1:3 weight based ratio). In the incubator a water container maintains the relative humidity at 80-85% for the first five months, and after that 60%. At that time, the water container is refilled.

Egg number 1 exploded in the incubator on 31/10/00 (after 447 days of incubation). Signs of development were absent. Egg number 2 still is being incubated.

### Mortality

The captive-bred specimens was kept in a separate enclosure measuring 50 x 30 cm. Light and heating were provided by means of a 60 W spot light. The substrate consisted of small size wood chips. Initially the tiny hatchling was unable to move, due to the fact that it was unable to reach the ground with its limbs. This changed after a while, but seems to have continued stressing the hatchling in a way. The specimen did not feed, despite offering of all types of food. The tortoise was soaked daily in water supplemented with vitamins.

The hatchling gained 1 g between 10/07/99 and 17/02/00 (9-10 g), but died in February due to overheating. It had positioned itself under the spot light in the evening, and remained there when temperatures rose the next day.

### Finally

Depending on information made available, changes in husbandry practises may be made. For instance, production of one egg per year seems very low. It could be questioned whether the males are interfering with each other during mating activity, or whether sexes should be separated for a period of time. Also incubation of the eggs could be improved. I hope to report about changes in the next annual report.

### Location A17

A group of 3.1.3 *P. a. oblonga* inhabit a closed enclosure of 205 x 50 cm. The enclosure has ventilation spaces at the sides. Soil consists of bark humus and loamy sand in a ratio of about 1:1, with some sandy sites. The depth of the soil layer is 4-12 cm. Further decoration of the enclosure consists of three wood stumps and a *Beaucarnia* sp. The wood provides retreats, that are being used by the specimens. They also retreat under hanging leaves of the *Beaucarnia*.

The terrarium is heated by means of the transformers of the tube lights in the enclosures under the one from *Pyxis*, as well as two 80 W spot lights and two 58 W tube lights with reflectors. The tube lights are switched on at 9.00 hours, and at 10.00 hours the spots are switched on. At 20.00 hours the spot lights are switched off, and after 21.00 hours the enclosure is dark. Photoperiod is gradually changed from 14 hours to 9-10 hours, in summer and winter respectively.

Day temperatures in summer rise up to 36°C, and in winter up to 28°C. During the night the temperatures are 22 and 19°C.

In summer the enclosure is sprayed daily, in winter only twice weekly. Especially the decoration of the enclosure and the three closed sides of the terrarium are sprayed. The soil is moistened every other day in summer, and once weekly in winter. As a result, relative humidity changes between 85 and 30%.

The animals are fed daily on a basis of romain salad, several wild herbs, and twice weekly fruits (no banana or *Citrus*-fruits). The food is supplemented with calcium, and once weekly additionally with Korvimin ZVT. In the enclosure there are several cuttlebones, that are being eaten by the tortoises.

During the day the tortoises are usually hidden and half buried in the soil. This changes when food is provided or when the terrarium is sprayed. However, the animals do not seem to like being sprayed directly, and in that case they run for shelter.

A water bowl that is refilled daily is used by the animals for drinking and defecating. They seem to drink relatively large amounts of water, if compared to other tortoise species. Additionally, they seem to eat more, relatively to their small size. The seven specimens in the enclosure eat half a head of lettuce per day.

Until now mating activity has not been observed, and eggs have not been produced.

## Location A18

### *Housing*

The enclosure measures 100 x 40 cm, and is decorated with 3-7 cm deep sand, five pieces of bark for shelter, two stones, three plants (2 Agavaceae, 1 Crassulaceae) and one dish for water. The enclosure is inhabited by two young *P. a. oblonga*, hatched in 1999. It is heated and illuminated by means of soil heating (25 x 35 cm), two Osram Concentra spot lights of 60 W, and two tube lights of 18 W.

### *Climate*

The tortoises have only been kept since July 2000. A moist, warm season with photoperiod of 13.5 hours has been provided. Since 1 November I am reducing it for 15 minutes every second day, till 9 hours will be reached (probably). I measured the temperatures at two points: Under a spot: 23-41°C, and without spot and soil heating: 23-32°C. Since 1 November I am decreasing temperature by switching off one spot completely, and by decreasing the time the soil heating and the second spot are switched on. Until mid October I moistened the terrarium about six times weekly, since 15 October only every second day, and since 1 November every four days. I will stop it probably 1 December completely (depending on the behaviour of the tortoises).

### *Feeding*

Until 31 October: Five times a week, only *Taraxacum*, *Trifolium* and *Plantago*. Supplements: Davinova or Calcipot D<sub>3</sub>.

### *Behaviour*

Nothing special. Activity mainly in the morning between 10.00 and 12.00 hours and (as far as observed), and during feeding time (afternoon 16.00- 17.00 hours). No interactions between each other have been observed.

### *Growth*

Specimen 0016: 23/07/00: 34 g, 60.5 x 44.0 x 29.6 mm (shell length x width x height)  
31/10/00: 58 g, 68.2 x 50.4 x 33.2 mm

Specimen 0017: 23/07/00: 18 g, 47.0 x 38.1 x 25.5 mm  
31/10/00: 24 g, 49.0 x 40.4 x 26.6 mm