Indian National Studbook of

Gaur

(Bos gaurus)

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

केन्द्रीय चिड़ियाघर प्राधिकरण
Central Zoo Authority

April, 2010

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Studbook compiled and analysed by

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Supported by

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Rajiv Gandhi Zool. Park & Res. Ctr, Pune
Sepahijala Zoological Park, Agartala
Bondla Zoo, Usgown, Goa
Indira Gandhi Zoological Park, Visakhapatnam

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Authors

Contents

Gaur (Indian Bison): Biology and Status

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Cetartiodactyla
Family	Bovidae
Scientific Name	***Bos gaurus***
Species Authority	C.H. Smith, 1827
Common Name	Gaur, indian bison

Gaur (***Bos gaurus***) is commonly referred as the Indian bison is the largest living bovine, confined to the oriental biogeographic region of the world. The gaur, belongs to the group of wild oxen that include the Asiatic buffalo, African buffalo, true cattle and bison. There has been some debate regarding the naming of the species as ***Bos gaurus*** by some authorities and as ***Bos frontalis*** by others. This debate was put to rest by the International Commission on Zoological Nomenclature naming the wild species as ***Bos gaurus*** and the domesticated forms (Mythun, Mithan or Gayal) as ***Bos frontalis.*** Three species of Gaur were recognized:

1. ***Bos gaurus gaurus*****:** India, Nepal, and Bhutan
2. ***B. g. readei*****:** Myanmar (Burma), southern China, Lao PDR, Viet Nam, Cambodia, and Thailand north of the Isthmus of Kra
3. ***B. g. hubbacki*****:** Thailand south of the Isthmus of Kra and in West Malaysia

However, recent advances in taxonomy of gaur suggest the presence of only two subspecies: ***B. g. gaurus*** in India and Nepal and ***B. g. laosiensis*** in the rest of the distribution range of the species. Specimens in north-eastern India may be intermediate forms between the subspecies.

Distribution

The historic distribution of Gaur covered the entire mainland south and Southeast Asia and Sri Lanka. The current distribution is restricted to scattered pockets in India, Nepal, Bhutan, Cambodia, China, Lao PDR, Peninsular Malaysia, Myanmar, Thailand and Vietnam. The distribution map shows a much generalized picture

whereas the actual distribution is much more fragmented and the species exists in small pockets within the areas of presence shown. Within the areas of actual occurrence, gaur densities are highly variable with only a few areas harbouring high density populations.

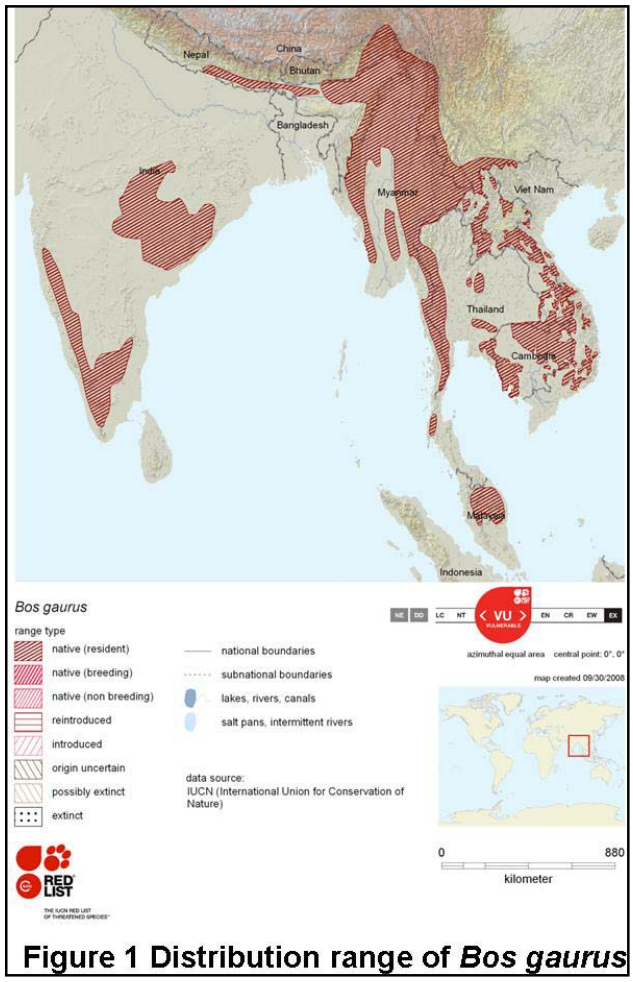

Figure 1 Distribution range of *Bos gaurus*

Biology

Gaur inhabit a wide variety of habitats ranging from tropical wet, semi-wet evergreen and bamboo forests, tropical moist deciduous, to tropical dry deciduous forests in Central India to Shola forests and tropical thorn forests on the eastern slopes in the Western Ghats. In these habitats the species exists upto an altitude of 2500 m.

Gaur bulls are larger than the cows and weigh between 600-1000 kg and are 1.6 - 1.9 m at shoulders whereas cows are relatively shorter and weigh much lesser. Both sexes are horned, being larger with more swaths in the males. Adult males have two prominent dewlaps, a small one at the chin and a long one hanging below throat. A shoulder hump is more pronounced in the males. Newly born calves are light golden yellow in colour. The colour darkens with age and adult females are dark brown whereas adult males are dark black. Both hind and fore legs are white to tan below the knees.

Gaurs reach sexual maturity at 2 – 3 years of age and usually produce one and rarely two calves after a gestation period of 275 days. Weaning takes place at 7 – 9

months. Breeding takes place throughout the year. Gaur is recorded to have a maximum longevity of 30 years.

Gaur are diurnal in their activity however, human disturbance forces them to adapt to more nocturnal activity. They feed during early mornings, late evenings or even throughout the night. Gaurs have typical local and seasonal movements which are influenced by resource availability. They are obligatory drinkers and require to drink at least once every day. The frequency may increase during peak summers. They are both grazers and browsers that feed on a variety of plant species. Incidents of debarking are also recorded. They are known to frequent salt licks.

Behaviour

Gaur is social animals living in herds. Herd size ranges form 2 – 20 individuals. Groups typically comprise of a few cows, calves and one or two adult bulls and sub-adults. Solitary bulls occasionally associate to form bachelor herds which break up with the onset of the rut. The group leadership is dependent upon size and age and the family groups are led by the eldest female whereas bachelor groups are led by the largest male. Solitary males and all male herds move to herds with females with the onset of the rutting season. Size rather than actual fighting is used by adult males to assert dominance. The dominant males by tending isolate cows in estrous and use a range of behaviour typical to ungulate reproductive behaviour such as flehmen, rutting, tending and mounting, successfully mate with cows. A variety of vocalizations are used for communication.

Threats

Gaur faces a set of different threats in the each of the landscapes that they occupy. Poaching is an omnipresent threat, be it for consumption, crop-protection, medicinal use or trophy hunting. Habitat loss and fragmentation are threats which are ubiquitous. In northeast India the species is threatened with habitat degradation brought about by shifting cultivation. In the rest of its range conversion of forest areas for agricultural use or for commercial plantations are other serious threats. The species is closely related to domestic livestock and is vulnerable to all the diseases that infect them. Rinderpest in the past has been a serious threat to wild populations;

though foot and mouth disease, anthrax and haemorrhagic fever have also been responsible for morbidity. Gaur populations are also vulnerable to predation especially at the calf and sub-adult stages.

Conservation Status

The global population of Gaur is estimated at 13,000 – 30,000 animals, of these only 5,200 – 18,000 are reproductively active individuals. The populations have declined overall by at least 30% during the last three generations. As a consequence they are categorized as Vulnerable (Criteria A2cd+3cd+4cd ver 3.1) of the IUCN Red List of Threatened species, 2009. They are listed in Schedule–I of the Indian Wildlife (Protection) Act of 1972 and are included in the Appendix I of the Conservation on International trade in Endangered Species of Wild Fauna and Flora (CITES).

Scope of the Studbook

The present studbook of One horned rhinoceros has been compiled for the India region and the data used is current till 2009.

Methods Used

The data collected for the compilation of the studbook was by way of field visits, visits to various zoos and through mailed questionnaire surveys. In addition to this the studbook on the CZA website and ISIS website were used for data collection. The data collected was entered in SPARKS 1.5 and studbook report was generated using the reports option. The SPARKS software was used to create ~.prn and ~.ped files for demographic and genetic analyses by PM2000. PM 2000 was used to produce the census report, life tables and population projections, as well as founder statistics, inbreeding coefficients, possible pairings and population planning.

Status in Captivity

The population status of living individuals of Gaur in Indian zoos is presented in table 1 below. The population sex ratio is slightly biased in favour of males though a female bias is desirable for the species.

Table 1 Status of Indian Bison in Indian Zoos

Sl. No.	Zoo Name	Male	Female	Unsexed	Total
1.	Bannerghata Biological Park, Bangalore	7	3	1	11
2.	M.C. Zoological Park, Chatbir	0	1	0	1
3.	National Zoological Park, New Delhi	2	2	0	4
4.	Arignar Anna Zoological Park, Chennai	4	5	0	9
5.	Sri Chamarajendra Zoological Park, Mysore	13	13	0	26
6.	Rajiv Gandhi Zool. Park & Res. Ctr, Pune	1	1	0	2
7.	Sepahijala Zoological Park, Agartala	1	0	0	1
8.	Bondla Zoo, Usgown, Goa	5	4	0	9
9.	Indira Gandhi Zoologicalm Park, Visakhapatnam	2	2	0	4
	Total	**35**	**31**	**1**	**67**

Based on data provided by zoos

Table 2 Location wise listing of living Indian bison in captivity in Indian zoos

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
Bannerghata Biological Park, Bangalore											
1.	Rani Rani	00007		Female	Wild	Wild	~ 1988	India Bannerghata	Capture Transfer	~ 1988 ~ 1988	
2.	Varunda	00010		Female	00003	00004	3-Apr-1989	Bannerghata	Birth	3-Apr-1989	
3.	Ganesh	00020		Male	00014	00015	28-Nov-1996	Bannerghata	Birth	28-Nov-1996	
4.	Chaturtha	00043		Male	00013	00021	10-Jan-2002	Bannerghata	Birth	10-Jan-2002	
5.	Rangannath	00044		Male	00020	00015	9-Apr-2002	Bannerghata	Birth	9-Apr-2002	
6.	Balrama	00045		Male	00013	00030	10-Aug-2002	Bannerghata	Birth	10-Aug-2002	
7.	Bheema	00047		Male	00013	00021	12-Oct-2002	Bannerghata	Birth	12-Oct-2002	
8.	Bharat	00048		Male	00013	00030	8-Jan-2003	Bannerghata	Birth	8-Jan-2003	
9.	Ravindra	00056		Male	00013	00021	2-Jan-2004	Bannerghata	Birth	2-Jan-2004	
10.	Kaveri	00074		Female	00013	00021	13-Jun-2006	Bannerghata	Birth	13-Jun-2006	
11.		00093		?	Unk	00007	20-Jun-2009	Bannerghata	Birth	20-Jun-2009	
7.3.1 (11)											
M.C. Zoological Park, Chatbir											
12.	Anju Anju	00059		Female	00034	00036	1-Jun-2004	Mysore Chatbir Zoo	Birth Transfer	1-Jun-2004 8-Dec-2006	
0.1.0											
National Zoological Park, New Delhi											
13.	Unm1 Unm1	00002		Female	Unk	Unk	~ 1985	Dacca Delhi	Birth Transfer	~ 1985 6-Apr-1990	
14.	Unm2 Unm2 Unm2	00063		Male	Wild	Wild	~ 2000	India Mysore Delhi	Capture Transfer Transfer	???? ???? 12-Sep-2006	
15.	Unm3 Unm3 Unm3	00064		Female	Wild	Wild	????	India Mysore Delhi	Capture Transfer Transfer	???? ???? 12-Sep-2006	
16.	Unm5	00085		Male	00063	00064	14-Dec-2007	Delhi	Birth	14-Dec-2007	

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
2.2.0 (4)											
Arignar Anna Zoological Park, Chennai											
17.	Mani Mani	00028		Male	Wild	Wild	~ 1995	India Chennai	Capture Transfer	24-Mar-1998 24-Mar-1998	
18.	Lily	00037		Female	Unk	Unk	6-Nov-2000	Mysore Chennai	Birth Transfer	6-Nov-2000 21-Dec-2003	
19.	Madhan	00060		Male	Unk	00037	31-Aug-2004	Chennai	Birth	31-Aug-2004	
20.	Geetha	00062		Female	Wild	Wild	~ 2000	India Chennai	Capture Transfer	14-Dec-2004 14-Dec-2004	
21.	Rathnam	00067		Male	00028	00037	30-Oct-2005	Chennai	Birth	30-Oct-2005	
22.	Vijay	00077		Male	00028	00062	3-Jan-2007	Chennai	Birth	3-Jan-2007	
23.	_____	00078		Female	00028	00037	30-Jan-2007	Chennai	Birth	30-Jan-2007	
24.	Lekshmi	00088		Female	00028	00037	11-Apr-2008	Chennai	Birth	11-Apr-2008	
25.	Sranya	00091		Female	00028	00062	17-Mar-2009	Chennai	Birth	17-Mar-2009	
4.5.0 (9)											
Sri Chamarajendra Zoological Park, Mysore											
26.	Madhuri	00018		Female	00008	00009	22-Mar-1996	Mysore	Birth	22-Mar-1996	
27.	Meena	00026		Female	00008	00018	16-Mar-1997	Mysore	Birth	16-Mar-1997	
28.	Sundari	00031		Female	00008	00018	7-Mar-1999	Mysore	Birth	7-Mar-1999	
29.	Laara	00034		Male	00022	00023	9-May-2000	Mysore	Birth	9-May-2000	
30.	Rose	00035		Female	00025	00018	12-Aug-2000	Mysore	Birth	12-Aug-2000	
31.	Jasmine	00036		Female	00025	00021	24-Aug-2000	Mysore	Birth	24-Aug-2000	
32.	Bhuvan	00049		Male	25	00009	9-Jan-2003	Mysore	Birth	9-Jan-2003	
33.	Chetan	00051		Male	00025	00026	23-Mar-2003	Mysore	Birth	23-Mar-2003	
34.	Kalpana	00053		Female	00034	00036	25-Aug-2003	Mysore	Birth	25-Aug-2003	
35.	Vipin	00055		Male	00025	00018	1-Oct-2003	Mysore	Birth	1-Oct-2003	
36.	Amith	00057		Female	00025	00009	14-Apr-2004	Mysore	Birth	14-Apr-2004	
37.	Akila	00058		Female	00034	00035	7-May-2004	Mysore	Birth	7-May-2004	
38.	Violaine	00065		Female	00025	00009	23-Mar-2005	Mysore	Birth	23-Mar-2005	
39.	Priya	00066		Female	00034	00036	18-Aug-2005	Mysore	Birth	18-Aug-2005	
40.	Pretam	00070		Male	00025	00009	17-Feb-2006	Mysore	Birth	17-Feb-2006	

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
41.	Anubhav	00072		Male	00025	00009	11-May-2006	Mysore	Birth	11-May-2006	
42.	Sarita	00073		Female	00025	00018	23-May-2006	Mysore	Birth	23-May-2006	
43.	Unm4	00076		Male	00028	00036	3-Jan-2007	Mysore	Birth	3-Jan-2007	
44.	Sheshan	00079		Male	00025	UNK	14-Feb-2007	Mysore	Birth	14-Feb-2007	
45.	Aditya	00080		Male	00034	00057	3-Jun-2007	Mysore	Birth	3-Jun-2007	
46.	Ashoka	00081		Male	00025	00065	24-Jun-2007	Mysore	Birth	24-Jun-2007	
47.	Gowri	00082		Female	00025	00018	1-Sep-2007	Mysore	Birth	1-Sep-2007	
48.	Siddhu	00083		Male	00034	00031	25-Sep-2007	Mysore	Birth	25-Sep-2007	
49.	Harsha	00084		Male	00034	00053	25-Sep-2007	Mysore	Birth	25-Sep-2007	
50.	Ragini	00089		Female	00034	00035	9-Jan-2008	Mysore	Birth	9-Jan-2008	
51.	Avinash	00090		Male	Unk	00018	13-Mar-2008	Mysore	Birth	13-Mar-2008	
13.13.0 (26)											
Rajiv Gandhi Zool. Park & Res. Ctr, Pune											
52.	Prakash	00087		Male	Unk	Unk	13-Mar-2008	Mysore Pune	Birth Transfer	13-Mar-2008 21-Sep-2009	
53.	Hamsa	00092		Female	Unk	Unk	30-Apr-2008	Mysore Pune	Birth Transfer	30-Apr-2008 21-Sep-2009	
1.1.0 (2)											
Sepahijala Zoological Park, Agartala											
54.	None Rabi	00041		Male	Wild	Wild	????	India Sepahijala	Capture Transfer	23-Mar-2001 23-Mar-2001	
1.0.0 (1)											
Bondla Zoo, Usgown, Goa											
55.	Rosy Rosy	00024		Female	Wild	Wild	????	India Usgown	Capture Transfer	~ 1997 ~ 1997	
56.	Remo	00032		Male	00001	00024	26-Oct-1999	Usgown	Birth	26-Oct-1999	
57.	Prem	00038		Male	00001	00024	6-Dec-2000	Usgown	Birth	6-Dec-2000	
58.	Veeru	00046		Male	00001	00024	20-Sep-2002	Usgown	Birth	20-Sep-2002	
59.	Rani	00054		Female	00001	00024	4-Sep-2003	Usgown	Birth	4-Sep-2003	
60.	Somu	00061		Male	00032	00024	9-Sep-2004	Usgown	Birth	9-Sep-2004	
61.	Pinky	00071		Female	00032	00054	26-Feb-2006	Usgown	Birth	26-Feb-2006	

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
62.	Rosa	00075		Female	Unk	00024	19-Sep-2006	Usgown	Birth	19-Sep-2006	
63.	Bhima	00086		Male	Unk	00024	30-Dec-2007	Usgown	Birth	30-Dec-2007	
5.4.0 (9)											
Indira Gandhi Zoologicalm Park, Visakhapatnam											
64.	Gowhar Gowhar	00027		Male	00005	00016	12-Jan-1998	Hyderabad Visakapatnam	Birth Transfer	12-Jan-1998 13-Mar-2000	
65.	Gayatri	00039		Female	00005	00016	22-Dec-2000	Hyderabad Visakapatnam	Birth Transfer	22-Dec-2000 21-Sep-2002	
66.	Reshma	00040		Female	00019	00016	15-Mar-2001	Hyderabad Visakapatnam	Birth Transfer	15-Mar-2001 15-Mar-2004	
67.	Shiva	00052		Male	00019	00033	30-Jul-2003	Hyderabad Visakapatnam	Birth Transfer	30-Jul-2003 29-Jan-2004	
2.2.0 (4)											

Table 3 Historical listing of Indian bison in Indian zoos

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
1.	Rajan Jr	00001		Male	Unk	Unk	~ 1985	Usgown	Birth Death	~ 1985 27-Sep-2003	
2.	Unm1 Unm1	00002		Female	Unk	Unk	~ 1985	Dacca Delhi	Birth Transfer	~ 1985 6-Apr-1990	
3.	Keshava	00003		Male	Unk	Unk	????	Bannerghata	Birth Death	???? ????	
4.	Sheela	00004		Female	Unk	Unk	????	Bannerghata	Birth Death	???? ????	
5.	Govind Govind	00005		Male	Wild	Wild	????	India Hyderabad	Capture Transfer Death	16-Jun-1987 16-Jun-1987 1-Apr-2001	
6.	Gangawathi	00006		Female	Unk	Unk	16-Sep-1987	Hyderabad	Birth Death	16-Sep-1987 7-Mar-1999	
7.	Rani Rani	00007		Female	Wild	Wild	~ 1988	India Bannerghata	Capture Transfer	~ 1988 ~ 1988	
8.	Sheru	00008		Male	Unk	Unk	????	Mysore	Birth Death	???? ????	
9.	Rani I	00009		Female	Unk	Unk	????	Mysore	Birth Death	???? ????	
10.	Varunda	00010		Female	00003	00004	3-Apr-1989	Bannerghata	Birth	3-Apr-1989	
11.	Trishal	00011		Male	Unk	Unk	10-Apr-1989	Hyderabad	Birth Death	10-Apr-1989 13-Jun-1994	
12.	Gangotri	00012		Female	Unk	Unk	25-Nov-1991	Hyderabad	Birth Death	25-Nov-1991 24-Mar-1999	
13.	Arjun	00013		Male	00008	00009	27-Nov-1992	Mysore Bannerghata	Birth Transfer Death	27-Nov-1992 1-Jan-2001 17-Jul-2007	

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
14.	Rama	00014		Male	Unk	Unk	????	Bannerghata	Birth Death	???? ????	
15.	Madhuri I	00015		Female	Unk	Unk	????	Bannerghata	Birth Death	???? ????	
16.	Gowri	00016		Female	00005	00012	1-Nov-1993	Hyderabad	Birth Death	1-Nov-1993 2-Mar-2004	
17.	Radha	00017		Female	Unk	Unk	~ 1996	Hyderabad	Birth Death	~ 1996 15-Mar-2004	
18.	Madhuri	00018		Female	00008	00009	22-Mar-1996	Mysore	Birth	22-Mar-1996	
19.	Gopal	00019		Male	00005	00016	10-Nov-1996	Hyderabad	Birth Death	10-Nov-1996 2-Mar-2004	
20.	Ganesh	00020		Male	00014	00015	28-Nov-1996	Bannerghata	Birth	28-Nov-1996	
21.	Tunge Tunge	00021		Female	Unk	Unk	12-Dec-1996	Mysore Bannerghata	Birth Transfer Death	12-Dec-1996 13-Dec-2001 4-Jan-2008	
22.	Sachin	00022		Male	Unk	Unk	????	Mysore	Birth Death	???? 1-Jun-2005	
23.	Sandhya	00023		Female	Unk	Unk	????	Mysore	Birth Death	???? ????	
24.	Rosy Rosy	00024		Female	Wild	Wild	????	India Usgown	Capture Transfer	~ 1997 ~ 1997	
25.	Anil	00025		Male	Unk	Unk	????	Mysore	Birth Death	???? ????	
26.	Meena	00026		Female	00008	00018	16-Mar-1997	Mysore	Birth	16-Mar-1997	
27.	Gowhar Gowhar	00027		Male	00005	00016	12-Jan-1998	Hyderabad Visakapatnam	Birth Transfer	12-Jan-1998 13-Mar-2000	
28.	Mani Mani	00028		Male	Wild	Wild	~ 1995	India Chennai	Capture Transfer	24-Mar-1998 24-Mar-1998	
29.	Unamed Unamed	00029		Male	00001	00024	31-Aug-1998	Usgown Molem	Birth Release	31-Aug-1998 9-Dec-1999	

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
30.	Gange	00030		Female	00008	00009	12-Jan-1999	Mysore Bannerghata	Birth Transfer Death	12-Jan-1999 13-Dec-2001 15-Jun-2008	
31.	Sundari	00031		Female	00008	00018	7-Mar-1999	Mysore	Birth	7-Mar-1999	
32.	Remo	00032		Male	00001	00024	26-Oct-1999	Usgown	Birth	26-Oct-1999	
33.	Gautami	00033		Female	00005	00016	11-Dec-1999	Hyderabad	Birth Death	11-Dec-1999 23-Aug-2003	
34.	Laara	00034		Male	00022	00023	9-May-2000	Mysore	Birth	9-May-2000	
35.	Rose	00035		Female	00025	00018	12-Aug-2000	Mysore	Birth	12-Aug-2000	
36.	Jasmine	00036		Female	00025	00021	24-Aug-2000	Mysore	Birth	24-Aug-2000	
37.	Lily	00037		Female	Unk	Unk	6-Nov-2000	Mysore Chennai	Birth Transfer	6-Nov-2000 21-Dec-2003	
38.	Prem	00038		Male	00001	00024	6-Dec-2000	Usgown	Birth	6-Dec-2000	
39.	Gayatri	00039		Female	00005	00016	22-Dec-2000	Hyderabad Visakapatnam	Birth Transfer	22-Dec-2000 21-Sep-2002	
40.	Reshma	00040		Female	00019	00016	15-Mar-2001	Hyderabad Visakapatnam	Birth Transfer	15-Mar-2001 15-Mar-2004	
41.	None Rabi	00041		Male	Wild	Wild	????	India Sepahijala	Capture Transfer	23-Mar-2001 23-Mar-2001	
42.	Unamed 2	00042		Male	00001	00024	6-Oct-2001	Usgown	Birth Death	6-Oct-2001 8-Oct-2001	
43.	Chaturtha	00043		Male	00013	00021	10-Jan-2002	Bannerghata	Birth	10-Jan-2002	
44.	Rangannath	00044		Male	00020	00015	9-Apr-2002	Bannerghata	Birth	9-Apr-2002	
45.	Balrama	00045		Male	00013	00030	10-Aug-2002	Bannerghata	Birth	10-Aug-2002	
46.	Veeru	00046		Male	00001	00024	20-Sep-2002	Usgown	Birth	20-Sep-2002	
47.	Bheema	00047		Male	00013	00021	12-Oct-2002	Bannerghata	Birth	12-Oct-2002	
48.	Bharat	00048		Male	00013	00030	8-Jan-2003	Bannerghata	Birth	8-Jan-2003	
49.	Bhuvan	00049		Male	25	00009	9-Jan-2003	Mysore	Birth	9-Jan-2003	
50.	_____	00050		Female	00019	00016	14-Feb-2003	Hyderabad	Birth Death	14-Feb-2003 ????	
51.	Chetan	00051		Male	00025	00026	23-Mar-2003	Mysore	Birth	23-Mar-2003	

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
52.	Shiva	00052		Male	00019	00033	30-Jul-2003	Hyderabad Visakapatnam	Birth Transfer	30-Jul-2003 29-Jan-2004	
53.	Kalpana	00053		Female	00034	00036	25-Aug-2003	Mysore	Birth	25-Aug-2003	
54.	Rani	00054		Female	00001	00024	4-Sep-2003	Usgown	Birth	4-Sep-2003	
55.	Vipin	00055		Male	00025	00018	1-Oct-2003	Mysore	Birth	1-Oct-2003	
56.	Ravindra	00056		Male	00013	00021	2-Jan-2004	Bannerghata	Birth	2-Jan-2004	
57.	Amith	00057		Female	00025	00009	14-Apr-2004	Mysore	Birth	14-Apr-2004	
58.	Akila	00058		Female	00034	00035	7-May-2004	Mysore	Birth	7-May-2004	
59.	Anju Anju	00059		Female	00034	00036	1-Jun-2004	Mysore Chatbir Zoo	Birth Transfer	1-Jun-2004 8-Dec-2006	
60.	Madhan	00060		Male	Unk	00037	31-Aug-2004	Chennai	Birth	31-Aug-2004	
61.	Somu	00061		Male	00032	00024	9-Sep-2004	Usgown	Birth	9-Sep-2004	
62.	Geetha	00062		Female	Wild	Wild	~ 2000	India Chennai	Capture Transfer	14-Dec-2004 14-Dec-2004	
63.	Unm2 Unm2 Unm2	00063		Male	Wild	Wild	~ 2000	India Mysore Delhi	Capture Transfer Transfer	???? ???? 12-Sep-2006	
64.	Unm3 Unm3 Unm3	00064		Female	Wild	Wild	????	India Mysore Delhi	Capture Transfer Transfer	???? ???? 12-Sep-2006	
65.	Violaine	00065		Female	00025	00009	23-Mar-2005	Mysore	Birth	23-Mar-2005	
66.	Priya	00066		Female	00034	00036	18-Aug-2005	Mysore	Birth	18-Aug-2005	
67.	Rathnam	00067		Male	00028	00037	30-Oct-2005	Chennai	Birth	30-Oct-2005	
68.	Harshita	00068		Female	00034	00026	????	Mysore Chatbir Z	Birth Transfer Death	???? 8-Dec-2006 14-Apr-2008	
69.	Manoj	00069		Male	00034	00035	????	Mysore Chatbir Z	Birth Transfer Death	???? 8-Dec-2006 2-Jan-2007	
70.	Pretam	00070		Male	00025	00009	17-Feb-2006	Mysore	Birth	17-Feb-2006	
71.	Pinky	00071		Female	00032	00054	26-Feb-2006	Usgown	Birth	26-Feb-2006	
72.	Anubhav	00072		Male	00025	00009	11-May-	Mysore	Birth	11-May-2006	

Sl.no.	Home Name & Tag No.	National Studbook No.	International Studbook No.	Sex	Sire	Dam	Birth Date	Location	Event	Date	Remarks
							2006				
73.	Sarita	00073		Female	00025	00018	23-May-2006	Mysore	Birth	23-May-2006	
74.	Kaveri	00074		Female	00013	00021	13-Jun-2006	Bannerghata	Birth	13-Jun-2006	
75.	Rosa	00075		Female	Unk	00024	19-Sep-2006	Usgown	Birth	19-Sep-2006	
76.	Unm4	00076		Male	00028	00036	3-Jan-2007	Mysore	Birth	3-Jan-2007	
77.	Vijay	00077		Male	00028	00062	3-Jan-2007	Chennai	Birth	3-Jan-2007	
78.	_____	00078		Female	00028	00037	30-Jan-2007	Chennai	Birth	30-Jan-2007	
79.	Sheshan	00079		Male	00025	UNK	14-Feb-2007	Mysore	Birth	14-Feb-2007	
80.	Aditya	00080		Male	00034	00057	3-Jun-2007	Mysore	Birth	3-Jun-2007	
81.	Ashoka	00081		Male	00025	00065	24-Jun-2007	Mysore	Birth	24-Jun-2007	
82.	Gowri	00082		Female	00025	00018	1-Sep-2007	Mysore	Birth	1-Sep-2007	
83.	Siddhu	00083		Male	00034	00031	25-Sep-2007	Mysore	Birth	25-Sep-2007	
84.	Harsha	00084		Male	00034	00053	25-Sep-2007	Mysore	Birth	25-Sep-2007	
85.	Unm5	00085		Male	00063	00064	14-Dec-2007	Delhi	Birth	14-Dec-2007	
86.	Bhima	00086		Male	Unk	00024	30-Dec-2007	Usgown	Birth	30-Dec-2007	
87.	Prakash	00087		Male	Unk	Unk	13-Mar-2008	Mysore Pune	Birth Transfer	13-Mar-2008 21-Sep-2009	
88.	Lekshmi	00088		Female	00028	00037	11-Apr-2008	Chennai	Birth	11-Apr-2008	
89.	Ragini	00089		Female	00034	00035	9-Jan-2008	Mysore	Birth	9-Jan-2008	
90.	Avinash	00090		Male	Unk	00018	13-Mar-2008	Mysore	Birth	13-Mar-2008	
91.	Sranya	00091		Female	00028	00062	17-Mar-2009	Chennai	Birth	17-Mar-2009	
92.	Hamsa	00092		Female	Unk	Unk	30-Apr-2008	Mysore Pune	Birth Transfer	30-Apr-2008 21-Sep-2009	
93.		00093		?	Unk	00007	20-Jun-2009	Bannerghata	Birth	20-Jun-2009	

Population Planning/ Recommendations

Bos gaurus listed as Vulnerable in the IUCN Red List of Threatened species has continued to decline at an alarming rate in the recent times. Its distribution range included south and south-east Asia, a region undergoing rapid human population growth and industrial development along with clearing of large forested areas for agriculture and commercial plantations. The loss of suitable habitats as an outcome of this economic development poses a threat to the continued long-term survival of the species. It therefore becomes imperative to manage a demographically stable and genetically viable population of the species in captivity for insurance and future reintroductions if necessary.

A global effort in this regard is underway and the Indian captive population is a part of this attempt. The current Indian captive population has 67 (35.31.1) specimens spread across 9 zoos in the country. The total number of specimens included in the studbook is 93; of which 8 specimens are of wild origin, and 7 have successfully produced offspring. The gene diversity retained in this population is 0.859, and the potential gene diversity of this population could have been 0.937 had all founders contributed equally to the population.

Table 4 Genetic Status Table:

	Current	**Potential**
Founders	7	1 additional
Founder genome equivalents	3.55	7.94
Founder genome surviving	5.16	7.94
Gene diversity retained	0.859	0.937
Population mean kinship	0.141	0.063
Mean inbreeding	0.175	0.063
Ne / N	0.33	-----
% of pedigree known	58	-----

Table 5 Demographic Summary Table:

Current size of managed population	67 (35.31.1)
# Specimens excluded from management	0
Mean generation time	9.9 years
Potential population growth rate	1.05

Generation length: The average time elapsing from reproduction in one generation to the time the next generation reproduces. Also, the average age at which a female (or male) produces offspring. It is not the age of first reproduction. Males and females often have different generation times.

Effective Population Size (Ne / N ratio) -- The size of a randomly mating population of constant size with equal sex ratio and a Poisson distribution of family sizes that would (a) result in the same mean rate of inbreeding as that observed in the population, or (b) would result in the same rate of random change in gene frequencies (genetic drift) as observed in the population. These two definitions are identical only if the population is demographically stable (because the rate of inbreeding depends on the distribution of alleles in the parental generation, whereas the rate of gene frequency drift is measured in the current generation).

Founder Genome Equivalents (FGE) – The number wild-caught individuals (founders) that would produce the same amount of gene diversity as does the population under study. The gene diversity of a population is 1 - 1 / (2 * FGE).

The population was modeled using PM 2000 (Ver.1.213). The mean generation length was computed as 9.9 years. Modeling the current population for minimum population size required to retain 90% genetic diversity at the end of 50 years and be demographically stable at the same gave a result of 123 individuals.

Table 6 Management Strategy Table:

Variables	Planned
Mean Generation length	9.9
Population growth rate	1.05
Ne / N ratio	0.32
Initial gene diversity	0.89
Target population size	123
Maximum Allowable Population Size	150
New Founders per Addition Event	2
Year to Start Adding Founders	1
Year to Stop Adding Founders	15
Years Between Addition Events	1
FGE Recruited per New Founder	0.400

Possible pairings were carried out from a listing of ordered mean kinship of live specimens in the studbook to check for any inbreeding depression and associated loss of genetic diversity in progeny thus produced. Specimens with high mean kinship values, unknown ancestry or past their reproductive prime were excluded from

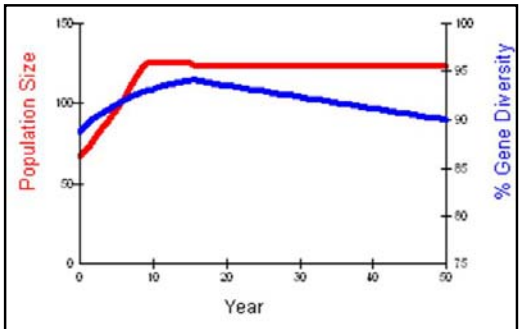

Figure 2 Population management strategy

the pairings. The results are presented in table 8. While implementing pairings the guiding principle should be the maximal retention of genetic diversity and the minimal distance that the animals have to be moved to implement such pairings.

Table 7 Ordered mean kinships

	Males					Females				
Rank	**Stbk#**	**MK**	**Known**	**Age**	**Location**	**Stbk#**	**MK**	**Known**	**Age**	**Location**
1	00041	0.0000	100.0	0	Sepahijala	00064	0.0198	100.0	0	Delhi
2	00063	0.0198	100.0	10	Delhi	00007	0.0198	100.0	22	Bannerghata
3	00085	0.0396	100.0	2	Delhi	00062	0.0396	100.0	10	Chennai
4	00077	0.0990	100.0	3	Chennai	00091	0.0990	100.0	1	Chennai
5	00028	0.1188	100.0	15	Chennai	00078	0.1386	50.0	3	Chennai
6	00067	0.1386	50.0	4	Chennai	00088	0.1386	50.0	2	Chennai
7	00076	0.1386	50.0	3	Mysore	00039	0.1419	75.0	9	Visakapatnam
8	00027	0.1419	75.0	12	Visakapatnam	00040	0.1525	62.5	9	Visakapatnam
9	00052	0.1452	75.0	7	Visakapatnam	00024	0.1683	100.0	0	Usgown
10	00038	0.1881	50.0	9	Usgown	00075	0.1881	50.0	3	Usgown
11	00046	0.1881	50.0	7	Usgown	00054	0.1980	50.0	7	Usgown
12	00086	0.1881	50.0	2	Usgown	00071	0.2030	50.0	4	Usgown
13	00061	0.1947	75.0	6	Usgown	00002	---	---	25	Delhi
14	00032	0.2079	50.0	10	Usgown	00037	---	---	9	Chennai
15	00087	---	---	2	Pune	00092	---	---	2	Pune
16	00020	---	---	13	Bannerghata	00010	---	---	21	Bannerghata
17	00034	---	---	10	Mysore	00018	---	---	14	Mysore
18	00043	---	---	8	Bannerghata	00026	---	---	13	Mysore
19	00044	---	---	8	Bannerghata	00031	---	---	11	Mysore
20	00045	---	---	8	Bannerghata	00035	---	---	10	Mysore
21	00047	---	---	7	Bannerghata	00036	---	---	10	Mysore
22	00048	---	---	7	Bannerghata	00053	---	---	7	Mysore
23	00049	---	---	7	Mysore	00057	---	---	6	Mysore
24	00051	---	---	7	Mysore	00058	---	---	6	Mysore
25	00055	---	---	6	Mysore	00059	---	---	6	Chatbir Zoo
26	00056	---	---	6	Bannerghata	00065	---	---	5	Mysore
27	00060	---	---	6	Chennai	00066	---	---	5	Mysore
28	00070	---	---	4	Mysore	00073	---	---	4	Mysore
29	00072	---	---	4	Mysore	00074	---	---	4	Bannerghata
30	00079	---	---	3	Mysore	00082	---	---	3	Mysore
31	00080	---	---	3	Mysore	00089	---	---	2	Mysore
32	00081	---	---	3	Mysore					
33	00083	---	---	2	Mysore					
34	00084	---	---	2	Mysore					
35	00090	---	---	2	Mysore					

Ordered Mean Kinships for Unknown sex animals

Rank	Stbk#	MK	Known	Age	Location
1	00093	0.0396	50.0	1	Bannerghata

Genetic Diversity (GD) The heterozygosity expected in a population if the population were in Hardy-Weinberg equilibrium. Gene diversity is calculated from allele frequencies, and is the heterozygosity expected in progeny produced by random mating. The proportional gene diversity (as a proportion of the wild or source population) is the probability that two alleles from the same locus sampled at random from the population will be identical by descent.

Mean kinship (MK) The mean kinship coefficient between an animal and all animals (including itself) in the living, captive-born population. The mean kinship of a population is equal to the proportional loss of gene diversity of the descendant (captive-born) population relative to the founders and is also the mean inbreeding coefficient of progeny produced by random mating. Mean kinship is also the reciprocal of two times the founder genome equivalents.

Table 8 Summary of Breeding Recommendations

ID	Location	Sex	Breed With
00024	Usgown	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00027	Visakapatnam	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00028	Chennai	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00032	Usgown	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00038	Usgown	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00039	Visakapatnam	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00040	Visakapatnam	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00041	Sepahijala	Male	00064, 00062, 00039, 00040, 00024, 00054, 00071, 00075, 00078, 00091, 00088
00046	Usgown	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00052	Visakapatnam	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00054	Usgown	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00061	Usgown	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00062	Chennai	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00063	Delhi	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00064	Delhi	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00067	Chennai	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00071	Usgown	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00075	Usgown	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086
00076	Mysore	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00077	Chennai	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00078	Chennai	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086

ID	Location	Sex	Breed With
00085	Delhi	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00086	Usgown	Male	00024, 00039, 00040, 00054, 00062, 00064, 00071, 00075, 00078, 00091, 00088
00091	Chennai	Female	00041, 00027, 00028, 00032, 00038, 00046, 00052, 00061, 00063, 00067, 00076, 00077, 00085, 00086

Table 9 Live animals not included in pairings

Sl. No.	ID	Location	Sex
1.	00002	Delhi	Female
2.	00007	Bannerghata	Female
3.	00010	Bannerghata	Female
4.	00018	Mysore	Female
5.	00031	Mysore	Female
6.	00035	Mysore	Female
7.	00036	Mysore	Female
8.	00037	Chennai	Female
9.	00053	Mysore	Female
10.	00057	Mysore	Female
11.	00058	Mysore	Female
12.	00059	Chatbir Zoo	Female
13.	00065	Mysore	Female
14.	00066	Mysore	Female
15.	00073	Mysore	Female
16.	00074	Bannerghata	Female
17.	00082	Mysore	Female
18.	00089	Mysore	Female
19.	00092	Pune	Female
20.	00020	Bannerghata	Male
21.	00034	Mysore	Male
22.	00043	Bannerghata	Male
23.	00044	Bannerghata	Male
24.	00045	Bannerghata	Male
25.	00047	Bannerghata	Male
26.	00048	Bannerghata	Male
27.	00049	Mysore	Male
28.	00051	Mysore	Male
29.	00055	Mysore	Male
30.	00056	Bannerghata	Male
31.	00060	Chennai	Male
32.	00070	Mysore	Male
33.	00072	Mysore	Male
34.	00079	Mysore	Male
35.	00080	Mysore	Male
36.	00081	Mysore	Male
37.	00083	Mysore	Male
38.	00084	Mysore	Male
39.	00087	Pune	Male
40.	00090	Mysore	Male
41.	00093	Bannerghata	Unsexed

Demographic Analysis

The current Indian bison population in captivity originated from individuals of unknown ancestry in National Zoological Park, Delhi and Bondla Zoo, Usgown, Goa.

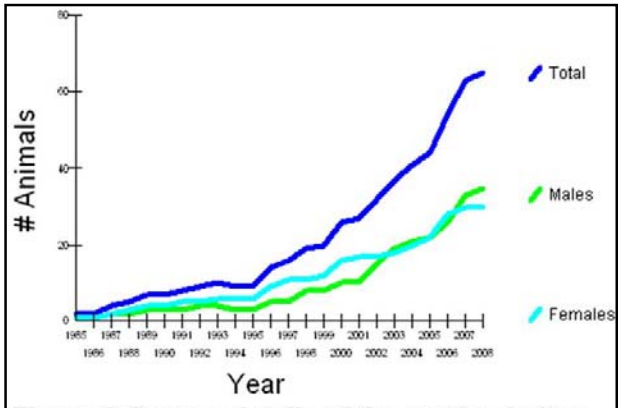

Figure 3 Census details of the captive Indian Bison in Indian zoos

The first animal of known wild origin for which records are available entered the captive population in 1988 in Nehru Zoological Park, Hyderabad; subsequently six additional animals of wild origin entered the captive program over the years, with the last animal entering the captive program in 2004 in Sri Chamarajendra Zoological Park, Mysore. The captive population increased from the initial 2 animals in 1985 to the current 67 largely due to births in captivity.

Table 10 Census details of the captive Indian population in Indian zoos

Years	Total	Females	Males	Unsexed	Wild Origin	Captive Born	Lambda
1985	2	1	1	0	0	2	0
1986	2	1	1	0	0	2	1
1987	4	2	2	0	0	4	2
1988	5	3	2	0	1	4	1.25
1989	7	4	3	0	1	6	1.4
1990	7	4	3	0	1	6	1
1991	8	5	3	0	1	7	1.143
1992	9	5	4	0	1	8	1.125
1993	10	6	4	0	1	9	1.111
1994	9	6	3	0	1	8	0.9
1995	9	6	3	0	1	8	1
1996	14	9	5	0	1	13	1.556
1997	16	11	5	0	2	14	1.143
1998	19	11	8	0	3	16	1.188
1999	20	12	8	0	3	17	1.053
2000	26	16	10	0	3	23	1.3
2001	27	17	10	0	4	23	1.038
2002	32	17	15	0	4	28	1.185
2003	37	18	19	0	4	33	1.156
2004	41	20	21	0	5	36	1.108
2005	44	22	22	0	5	39	1.073
2006	54	28	26	0	7	47	1.227
2007	63	30	33	0	7	56	1.167
2008	65	30	35	0	7	58	1.032

Age Distribution

The age structure of the living captive Indian bison population was modeled using PM 2000. this includes a total of 67 individuals of this one male and two females are of unknown age. The results obtained for stable age distribution (modeled data) suggest that while for males it is essential to have a larger proportion of individuals in the younger – reproductive ages and a few or none in the higher age classes.

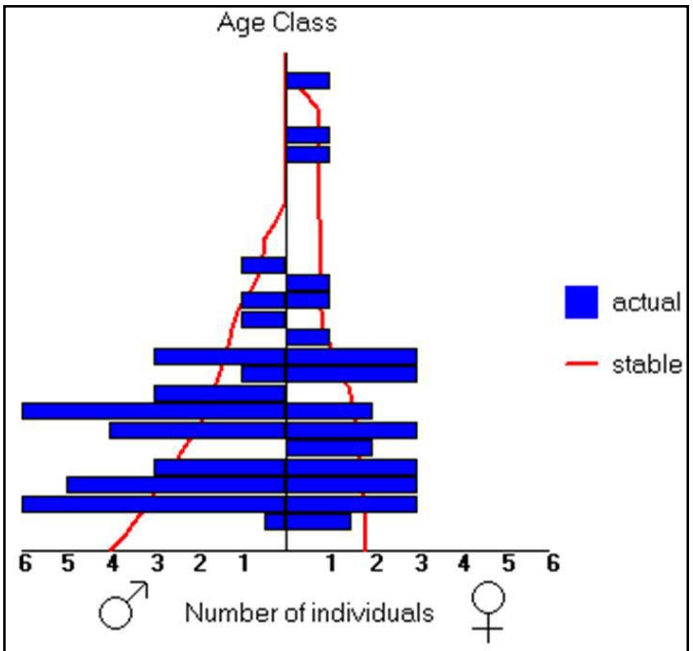

Figure 4 Age distribution of captive Indian bison population

For females an elongated bell shaped curve is obtained which suggests that equitable distribution of individuals in all age class with a gradual decline in numbers in post reproductive age classes, is essential for maintaining a stable population. The actual age distribution of the population shows that a majority of the individuals in the population are in the reproductive age class, thus with appropriate management the population can be used for rapid growth to achieve population targets.

Table 11 Age distribution of the living captive one horned rhinoceros in Indian zoos

	Males		Females	
Age (x)	**Actual**	**Stable**	**Actual**	**Stable**
0	0	4	0	1.85
1	0.5	3.61	1.5	1.83
2	6	3.31	3	1.81
3	5	3.03	3	1.76
4	3	2.78	3	1.71
5	0	2.48	2	1.69
6	4	2.21	3	1.67
7	6	1.96	2	1.57
8	3	1.73	0	1.46
9	1	1.58	3	1.39
10	3	1.45	3	1.25
11	0	1.33	1	1
12	1	1.22	0	0.83
13	1	1.11	1	0.82
14	0	0.84	1	0.81

15	1	0.6	0	0.8
16	0	0.55	0	0.8
17	0	0.5	0	0.79
18	0	0.23	0	0.78
19	0	0	0	0.77
20	0	0	0	0.77
21	0	0	1	0.76
22	0	0	1	0.75
23	0	0	0	0.74
24	0	0	0	0.74
25	0	0	1	0.37
26	0	0	0	0

Life Tables

The life table data for Indian bison in captivity are presented in table 11 below. Mortality in males peaks in the 14th year of life and in the living population the oldest male is of 15 years; whereas in females mortality peaks in the 11th year of life and the oldest living female is of 25 years. Males initiate reproductive activity in the 3rd year and distinct peaks are observed in the 7th, 11th and 13th years. A plateau with high reproductive activity is observed from the 15th – 17th years while a peak is observed in the 18th year. This may be attributed to the fact that only dominant large males may be surviving to these age classes. In females reproductive activity is initiated in the 2nd year of life and shows alternate peaks and troughs till the 11th year. This may be attributed to the long gestation period and weaning time and the need for females to recoup from previous calving.

Table 12 Life Table data for males and females

	Males					Females				
Age	**Qx**	**Px**	**Lx**	**Mx**	**Vx**	**Qx**	**Px**	**Lx**	**Mx**	**Vx**
0	0.030	0.970	1.000	0.000	1.015	0.000	1.000	1.000	0.010	1.000
1	0.000	1.000	0.970	0.000	1.125	0.000	1.000	1.000	0.010	1.000
2	0.000	1.000	0.970	0.000	1.229	0.000	1.000	1.000	0.050	0.999
3	0.000	1.000	0.970	0.040	1.341	0.040	0.960	1.000	0.180	0.978
4	0.000	1.000	0.970	0.060	1.420	0.000	1.000	0.960	0.100	0.823
5	0.050	0.950	0.970	0.050	1.523	0.000	1.000	0.960	0.040	0.730
6	0.000	1.000	0.922	0.080	1.651	0.000	1.000	0.960	0.130	0.696
7	0.070	0.930	0.922	0.190	1.777	0.110	0.890	0.960	0.180	0.605
8	0.000	1.000	0.857	0.000	1.797	0.000	1.000	0.854	0.060	0.456
9	0.000	1.000	0.857	0.190	1.962	0.080	0.920	0.854	0.080	0.416
10	0.000	1.000	0.857	0.190	1.935	0.110	0.890	0.786	0.060	0.375
11	0.000	1.000	0.857	0.400	1.905	0.280	0.720	0.700	0.180	0.393
12	0.000	1.000	0.857	0.120	1.642	0.000	1.000	0.504	0.000	0.257
13	0.000	1.000	0.857	0.450	1.662	0.000	1.000	0.504	0.000	0.259

14	0.360	0.640	0.857	0.200	1.614	0.000	1.000	0.504	0.000	0.262
15	0.000	1.000	0.548	0.500	1.977	0.000	1.000	0.504	0.000	0.264
16	0.000	1.000	0.548	0.500	1.613	0.000	1.000	0.504	0.000	0.267
17	0.000	1.000	0.548	0.500	1.215	0.000	1.000	0.504	0.000	0.269
18	1.000	0.000	0.548	1.560	1.560	0.000	1.000	0.504	0.000	0.272
19	1.000	0.000	0.000	0.000	0.000	0.000	1.000	0.504	0.000	0.275
20	1.000	0.000	0.000	0.000	0.000	0.000	1.000	0.504	0.000	0.277
21	1.000	0.000	0.000	0.000	0.000	0.000	1.000	0.504	0.280	0.280
22	1.000	0.000	0.000	0.000	0.000	0.000	1.000	0.504	0.000	0.000
23	1.000	0.000	0.000	0.000	0.000	0.000	1.000	0.504	0.000	0.000
24	1.000	0.000	0.000	0.000	0.000	0.000	1.000	0.504	0.000	0.000
25	1.000	0.000	0.000	0.000	0.000	1.000	0.000	0.504	0.000	0.000
26	1.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000

Qx = mortality; Px = survival; Lx = cumulative survivorship;
Mx = fecundity; Vx = expected future reproduction

Mortality Rate [Qx] the proportion of individuals that die during an age class. It is calculated from the number of animals that die during an age class divided by the number of animals that were alive at the beginning of the age class (i.e.-"at risk")

Px, Age-Specific Survival – The probability that an individual of age *x* survives one time period; is conditional on an individual being alive at the beginning of the time period. Alternatively, the proportion of individuals which survive from the beginning of one age class to the next.

Fecundity Rate [Mx] The average number of same-sexed young born to animals in that age class. The fecundity rates provide information on the age of first, last, and maximum reproduction.

lx, Age-Specific Survivorship – The probability that a new individual (e.g., age 0) is alive at the *beginning* of age *x*. Alternatively, the proportion of individuals which survive from birth to the beginning of a specific age class.

Mean Vx, Reproductive Value – The expected number of offspring produced this year and in future years by an animal of age x.

Intrinsic Rate of Increase [r] the exponential rate at which a population with a stable age distribution grows.

Population Growth Rate (Lambda, λ) -- The proportional change in population size from one year to the next. Lambda can be based on life-table calculations (the expected lambda) or from observed changes in population size from year to year. A lambda of 1.11 means a 11% per year increase; lambda of .97 means a 3% decline in size per year.

Net Reproductive Rate [Ro] if each animal were to replace itself each generation, the net reproductive rate would be 1.00 and the population would remain the same size. A growing population has an Ro greater than 1.0 and a declining population less than 1.0.

Generation Time (T) -- The average time elapsing from reproduction in one generation to the time the next generation reproduces.

Population Projections

The projected population growth rates for the population as calculated from the life tables above are presented below in table 13. A perusal of the table suggests that the captive population of Gaur in Indian zoos is growing at a steady rate. The generation time (T) of females is significantly lesser than the males.

Table 13 Projected population growth rates

	Males	Females
r	0.0877	0.0097
lambda	1.0917	1.0097
R_0	2.743	1.083
T	11.50	8.22

Population projection using PM 2000 was modelled for the captive Indian bison population. The results are presented in figure 5 and table 13 above. For a genetically viable population it was assumed that a time period of 15 years would be required to achieve the population size required to meet genetic goals of 123 individuals. Table 13 provides details on the number of individuals in each age class required every year over the next 50 years for the maintenance of a genetically viable and demographically stable population.

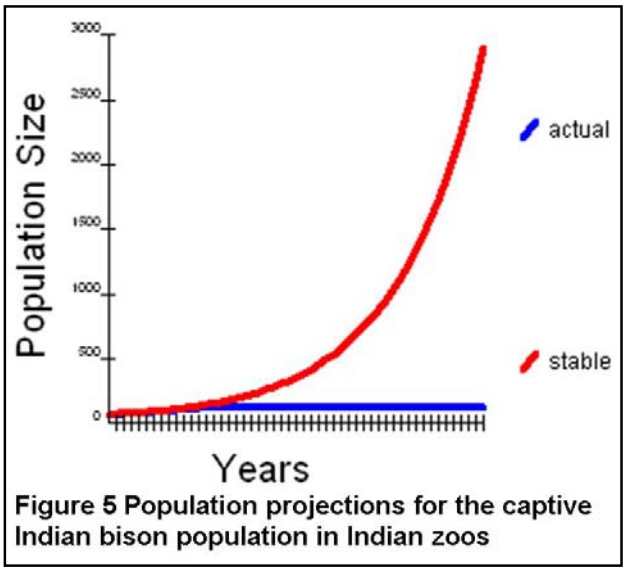

Figure 5 Population projections for the captive Indian bison population in Indian zoos

Table 13 Population projections for the captive one horned rhinoceros for the next 50 years

	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00
# Born	0.00	6.56	5.75	6.39	7.62	7.62	7.48	8.02	9.30	8.86	8.67	11.89	13.82	7.83	3.73	6.94	8.94	6.49
0.00	0.00	6.51	5.71	6.35	7.57	7.56	7.43	7.96	9.23	8.79	8.61	11.80	13.72	7.77	3.71	6.88	8.87	6.44
1.00	2.00	0.00	6.46	5.67	6.30	7.51	7.50	7.37	7.90	9.16	8.73	8.54	11.71	13.61	7.71	3.68	6.83	8.80
2.00	9.00	2.00	0.00	6.46	5.67	6.30	7.51	7.50	7.37	7.90	9.16	8.73	8.54	11.71	13.61	7.71	3.68	6.83
3.00	8.00	8.94	1.97	0.00	6.39	5.61	6.23	7.43	7.43	7.30	7.82	9.07	8.64	8.46	11.59	13.48	7.63	3.64
4.00	6.00	7.94	8.88	1.94	0.00	6.33	5.55	6.17	7.36	7.35	7.22	7.74	8.98	8.55	8.37	11.48	13.34	7.56
5.00	2.00	5.93	7.81	8.73	1.93	0.00	6.25	5.48	6.09	7.27	7.26	7.13	7.65	8.86	8.44	8.27	11.33	13.17
6.00	7.00	2.00	5.85	7.69	8.58	1.92	0.00	6.17	5.41	6.02	7.17	7.17	7.04	7.55	8.75	8.33	8.16	11.19
7.00	8.00	6.70	1.89	5.59	7.36	8.22	1.82	0.00	5.89	5.17	5.74	6.85	6.84	6.72	7.21	8.35	7.96	7.79
8.00	3.00	7.67	6.39	1.78	5.32	7.03	7.86	1.72	0.00	5.61	4.92	5.47	6.52	6.52	6.40	6.87	7.96	7.58
9.00	4.00	3.00	7.59	6.28	1.71	5.21	6.93	7.76	1.67	0.00	5.50	4.83	5.36	6.39	6.39	6.28	6.73	7.80
10.00	6.00	3.72	3.00	7.42	6.04	1.55	4.97	6.69	7.53	1.56	0.00	5.25	4.60	5.11	6.10	6.09	5.99	6.42
11.00	1.00	5.43	3.20	3.00	7.11	5.60	1.25	4.53	6.26	7.11	1.34	0.00	4.78	4.20	4.66	5.56	5.56	5.46
12.00	1.00	0.84	5.03	2.84	3.00	6.89	5.29	1.05	4.22	5.96	6.81	1.20	0.00	4.46	3.91	4.35	5.19	5.18
13.00	2.00	1.00	0.84	5.03	2.84	3.00	6.89	5.29	1.05	4.22	5.96	6.81	1.20	0.00	4.46	3.91	4.35	5.19
14.00	1.00	1.82	0.82	0.84	4.49	2.66	2.46	5.85	4.62	1.05	3.75	5.16	5.86	1.12	0.00	3.96	3.47	3.86
15.00	1.00	1.00	1.64	0.64	0.84	3.95	2.48	1.92	4.81	3.95	1.05	3.27	4.37	4.90	1.04	0.00	3.45	3.03
16.00	0.00	1.00	1.00	1.64	0.64	0.84	3.95	2.48	1.92	4.81	3.95	1.05	3.27	4.37	4.90	1.04	0.00	3.45
17.00	0.00	0.00	1.00	1.00	1.64	0.64	0.84	3.95	2.48	1.92	4.81	3.95	1.05	3.27	4.37	4.90	1.04	0.00
18.00	0.00	0.00	0.00	0.50	1.00	1.32	0.32	0.84	2.99	2.16	0.96	2.96	2.76	1.05	2.42	2.96	3.21	0.90
19.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.84	2.03	1.84	0.00	1.11	1.57	1.05	1.57	1.54	1.51
20.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.84	2.03	1.84	0.00	1.11	1.57	1.05	1.57	1.54
21.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.84	2.03	1.84	0.00	1.11	1.57	1.05	1.57
22.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.84	2.03	1.84	0.00	1.11	1.57	1.05
23.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.84	2.03	1.84	0.00	1.11	1.57
24.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.84	2.03	1.84	0.00	1.11
25.00	1.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.42	1.02	0.92	0.00
26.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	64.00	67.48	71.09	74.89	78.93	83.15	87.56	92.19	97.09	102.18	107.49	113.20	119.22	122.03	122.09	122.26	122.50	122.64

	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00	31.00	32.00	33.00	34.00
# Born	4.58	6.49	7.15	6.88	7.68	8.08	7.15	6.07	7.23	8.04	7.05	7.47	8.86	8.38	6.66	6.82	7.95
0.00	4.54	6.44	7.10	6.82	7.62	8.02	7.10	6.03	7.18	7.98	6.99	7.42	8.80	8.31	6.61	6.77	7.89
1.00	6.39	4.51	6.39	7.04	6.77	7.57	7.96	7.04	5.98	7.12	7.92	6.94	7.36	8.73	8.25	6.56	6.71
2.00	8.80	6.39	4.51	6.39	7.04	6.77	7.57	7.96	7.04	5.98	7.12	7.92	6.94	7.36	8.73	8.25	6.56
3.00	6.76	8.71	6.33	4.46	6.33	6.97	6.70	7.49	7.87	6.97	5.92	7.05	7.84	6.87	7.29	8.64	8.17
4.00	3.60	6.69	8.62	6.26	4.42	6.26	6.90	6.64	7.41	7.79	6.90	5.86	6.98	7.76	6.80	7.21	8.55
5.00	7.46	3.56	6.61	8.51	6.18	4.36	6.18	6.81	6.55	7.32	7.70	6.81	5.79	6.89	7.66	6.72	7.12
6.00	13.00	7.37	3.51	6.53	8.41	6.11	4.30	6.10	6.73	6.47	7.23	7.60	6.73	5.71	6.80	7.57	6.63
7.00	10.68	12.41	7.03	3.35	6.23	8.03	5.83	4.11	5.83	6.42	6.18	6.90	7.25	6.42	5.46	6.49	7.22
8.00	7.42	10.18	11.83	6.70	3.20	5.94	7.65	5.55	3.92	5.55	6.12	5.88	6.57	6.91	6.12	5.20	6.19
9.00	7.43	7.27	9.97	11.59	6.57	3.13	5.82	7.49	5.44	3.84	5.44	6.00	5.77	6.44	6.77	6.00	5.09
10.00	7.44	7.09	6.94	9.51	11.06	6.26	2.99	5.55	7.15	5.19	3.66	5.19	5.72	5.50	6.14	6.46	5.72
11.00	5.85	6.78	6.46	6.33	8.67	10.08	5.71	2.72	5.06	6.52	4.73	3.34	4.73	5.21	5.01	5.60	5.89
12.00	5.09	5.46	6.33	6.03	5.90	8.09	9.40	5.33	2.54	4.72	6.08	4.42	3.11	4.41	4.86	4.68	5.23
13.00	5.18	5.09	5.46	6.33	6.03	5.90	8.09	9.40	5.33	2.54	4.72	6.08	4.42	3.11	4.41	4.86	4.68
14.00	4.60	4.60	4.51	4.84	5.61	5.34	5.23	7.17	8.34	4.72	2.25	4.18	5.39	3.91	2.76	3.91	4.31
15.00	3.36	4.01	4.01	3.94	4.22	4.89	4.66	4.56	6.26	7.27	4.12	1.96	3.65	4.70	3.41	2.41	3.41
16.00	3.03	3.36	4.01	4.01	3.94	4.22	4.89	4.66	4.56	6.26	7.27	4.12	1.96	3.65	4.70	3.41	2.41
17.00	3.45	3.03	3.36	4.01	4.01	3.94	4.22	4.89	4.66	4.56	6.26	7.27	4.12	1.96	3.65	4.70	3.41
18.00	0.00	2.55	2.24	2.49	2.97	2.96	2.91	3.12	3.62	3.45	3.37	4.63	5.38	3.05	1.45	2.70	3.48
19.00	0.76	0.00	1.65	1.45	1.61	1.92	1.92	1.88	2.02	2.34	2.23	2.18	2.99	3.48	1.97	0.94	1.75
20.00	1.51	0.76	0.00	1.65	1.45	1.61	1.92	1.92	1.88	2.02	2.34	2.23	2.18	2.99	3.48	1.97	0.94
21.00	1.54	1.51	0.76	0.00	1.65	1.45	1.61	1.92	1.92	1.88	2.02	2.34	2.23	2.18	2.99	3.48	1.97
22.00	1.57	1.54	1.51	0.76	0.00	1.65	1.45	1.61	1.92	1.92	1.88	2.02	2.34	2.23	2.18	2.99	3.48
23.00	1.05	1.57	1.54	1.51	0.76	0.00	1.65	1.45	1.61	1.92	1.92	1.88	2.02	2.34	2.23	2.18	2.99
24.00	1.57	1.05	1.57	1.54	1.51	0.76	0.00	1.65	1.45	1.61	1.92	1.92	1.88	2.02	2.34	2.23	2.18
25.00	0.56	0.79	0.52	0.79	0.77	0.76	0.38	0.00	0.83	0.72	0.81	0.96	0.96	0.94	1.01	1.17	1.12
26.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	122.67	122.72	122.78	122.84	122.91	122.98	123.04	123.08	123.09	123.10	123.11	123.11	123.13	123.14	123.13	123.12	123.12

	35.00	**36.00**	**37.00**	**38.00**	**39.00**	**40.00**	**41.00**	**42.00**	**43.00**	**44.00**	**45.00**	**46.00**	**47.00**	**48.00**	**49.00**	**50.00**
# Born	7.77	7.49	8.34	8.26	6.82	6.75	7.85	7.72	6.70	6.83	7.60	7.44	7.25	7.81	7.96	7.24
0.00	7.71	7.44	8.28	8.20	6.77	6.70	7.80	7.66	6.65	6.78	7.55	7.39	7.19	7.75	7.90	7.18
1.00	7.83	7.65	7.38	8.21	8.14	6.71	6.65	7.74	7.61	6.60	6.73	7.49	7.33	7.14	7.69	7.84
2.00	6.71	7.83	7.65	7.38	8.21	8.14	6.71	6.65	7.74	7.61	6.60	6.73	7.49	7.33	7.14	7.69
3.00	6.50	6.65	7.75	7.58	7.31	8.13	8.06	6.65	6.58	7.66	7.53	6.54	6.66	7.41	7.26	7.07
4.00	8.08	6.43	6.58	7.67	7.50	7.23	8.05	7.97	6.58	6.51	7.58	7.45	6.47	6.59	7.34	7.18
5.00	8.45	7.98	6.35	6.49	7.57	7.40	7.14	7.95	7.87	6.50	6.43	7.48	7.36	6.39	6.51	7.24
6.00	7.03	8.34	7.88	6.27	6.41	7.48	7.31	7.05	7.85	7.77	6.41	6.35	7.39	7.26	6.31	6.43
7.00	6.33	6.71	7.96	7.52	5.98	6.12	7.14	6.98	6.73	7.49	7.42	6.12	6.06	7.06	6.94	6.02
8.00	6.88	6.03	6.40	7.59	7.17	5.70	5.83	6.80	6.65	6.41	7.14	7.07	5.83	5.78	6.72	6.61
9.00	6.06	6.75	5.91	6.27	7.43	7.02	5.59	5.72	6.66	6.52	6.28	6.99	6.93	5.72	5.66	6.59
10.00	4.86	5.78	6.43	5.64	5.98	7.09	6.70	5.33	5.45	6.36	6.22	5.99	6.67	6.61	5.45	5.40
11.00	5.22	4.43	5.27	5.87	5.14	5.45	6.46	6.11	4.86	4.97	5.80	5.67	5.47	6.08	6.03	4.97
12.00	5.49	4.87	4.13	4.92	5.47	4.79	5.09	6.03	5.70	4.53	4.64	5.41	5.29	5.10	5.67	5.62
13.00	5.23	5.49	4.87	4.13	4.92	5.47	4.79	5.09	6.03	5.70	4.53	4.64	5.41	5.29	5.10	5.67
14.00	4.15	4.63	4.87	4.31	3.66	4.36	4.85	4.25	4.51	5.35	5.05	4.02	4.11	4.79	4.69	4.52
15.00	3.76	3.62	4.04	4.25	3.76	3.20	3.80	4.23	3.71	3.93	4.66	4.41	3.51	3.59	4.18	4.09
16.00	3.41	3.76	3.62	4.04	4.25	3.76	3.20	3.80	4.23	3.71	3.93	4.66	4.41	3.51	3.59	4.18
17.00	2.41	3.41	3.76	3.62	4.04	4.25	3.76	3.20	3.80	4.23	3.71	3.93	4.66	4.41	3.51	3.59
18.00	2.52	1.78	2.52	2.78	2.67	2.99	3.14	2.78	2.36	2.81	3.13	2.74	2.91	3.45	3.26	2.59
19.00	2.25	1.63	1.15	1.63	1.80	1.73	1.93	2.03	1.80	1.53	1.82	2.03	1.77	1.88	2.23	2.11
20.00	1.75	2.25	1.63	1.15	1.63	1.80	1.73	1.93	2.03	1.80	1.53	1.82	2.03	1.77	1.88	2.23
21.00	0.94	1.75	2.25	1.63	1.15	1.63	1.80	1.73	1.93	2.03	1.80	1.53	1.82	2.03	1.77	1.88
22.00	1.97	0.94	1.75	2.25	1.63	1.15	1.63	1.80	1.73	1.93	2.03	1.80	1.53	1.82	2.03	1.77
23.00	3.48	1.97	0.94	1.75	2.25	1.63	1.15	1.63	1.80	1.73	1.93	2.03	1.80	1.53	1.82	2.03
24.00	2.99	3.48	1.97	0.94	1.75	2.25	1.63	1.15	1.63	1.80	1.73	1.93	2.03	1.80	1.53	1.82
25.00	1.09	1.50	1.74	0.99	0.47	0.87	1.13	0.82	0.58	0.82	0.90	0.87	0.97	1.02	0.90	0.76
26.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	123.12	123.11	123.09	123.09	123.09	123.09	123.09	123.09	123.09	123.09	123.10	123.10	123.10	123.10	123.10	123.10

Genetic Analysis

The captive population of Indian bison population has the genetic representation from seven animals of wild origin; an additional wild origin animal did not contribute to the population. Population with few founders (below 20) are vulnerable to stochastic events due to the poor representation of the wild gene pool in the captive population. Such populations require intensive genetic management to ensure an adequate conservation of the original gene diversity in the population. The genetic parameters of the studbook population were analysed using PM 2000, the results are presented below.

Founder Statistics

An analysis of the founder statistics of the founder statistics of the captive Indian bison population is presented in table 15 and figures 6-8. The studbook numbers 00024, 00005 and 00028 are over represented in the population whereas 00064, 00007, 00062 and 00063 are underrepresented; 00041 is not represented at all. A perusal of figure 7 suggests that had all founders contributed equally to the population the potential allele retention as compared to the actual allele retention would have been much higher thereby significantly enhancing the genetic diversity of the population.

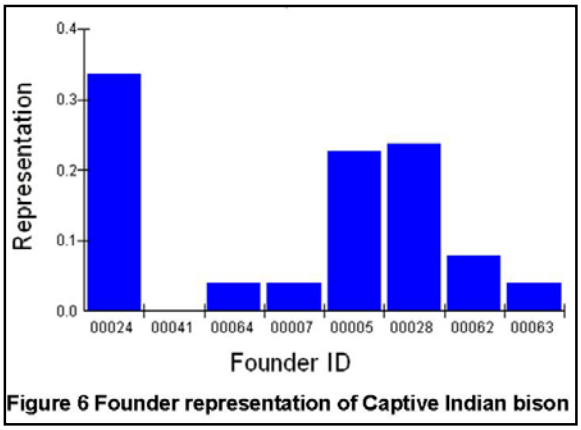

Figure 6 Founder representation of Captive Indian bison

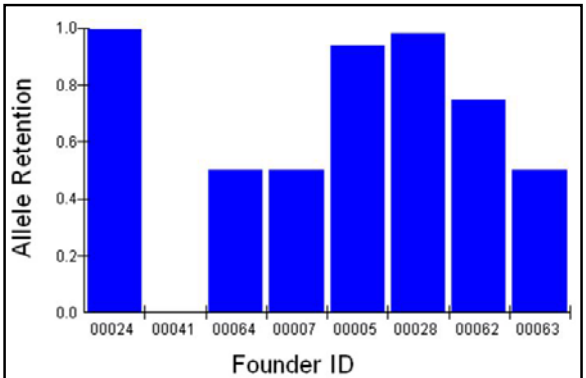

Figure 7 Founder allele retention of Captive Indian bison

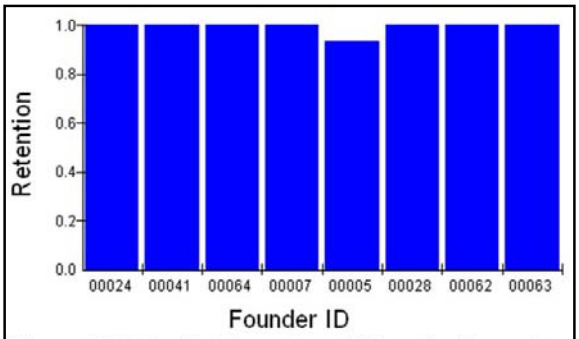

Figure 8 Potential founder allele retention of Captive Indian bison

Table 15 Founder Statistics Table:

Studbook #	Sex	Age	Representation	Contribution	Allele Retent.	Potential Ret.	Descendants
00005	M	D	0.2277	2.8750	0.9365	0.9365	4.00
00007	F	22	0.0396	0.5000	0.5000	1.0000	1.00
00024	F	-1	0.3366	4.2500	0.9950	1.0000	8.00
00028	M	15	0.2376	3.0000	0.9835	1.0000	6.00
00041	M	-1	0.0000	0.0000	0.0000	1.0000	0.00
00062	F	10	0.0792	1.0000	0.7485	1.0000	2.00
00063	M	10	0.0396	0.5000	0.5000	1.0000	1.00
00064	F	-1	0.0396	0.5000	0.5000	1.0000	1.00

Individual statistics

The genetic details of the living specimens of the captive Indian bison population are summarized in table 16 below. The information contained in the table can be used to decide on pairings. Specimens that have low mean kinship values and inbreeding coefficients are better for breeding purposes than animals with higher values. Similarly individuals with a few are no offspring are to be preferred over individuals which have several offspring as their genes are already represented in the captive population. This would ensure that the genes of all individuals are equally represented in the captive population and is the closest possible representation of the original wild gene pool sampled.

Table 16 individual statistics of the captive Indian bison population

National	Sex	Sire	Dam	Age	Location	Known	Inbreeding	Mean	Kinship	First	Progeny	Local ID
00002	Female	Unk	Unk	25	Delhi	0	---	---	---	---	0	Unm1
00007	Female	Wild	Wild	22	Bannerghata	100	0	0.02	0.016	9.9	1	Rani
00010	Female	00003	00004	21	Bannerghata	0	---	---	---	---	0	Varunda
00018	Female	00008	00009	14	Mysore	0	---	---	---	---	7	Madhuri
00020	Male	00014	00015	13	Bannerghata	0	---	---	---	---	1	Ganesh
00024	Female	Wild	Wild	0	Usgown	100	0	0.168	0.191	83.9	9	Rosy
00026	Female	00008	00018	13	Mysore	0	---	---	---	---	1	Meena
00027	Male	00005	00016	12	Visakapatnam	75	0.5	0.142	0.131	70.7	0	Gowhar
00028	Male	Wild	Wild	15	Chennai	100	0	0.119	0.114	59.2	6	Mani
00031	Female	00008	00018	11	Mysore	0	---	---	---	---	1	Sundari
00032	Male	00001	00024	10	Usgown	50	0	0.208	0.242	103.7	2	Remo
00034	Male	00022	00023	10	Mysore	0	---	---	---	---	8	Laara
00035	Female	00025	00018	10	Mysore	0	---	---	---	---	2	Rose
00036	Female	00025	00021	10	Mysore	0	---	---	---	---	4	Jasmine
00037	Female	Unk	Unk	9	Chennai	0	---	---	---	---	4	Lily
00038	Male	00001	00024	9	Usgown	50	0	0.188	0.222	93.8	0	Prem
00039	Female	00005	00016	9	Visakapatnam	75	0.5	0.142	0.118	70.7	0	Gayatri
00040	Female	00019	00016	9	Visakapatnam	62	0.667	0.153	0.132	76	0	
00041	Male	Wild	Wild	0	Sepahijala	100	0	0	0	0	0	Rabi
00043	Male	00013	00021	8	Bannerghata	0	---	---	---	---	0	Chaturtha
00044	Male	00020	00015	8	Bannerghata	0	---	---	---	---	0	Ranganath
00045	Male	00013	00030	8	Bannerghata	0	---	---	---	---	0	Balrama
00046	Male	00001	00024	7	Usgown	50	0	0.188	0.219	93.8	0	Veeru
00047	Male	00013	00021	7	Bannerghata	0	---	---	---	---	0	Bheema
00048	Male	00013	00030	7	Bannerghata	0	---	---	---	---	0	Bharat
00049	Male	00025	00009	7	Mysore	0	---	---	---	---	0	Bhuvan
00051	Male	00025	00026	7	Mysore	0	---	---	---	---	0	Chetan
00052	Male	00019	00033	7	Visakapatnam	75	0.556	0.145	0.134	72.4	0	Shiva
00053	Female	00034	00036	7	Mysore	0	---	---	---	---	1	Kalpana
00054	Female	00001	00024	7	Usgown	50	0	0.198	0.207	98.7	1	Rani
00055	Male	00025	00018	6	Mysore	0	---	---	---	---	0	Vipin
00056	Male	00013	00021	6	Bannerghata	0	---	---	---	---	0	Ravindra
00057	Female	00025	00009	6	Mysore	0	---	---	---	---	1	Amith
00058	Female	00034	00035	6	Mysore	0	---	---	---	---	0	Akila

National	Sex	Sire	Dam	Age	Location	Known	Inbreeding	Mean	Kinship	First	Progeny	Local ID
00059	Female	00034	00036	6	Chatbir Zoo	0	---	---	---	---	0	Anju
00060	Male	P00037	00037	6	Chennai	0	---	---	---	---	0	Madhan
00061	Male	00032	00024	6	Usgown	75	0.5	0.195	0.225	97.1	0	Somu
00062	Female	Wild	Wild	10	Chennai	100	0	0.04	0.038	19.7	2	Geetha
00063	Male	Wild	Wild	10	Delhi	100	0	0.02	0.02	9.9	1	Unm2
00064	Female	Wild	Wild	0	Delhi	100	0	0.02	0.02	9.9	1	Unm3
00065	Female	00025	00009	5	Mysore	0	---	---	---	---	1	Violaine
00066	Female	00034	00036	5	Mysore	0	---	---	---	---	0	Priya
00067	Male	00028	00037	4	Chennai	50	0	0.139	0.137	69.1	0	Rathnam
00070	Male	00025	00009	4	Mysore	0	---	---	---	---	0	Pretam
00071	Female	00032	00054	4	Usgown	50	0.5	0.203	0.224	101.2	0	Pinky
00072	Male	00025	00009	4	Mysore	0	---	---	---	---	0	Anubhav
00073	Female	00025	00018	4	Mysore	0	---	---	---	---	0	Sarita
00074	Female	00013	00021	4	Bannerghata	0	---	---	---	---	0	Kaveri
00075	Female	P00024	00024	3	Usgown	50	0	0.188	0.206	93.8	0	Rosa
00076	Male	00028	00036	3	Mysore	50	0	0.139	0.136	69.1	0	Unm4
00077	Male	00028	00062	3	Chennai	100	0	0.099	0.098	49.4	0	Vijay
00078	Female	00028	00037	3	Chennai	50	0	0.139	0.13	69.1	0	_____
00079	Male	00025	P00025	3	Mysore	0	---	---	---	---	0	Sheshan
00080	Male	00034	00057	3	Mysore	0	---	---	---	---	0	Aditya
00081	Male	00025	00065	3	Mysore	0	---	---	---	---	0	Ashoka
00082	Female	00025	00018	3	Mysore	0	---	---	---	---	0	Gowri
00083	Male	00034	00031	2	Mysore	0	---	---	---	---	0	Siddhu
00084	Male	00034	00053	2	Mysore	0	---	---	---	---	0	Harsha
00085	Male	00063	00064	2	Delhi	100	0	0.04	0.04	19.7	0	Unm5
00086	Male	P00024	00024	2	Usgown	50	0	0.188	0.21	93.8	0	Bhima
00087	Male	Unk	Unk	2	Pune	0	---	---	---	---	0	Prakash
00088	Female	00028	00037	2	Chennai	50	0	0.139	0.131	69.1	0	Lekshmi
00089	Female	00034	00035	2	Mysore	0	---	---	---	---	0	Ragini
00090	Male	P00018	00018	2	Mysore	0	---	---	---	---	0	Avinash
00091	Female	00028	00062	1	Chennai	100	0	0.099	0.092	49.4	0	Sranya
00092	Female	Unk	Unk	2	Pune	0	---	---	---	---	0	Hamsa
00093	Unsexed	P00007	00007	1	Bannerghata	50	0	0.04	0.032	19.7	0	_____

Inbreeding Statistics

The inbreeding statistics of the captive Indian bison population were calculated using PM2000 and are presented below in table 17. Specimens with studbook numbers 00019, 00027, 00033, 00039, 00040, 00050, 00053, 00061 and 00071 have significant levels of inbreeding. They or their offspring should accordingly not be used for breeding purposes as they contain a much reduced sample of the original gene pool and their use in breeding would cause an accelerated loss of genetic diversity.

Table 17 Inbreeding statistics of the captive Indian bison population

National Studbook No.	Sex	Age	Location	% Known	Inbreeding Coefficient
00001	Male	18	Usgown	0	0
00002	Female	25	Delhi	0	0
00003	Male	0	Bannerghata	0	0
00004	Female	0	Bannerghata	0	0
00005	Male	0	Hyderabad	100	0
00006	Female	12	Hyderabad	0	0
00007	Female	22	Bannerghata	100	0
00008	Male	0	Mysore	0	0
00009	Female	0	Mysore	0	0
00010	Female	21	Bannerghata	0	0
00011	Male	5	Hyderabad	0	0
00012	Female	8	Hyderabad	0	0
00013	Male	15	Bannerghata	0	0
00014	Male	0	Bannerghata	0	0
00015	Female	0	Bannerghata	0	0
00016	Female	11	Hyderabad	50	0
00017	Female	8	Hyderabad	0	0
00018	Female	14	Mysore	0	0
00019	**Male**	**8**	**Hyderabad**	**75**	**0.5**
00020	Male	13	Bannerghata	0	0
00021	Female	12	Bannerghata	0	0
00022	Male	0	Mysore	0	0
00023	Female	0	Mysore	0	0
00024	Female	0	Usgown	100	0
00025	Male	0	Mysore	0	0
00026	Female	13	Mysore	0	0
00027	**Male**	**12**	**Visakapatnam**	**75**	**0.5**
00028	Male	15	Chennai	100	0
00029	Male	1	Molem (Released)	50	0
00030	Female	9	Bannergha	0	0
00031	Female	11	Mysore	0	0
00032	Male	10	Usgown	50	0
00033	**Female**	**4**	**Hyderabad**	**75**	**0.5**
00034	Male	10	Mysore	0	0

National Studbook No.	Sex	Age	Location	% Known	Inbreeding Coefficient
00035	Female	10	Mysore	0	0
00036	Female	10	Mysore	0	0
00037	Female	9	Chennai	0	0
00038	Male	9	Usgown	50	0
00039	**Female**	**9**	**Visakapatnam**	**75**	**0.5**
00040	**Female**	**9**	**Visakapatnam**	**62.5**	**0.6667**
00041	Male	0	Sepahijala	100	0
00042	Male	0	Usgown	50	0
00043	Male	8	Bannerghata	0	0
00044	Male	8	Bannerghata	0	0
00045	Male	8	Bannerghata	0	0
00046	Male	7	Usgown	50	0
00047	Male	7	Bannerghata	0	0
00048	Male	7	Bannerghata	0	0
00049	Male	7	Mysore	0	0
00050	**Female**	**1**	**Hyderabad**	**62.5**	**0.6667**
00051	Male	7	Mysore	0	0
00052	Male	7	Visakapatnam	75	0.5556
00053	**Female**	**7**	**Mysore**	**0**	**0**
00054	Female	7	Usgown	50	0
00055	Male	6	Mysore	0	0
00056	Male	6	Bannerghata	0	0
00057	Female	6	Mysore	0	0
00058	Female	6	Mysore	0	0
00059	Female	6	Chatbir Zoo	0	0
00060	Male	6	Chennai	0	0
00061	**Male**	**6**	**Usgown**	**75**	**0.5**
00062	Female	10	Chennai	100	0
00063	Male	10	Delhi	100	0
00064	Female	0	Delhi	100	0
00065	Female	5	Mysore	0	0
00066	Female	5	Mysore	0	0
00067	Male	4	Chennai	50	0
00068	Female	0	Chatbir Zoo	0	0
00070	Male	4	Mysore	0	0
00071	**Female**	**4**	**Usgown**	**50**	**0.5**
00072	Male	4	Mysore	0	0
00073	Female	4	Mysore	0	0
00074	Female	4	Bannerghata	0	0
00075	Female	3	Usgown	50	0
00076	Male	3	Mysore	50	0
00077	Male	3	Chennai	100	0
00078	Female	3	Chennai	50	0
00079	Male	3	Mysore	0	0
00080	Male	3	Mysore	0	0
00081	Male	3	Mysore	0	0
00082	Female	3	Mysore	0	0
00083	Male	2	Mysore	0	0
00084	Male	2	Mysore	0	0
00085	Male	2	Delhi	100	0

National Studbook No.	Sex	Age	Location	% Known	Inbreeding Coefficient
00086	Male	2	Usgown	50	0
00087	Male	2	Pune	0	0
00088	Female	2	Chennai	50	0
00089	Female	2	Mysore	0	0
00090	Male	2	Mysore	0	0
00091	Female	1	Chennai	100	0
00092	Female	2	Pune	0	0
00093	Unsexed	1	Bannerghata	50	0

Conclusion

Gaur (Indian bison) is a mega herbivore inhabiting a variety of habitat types and widely distributed across south and southeast Asia. The species is under increasing threat from continued habitat degradation and fragmentation and is listed as Vulnerable in th IUCN Red List of Threatened Species. The species is currently managed as part of an international effort and has several zoos holding the species both within and outside India.

Indian zoos currently have 67 (35.31.1) specimens in captivity. Analysis of the captive Indian population suggests that the current population was initiated with low founder numbers. A target population size for Indian zoos of 150 individuals to be achieved over 15 years; with the inclusion of two founders every year for the same time period is suggested for maintaining a genetically viable and demographically stable population.

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Glossary of Terms

Demographic Terms

Age Distribution -- A two-way classification showing the numbers or percentages of individuals in various age and sex classes.

Population Growth Rate (Lambda, λ) -- The proportional change in population size from one year to the next. Lambda can be based on life-table calculations (the expected lambda) or from observed changes in population size from year to year. A lambda of 1.11 means a 11% per year increase; lambda of .97 means a 3% decline in size per year.

Px, Age-Specific Survival – The probability that an individual of age *x* survives one time period; is conditional on an individual being alive at the beginning of the time period. Alternatively, the proportion of individuals which survive from the beginning of one age class to the next.

Qx, Mortality – Probability that an individual of age *x* dies during time period. Qx = 1-Px
The proportion of individuals that die during an age class. It is calculated from the number of animals that die during an age class divided by the number of animals that were alive at the beginning of the age class (i.e.-at risk).

lx, Age-Specific Survivorship – The probability that a new individual (e.g., age 0) is alive at the *beginning* of age *x*. Alternatively, the proportion of individuals which survive from birth to the beginning of a specific age class.

Mx, **Fecundity** – The average number of same-sexed young born to animals in that age class. Because SPARKS is typically using relatively small sample sizes, SPARKS calculates Mx as 1/2 the average number of young born to animals in that age class. This provides a somewhat less noisy estimate of Mx, though it does not allow for unusual sex ratios. The fecundity rates provide information on the age of first, last, and maximum reproduction.

Vx, **Reproductive Value** – The expected number of offspring produced this year and in future years by an animal of age x.

Ex, Life Expectancy – Average years of further life for an animal in age class x.

Risk (Qx or Mx) – The number of individuals that have lived during an age class. The number at risk is used to calculate Mx and Qx by dividing the number of births and deaths that occurred during an age class by the number of animals at risk of dying and reproducing during that age class.

Genetic Terms

(Founder) Contribution -- Number of copies of a founder's genome that are present in the living descendants. Each offspring contributes 0.5, each grand-offspring contributes 0.25, etc.

Current Gene Diversity (GD) -- The proportional gene diversity (as a proportion of the source population) is the probability that two alleles from the same locus sampled at random from the population will be identical by descent. Gene diversity is calculated from allele frequencies, and is the heterozygosity expected in progeny produced by random mating, and if the population were in Hardy-Weinberg equilibrium.

Effective Population Size (Inbreeding N_e) -- The size of a randomly mating population of constant size with equal sex ratio and a Poisson distribution of family sizes that would (a) result in the same mean rate of inbreeding as that observed in the population, or (b) would result in the same rate of random change in gene frequencies (genetic drift) as observed in the population. These two definitions are identical only if the population is demographically stable (because the rate of inbreeding depends on the distribution of alleles in the parental generation, whereas the rate of gene frequency drift is measured in the current generation).

FOKE, First Order Kin Equivalents – The number of first-order kin (siblings or offspring) that would contain the number of copies of an individuals alleles (identical by descent) as are present in the captive-born population. Thus an offspring or sib contributes 1 to FOKE; each grand-offspring contributes 1/2 to FOKE; each cousin contributes 1/4 to FOKE. FOKE = 4*N*MK, in which N is the number of living animals in the captive population.

Founder – An individual obtained from a source population (often the wild) that has no known relationship to any individuals in the derived population (except for its own descendants).

Founder Genome Equivalents (FGE) – The number wild-caught individuals (founders) that would produce the same amount of gene diversity as does the population under study. The gene diversity of a population is 1 - 1 / (2 * FGE).

Founder Genome Surviving – The sum of allelic retentions of the individual founders (i.e., the product of the mean allelic retention and the number of founders).

GU, Genome Uniqueness – Probability that an allele sampled at random from an individual is not present, identical by descent, in any other living individual in the population. GU-all is the genome uniqueness relative to the entire population. GU-Desc is the genome uniqueness relative to the living non-founder, descendants.

Inbreeding Coefficient (F) -- Probability that the two alleles at a genetic locus are identical by descent from an ancestor common to both parents. The mean inbreeding coefficient of a

population will be the proportional decrease in observed heterozygosity relative to the expected heterozygosity of the founder population.

KV, Kinship Value – The weighted mean kinship of an animal, with the weights being the reproductive values of each of the kin. The mean kinship value of a population predicts the loss of gene diversity expected in the subsequent generation if all animals were to mate randomly and all were to produce the numbers of offspring expected for animals of their age.

Mean Generation Time (T) -- The average time elapsing from reproduction in one generation to the time the next generation reproduces. Also, the average age at which a female (or male) produces offspring. It is not the age of first reproduction. Males and females often have different generation times.

Mean Kinship (MK) -- The mean kinship coefficient between an animal and all animals (including itself) in the living, captive-born population. The mean kinship of a population is equal to the proportional loss of gene diversity of the descendant (captive-born) population relative to the founders and is also the mean inbreeding coefficient of progeny produced by random mating. Mean kinship is also the reciprocal of two times the founder genome equivalents: MK = 1 / (2 * FGE). MK = 1 - GD.

Percent Known -- Percent of an animal's genome that is traceable to known Founders. Thus, if an animal has an UNK sire, the % Known = 50. If it has an UNK grandparent, % Known = 75.

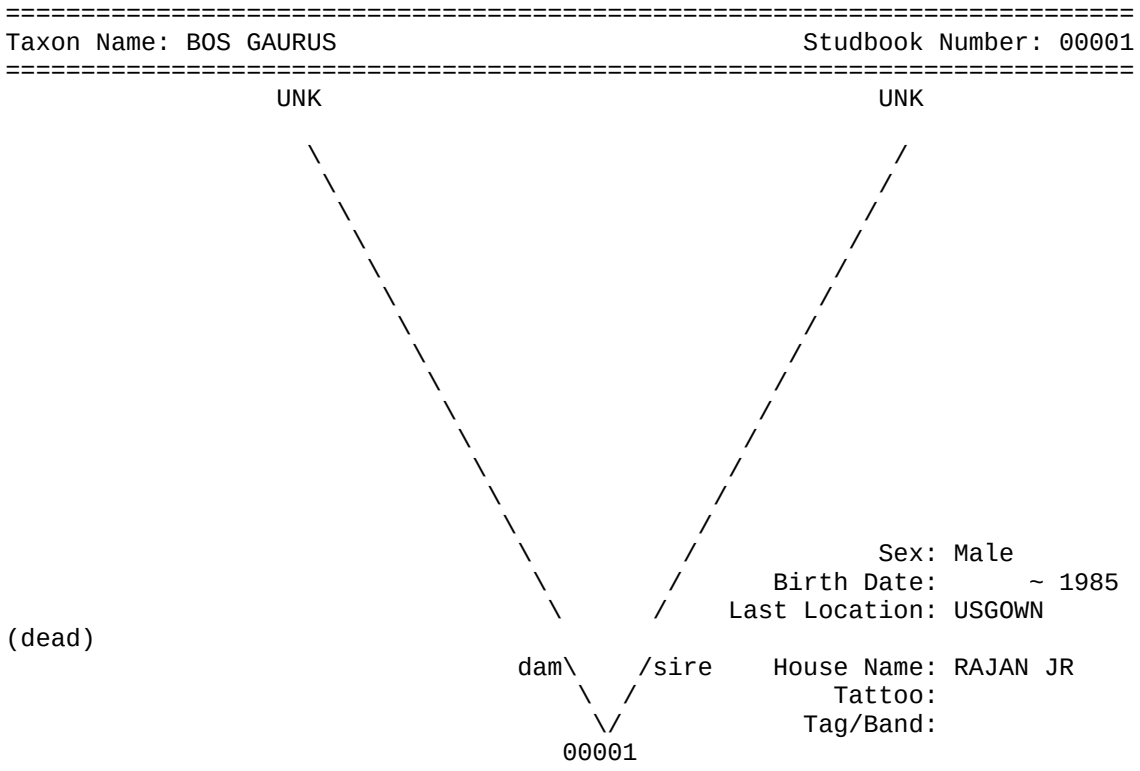
Prob Lost – Probability that a random allele from the individual will be lost from the population in the next generation, because neither this individual nor any of its relatives pass on the allele to an offspring. Assumes that each individual will produce a number of future offspring equal to its reproductive value, Vx.

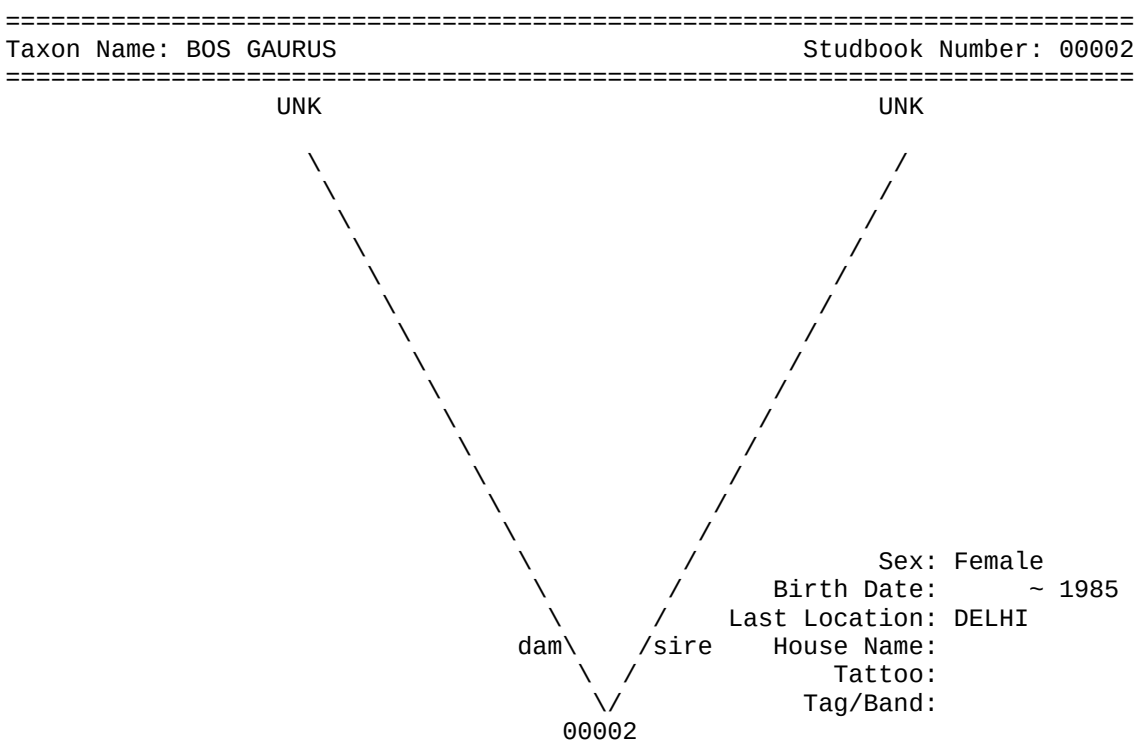
(Founder) Representation – Proportion of the genes in the descendant population that derives from that founder. I.e., proportional Founder Contribution.

Allele Retention – The probability that a gene present in a founder individual exists in the living, descendant population.

Appendix I

Pedigree Chart Report
GAUR Studbook





```
==========================================================================
Taxon Name: BOS GAURUS                          Studbook Number: 00003
==========================================================================
                  UNK                                   UNK

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                                \            /
                                 \          /          Sex: Male
                                  \        /       Birth Date:    ????
                                   \      /     Last Location: BANNERGHA
(dead)
                                dam\    /sire    House Name: KESHAVA
                                    \  /             Tattoo:
                                     \/            Tag/Band:
                                   00003


==========================================================================
Taxon Name: BOS GAURUS                          Studbook Number: 00004
==========================================================================
                  UNK                                   UNK

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                               \              /
                                \            /
                                 \          /          Sex: Female
                                  \        /       Birth Date:    ????
                                   \      /     Last Location: BANNERGHA
(dead)
                                dam\    /sire    House Name:
                                    \  /             Tattoo:
                                     \/            Tag/Band:
                                   00004
```

```
==========================================================================
Taxon Name: BOS GAURUS                          Studbook Number: 00005
==========================================================================
                  WILD                                  WILD

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                            \                    /
                             \                  /
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                               \              /
                                \            /
                                 \          /          Sex: Male
                                  \        /      Birth Date:    ????
                                   \      /    Last Location: HYDERABAD
(dead)
                                dam\    /sire    House Name:
                                    \  /             Tattoo:
                                     \/            Tag/Band:
                                   00005


==========================================================================
Taxon Name: BOS GAURUS                          Studbook Number: 00006
==========================================================================
                  UNK                                   UNK

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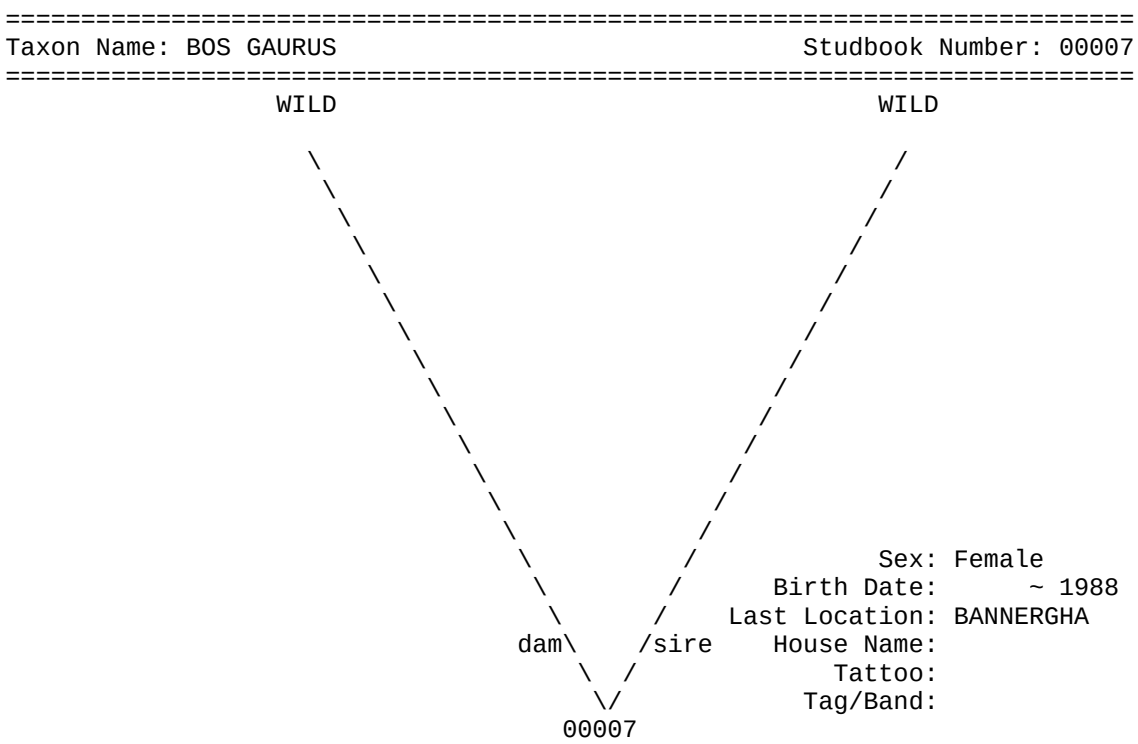
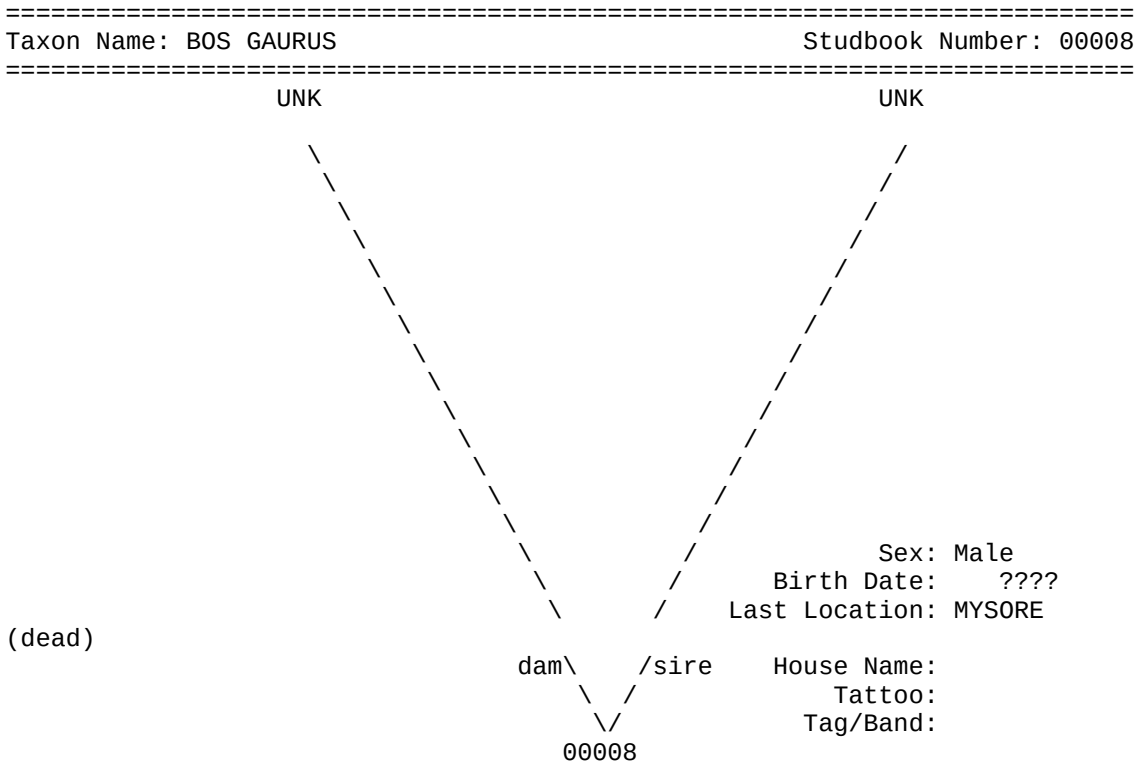
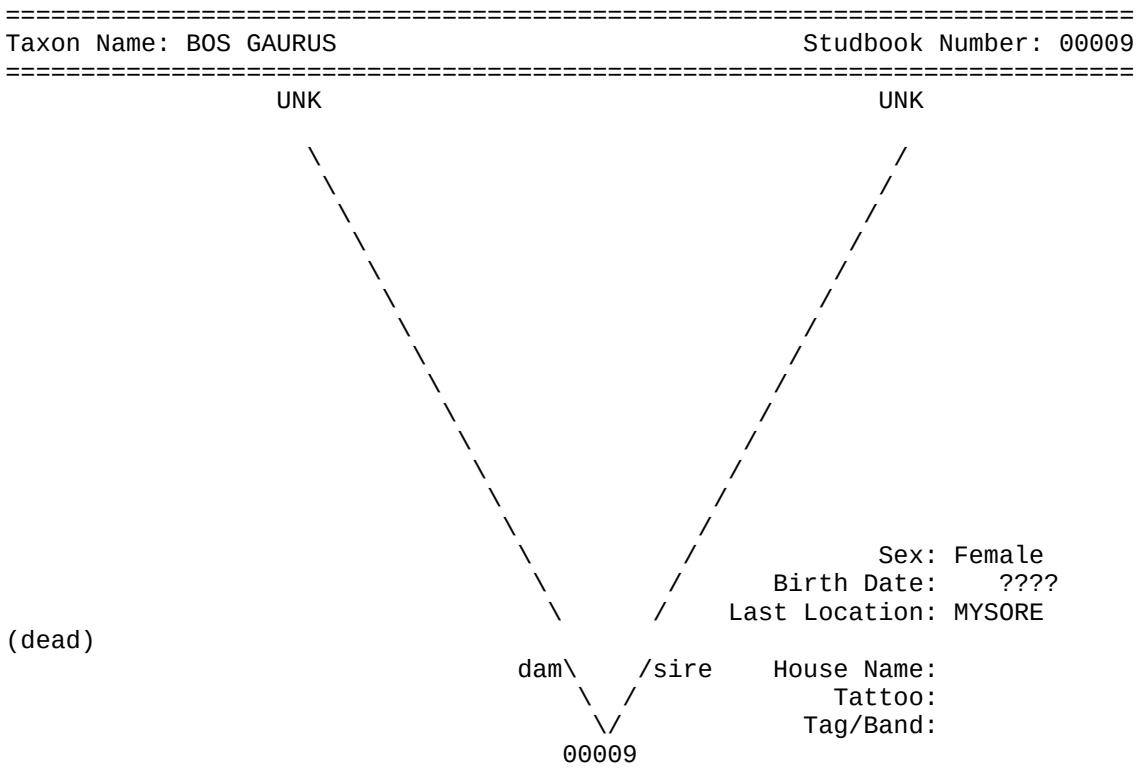
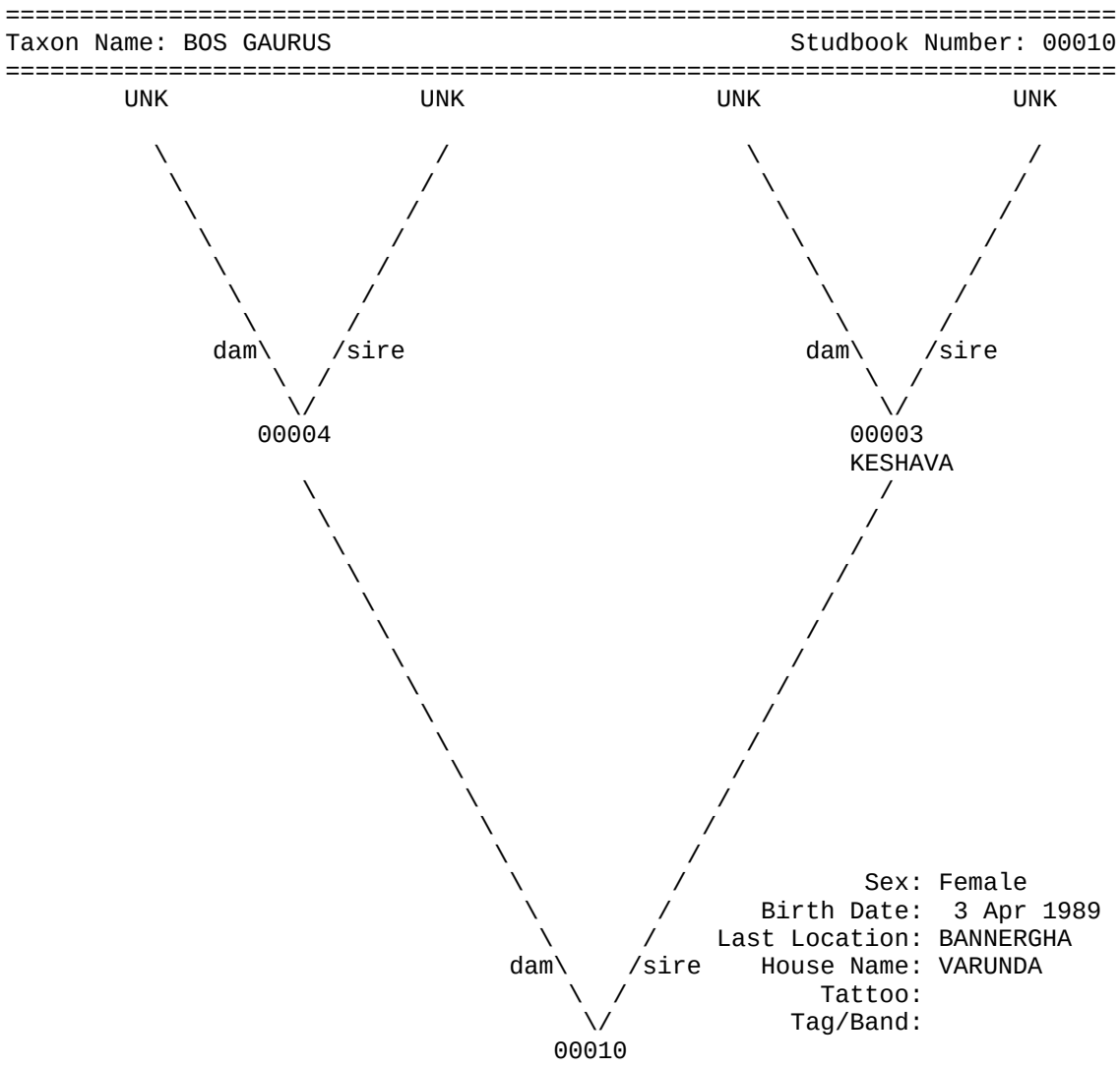
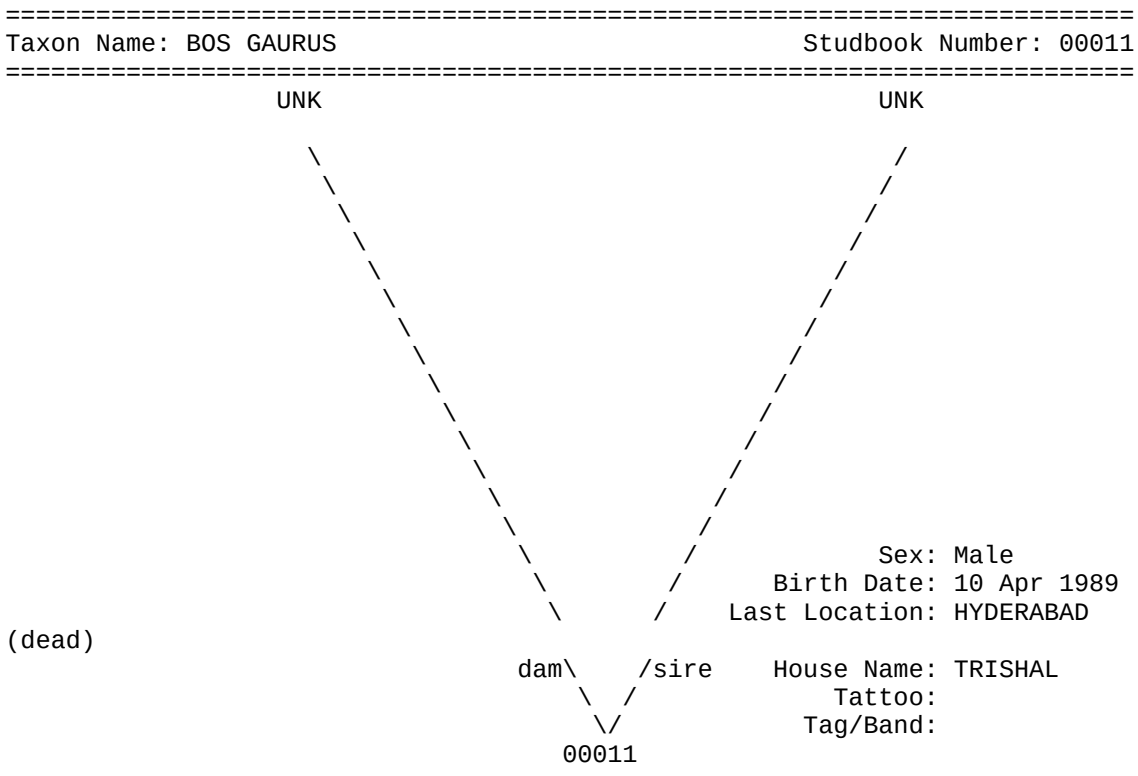
                            \                    /
                             \                  /
                              \                /
                               \              /
                                \            /
                                 \          /          Sex: Female
                                  \        /      Birth Date: 16 Sep 1987
                                   \      /    Last Location: HYDERABAD
(dead)
                                dam\    /sire    House Name: GANGAWATHI
                                    \  /             Tattoo:
                                     \/            Tag/Band:
                                   00006
```

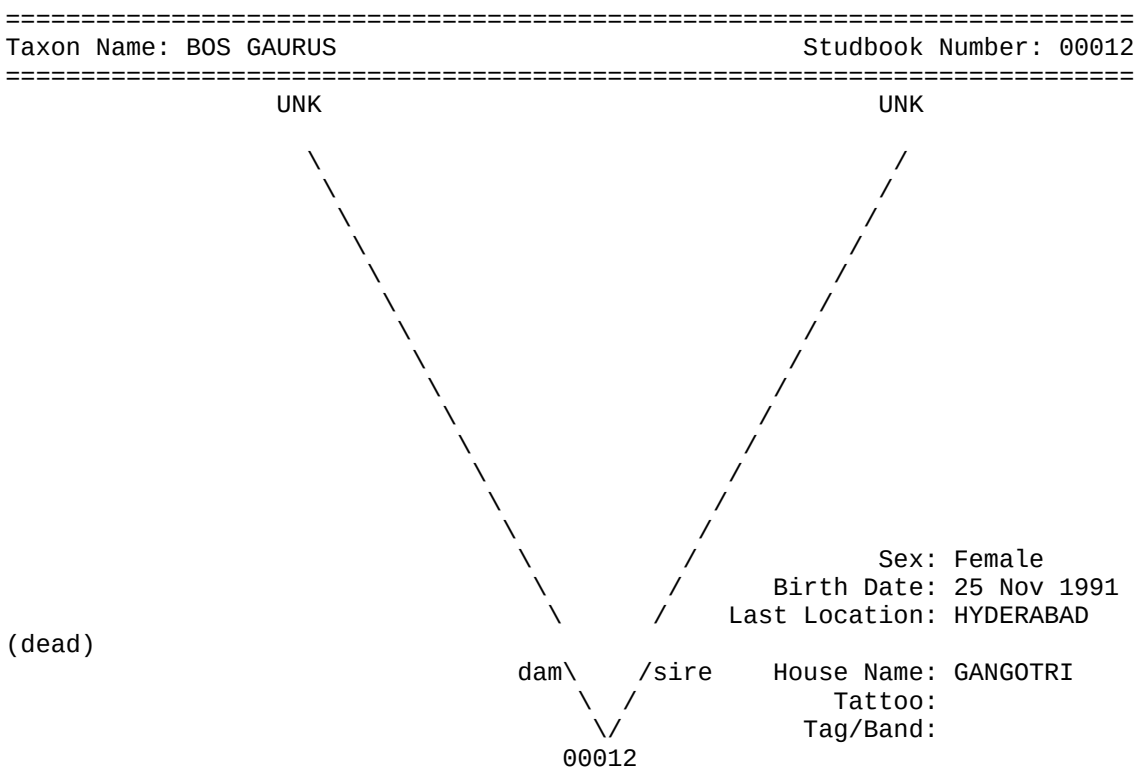

Taxon Name: BOS GAURUS
Studbook Number: 00007
WILD
WILD
Sex: Female
Birth Date: ~ 1988
Last Location: BANNERGHA
dam
sire
House Name:
Tattoo:
Tag/Band:
00007

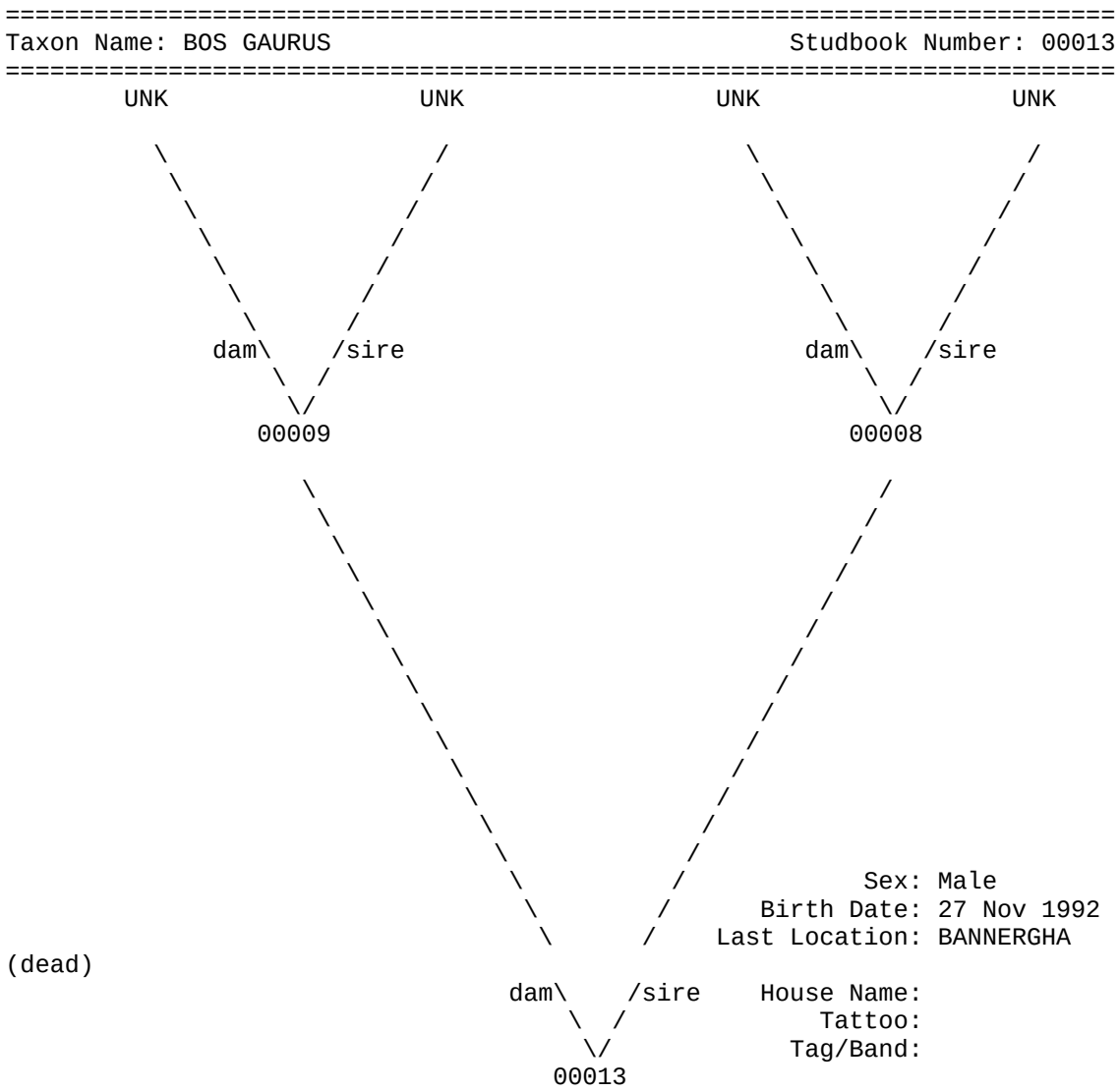

Taxon Name: BOS GAURUS
Studbook Number: 00008
UNK
UNK
Sex: Male
Birth Date: ????
Last Location: MYSORE
(dead)
dam
sire
House Name:
Tattoo:
Tag/Band:
00008

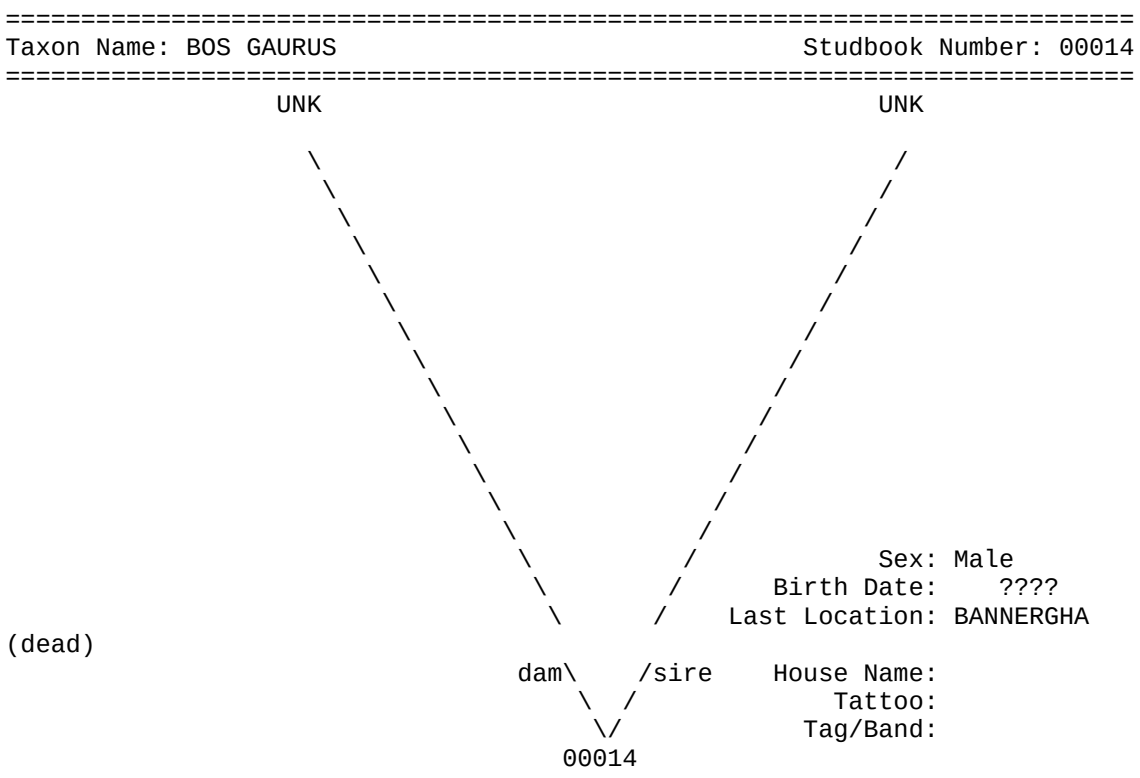

Taxon Name: BOS GAURUS
Studbook Number: 00009
UNK
UNK
Sex: Female
Birth Date: ????
Last Location: MYSORE
(dead)
dam\
/sire
House Name:
Tattoo:
Tag/Band:
00009

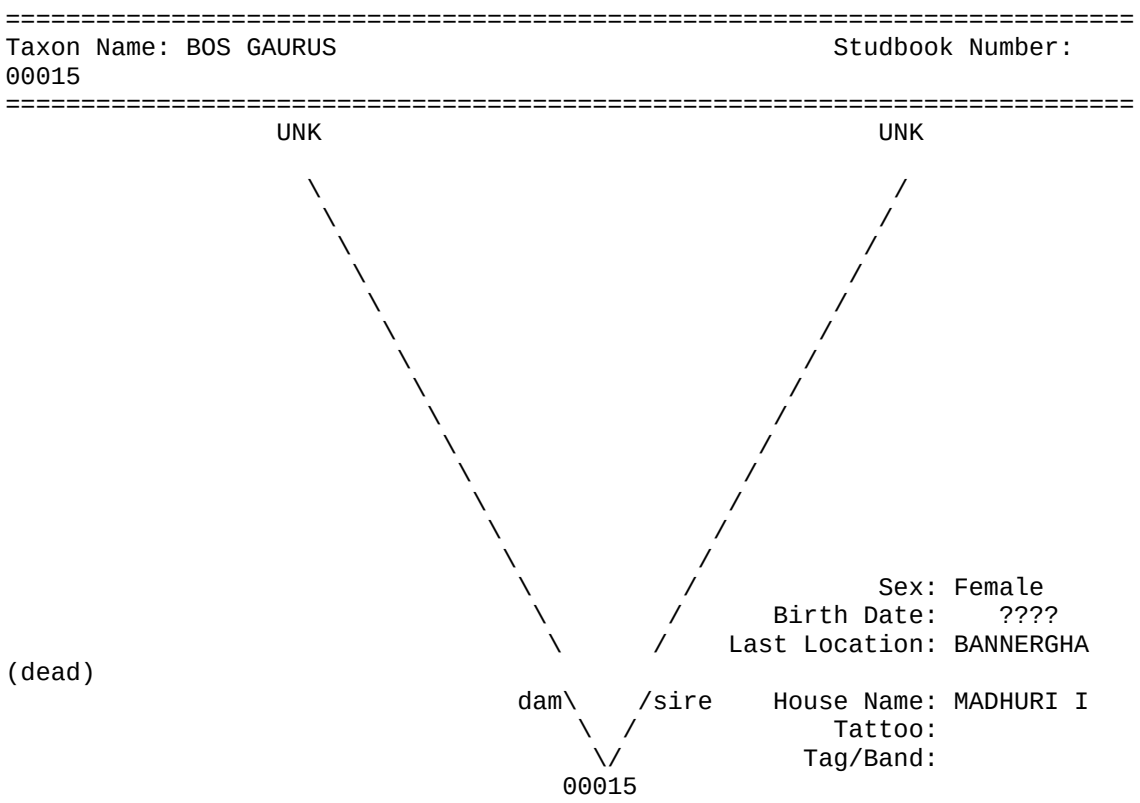

Taxon Name: BOS GAURUS
Studbook Number: 00010
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00004
00003
KESHAVA
dam
sire
00010
Sex: Female
Birth Date: 3 Apr 1989
Last Location: BANNERGHA
House Name: VARUNDA
Tattoo:
Tag/Band:

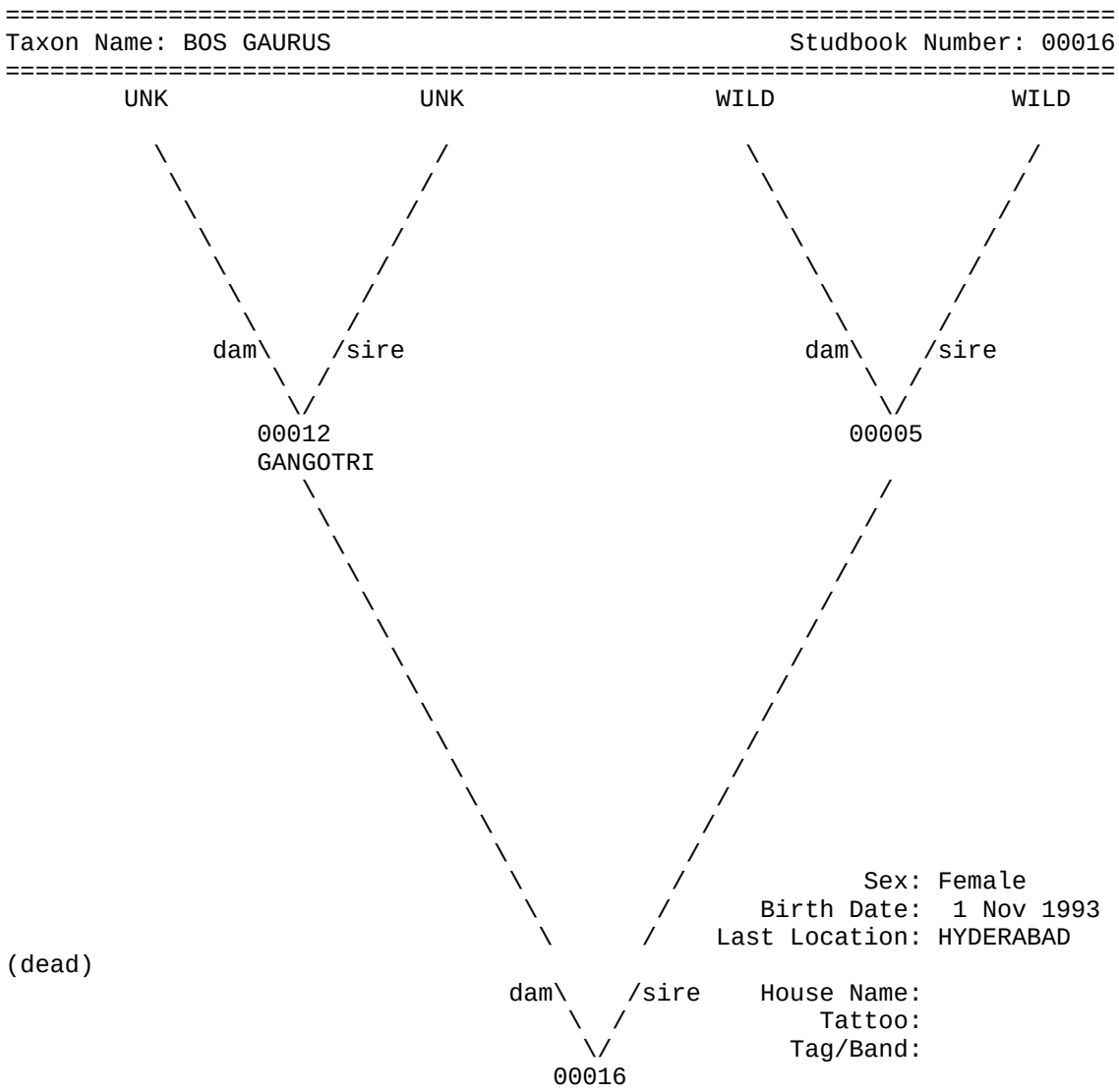

Taxon Name: BOS GAURUS
Studbook Number: 00011
UNK
UNK
Sex: Male
Birth Date: 10 Apr 1989
Last Location: HYDERABAD
(dead)
dam
sire
House Name: TRISHAL
Tattoo:
Tag/Band:
00011

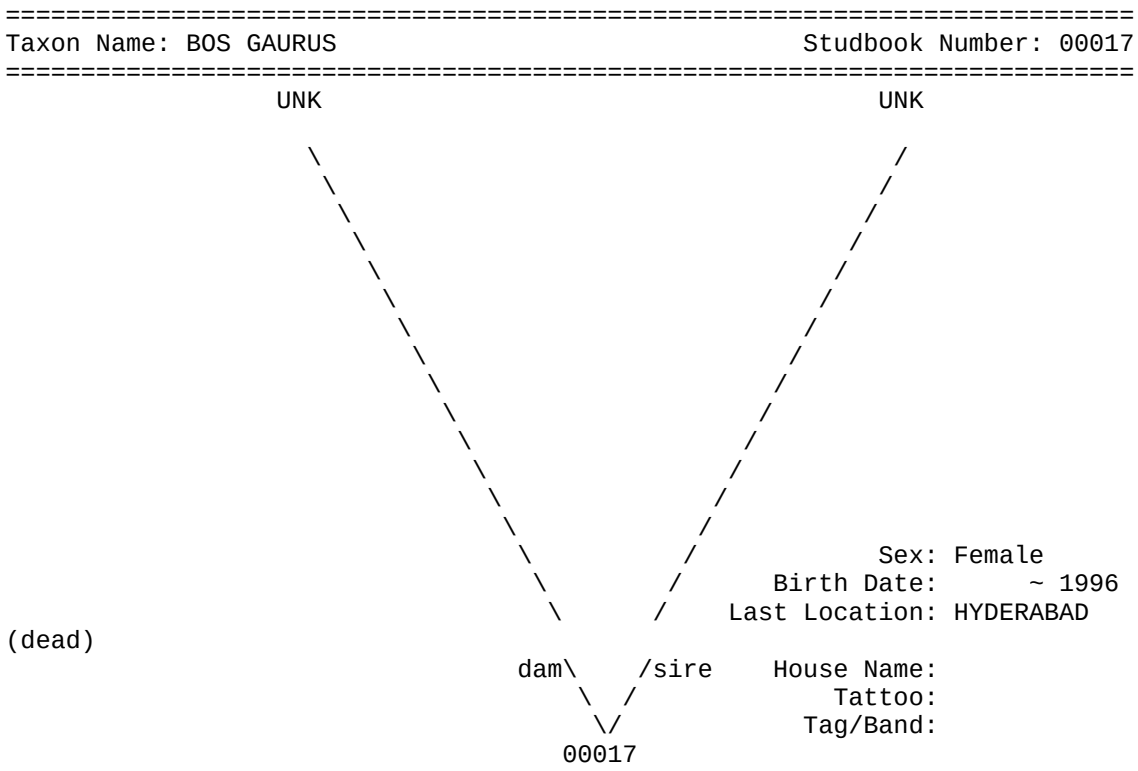

Taxon Name: BOS GAURUS
Studbook Number: 00012
UNK
UNK
Sex: Female
Birth Date: 25 Nov 1991
Last Location: HYDERABAD
(dead)
dam
sire
House Name: GANGOTRI
Tattoo:
Tag/Band:
00012

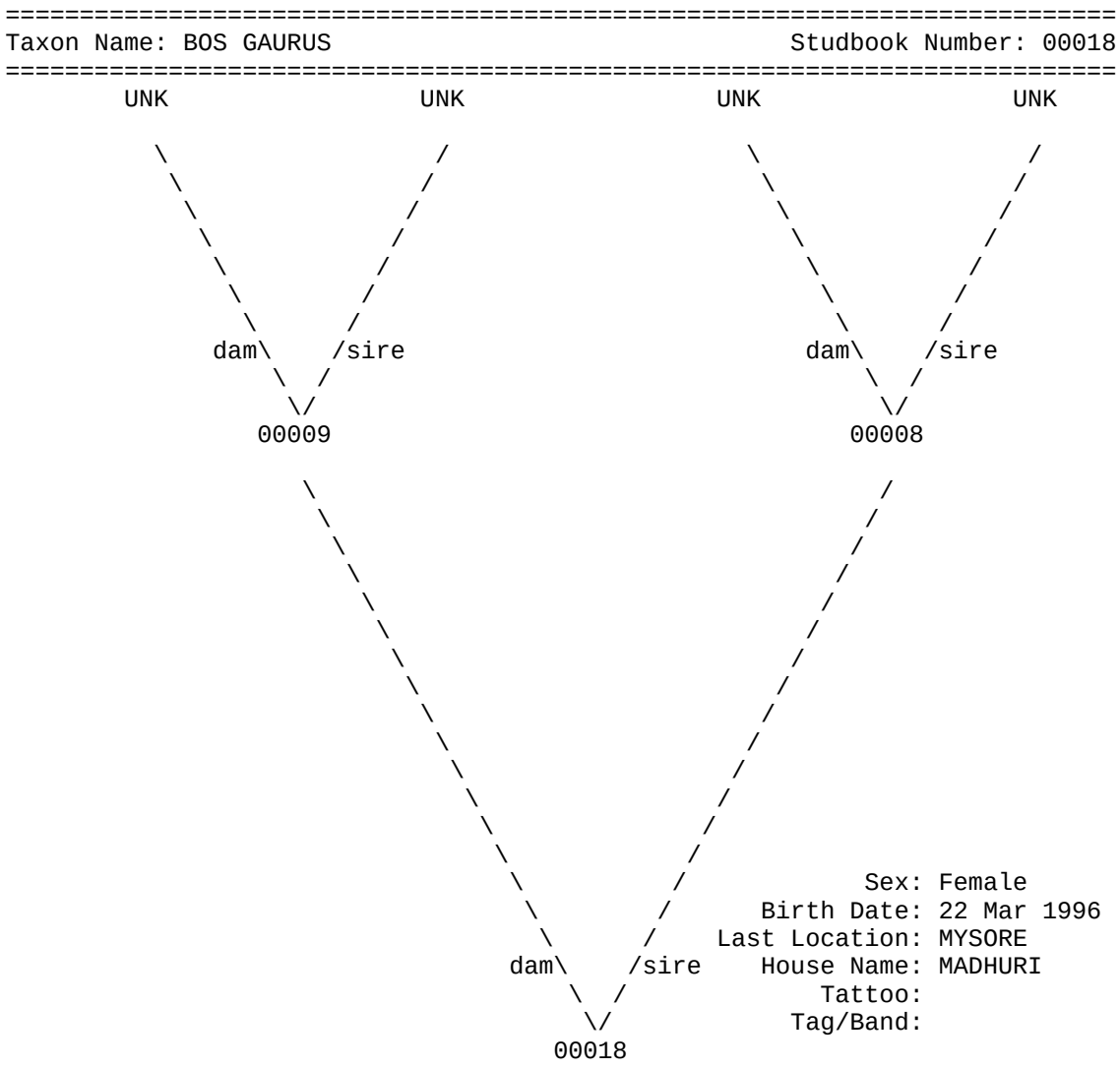

Taxon Name: BOS GAURUS
Studbook Number: 00013
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
Sex: Male
Birth Date: 27 Nov 1992
Last Location: BANNERGHA
(dead)
dam
sire
House Name:
Tattoo:
Tag/Band:
00013

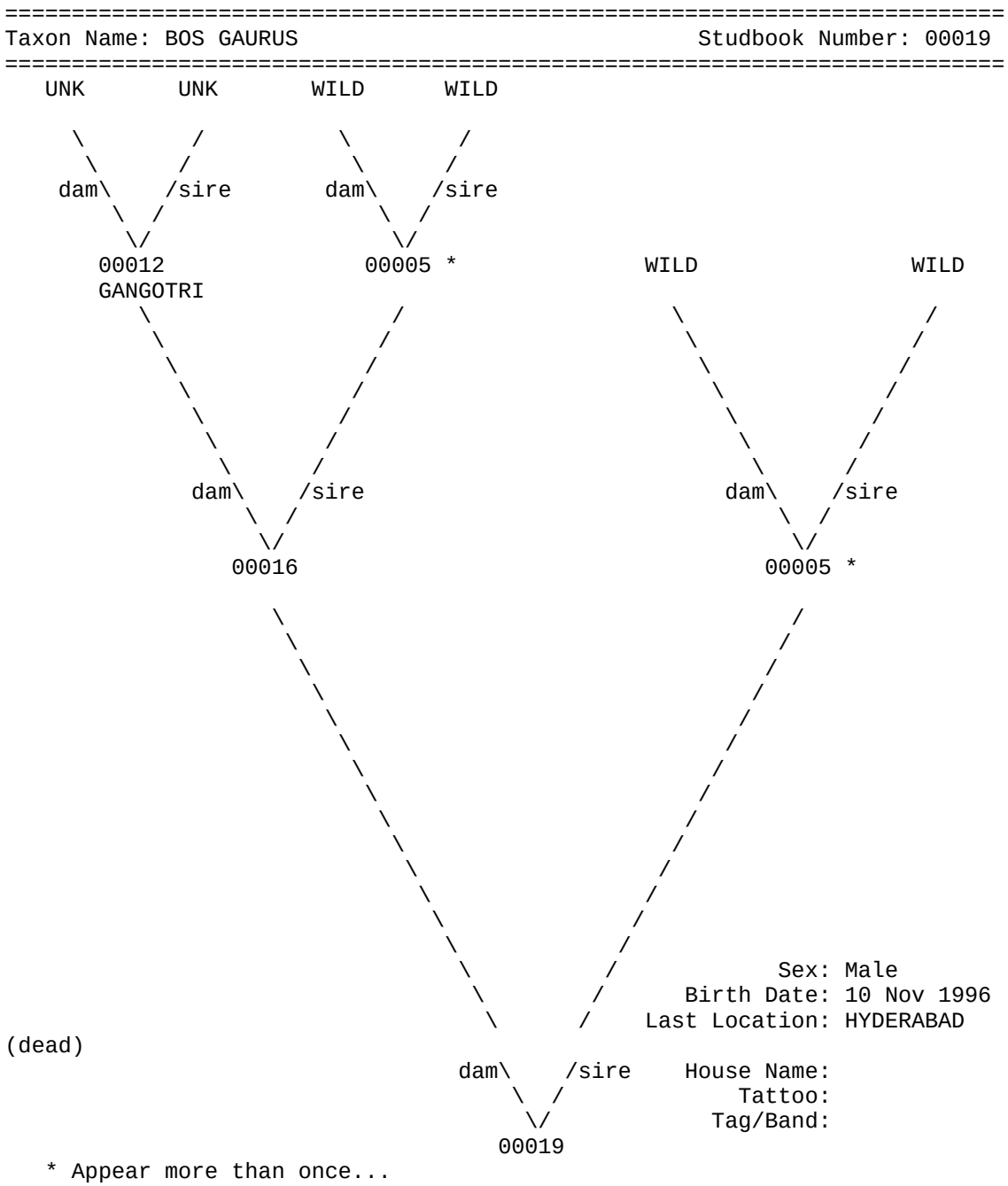

Taxon Name: BOS GAURUS
Studbook Number: 00014
UNK
UNK
Sex: Male
Birth Date: ????
Last Location: BANNERGHA
(dead)
dam\ /sire
House Name:
Tattoo:
Tag/Band:
00014

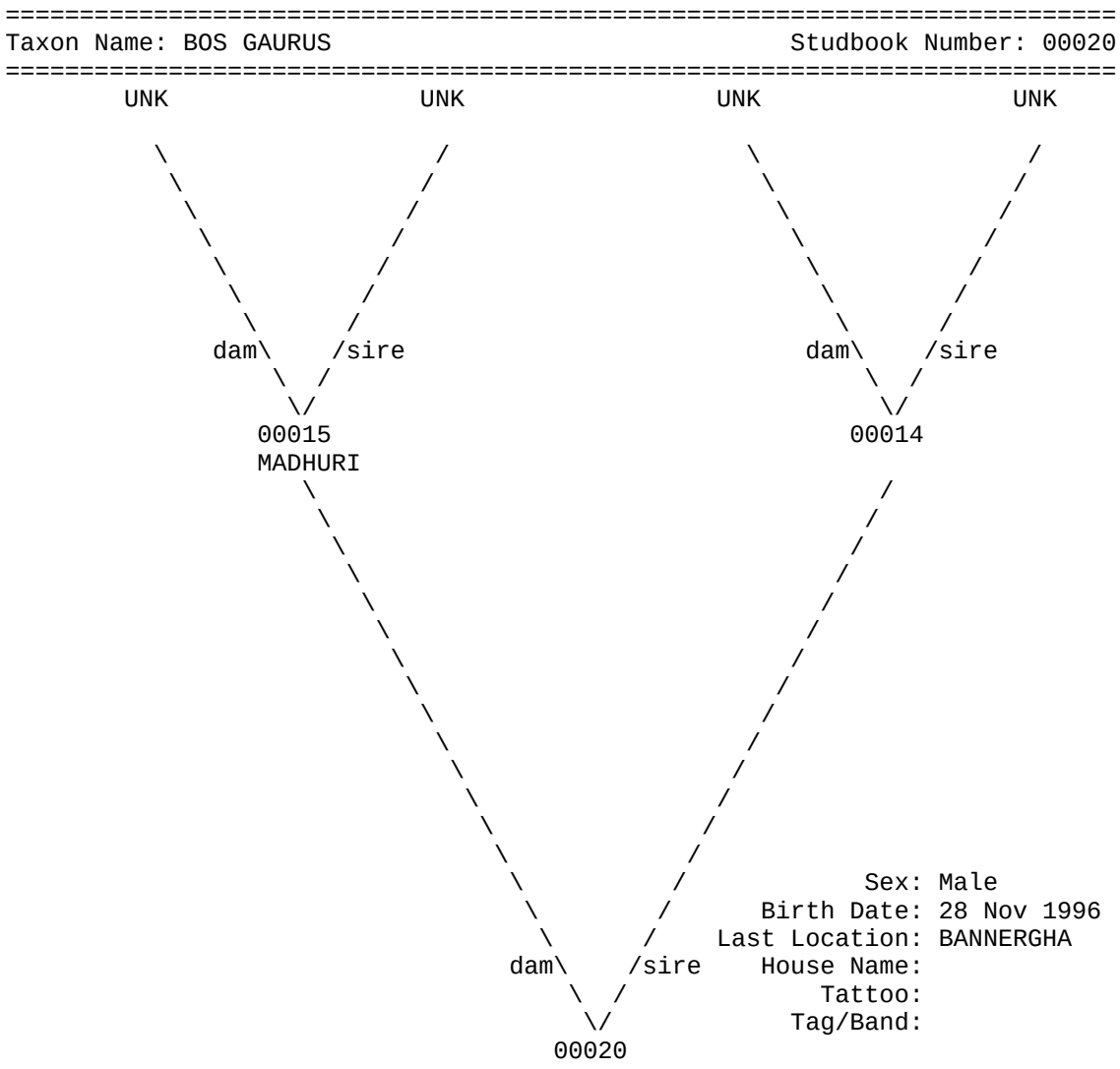

Taxon Name: BOS GAURUS
Studbook Number:
00015
UNK
UNK
Sex: Female
Birth Date: ????
Last Location: BANNERGHA
(dead)
dam\ /sire
House Name: MADHURI I
Tattoo:
Tag/Band:
00015


Taxon Name: BOS GAURUS
Studbook Number: 00016
UNK
UNK
WILD
WILD
dam
sire
dam
sire
00012
GANGOTRI
00005
Sex: Female
Birth Date: 1 Nov 1993
Last Location: HYDERABAD
(dead)
dam
sire
House Name:
Tattoo:
Tag/Band:
00016


Taxon Name: BOS GAURUS
Studbook Number: 00017
UNK
UNK
Sex: Female
Birth Date: ~ 1996
Last Location: HYDERABAD
(dead)
dam
sire
House Name:
Tattoo:
Tag/Band:
00017


Taxon Name: BOS GAURUS
Studbook Number: 00018
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
dam
sire
00018
Sex: Female
Birth Date: 22 Mar 1996
Last Location: MYSORE
House Name: MADHURI
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00019
UNK
UNK
WILD
WILD
dam\
/sire
dam\
/sire
00012
GANGOTRI
00005 *
WILD
WILD
dam\
/sire
dam\
/sire
00016
00005 *
Sex: Male
Birth Date: 10 Nov 1996
Last Location: HYDERABAD
(dead)
House Name:
Tattoo:
Tag/Band:
dam\
/sire
00019
* Appear more than once...


Taxon Name: BOS GAURUS
Studbook Number: 00020
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00015
MADHURI
00014
dam
sire
00020
Sex: Male
Birth Date: 28 Nov 1996
Last Location: BANNERGHA
House Name:
Tattoo:
Tag/Band:

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==========================================================================
Taxon Name: BOS GAURUS                          Studbook Number: 00021
==========================================================================
                  UNK                                   UNK

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                           \                    /
                            \                  /
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                              \              /
                               \            /
                                \          /
                                 \        /          Sex: Female
                                  \      /      Birth Date: 12 Dec 1996
                                   \    /    Last Location: BANNERGHA
(dead)
                                dam\    /sire    House Name:
                                    \  /             Tattoo:
                                     \/            Tag/Band:
                                   00021


==========================================================================
Taxon Name: BOS GAURUS                          Studbook Number: 00022
==========================================================================
                  UNK                                   UNK

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                     \                                /
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                          \                      /
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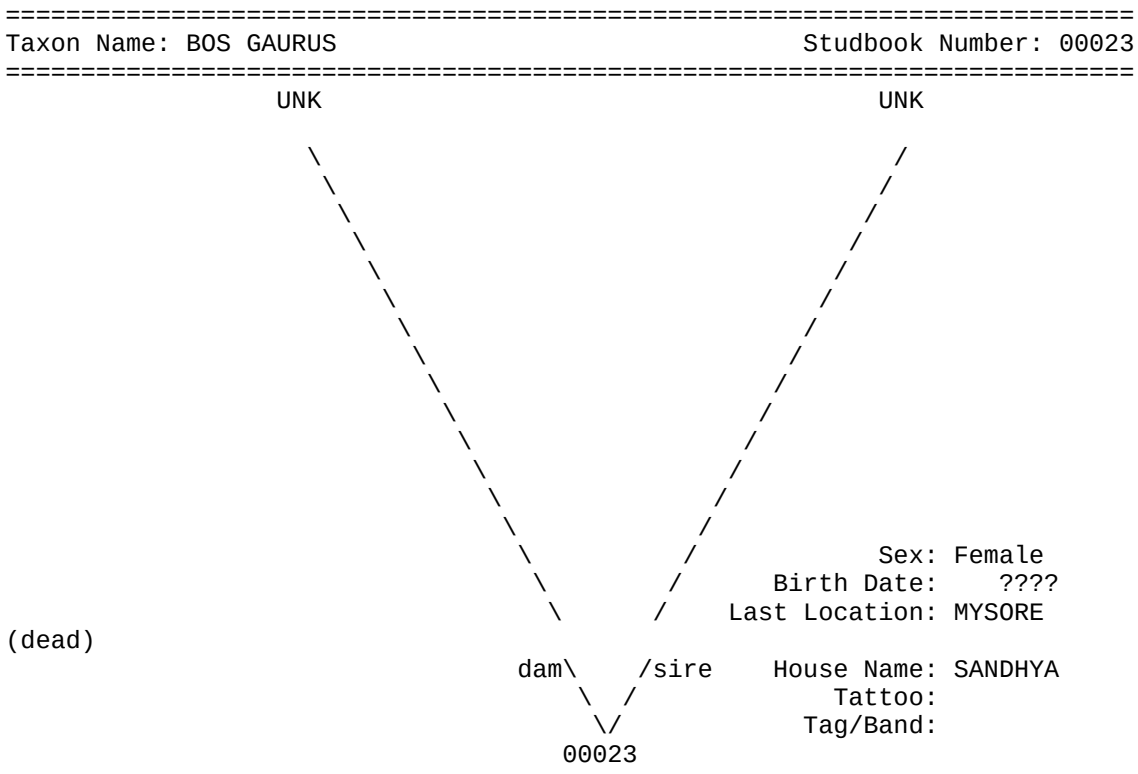
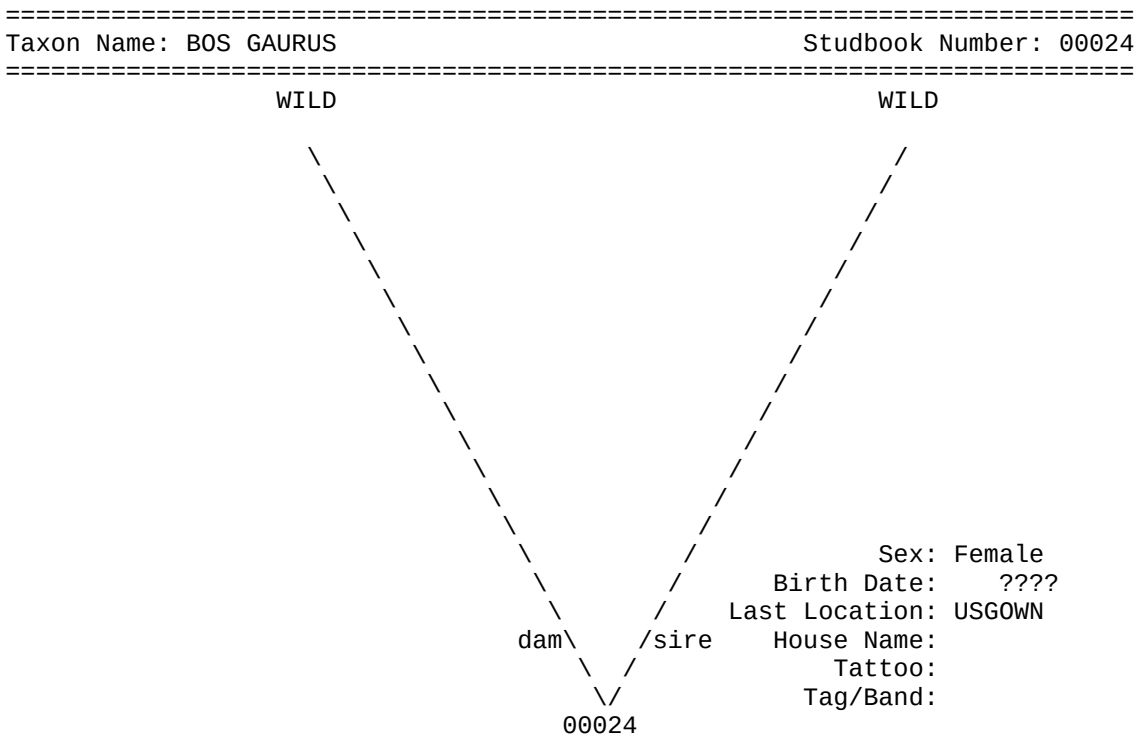
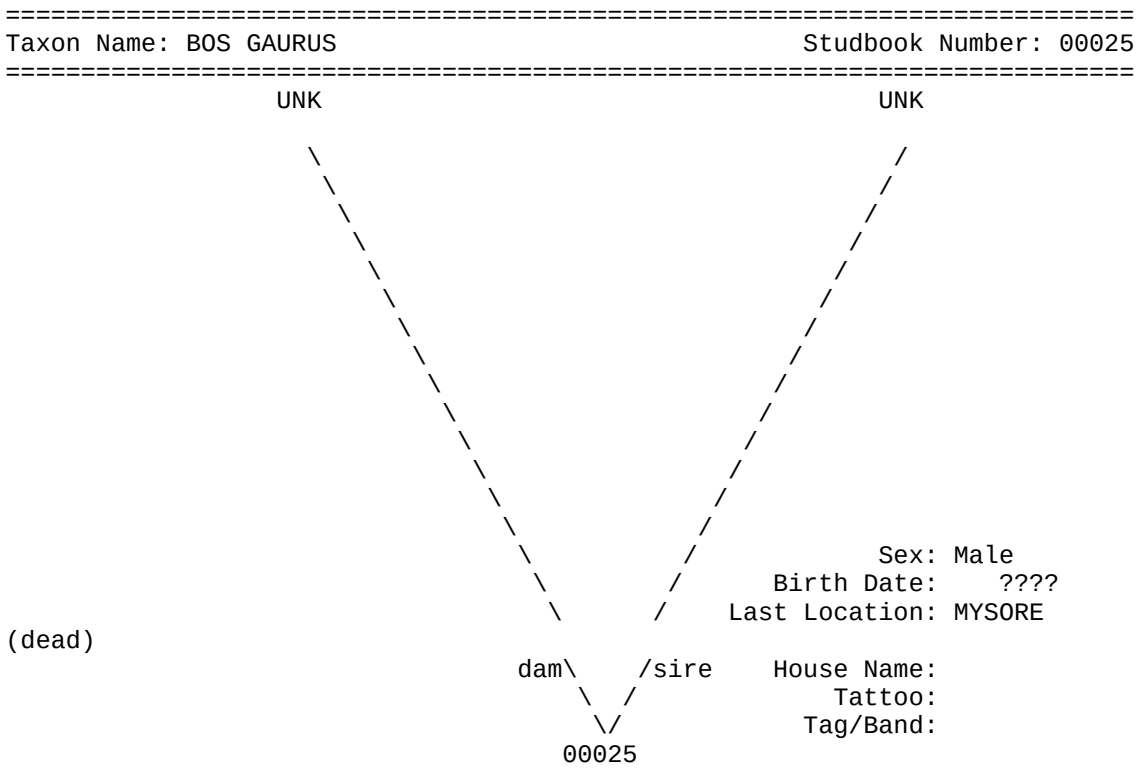
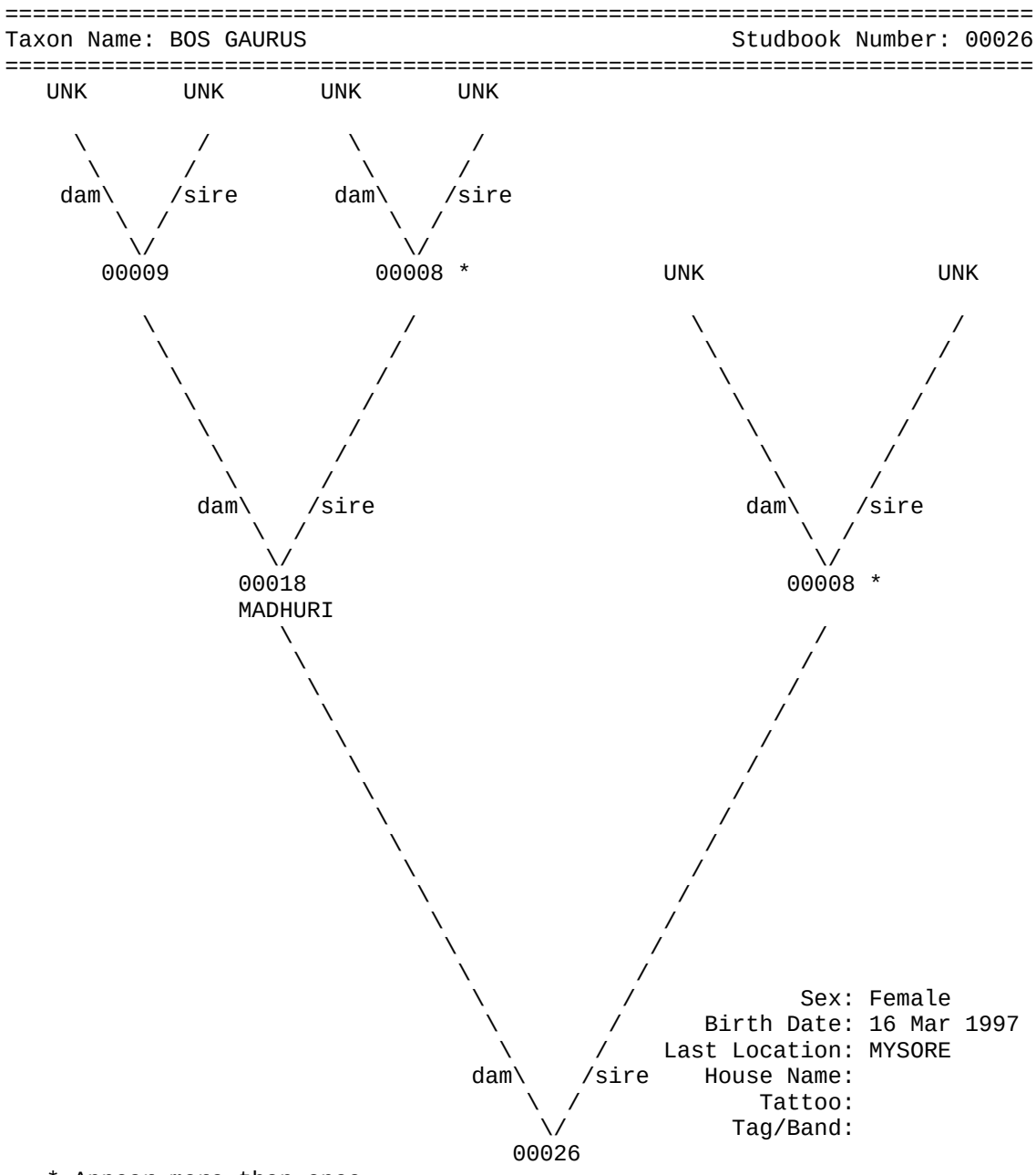
                              \              /
                               \            /
                                \          /
                                 \        /          Sex: Male
                                  \      /      Birth Date:    ????
                                   \    /    Last Location: MYSORE
(dead)
                                dam\    /sire    House Name:
                                    \  /             Tattoo:
                                     \/            Tag/Band:
                                   00022
```

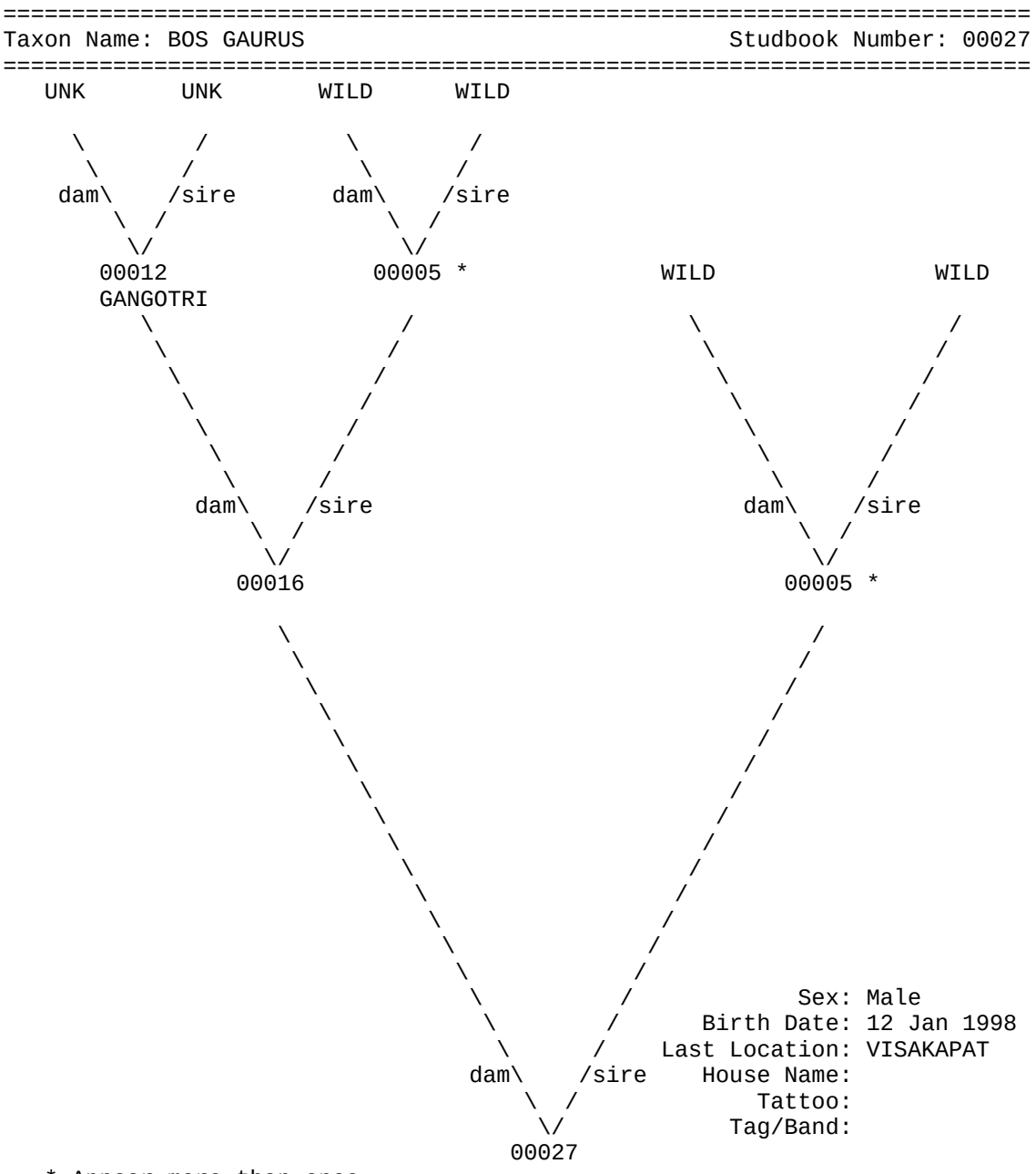

Taxon Name: BOS GAURUS
Studbook Number: 00023
UNK
UNK
Sex: Female
Birth Date: ????
Last Location: MYSORE
(dead)
dam
sire
House Name: SANDHYA
Tattoo:
Tag/Band:
00023

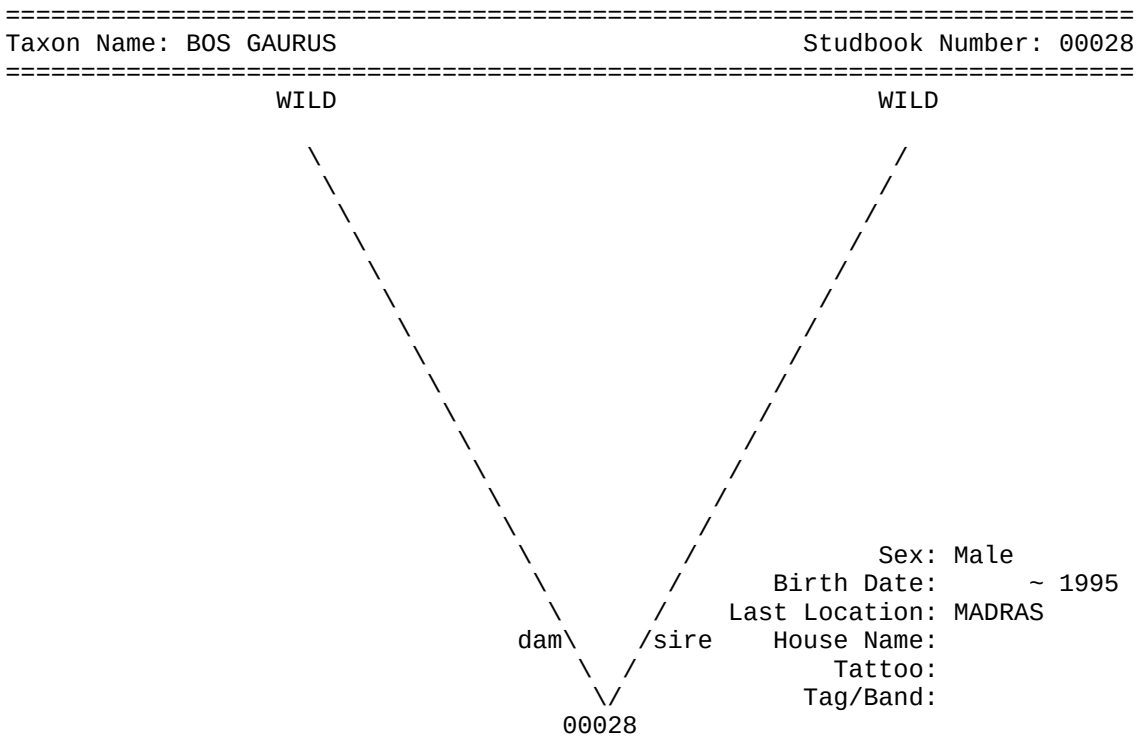

Taxon Name: BOS GAURUS
Studbook Number: 00024
WILD
WILD
Sex: Female
Birth Date: ????
Last Location: USGOWN
dam
sire
House Name:
Tattoo:
Tag/Band:
00024

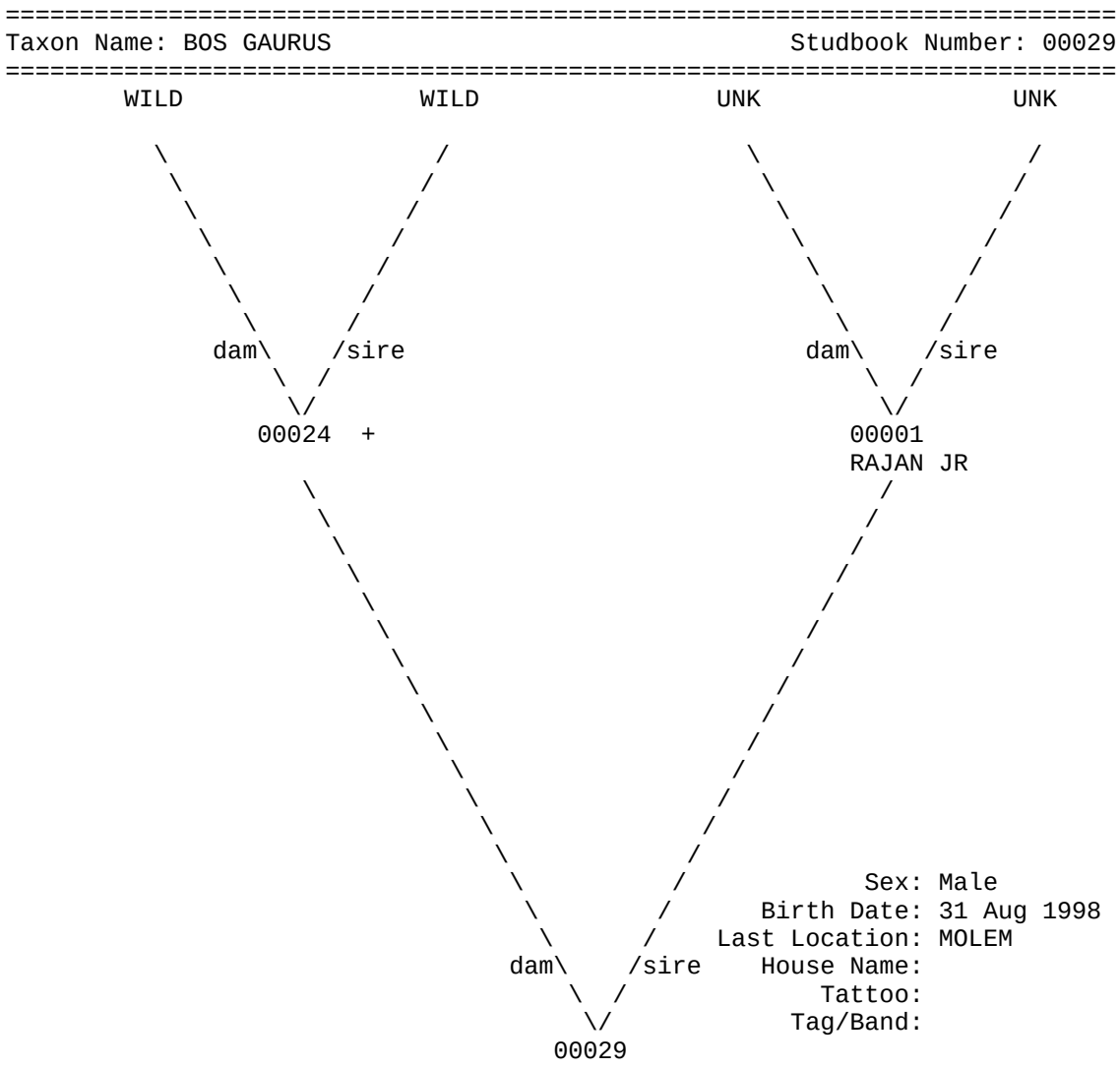

Taxon Name: BOS GAURUS
Studbook Number: 00025
UNK
UNK
Sex: Male
Birth Date: ????
Last Location: MYSORE
(dead)
dam\
/sire
House Name:
Tattoo:
Tag/Band:
00025



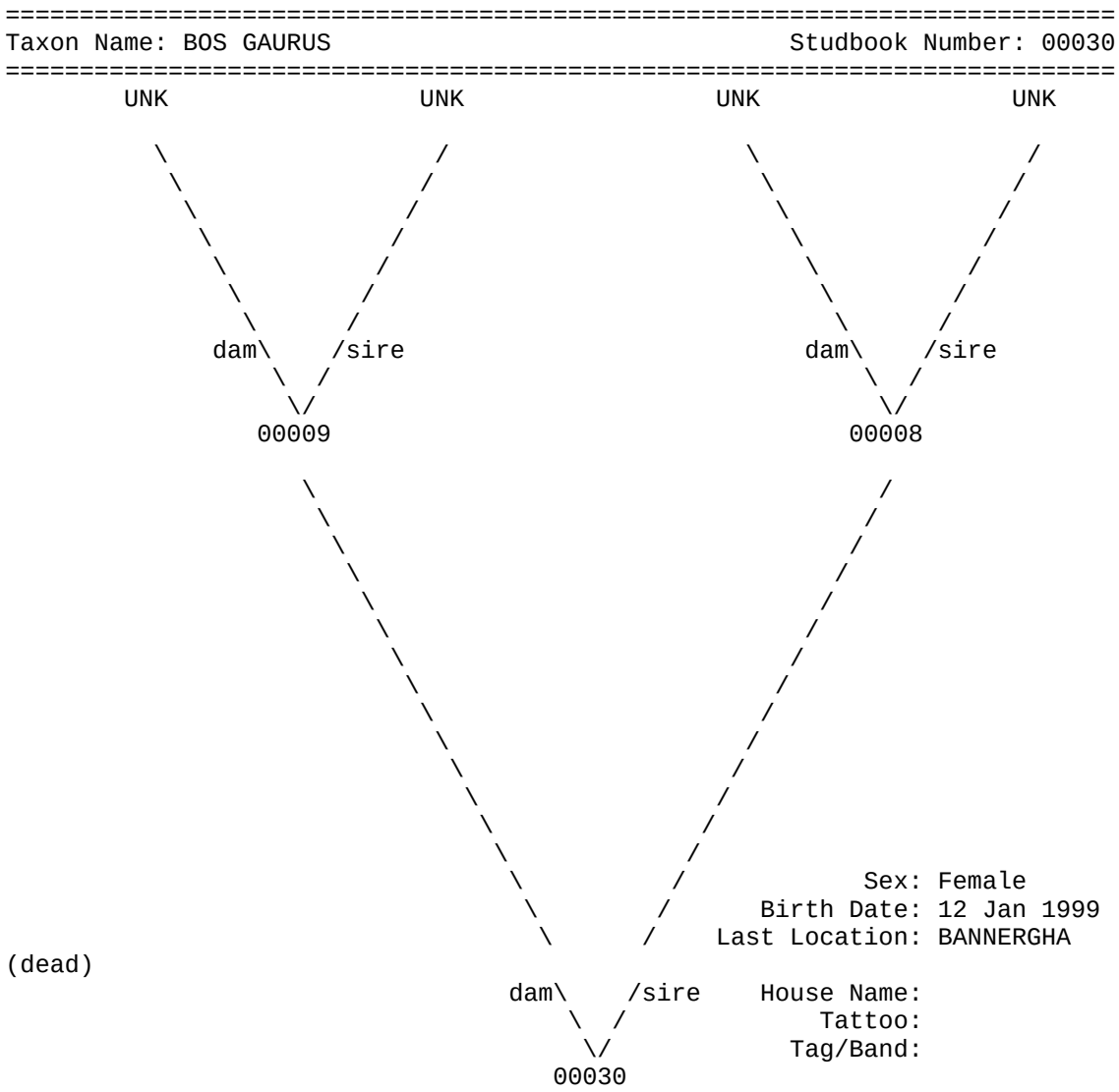
* Appear more than once...

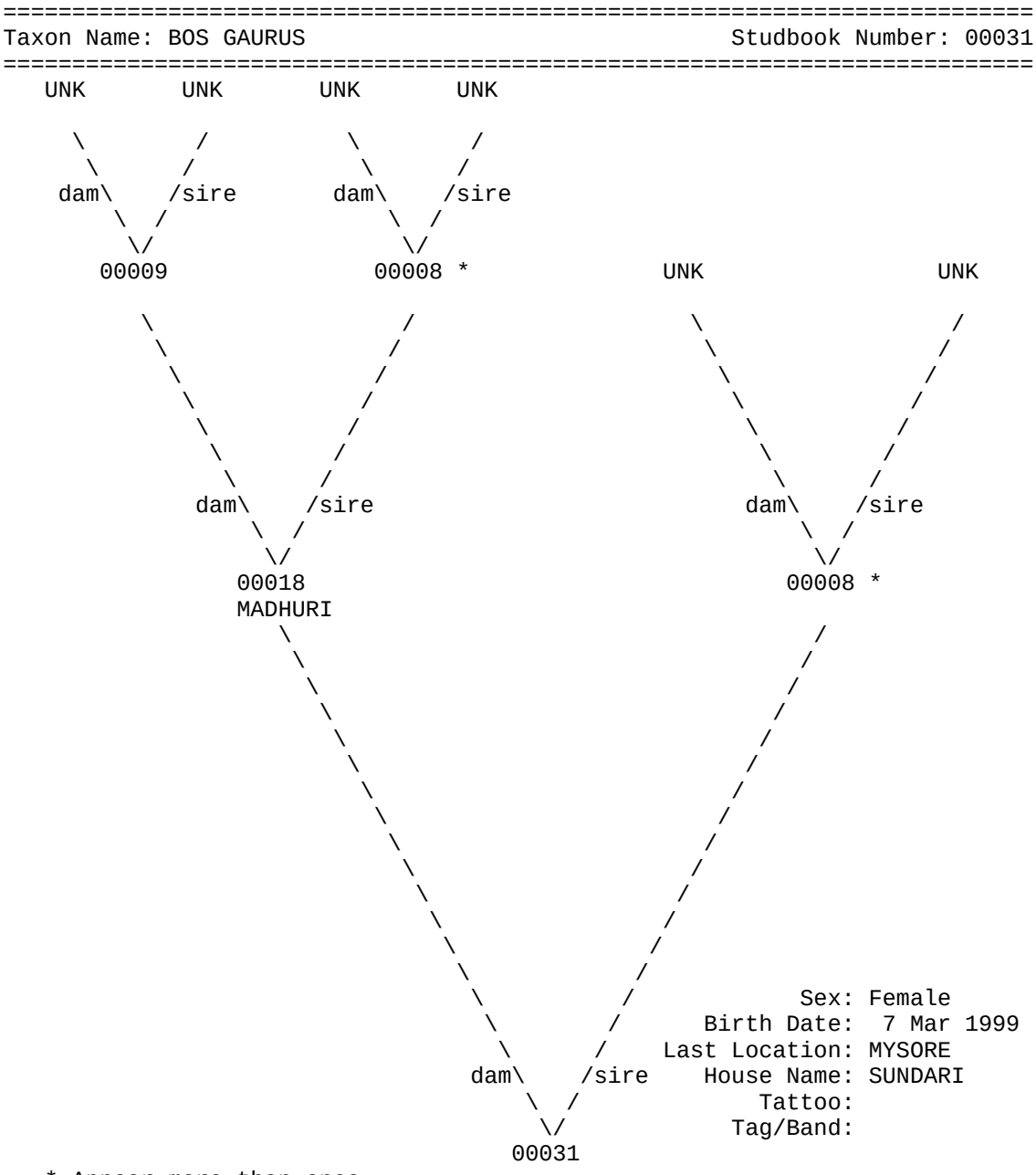

Taxon Name: BOS GAURUS
Studbook Number: 00027
UNK
UNK
WILD
WILD
dam\
/sire
dam\
/sire
00012
GANGOTRI
00005 *
WILD
WILD
dam\
/sire
dam\
/sire
00016
00005 *
dam\
/sire
00027
Sex: Male
Birth Date: 12 Jan 1998
Last Location: VISAKAPAT
House Name:
Tattoo:
Tag/Band:
* Appear more than once...


Taxon Name: BOS GAURUS
Studbook Number: 00028
WILD
WILD
Sex: Male
Birth Date: ~ 1995
Last Location: MADRAS
House Name:
Tattoo:
Tag/Band:
dam
sire
00028

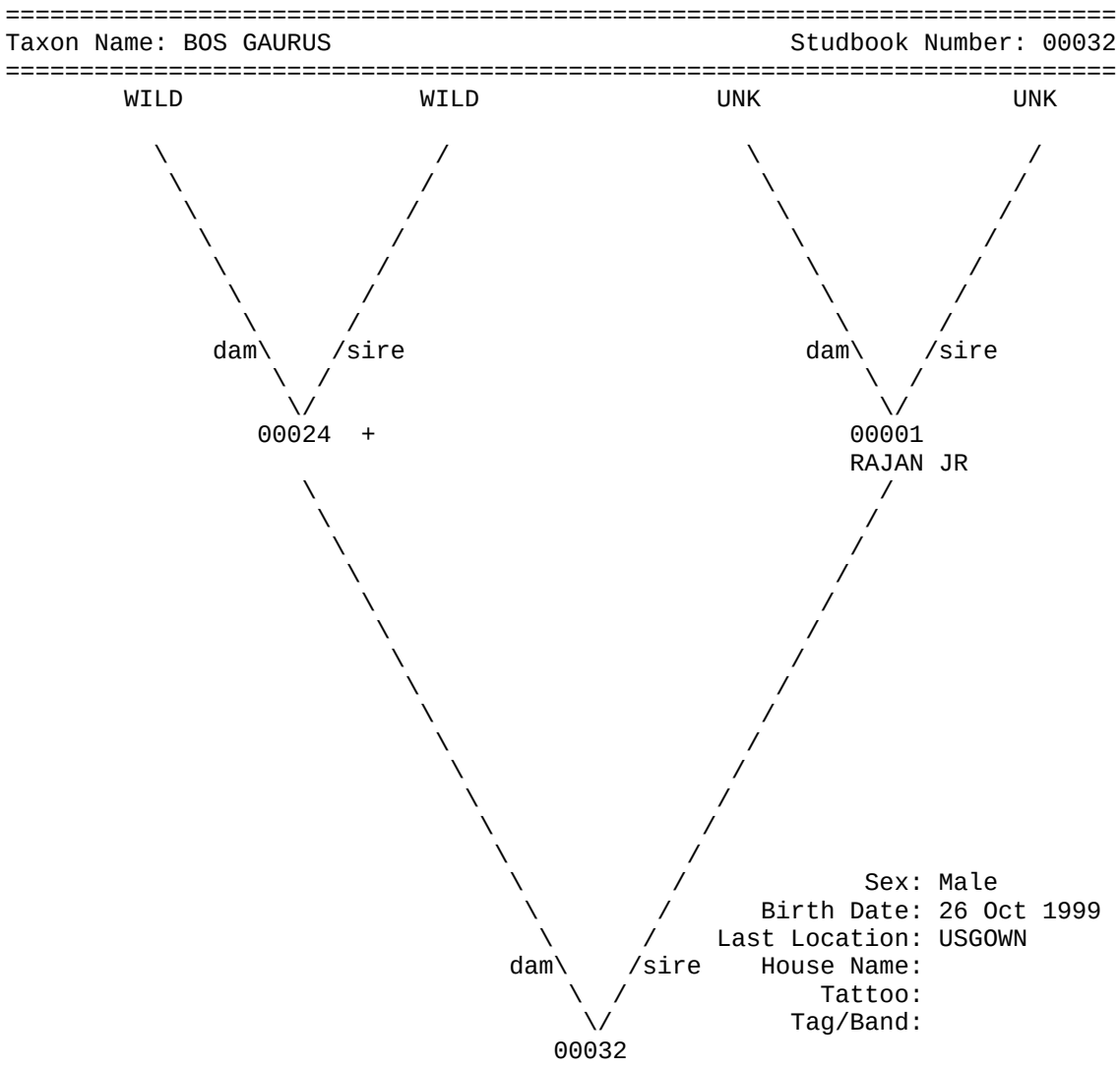

Taxon Name: BOS GAURUS
Studbook Number: 00029
WILD
WILD
UNK
UNK
dam
sire
dam
sire
00024 +
00001
RAJAN JR
dam
sire
00029
Sex: Male
Birth Date: 31 Aug 1998
Last Location: MOLEM
House Name:
Tattoo:
Tag/Band:

+ Wild-caught...

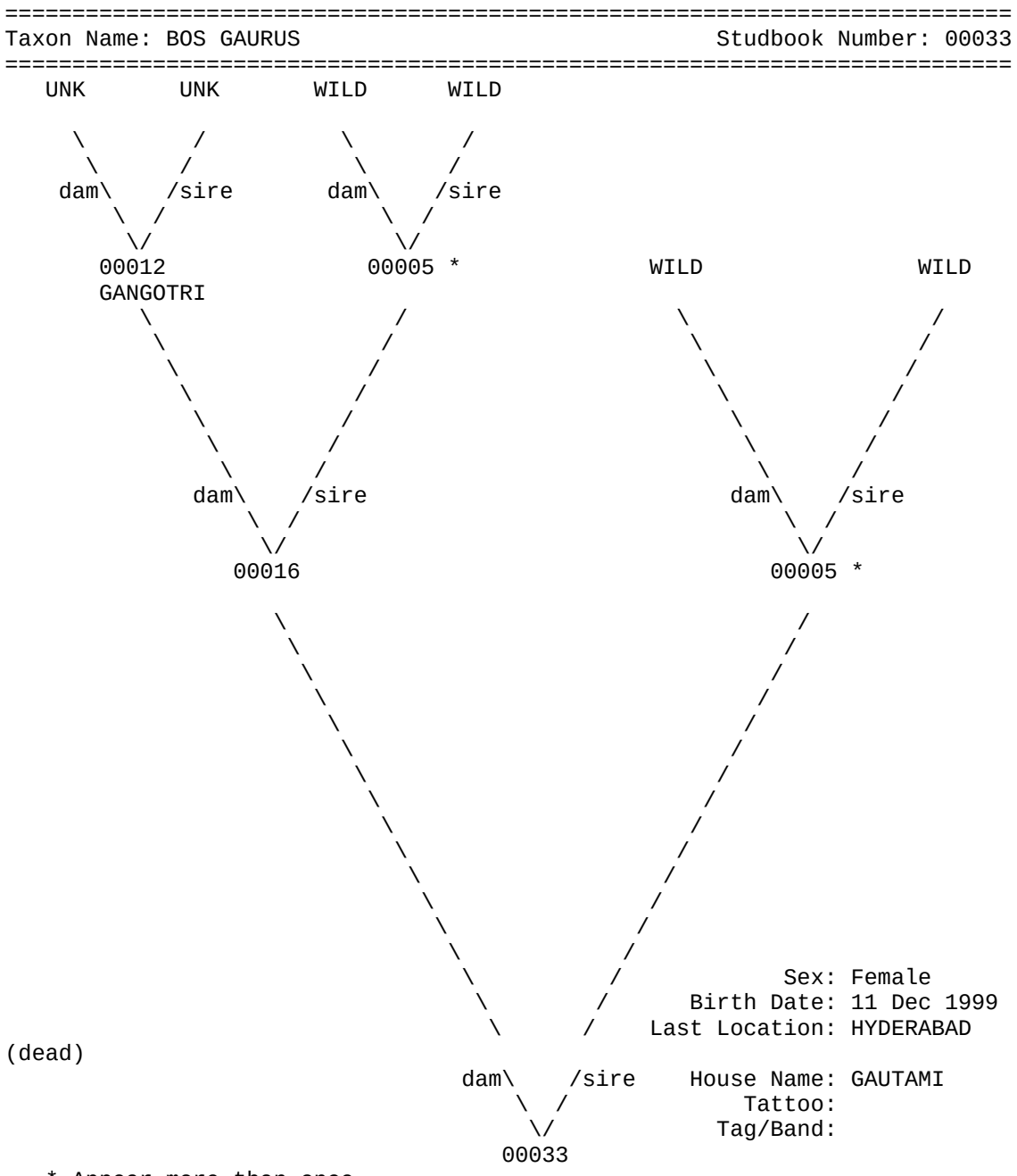

Taxon Name: BOS GAURUS
Studbook Number: 00030
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
Sex: Female
Birth Date: 12 Jan 1999
Last Location: BANNERGHA
(dead)
dam
sire
House Name:
Tattoo:
Tag/Band:
00030

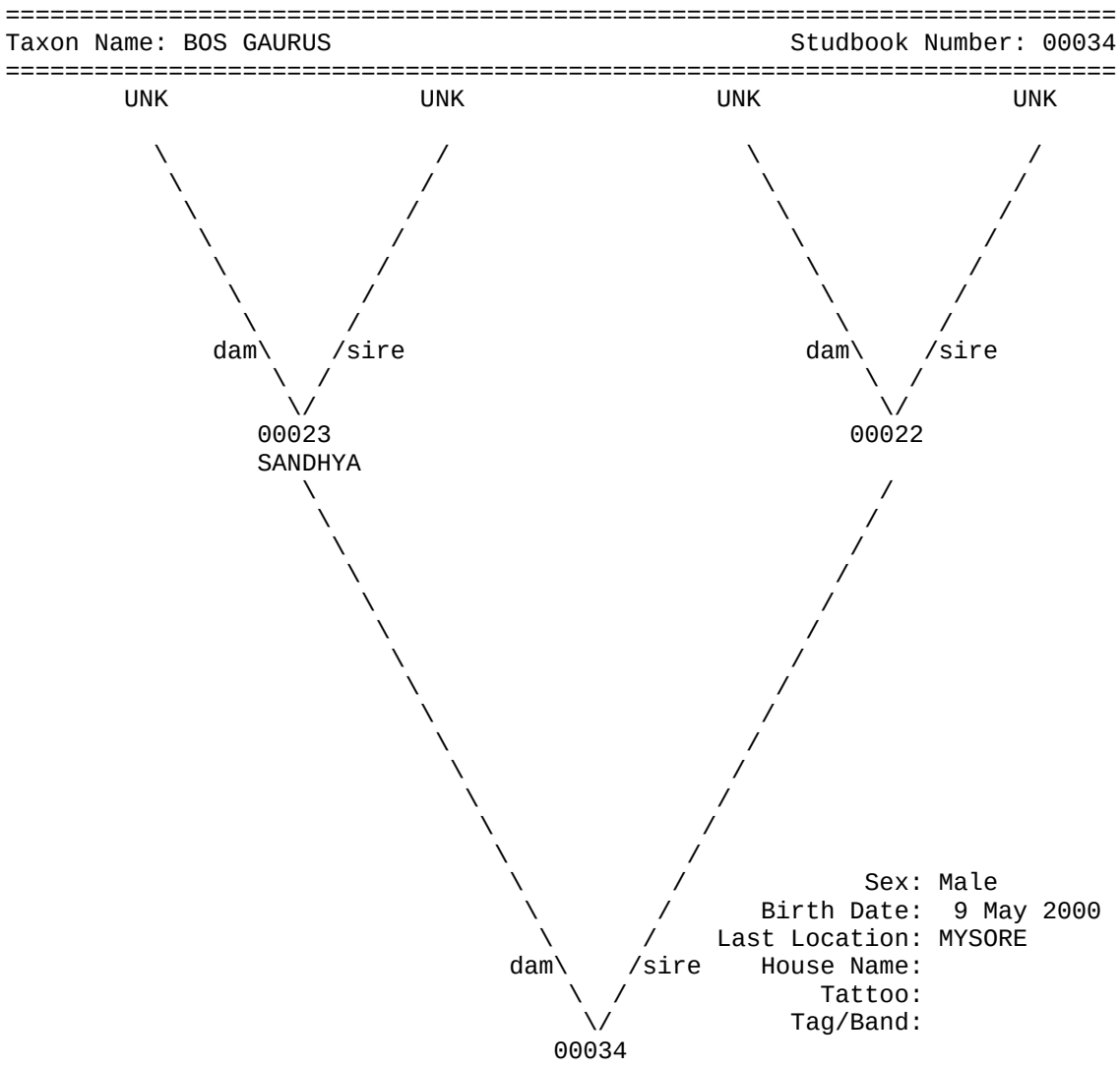


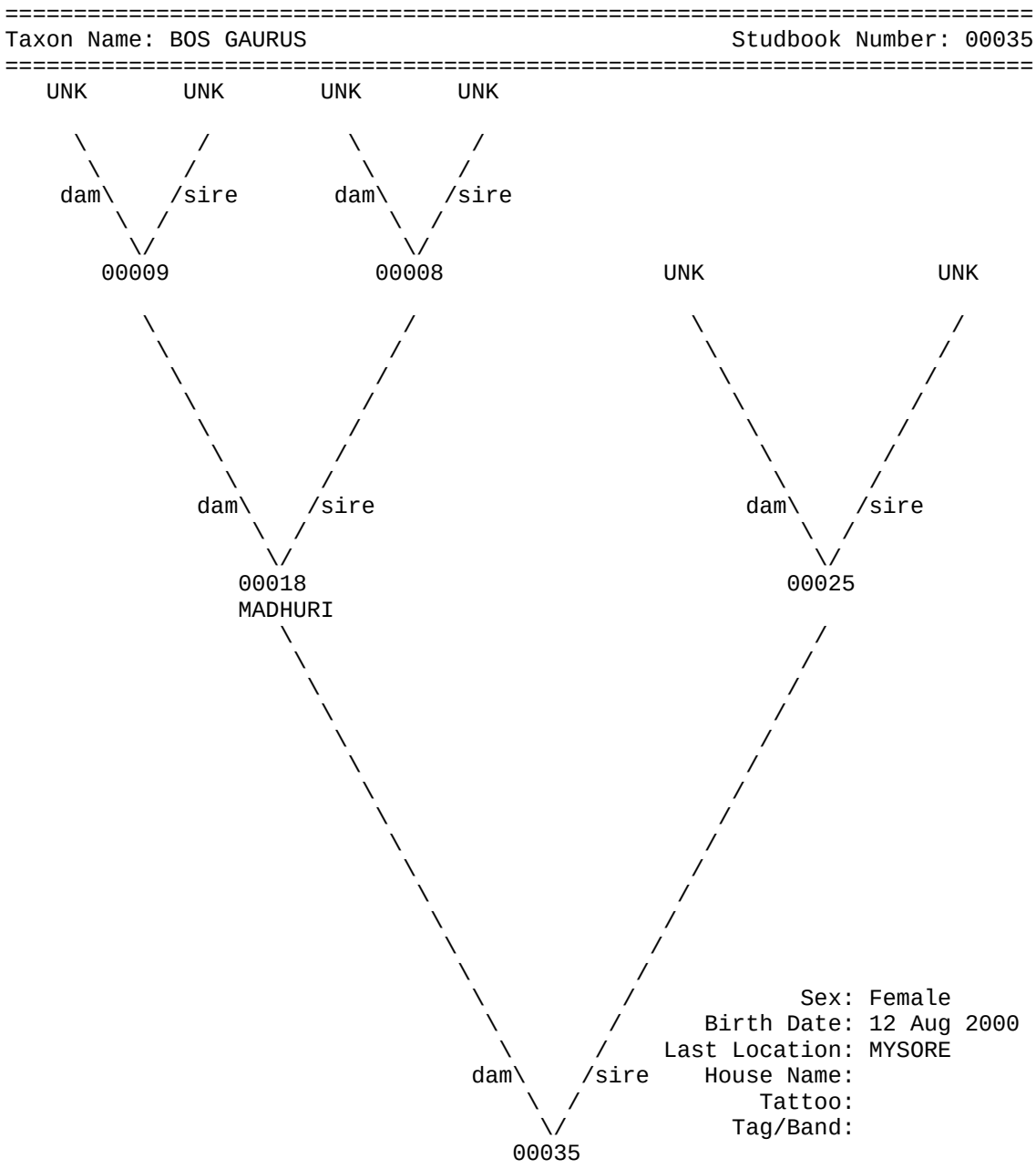
* Appear more than once...

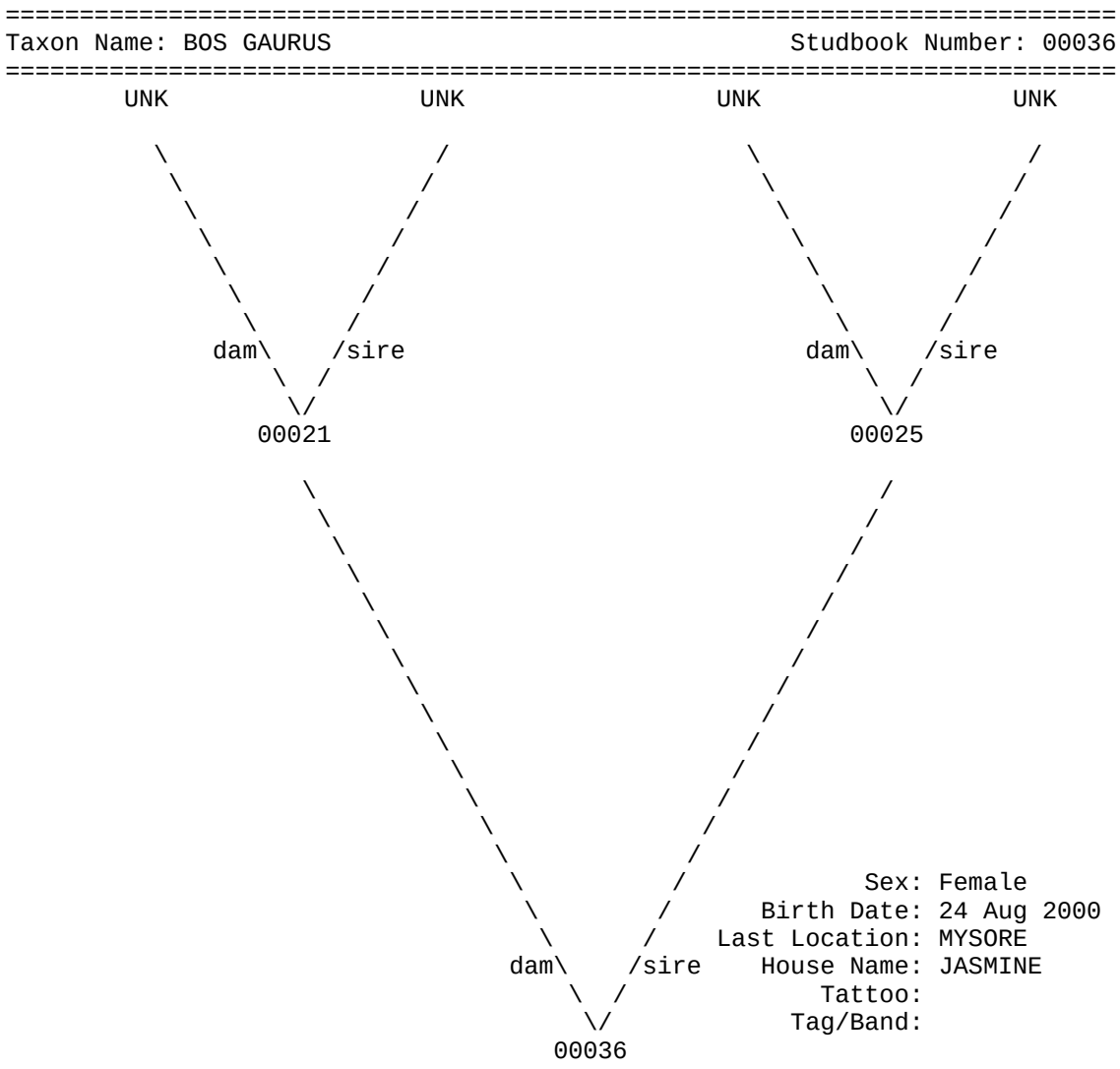

Taxon Name: BOS GAURUS
Studbook Number: 00032
WILD
WILD
UNK
UNK
dam
sire
dam
sire
00024 +
00001
RAJAN JR
dam
sire
00032
Sex: Male
Birth Date: 26 Oct 1999
Last Location: USGOWN
House Name:
Tattoo:
Tag/Band:

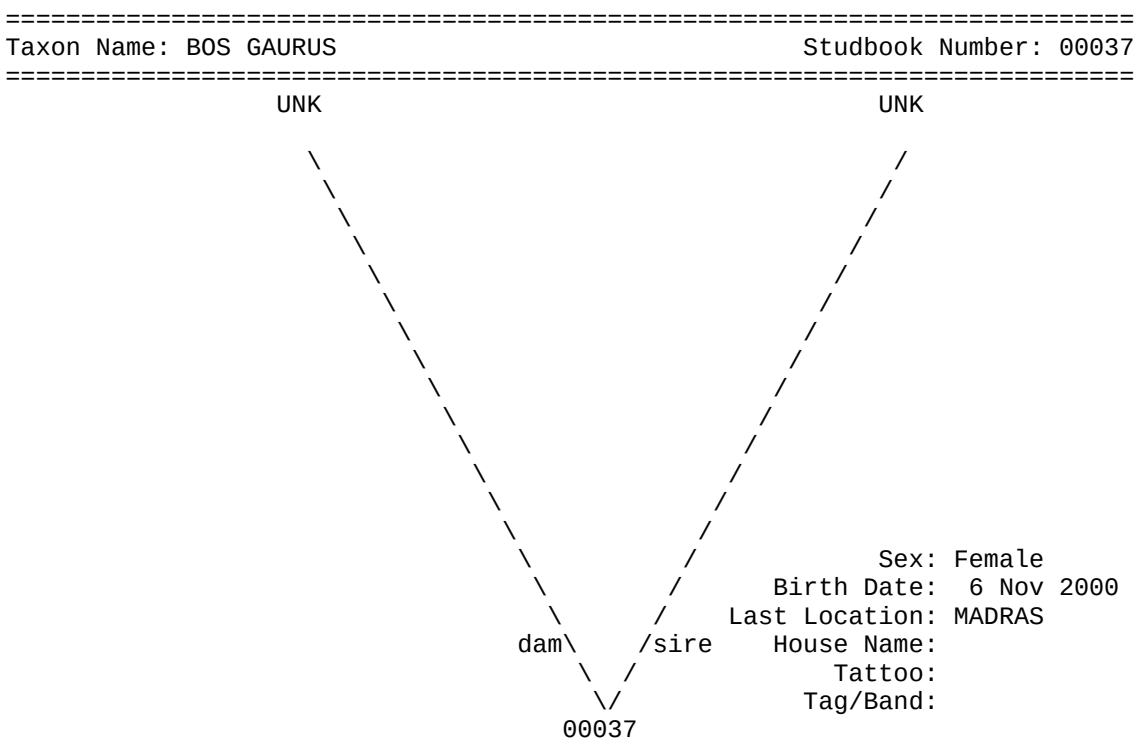
+ Wild-caught...

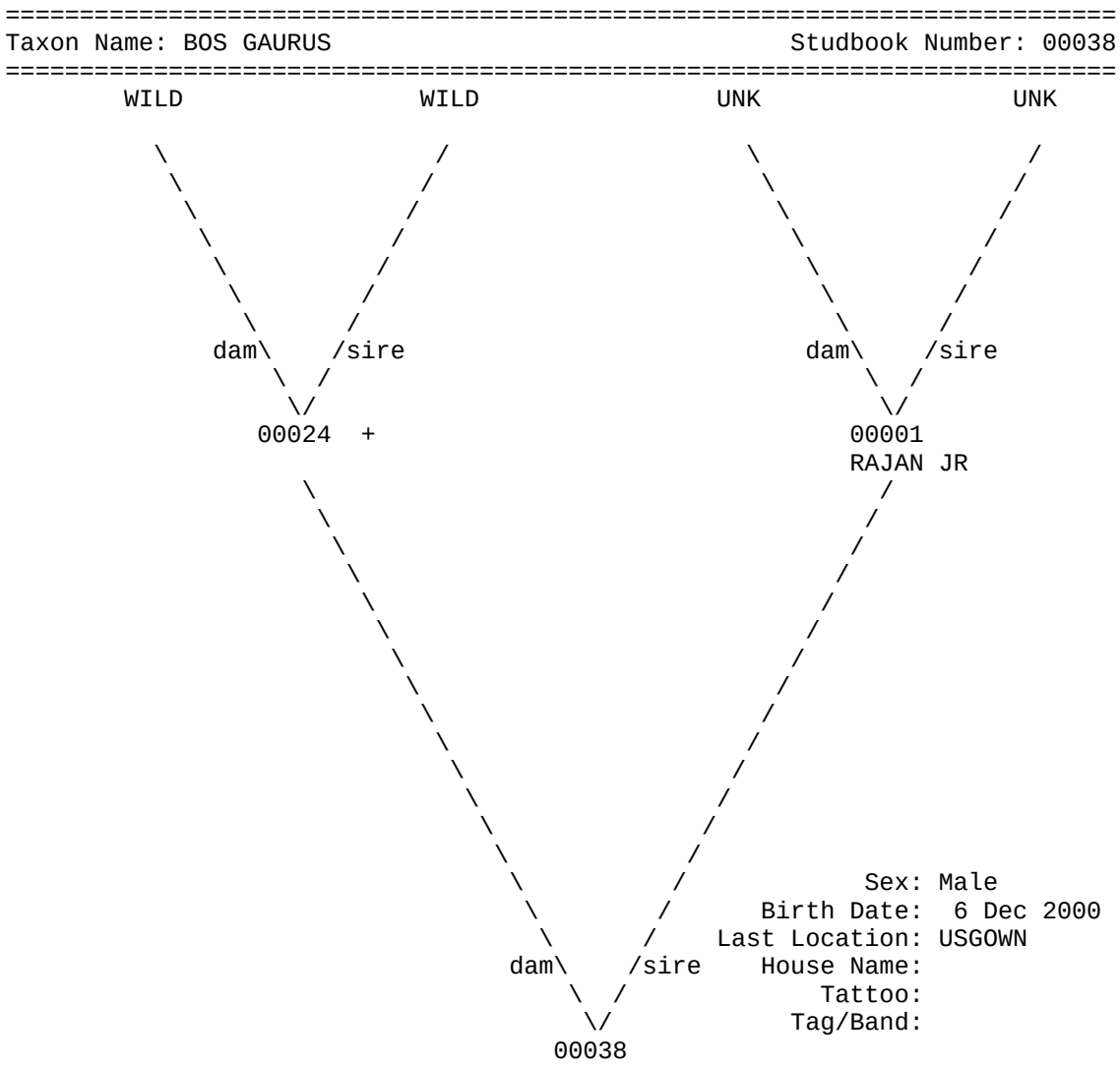

Taxon Name: BOS GAURUS
Studbook Number: 00033
UNK
UNK
WILD
WILD
dam\
/sire
dam\
/sire
00012
GANGOTRI
00005 *
WILD
WILD
dam\
/sire
dam\
/sire
00016
00005 *
Sex: Female
Birth Date: 11 Dec 1999
Last Location: HYDERABAD
(dead)
House Name: GAUTAMI
Tattoo:
Tag/Band:
dam\
/sire
00033
* Appear more than once...


Taxon Name: BOS GAURUS
Studbook Number: 00034
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00023
SANDHYA
00022
dam
sire
00034
Sex: Male
Birth Date: 9 May 2000
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:

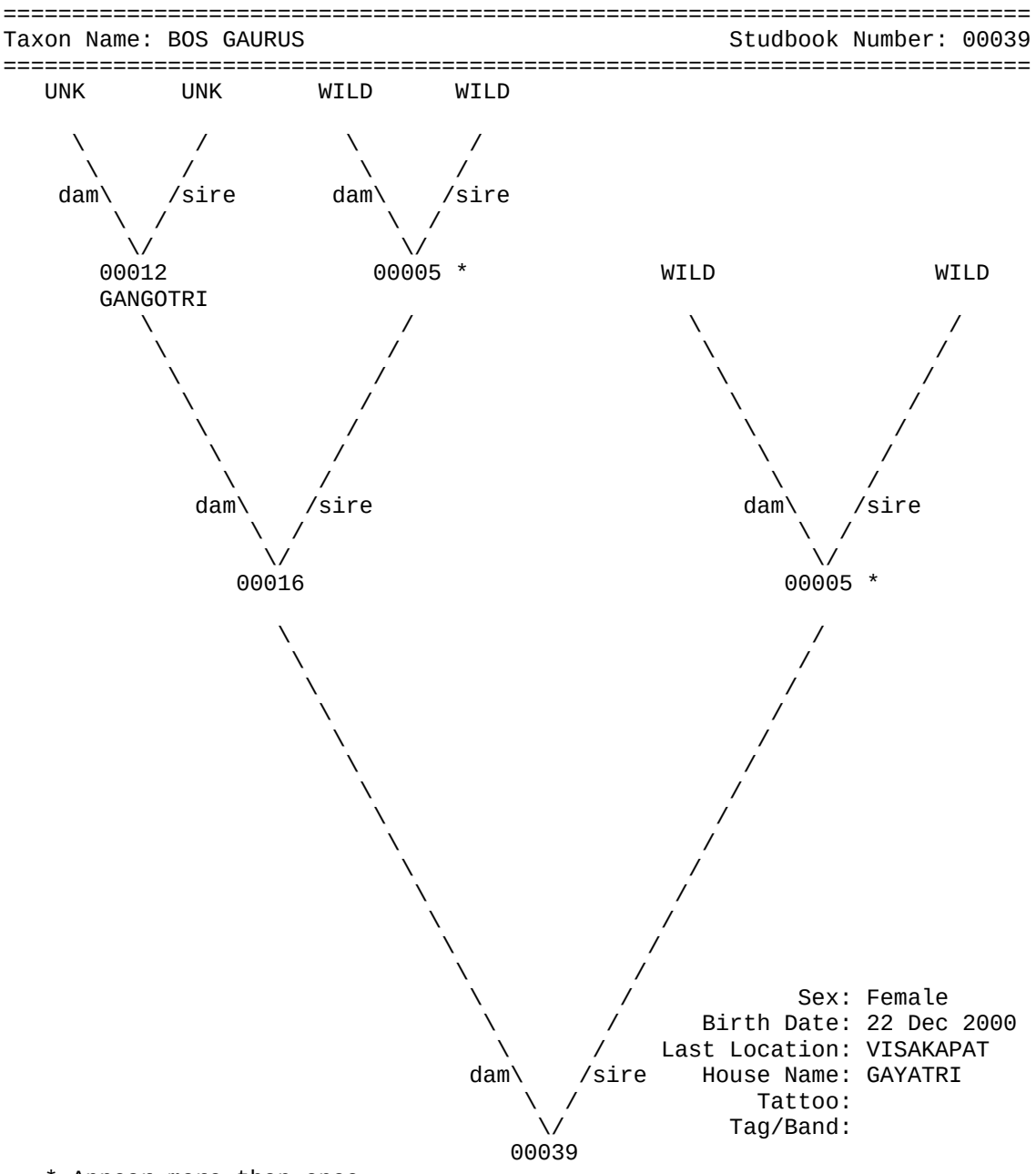

Taxon Name: BOS GAURUS
Studbook Number: 00035
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
UNK
UNK
dam
sire
dam
sire
00018
MADHURI
00025
dam
sire
00035
Sex: Female
Birth Date: 12 Aug 2000
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00036
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00021
00025
dam
sire
00036
Sex: Female
Birth Date: 24 Aug 2000
Last Location: MYSORE
House Name: JASMINE
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00037
UNK
UNK
Sex: Female
Birth Date: 6 Nov 2000
Last Location: MADRAS
House Name:
Tattoo:
Tag/Band:
dam
sire
00037


Taxon Name: BOS GAURUS
Studbook Number: 00038
WILD
WILD
UNK
UNK
dam
sire
dam
sire
00024 +
00001
RAJAN JR
dam
sire
00038
Sex: Male
Birth Date: 6 Dec 2000
Last Location: USGOWN
House Name:
Tattoo:
Tag/Band:

+ Wild-caught...



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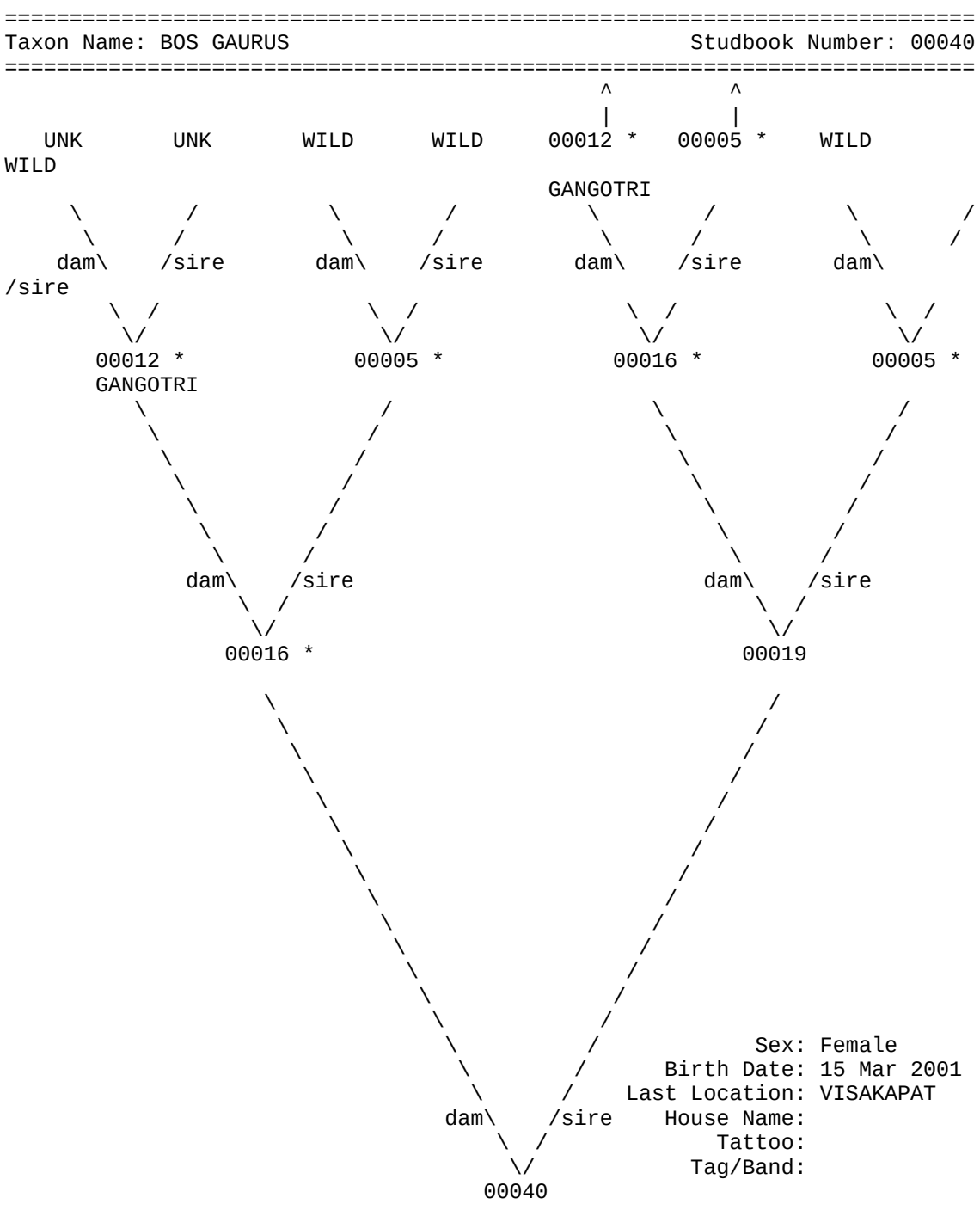

Taxon Name: BOS GAURUS Studbook Number: 00040

* Appear more than once...

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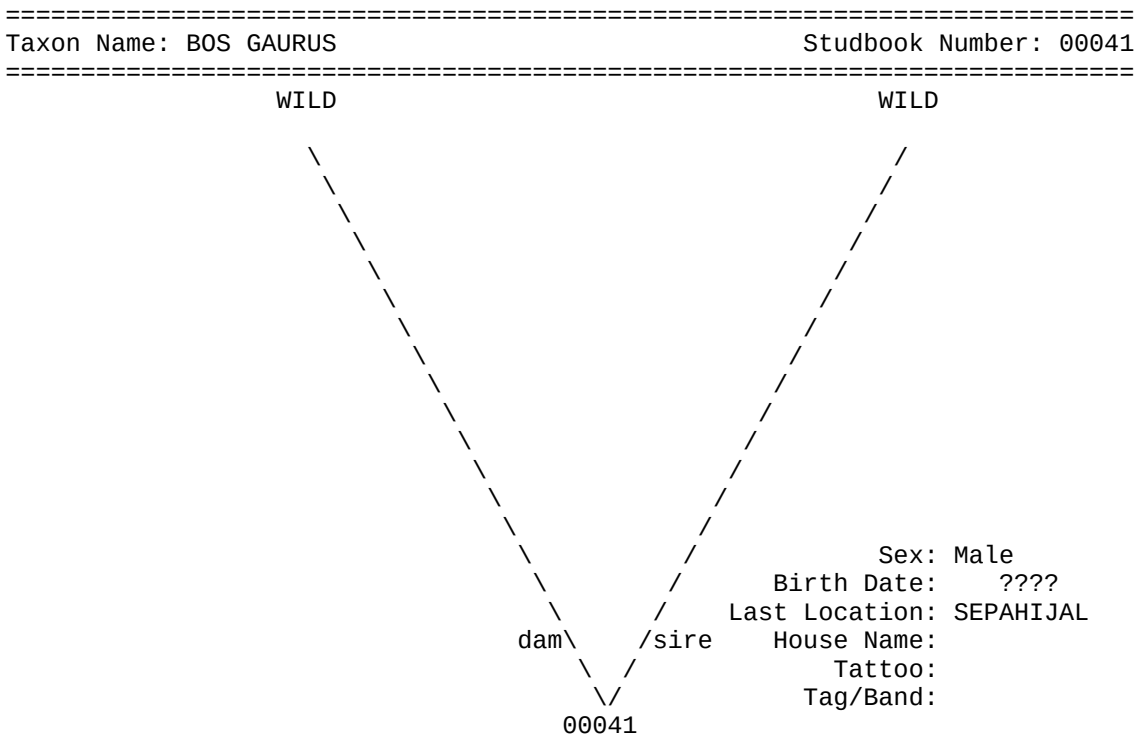
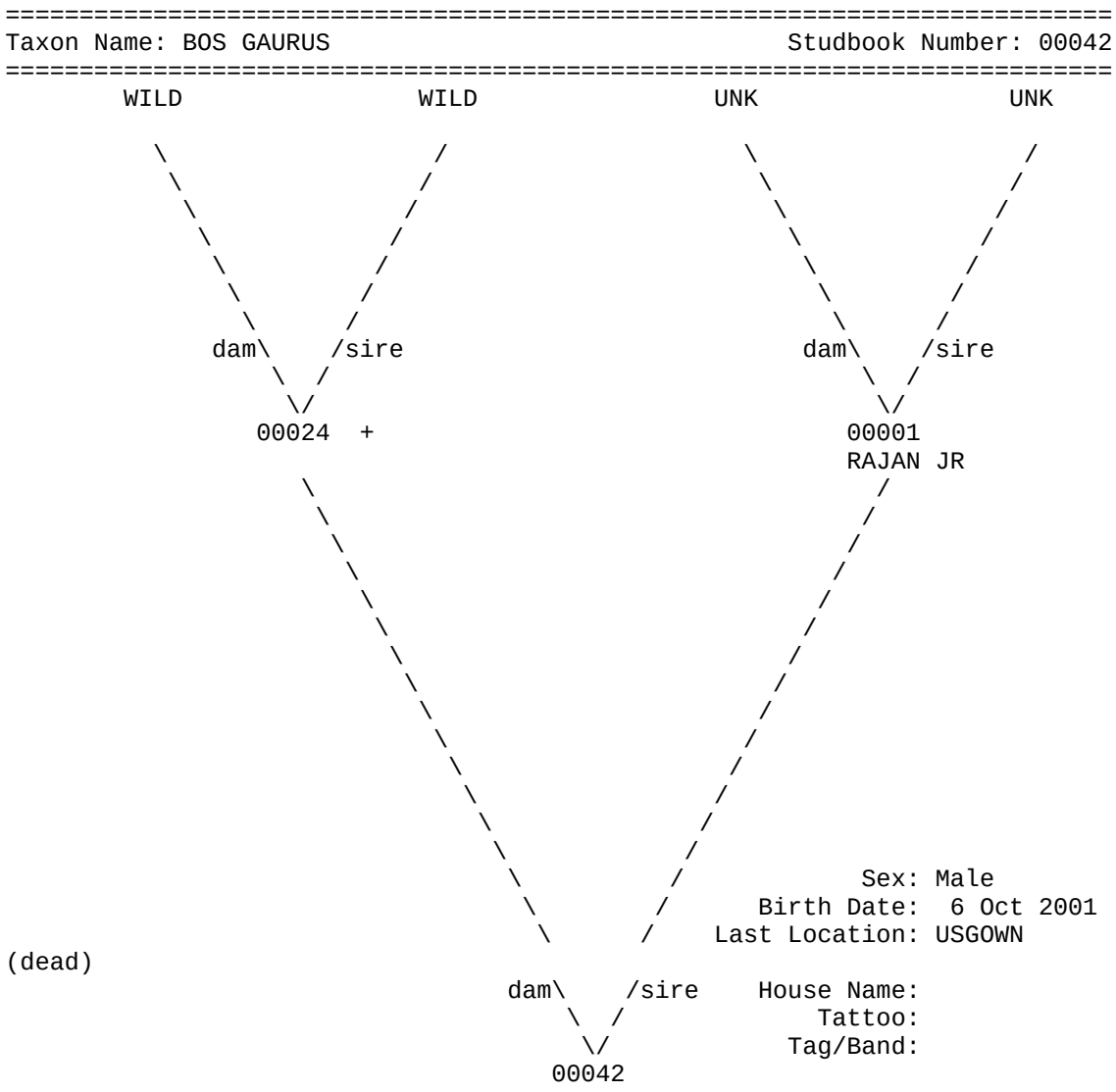
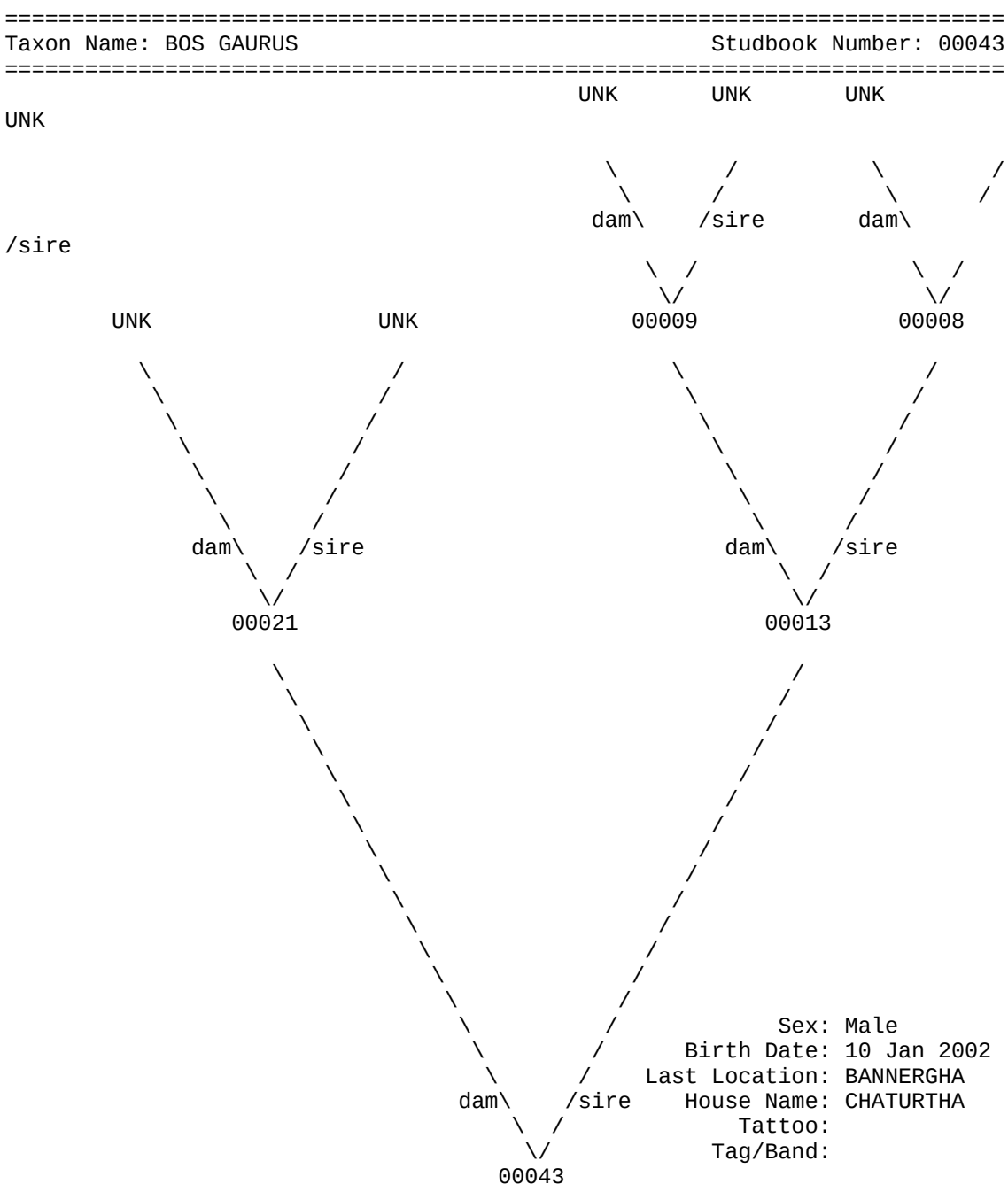
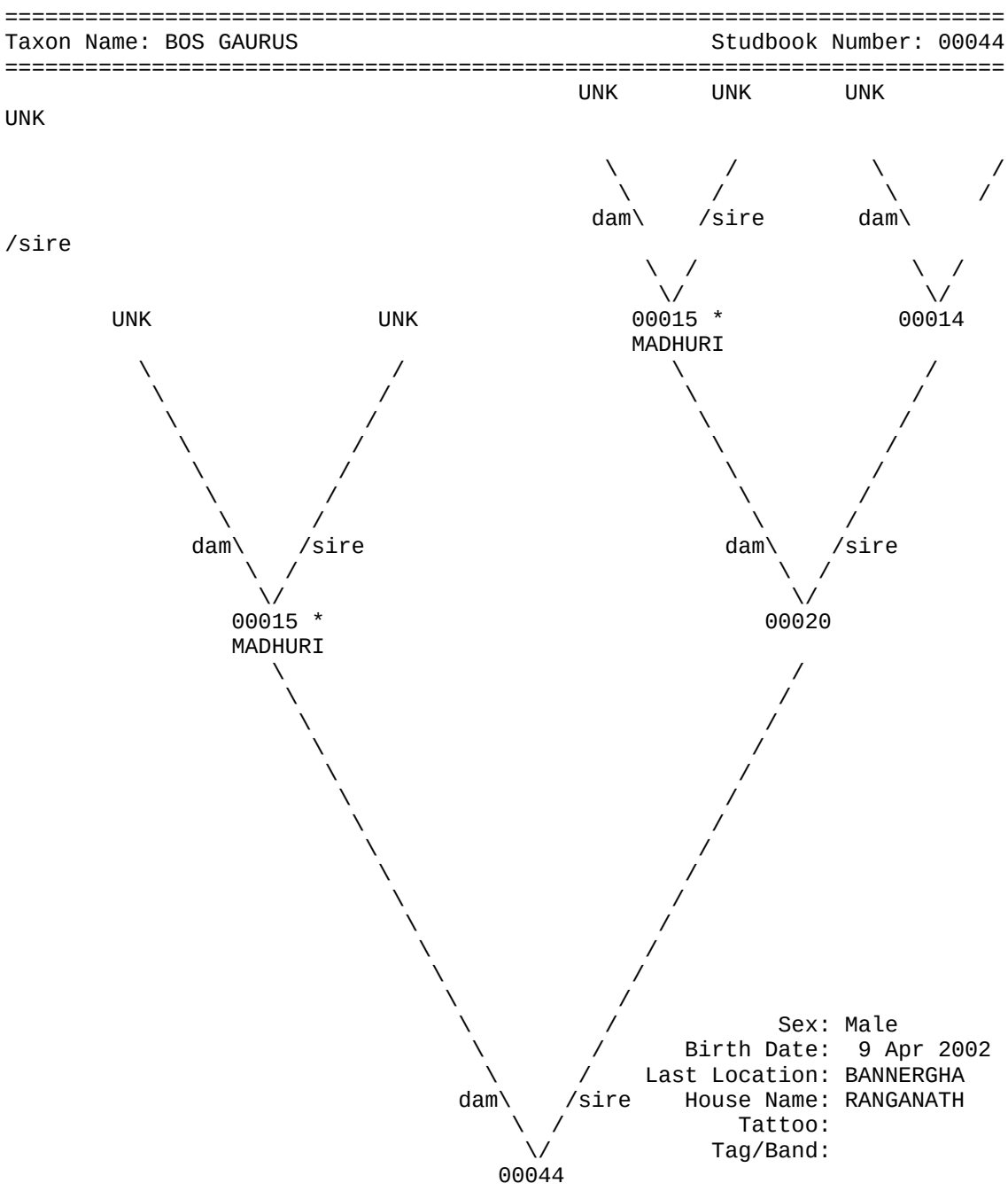

Taxon Name: BOS GAURUS
Studbook Number: 00041
WILD
WILD
Sex: Male
Birth Date: ????
Last Location: SEPAHIJAL
House Name:
Tattoo:
Tag/Band:
dam
sire
00041


Taxon Name: BOS GAURUS
Studbook Number: 00042
WILD
WILD
UNK
UNK
dam
sire
dam
sire
00024 +
00001
RAJAN JR
Sex: Male
Birth Date: 6 Oct 2001
Last Location: USGOWN
(dead)
dam
sire
House Name:
Tattoo:
Tag/Band:
00042
+ Wild-caught...


Taxon Name: BOS GAURUS
Studbook Number: 00043
UNK
UNK
UNK
UNK
dam\
/sire
dam\
/sire
UNK
UNK
00009
00008
dam\
/sire
dam\
/sire
00021
00013
dam\
/sire
00043
Sex: Male
Birth Date: 10 Jan 2002
Last Location: BANNERGHA
House Name: CHATURTHA
Tattoo:
Tag/Band:



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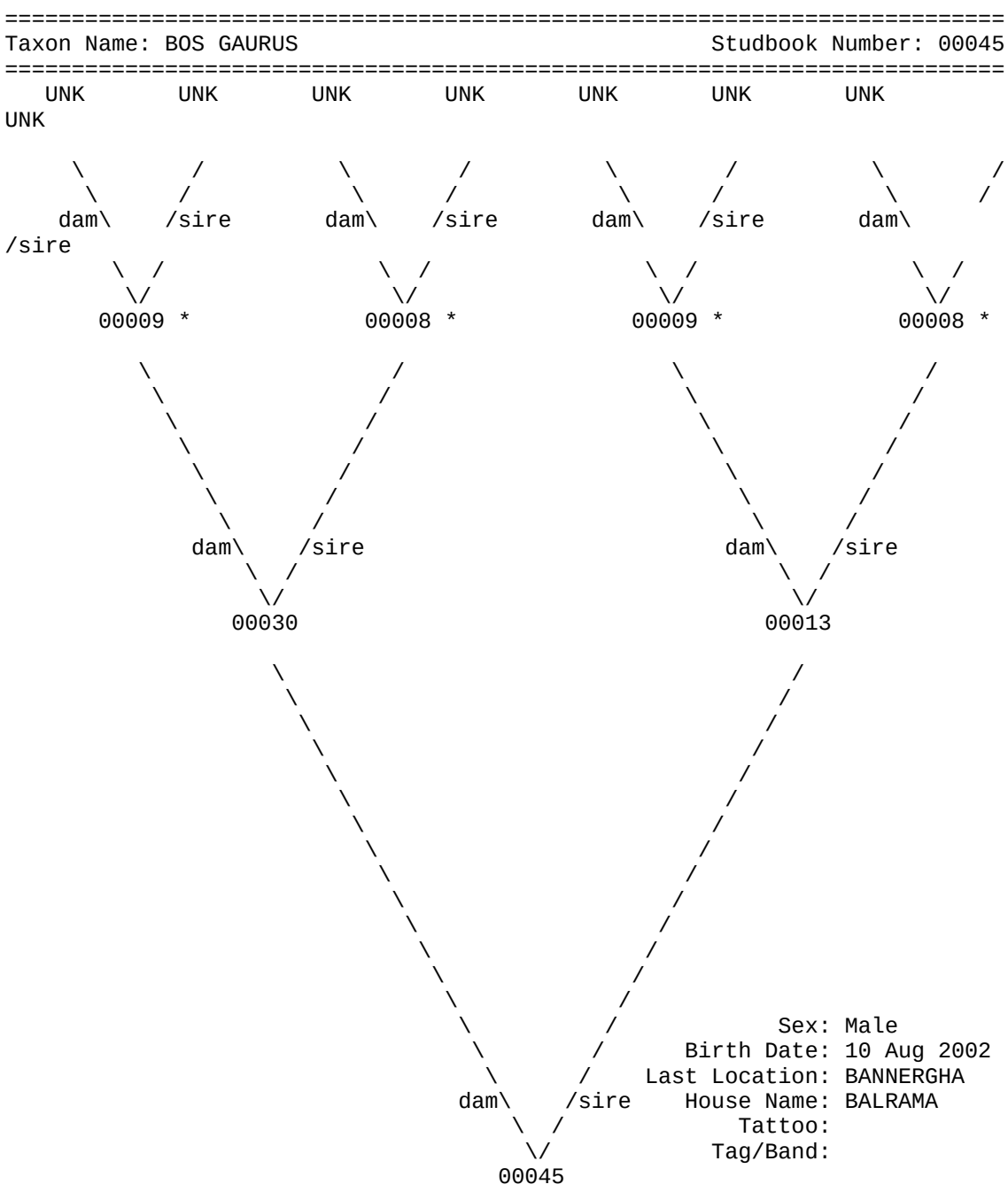
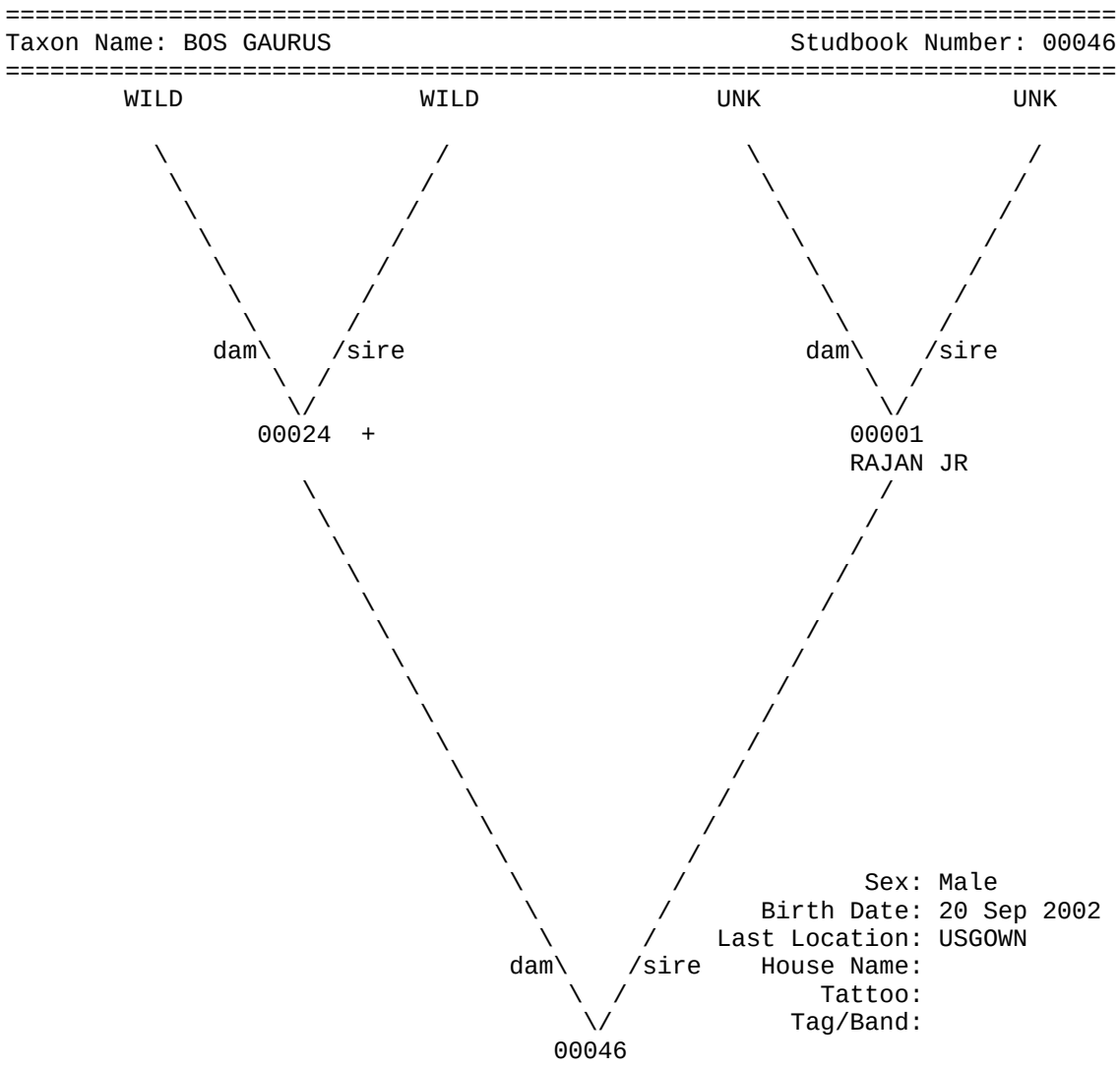
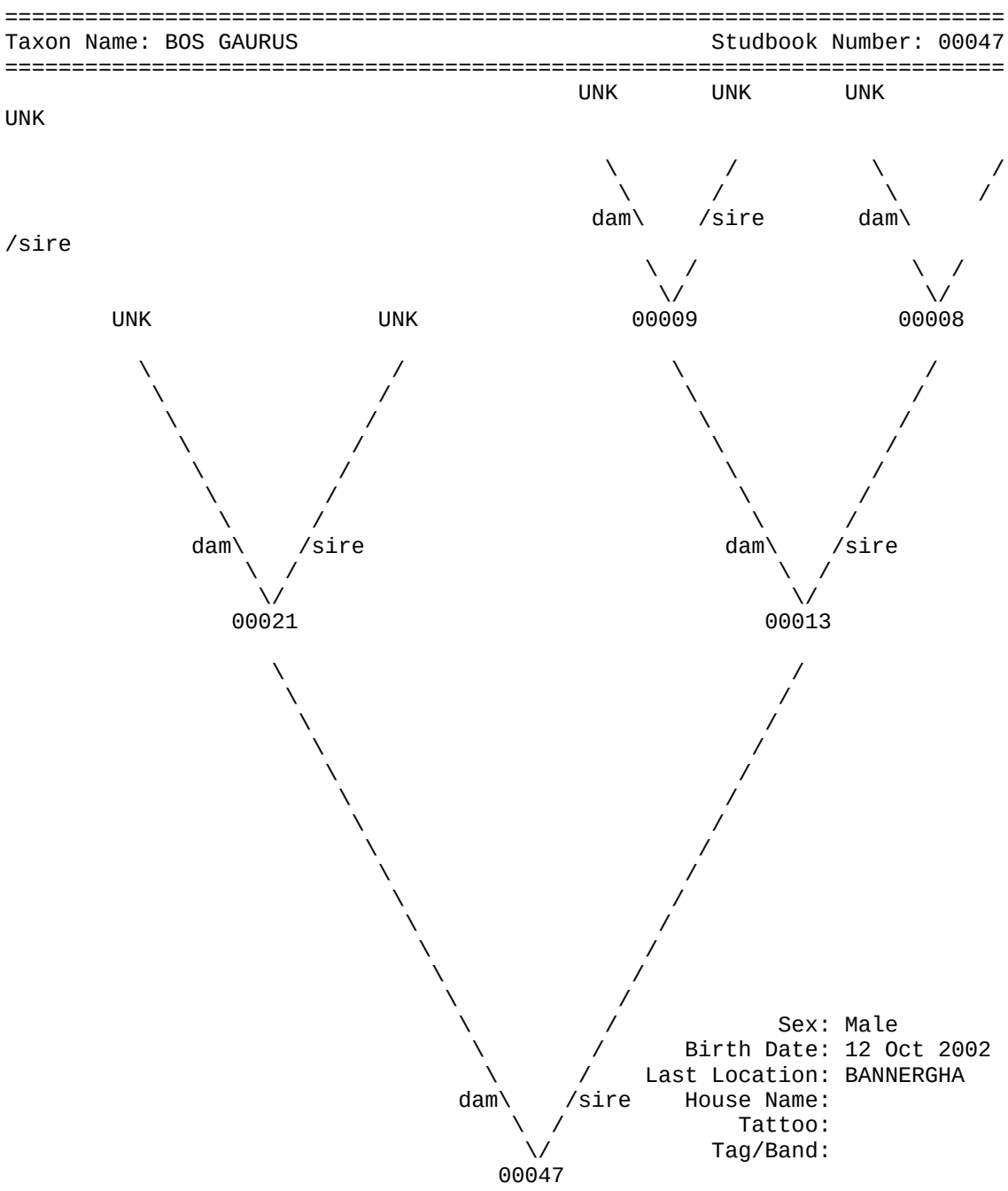
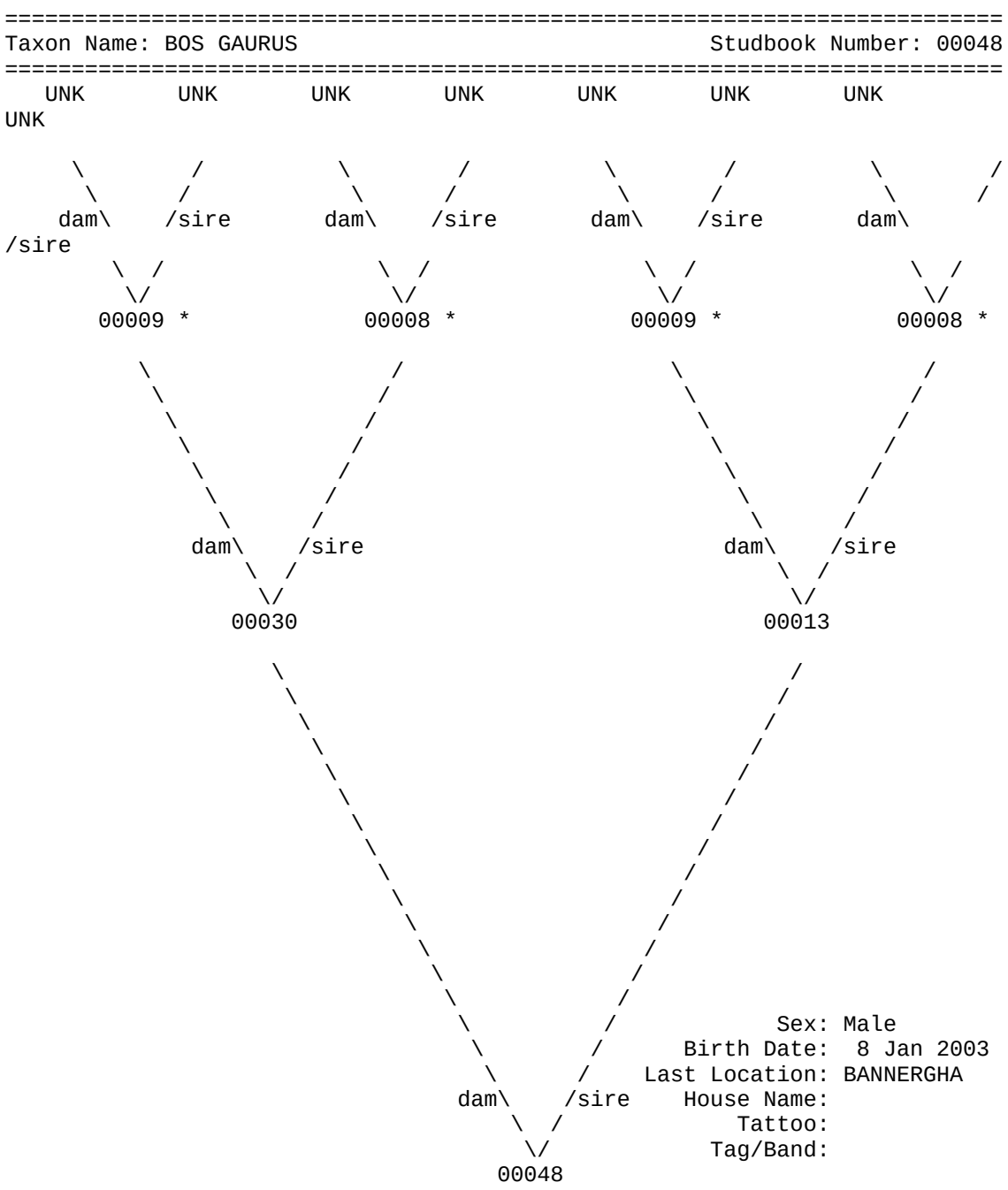


* Appear more than once...

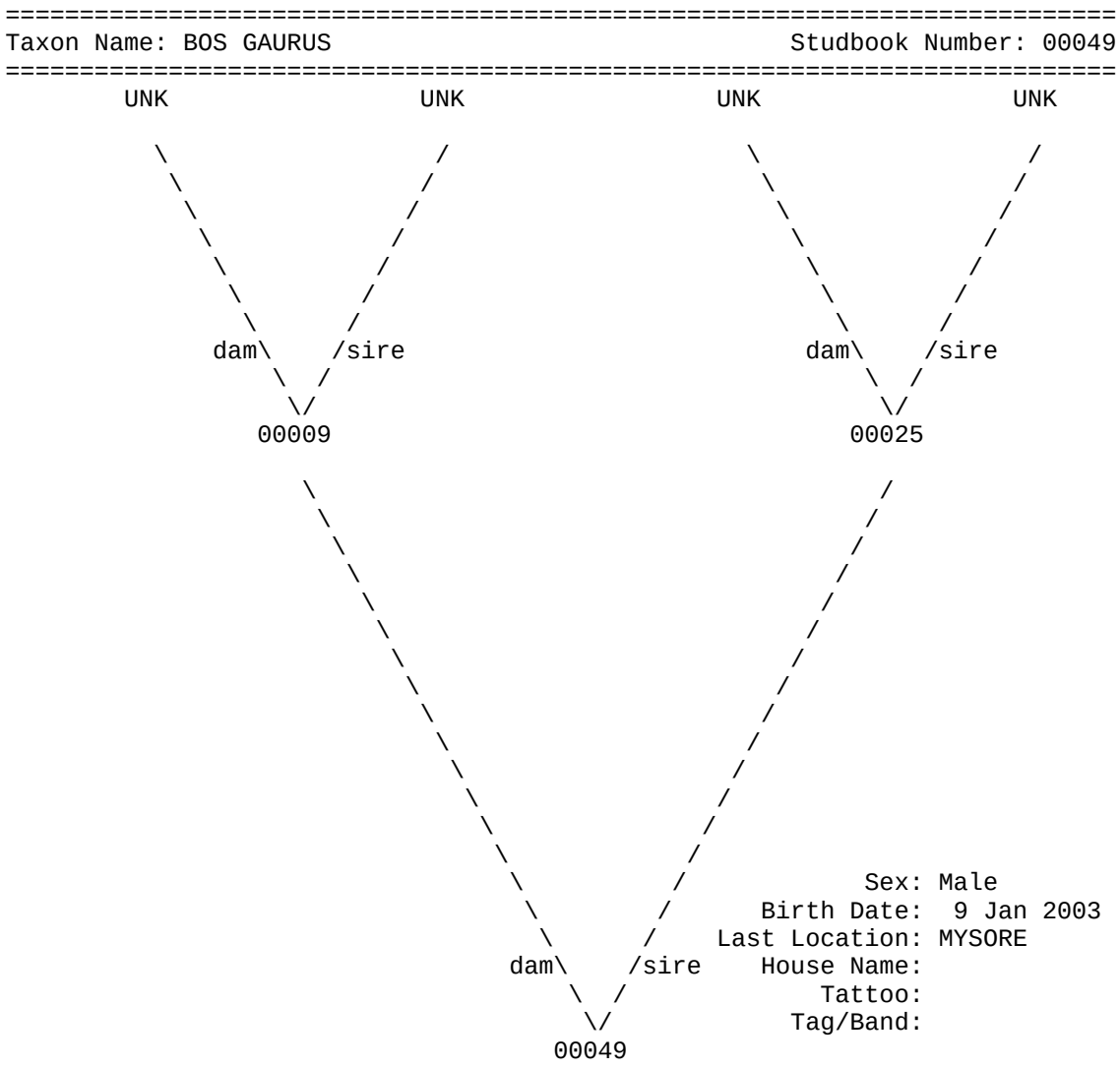

Taxon Name: BOS GAURUS
Studbook Number: 00046
WILD
WILD
UNK
UNK
dam
sire
dam
sire
00024 +
00001
RAJAN JR
dam
sire
00046
Sex: Male
Birth Date: 20 Sep 2002
Last Location: USGOWN
House Name:
Tattoo:
Tag/Band:

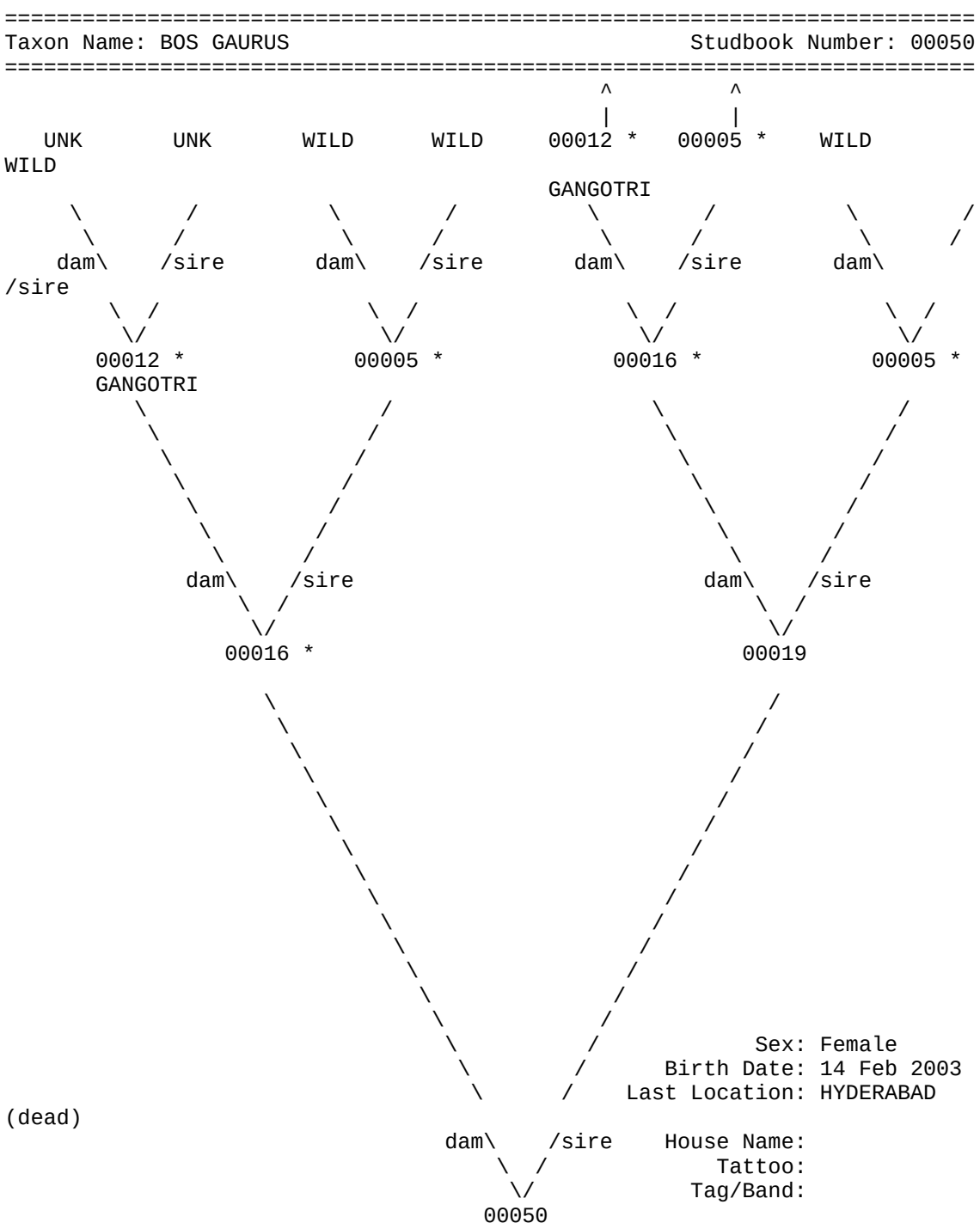
+ Wild-caught...


Taxon Name: BOS GAURUS
Studbook Number: 00047
UNK
UNK
UNK
UNK
dam\
/sire
/sire
dam\
UNK
UNK
00009
00008
dam\
/sire
dam\
/sire
00021
00013
dam\
/sire
00047
Sex: Male
Birth Date: 12 Oct 2002
Last Location: BANNERGHA
House Name:
Tattoo:
Tag/Band:



* Appear more than once...


Taxon Name: BOS GAURUS
Studbook Number: 00049
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00025
dam
sire
00049
Sex: Male
Birth Date: 9 Jan 2003
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:



Taxon Name: BOS GAURUS Studbook Number: 00050

* Appear more than once...

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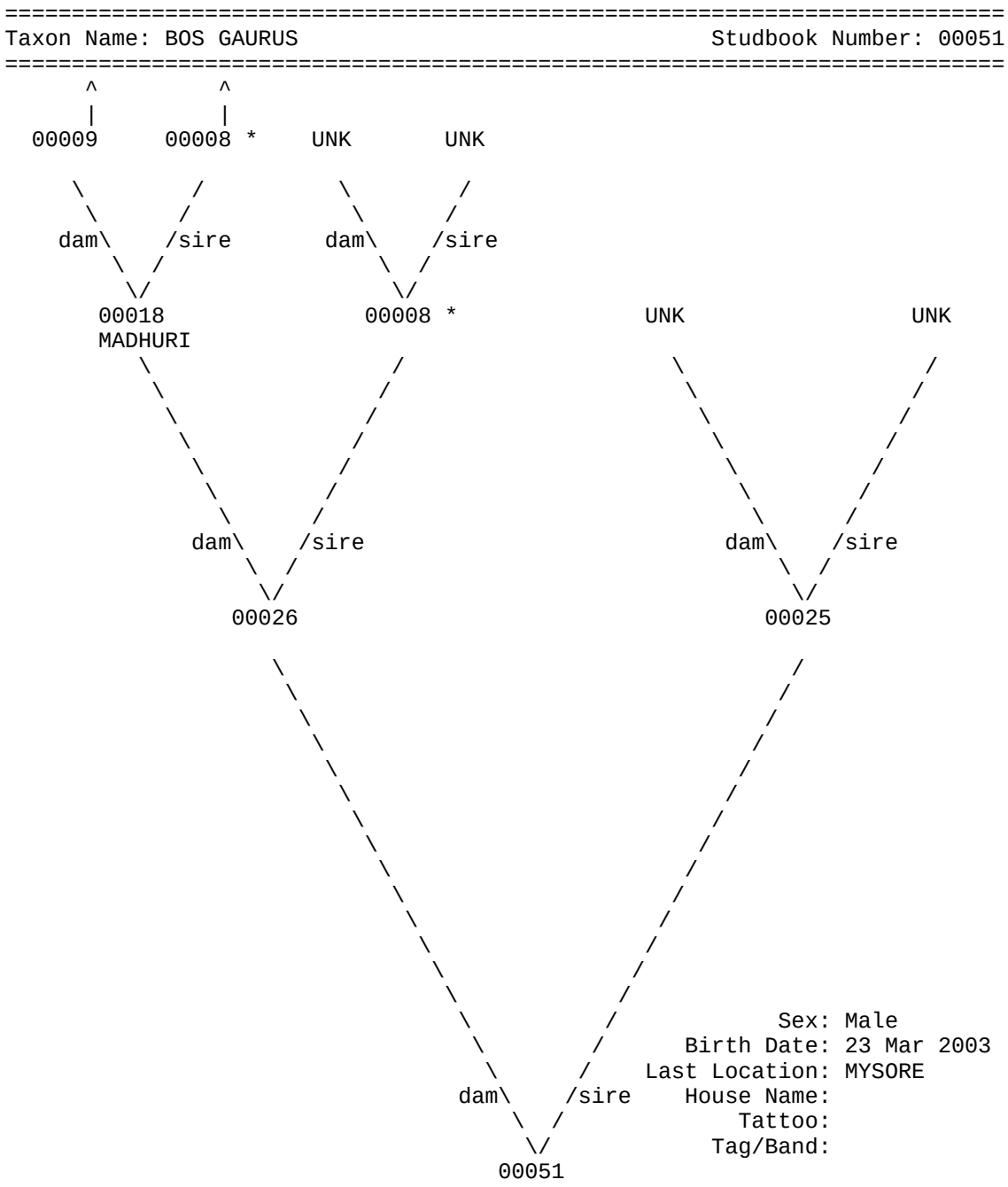
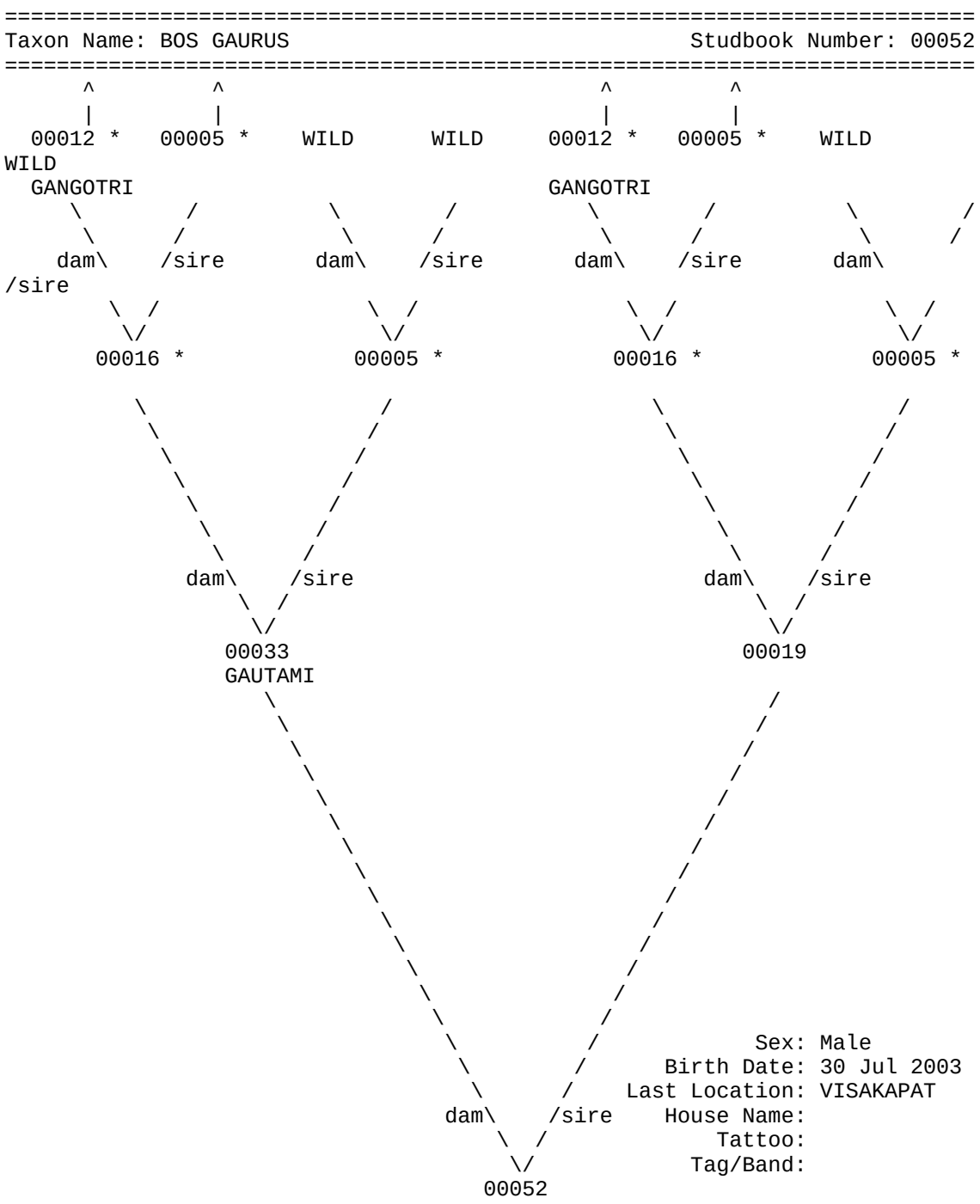


Taxon Name: BOS GAURUS Studbook Number: 00051

* Appear more than once...

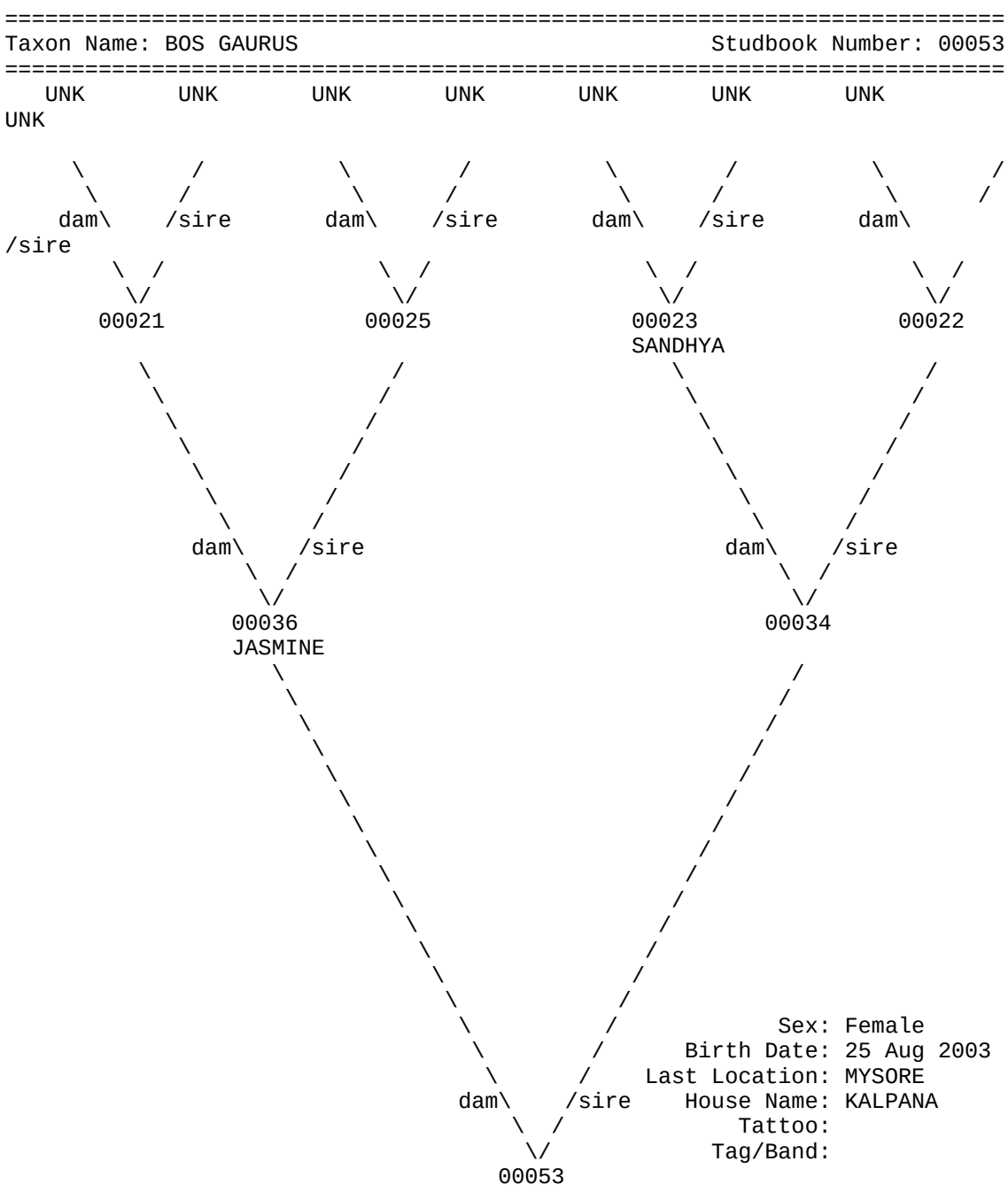
^ Pedigree continues beyond top of page...

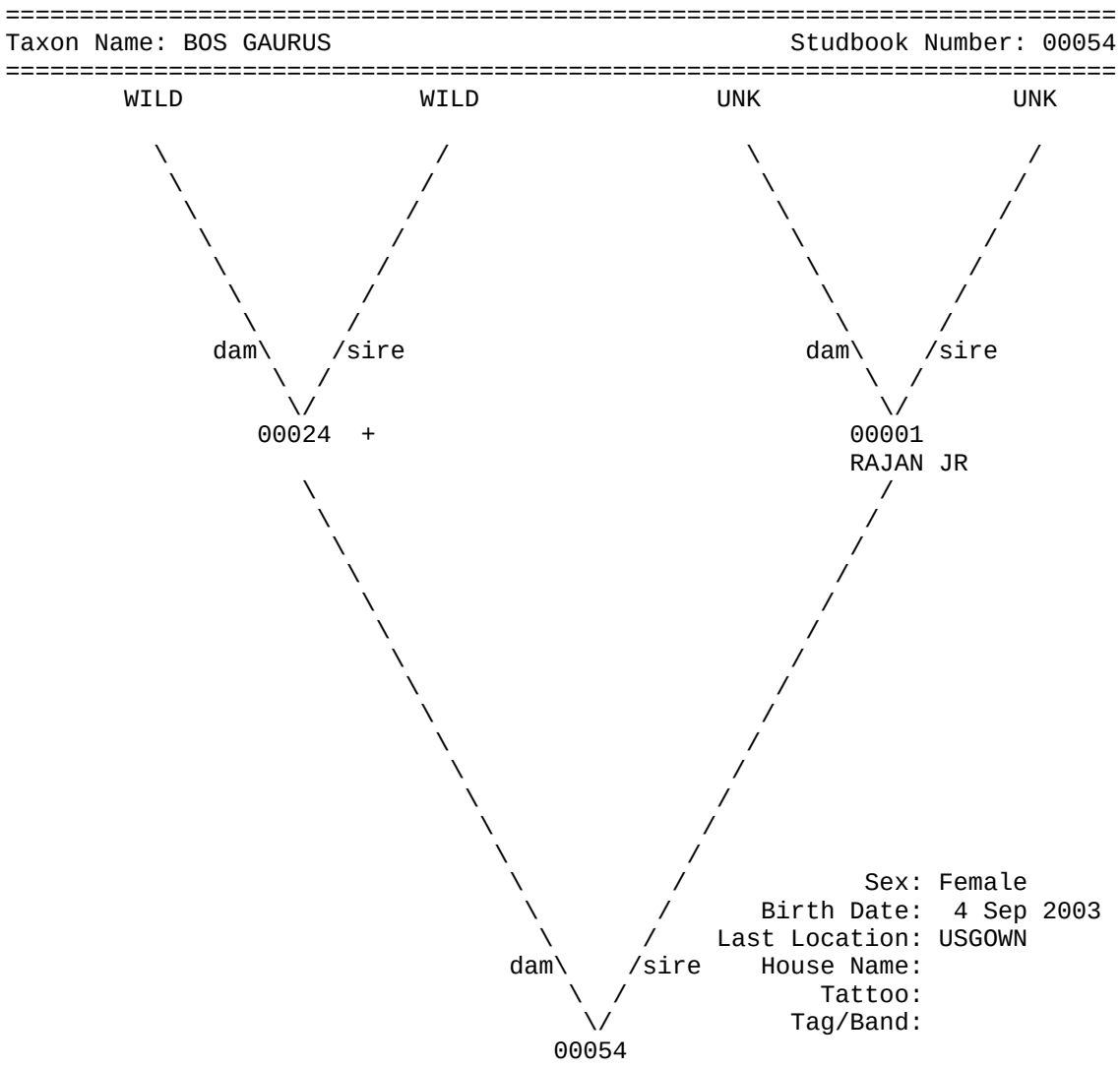


Taxon Name: BOS GAURUS Studbook Number: 00052

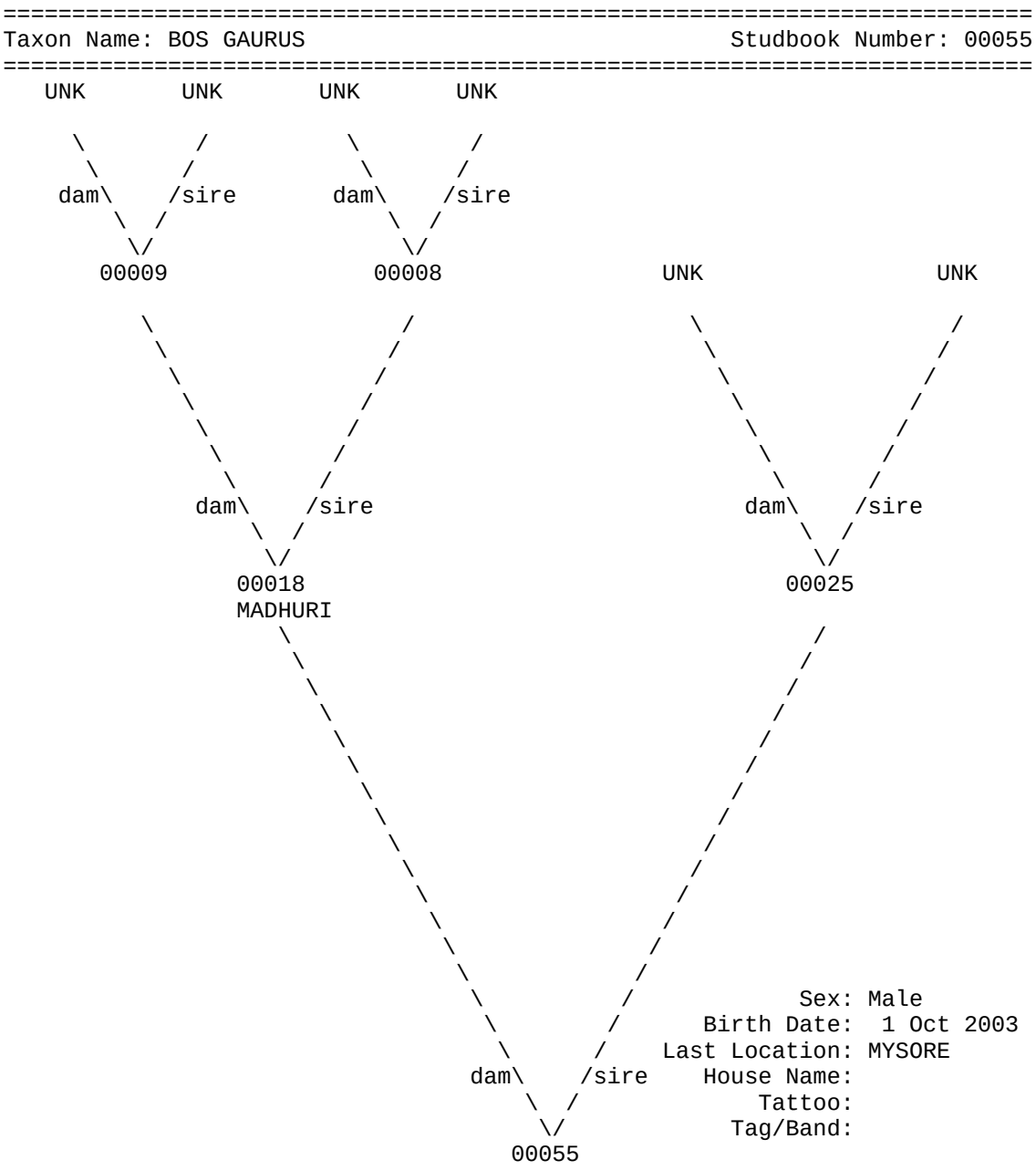
* Appear more than once...

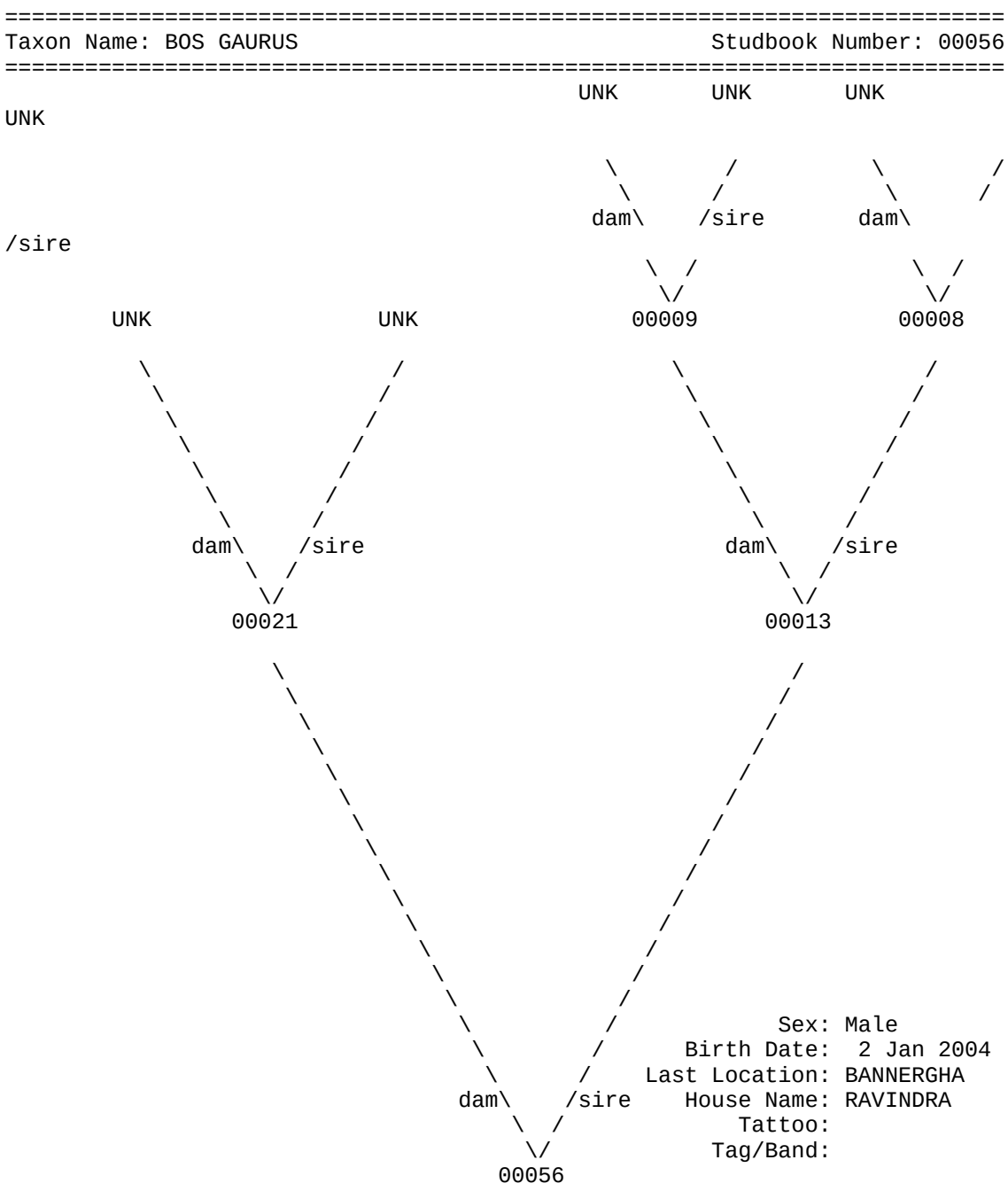
^ Pedigree continues beyond top of page...

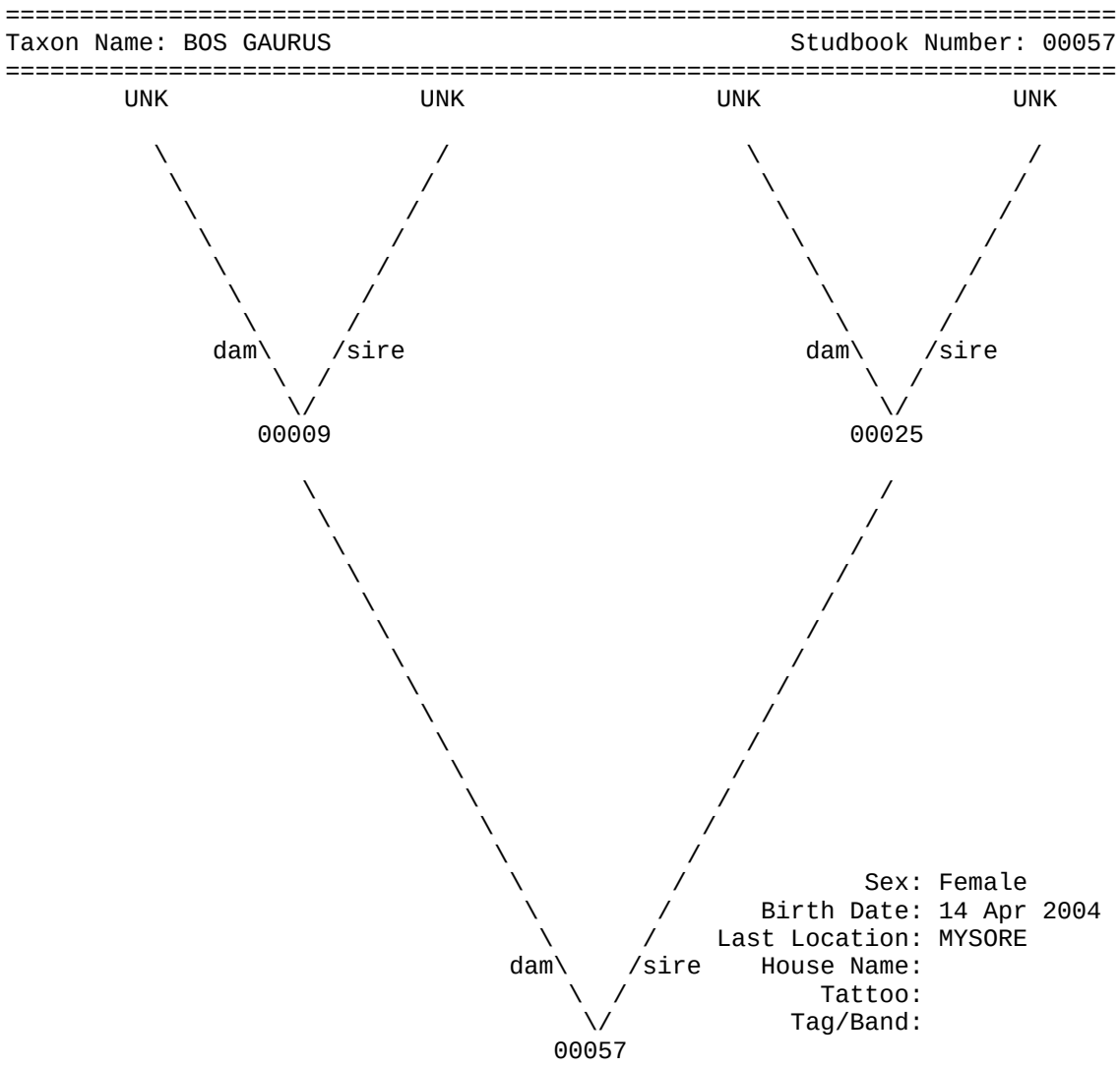

Taxon Name: BOS GAURUS
Studbook Number: 00053
UNK
UNK
UNK
UNK
UNK
UNK
UNK
UNK
dam\
/sire
dam\
/sire
dam\
/sire
dam\
/sire
00021
00025
00023
SANDHYA
00022
dam\
/sire
dam\
/sire
00036
JASMINE
00034
dam\
/sire
00053
Sex: Female
Birth Date: 25 Aug 2003
Last Location: MYSORE
House Name: KALPANA
Tattoo:
Tag/Band:

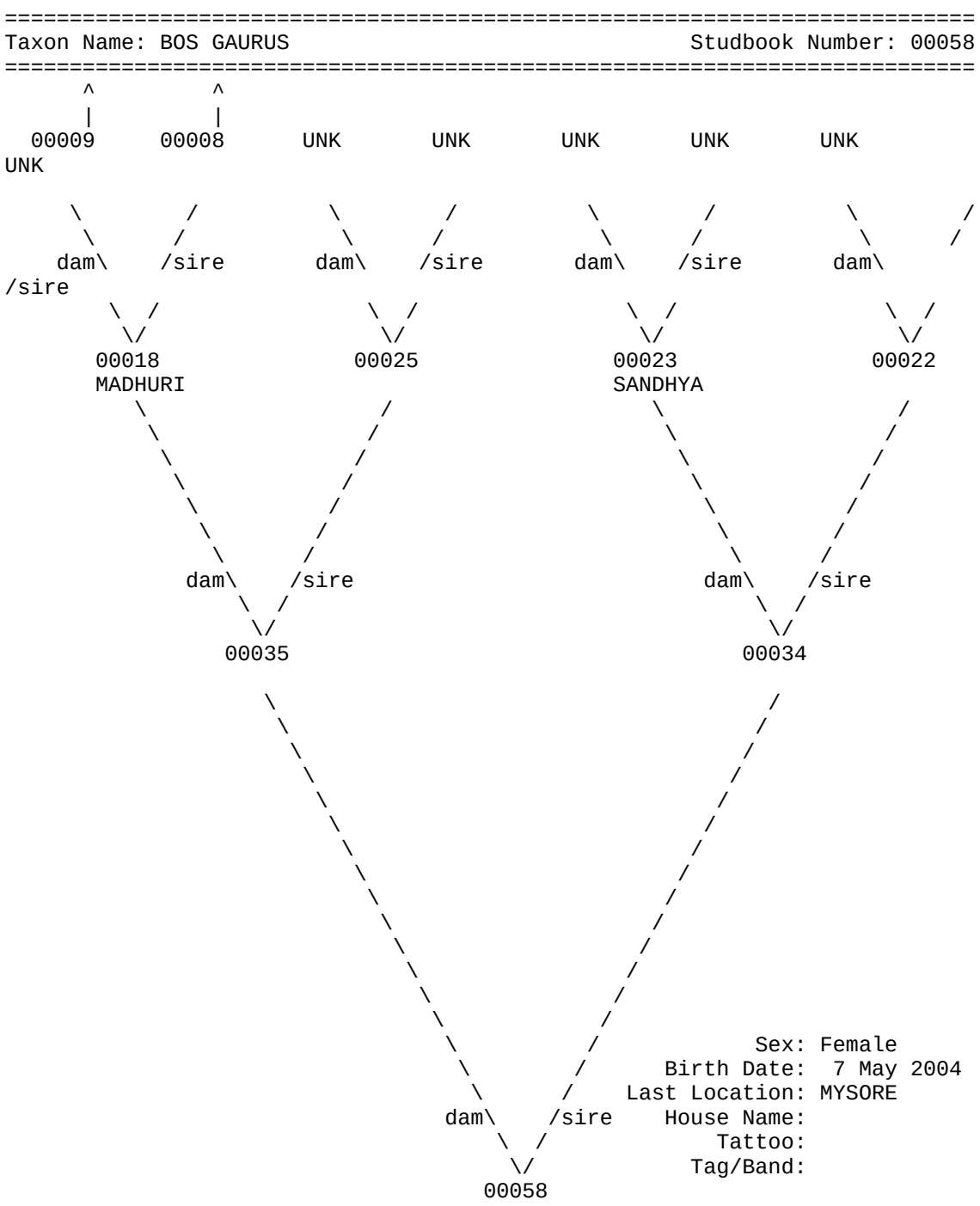

Taxon Name: BOS GAURUS
Studbook Number: 00054
WILD
WILD
UNK
UNK
dam
sire
dam
sire
00024 +
00001
RAJAN JR
dam
sire
00054
Sex: Female
Birth Date: 4 Sep 2003
Last Location: USGOWN
House Name:
Tattoo:
Tag/Band:

+ Wild-caught...


Taxon Name: BOS GAURUS
Studbook Number: 00055
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
UNK
UNK
dam
sire
dam
sire
00018
MADHURI
00025
dam
sire
00055
Sex: Male
Birth Date: 1 Oct 2003
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00056
UNK
UNK
UNK
UNK
dam\
/sire
dam\
/sire
UNK
UNK
00009
00008
dam\
/sire
dam\
/sire
00021
00013
dam\
/sire
00056
Sex: Male
Birth Date: 2 Jan 2004
Last Location: BANNERGHA
House Name: RAVINDRA
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00057
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00025
dam
sire
00057
Sex: Female
Birth Date: 14 Apr 2004
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:



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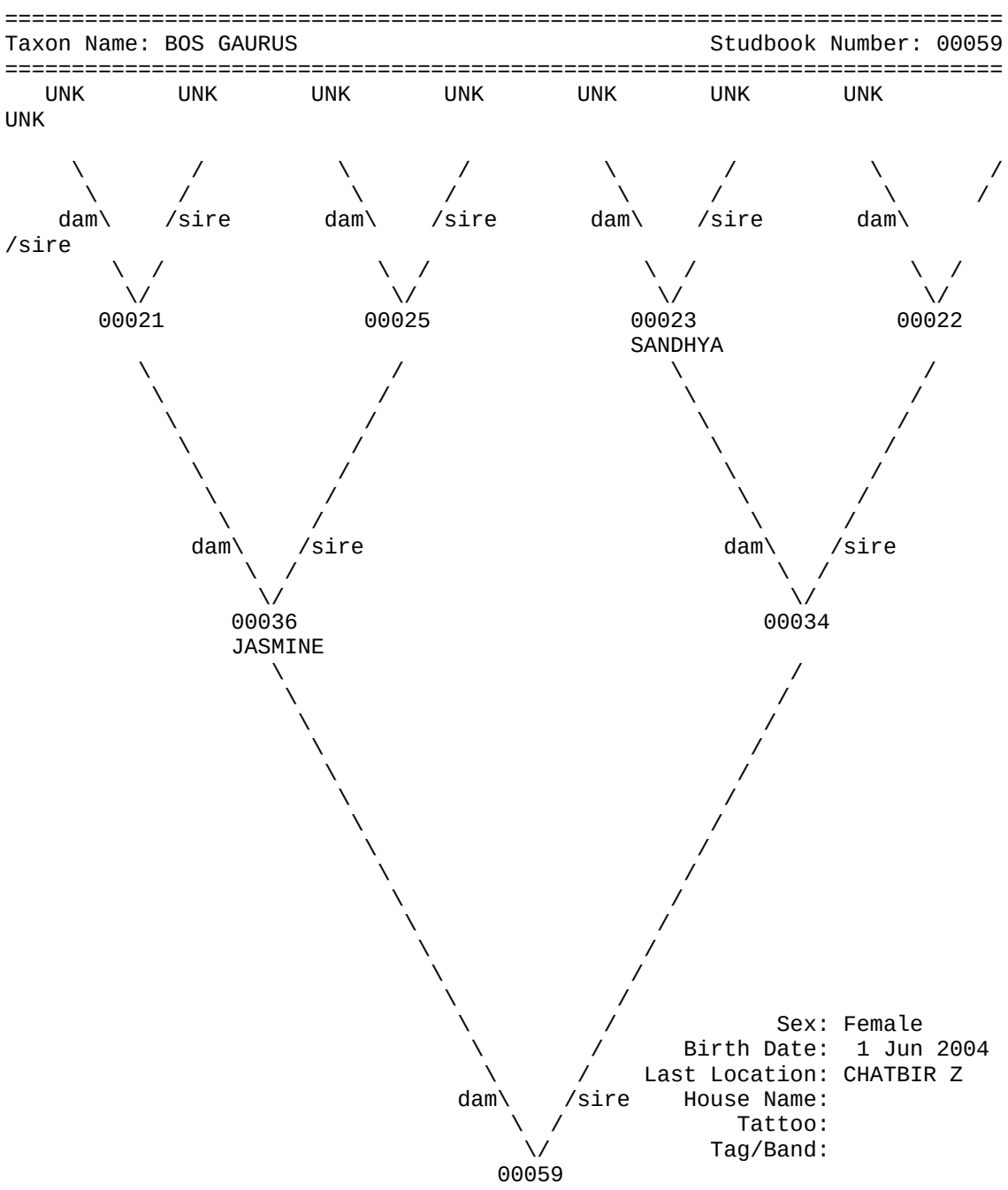
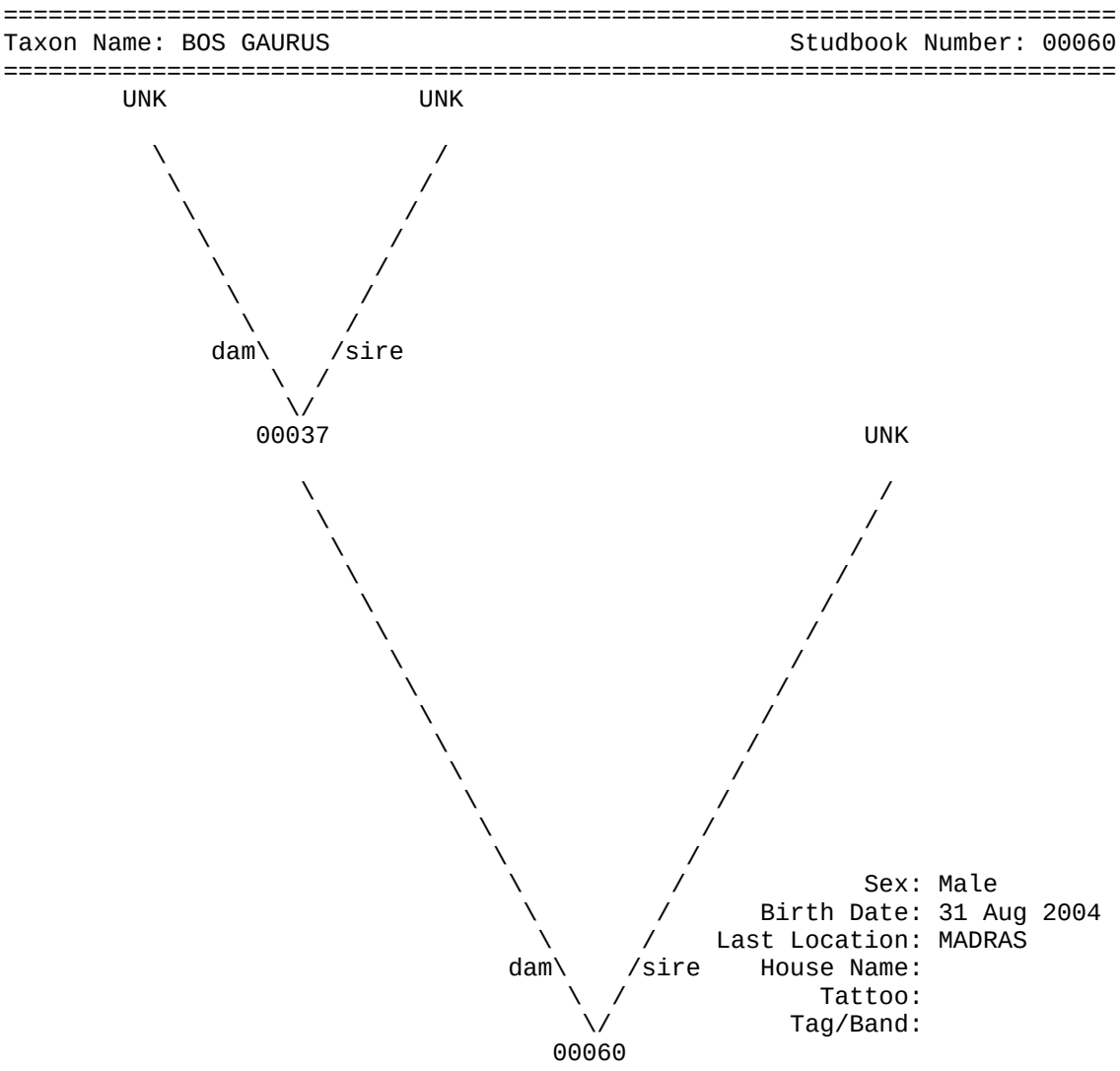
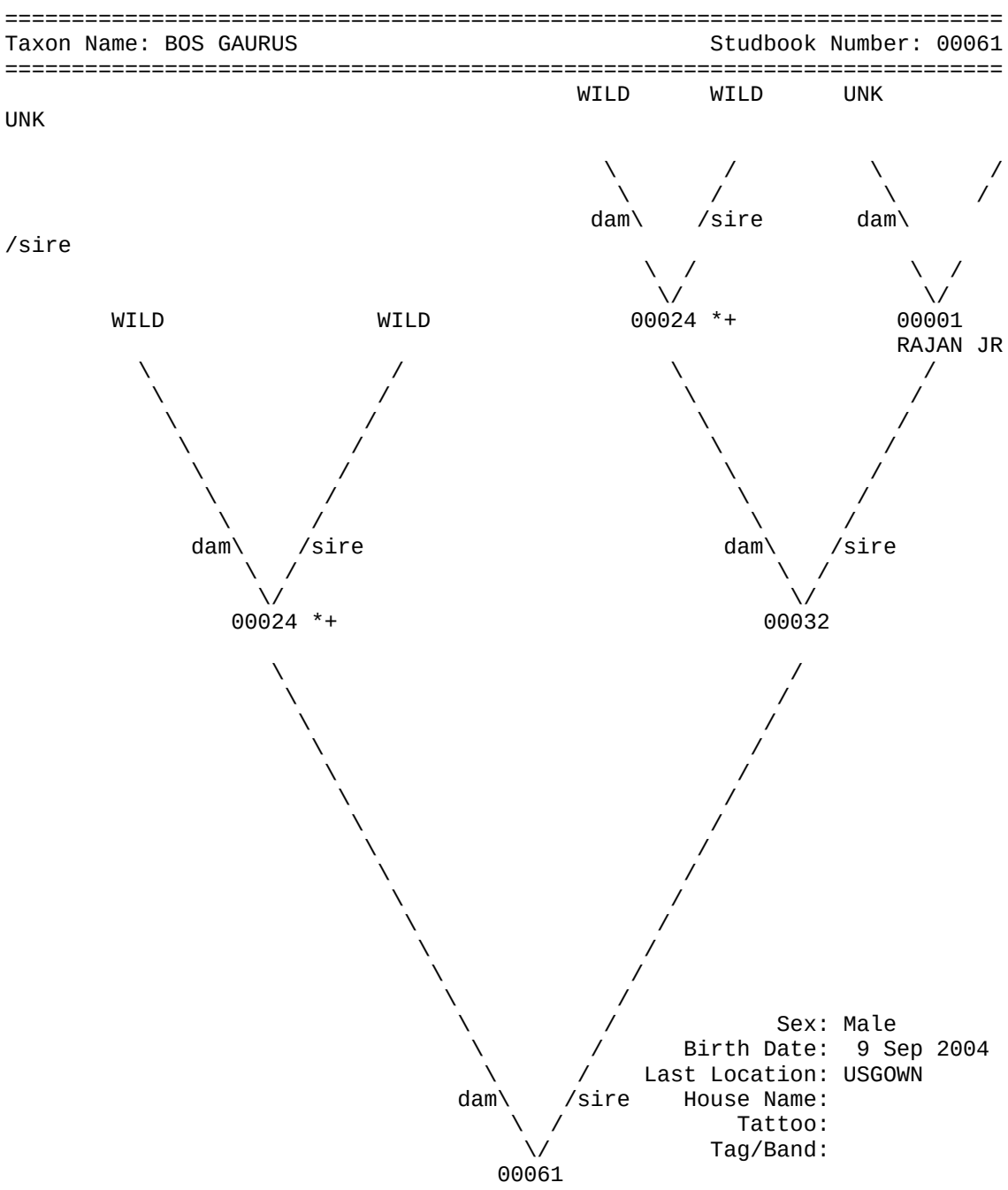
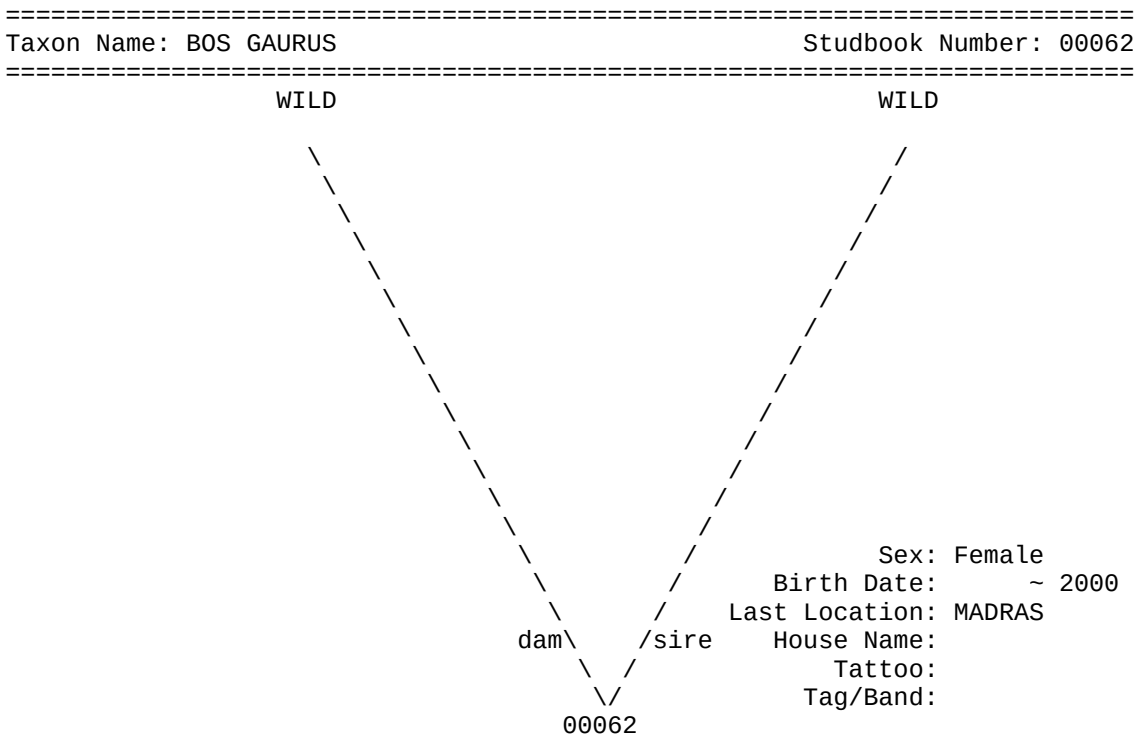
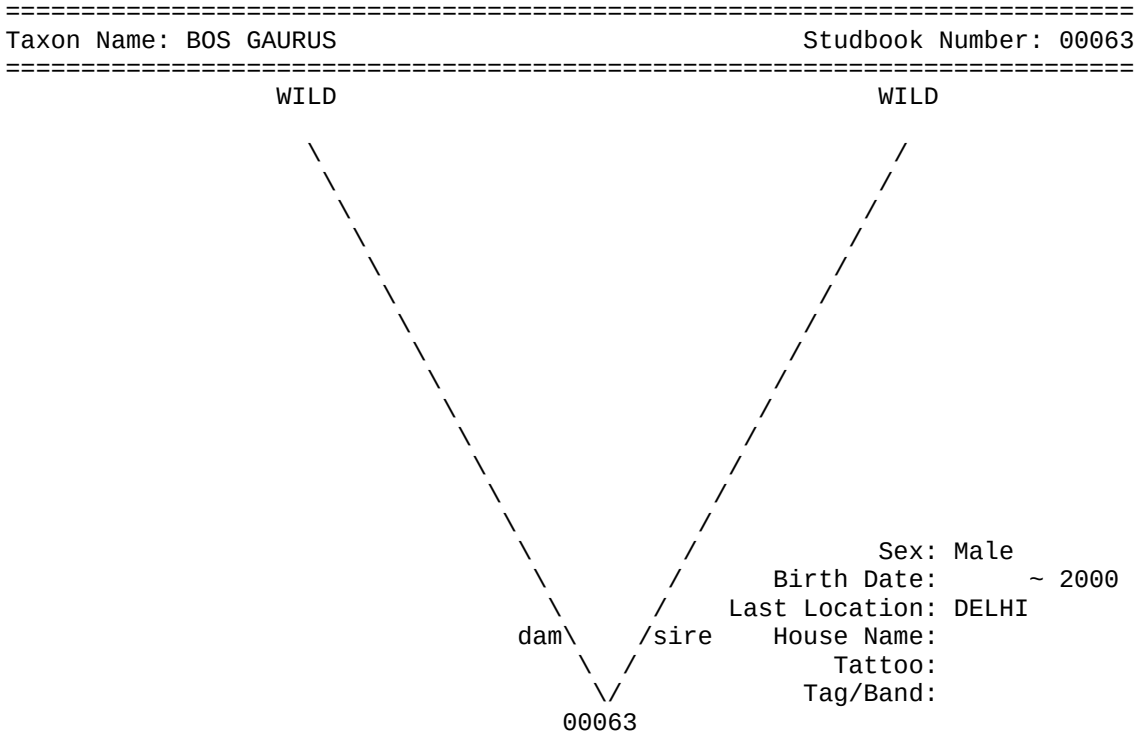

Taxon Name: BOS GAURUS
Studbook Number: 00059
UNK UNK UNK UNK UNK UNK UNK UNK
dam\ /sire dam\ /sire dam\ /sire dam\ /sire
00021 00025 00023 SANDHYA 00022
dam\ /sire dam\ /sire
00036 JASMINE 00034
dam\ /sire
00059
Sex: Female
Birth Date: 1 Jun 2004
Last Location: CHATBIR Z
House Name:
Tattoo:
Tag/Band:

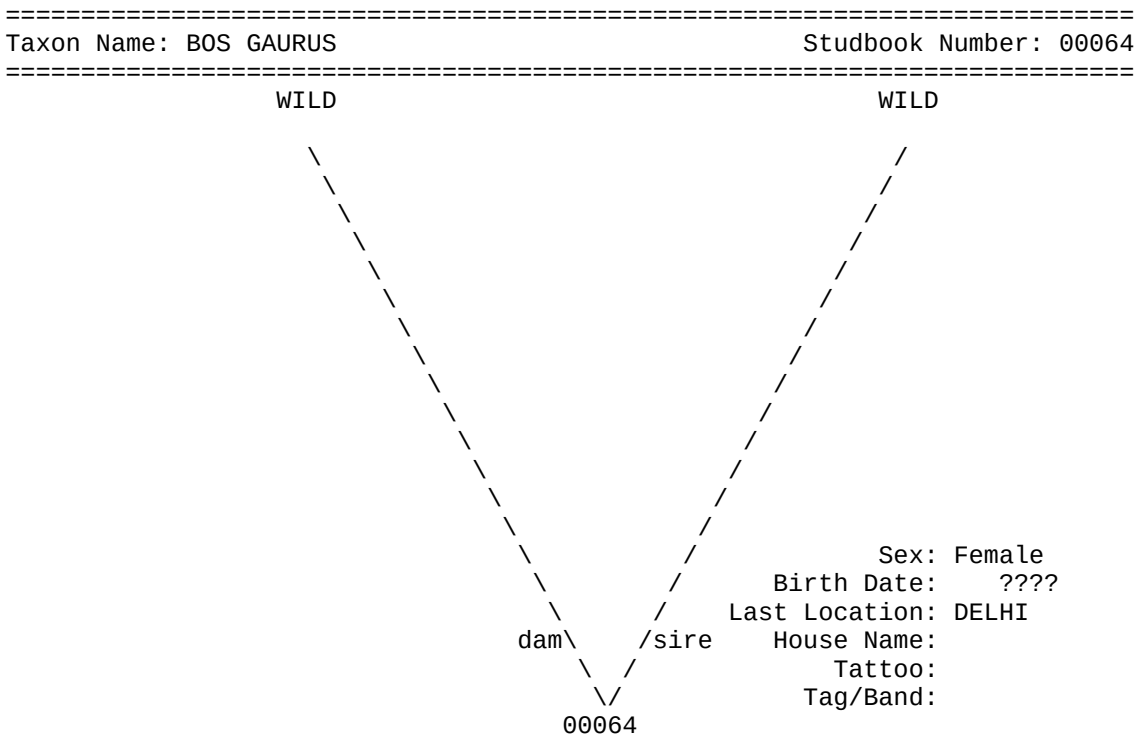

Taxon Name: BOS GAURUS
Studbook Number: 00060
UNK
UNK
dam
sire
00037
UNK
dam
sire
00060
Sex: Male
Birth Date: 31 Aug 2004
Last Location: MADRAS
House Name:
Tattoo:
Tag/Band:

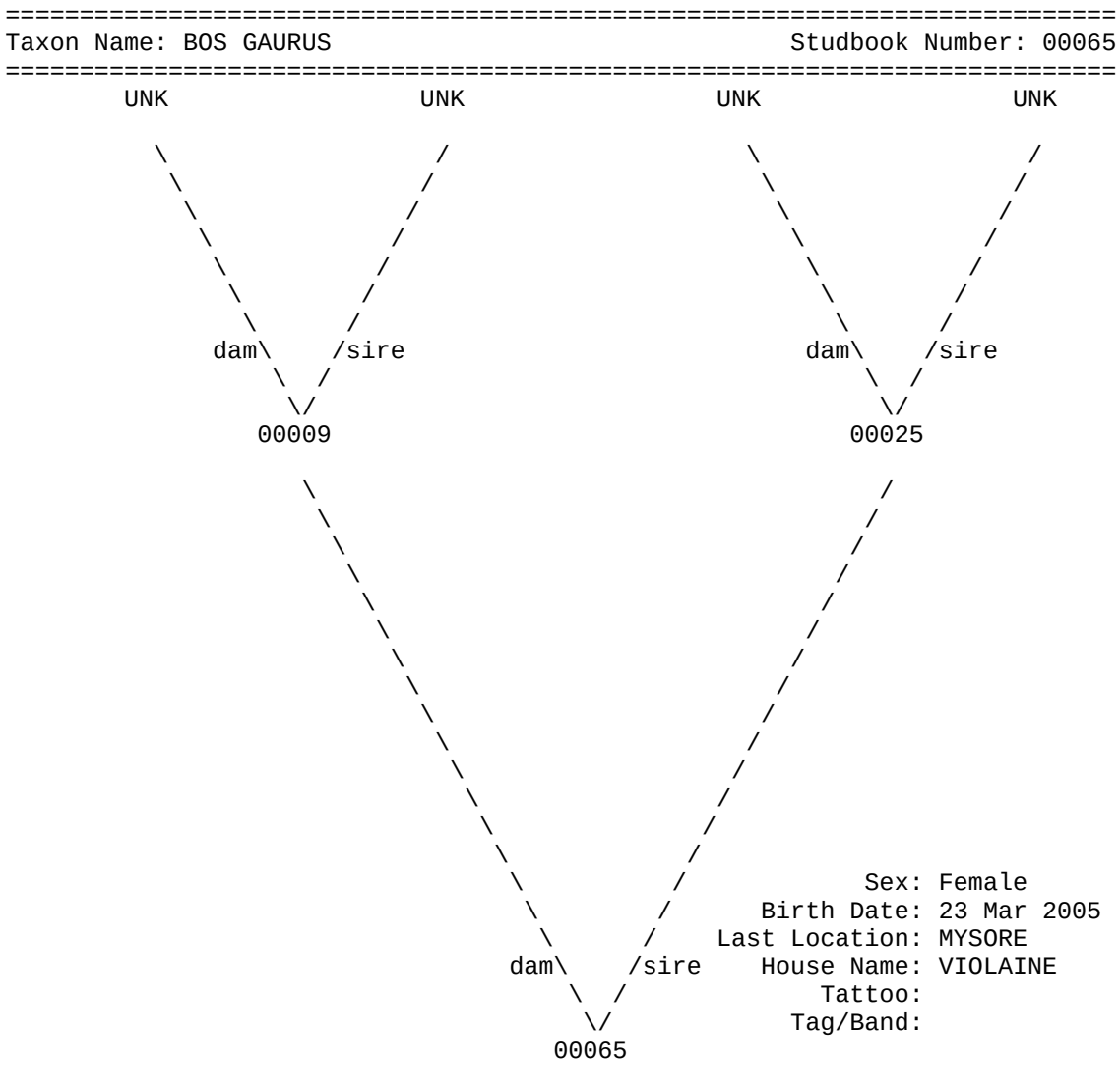


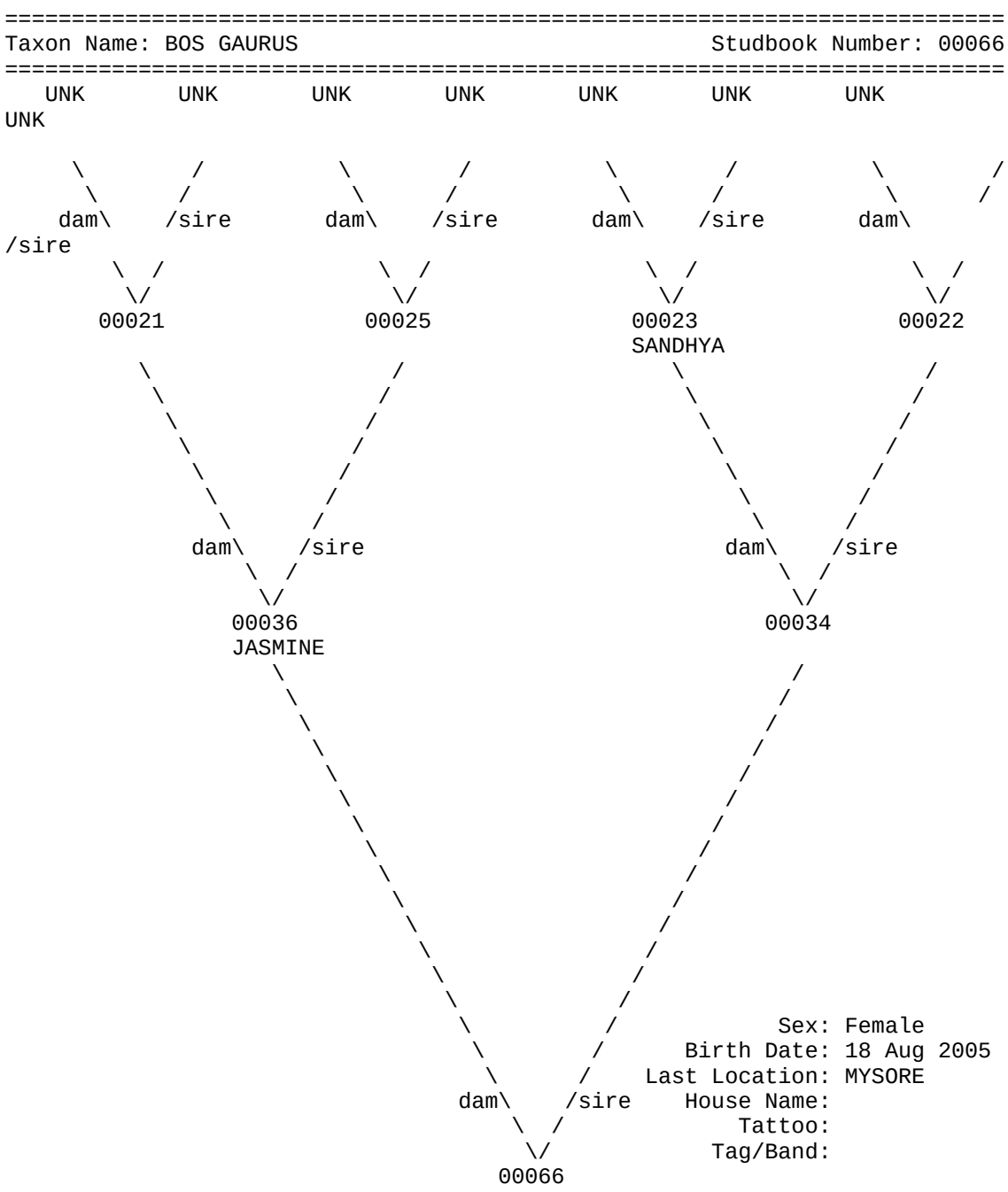
+ Wild-caught... * Appear more than once...

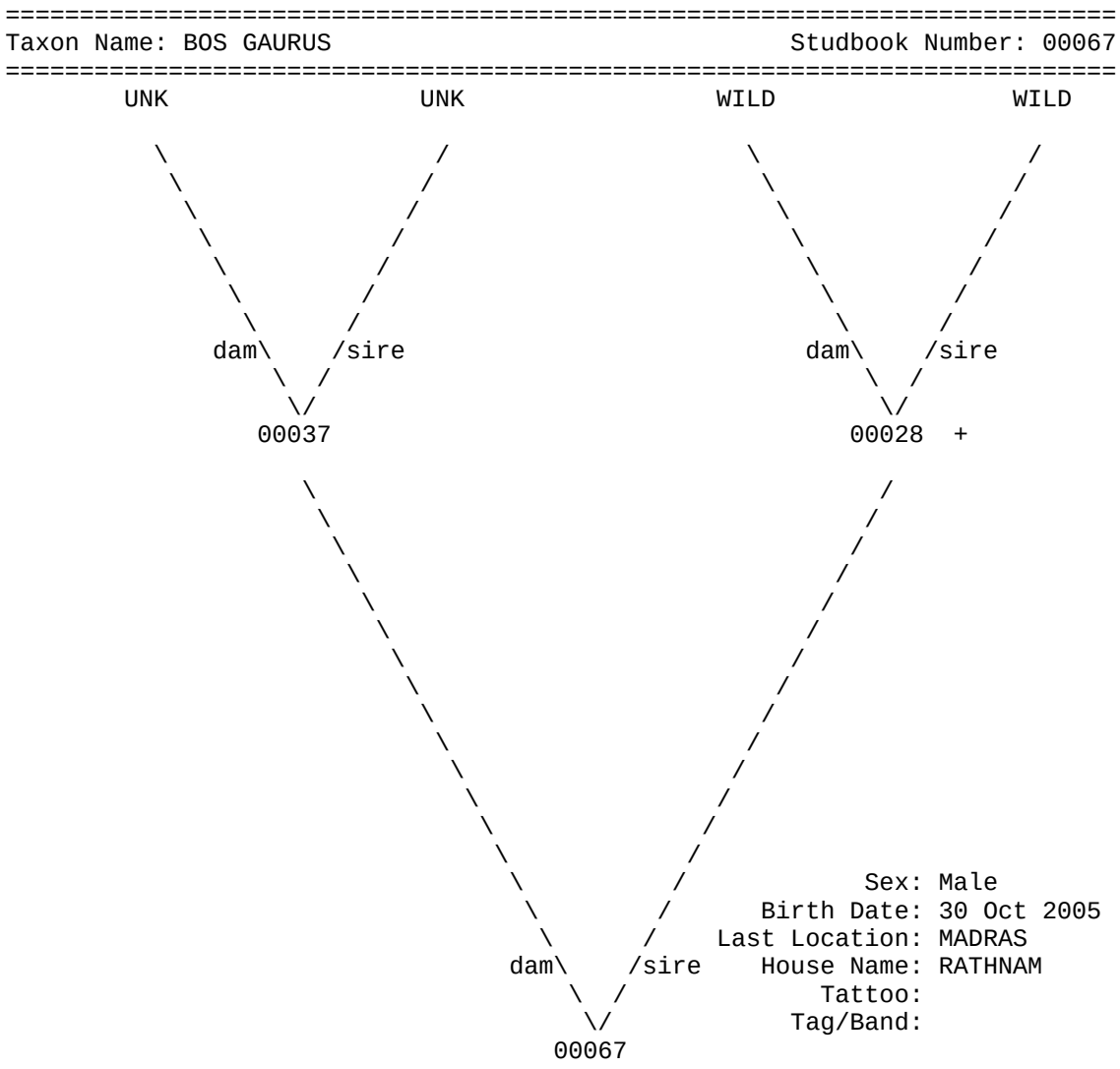

Taxon Name: BOS GAURUS
Studbook Number: 00062
WILD
WILD
Sex: Female
Birth Date: ~ 2000
Last Location: MADRAS
House Name:
Tattoo:
Tag/Band:
dam
sire
00062


Taxon Name: BOS GAURUS
Studbook Number: 00063
WILD
WILD
Sex: Male
Birth Date: ~ 2000
Last Location: DELHI
House Name:
Tattoo:
Tag/Band:
dam
sire
00063

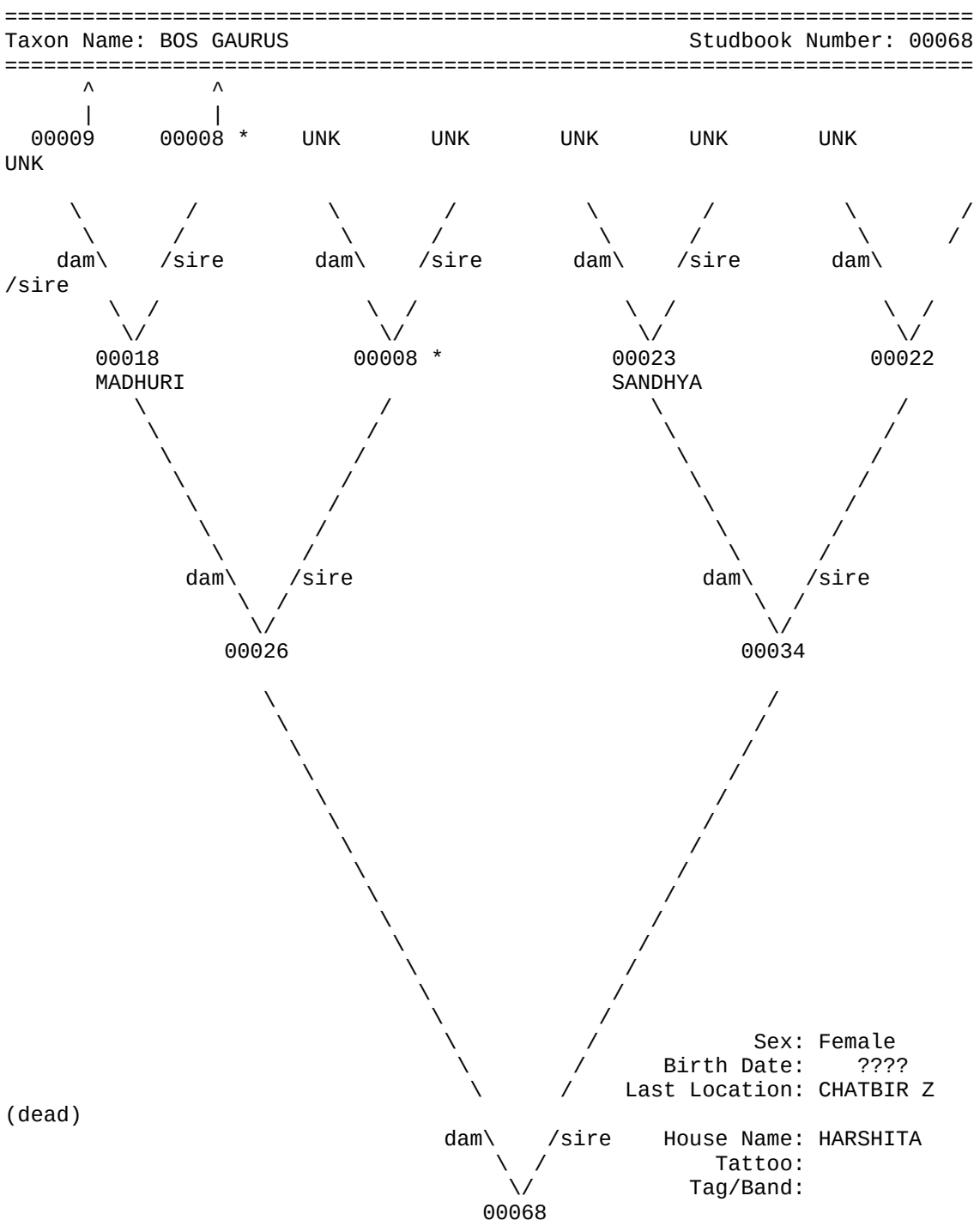

Taxon Name: BOS GAURUS
Studbook Number: 00064
WILD
WILD
Sex: Female
Birth Date: ????
Last Location: DELHI
House Name:
Tattoo:
Tag/Band:
dam
sire
00064


Taxon Name: BOS GAURUS
Studbook Number: 00065
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00025
dam
sire
00065
Sex: Female
Birth Date: 23 Mar 2005
Last Location: MYSORE
House Name: VIOLAINE
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00066
UNK UNK UNK UNK UNK UNK UNK UNK
dam\ /sire dam\ /sire dam\ /sire dam\ /sire
00021 00025 00023 SANDHYA 00022
dam\ /sire dam\ /sire
00036 JASMINE 00034
dam\ /sire
00066
Sex: Female
Birth Date: 18 Aug 2005
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00067
UNK
UNK
WILD
WILD
dam
sire
dam
sire
00037
00028 +
dam
sire
00067
Sex: Male
Birth Date: 30 Oct 2005
Last Location: MADRAS
House Name: RATHNAM
Tattoo:
Tag/Band:

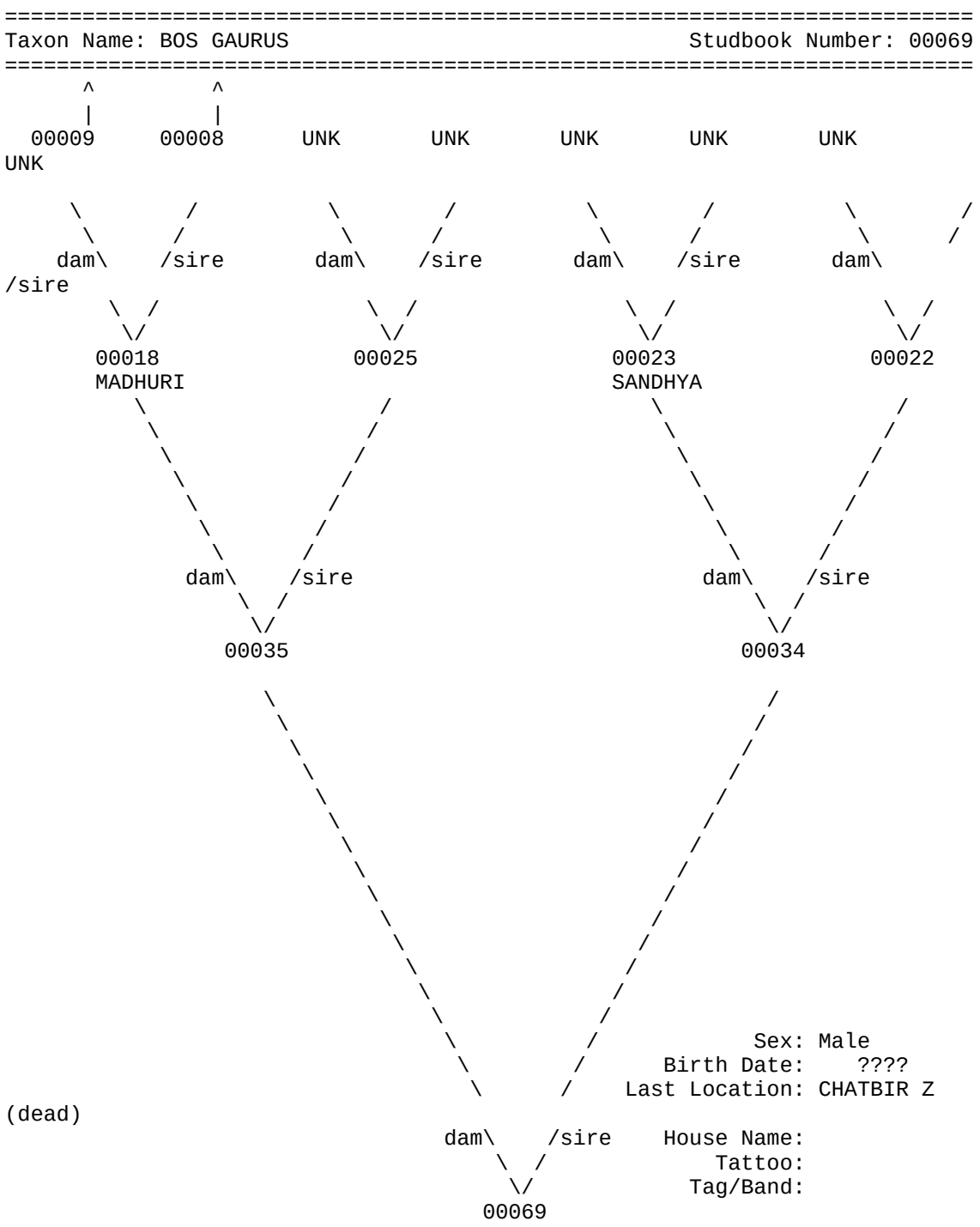
+ Wild-caught...



Taxon Name: BOS GAURUS Studbook Number: 00068

* Appear more than once...

^ Pedigree continues beyond top of page...



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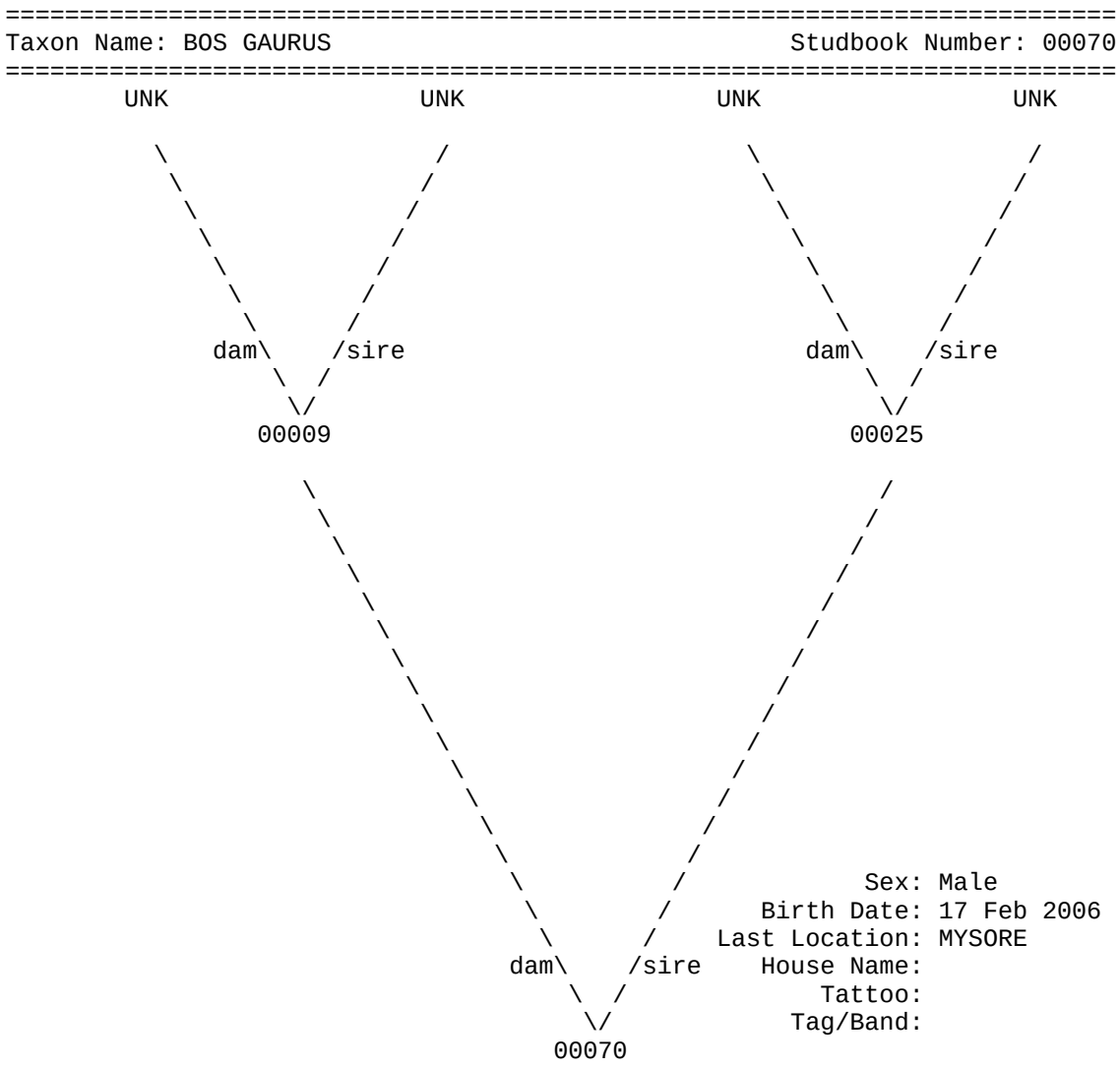
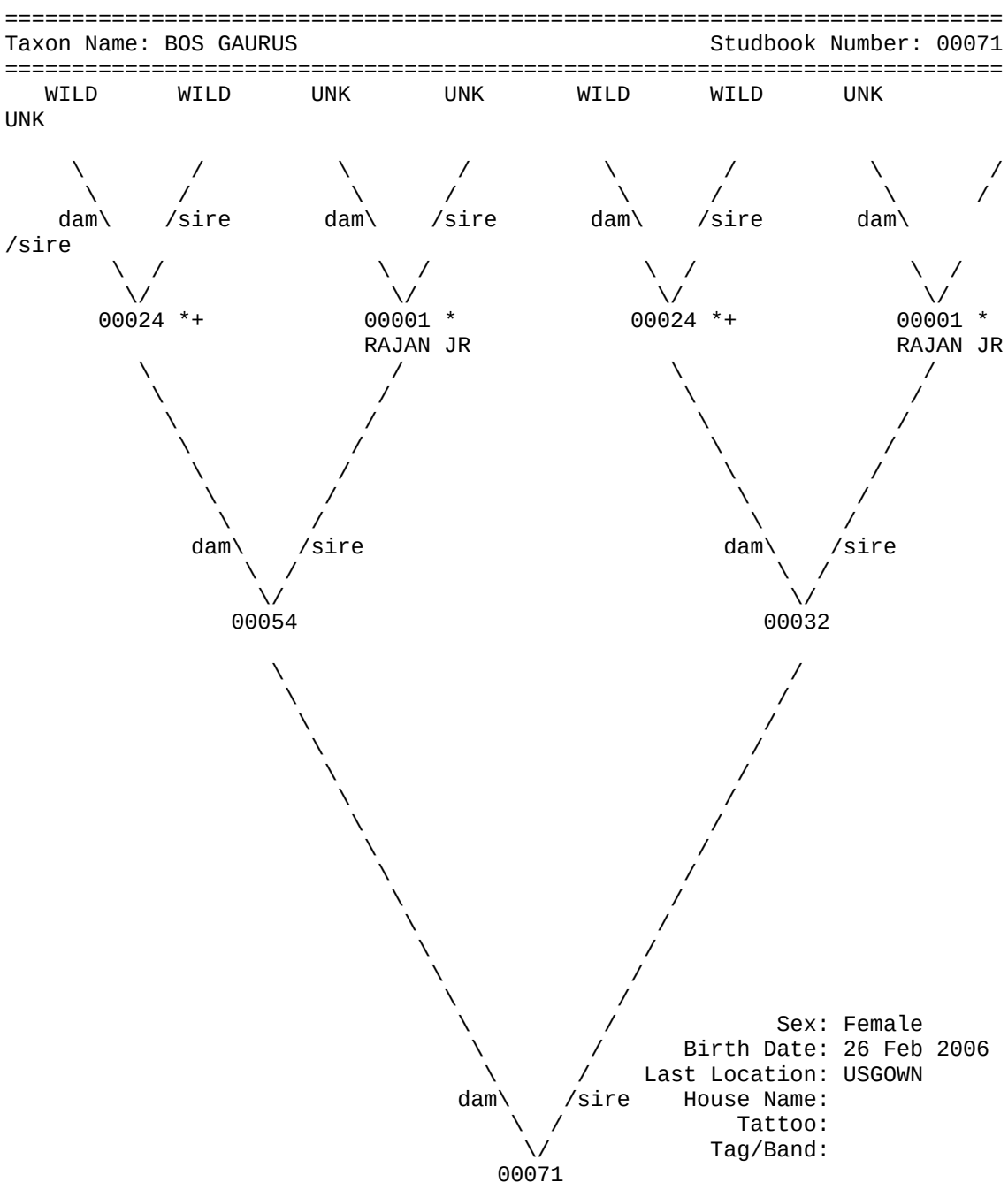
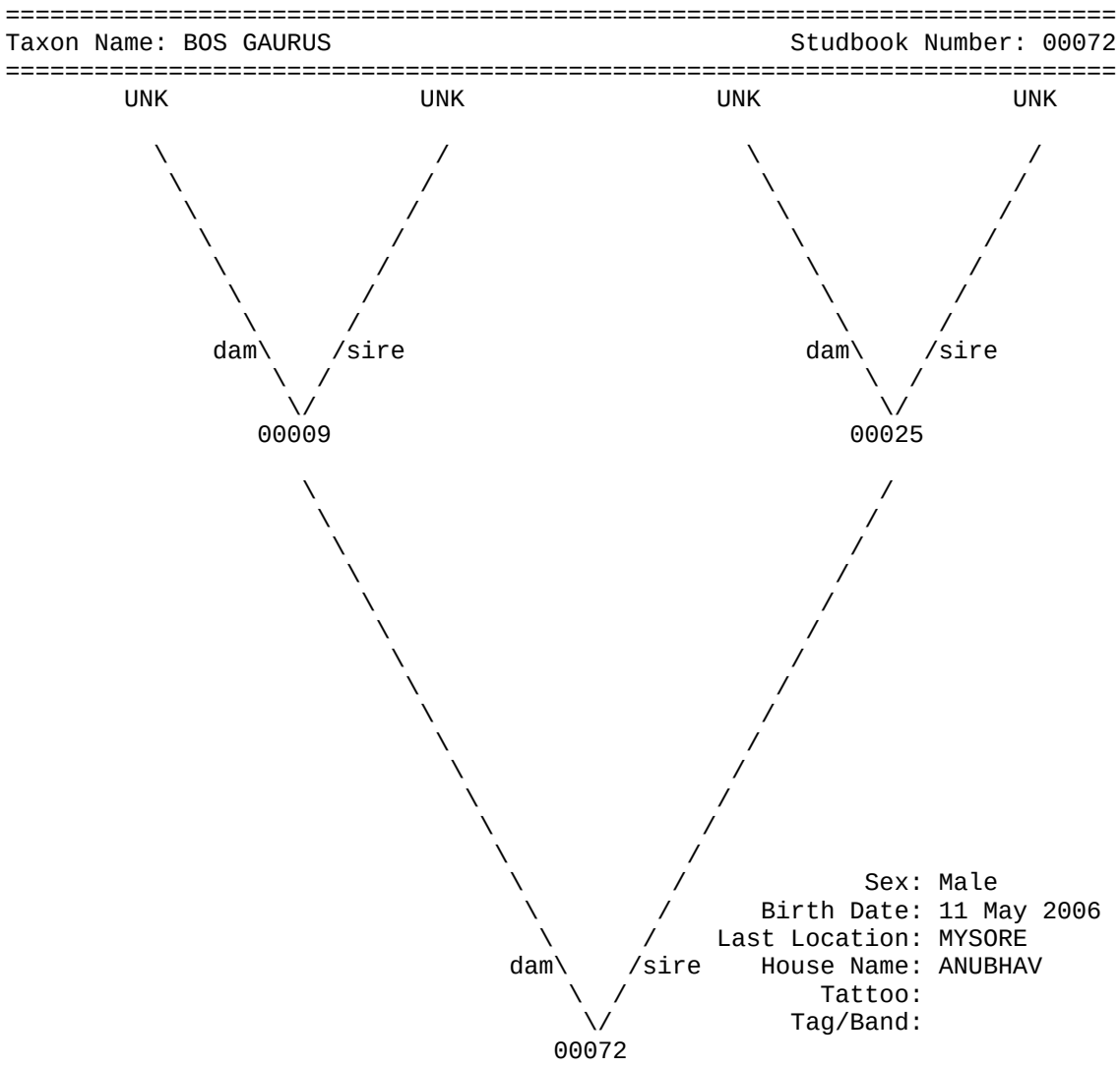
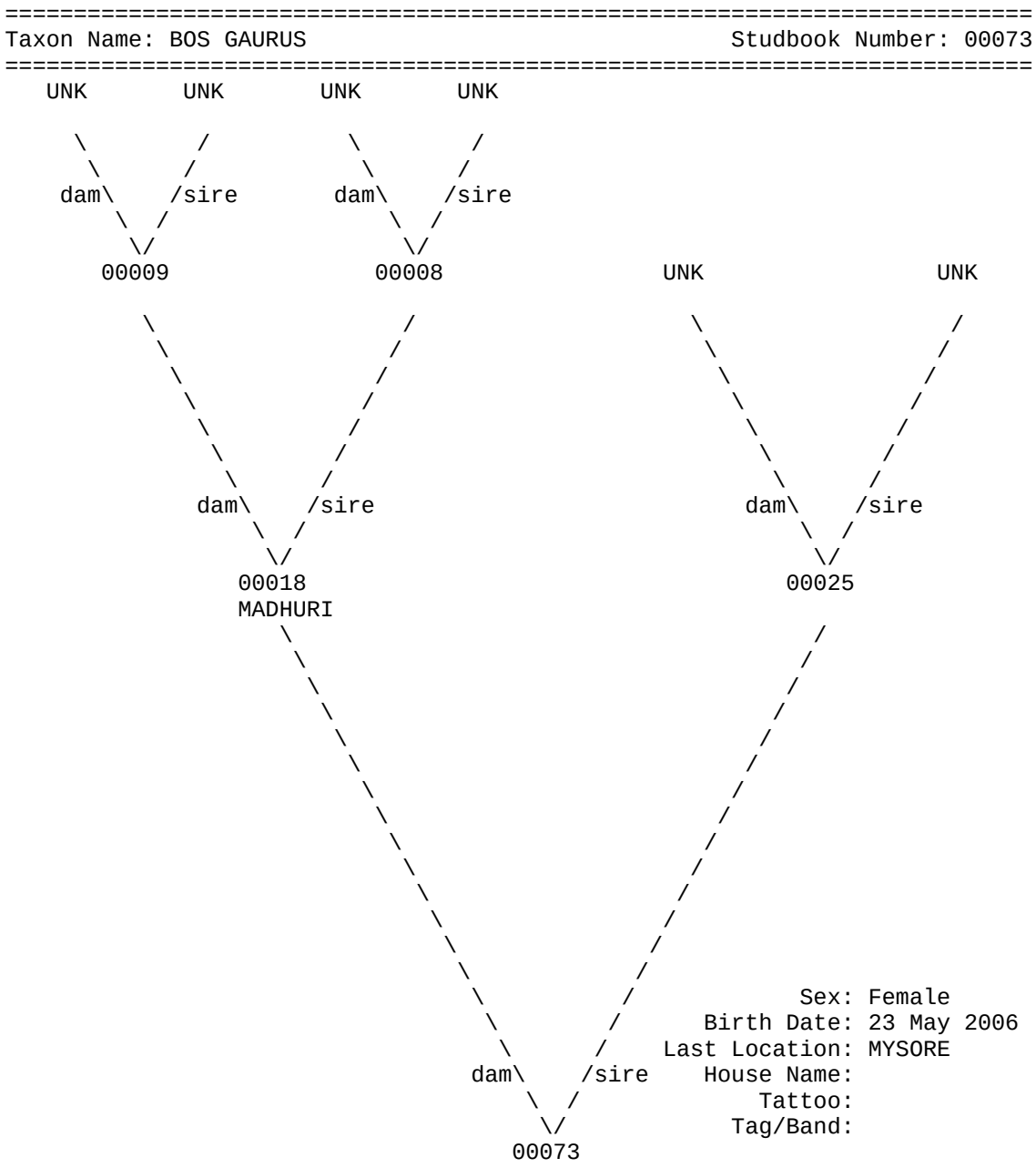
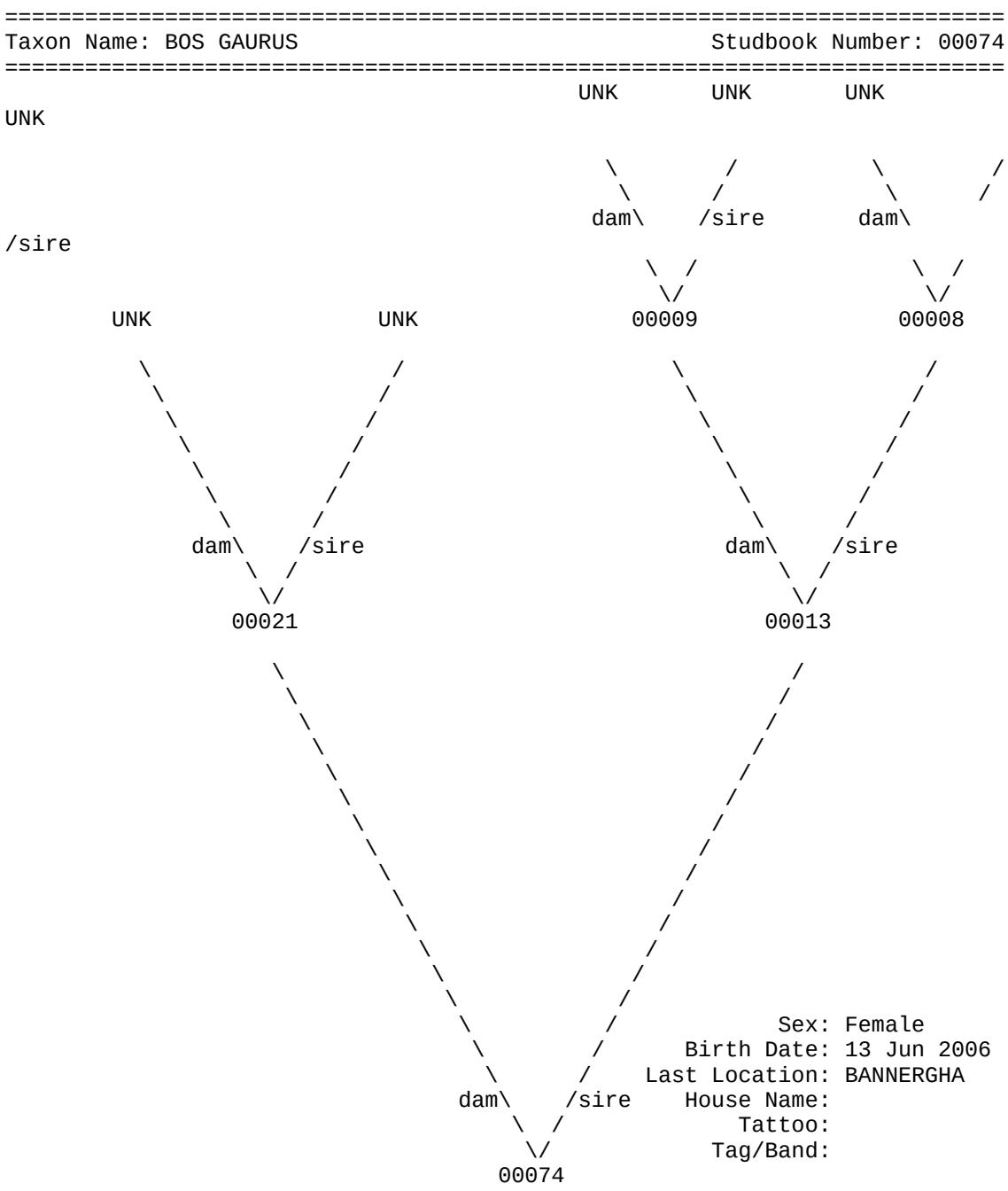

Taxon Name: BOS GAURUS
Studbook Number: 00070
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00025
dam
sire
00070
Sex: Male
Birth Date: 17 Feb 2006
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:

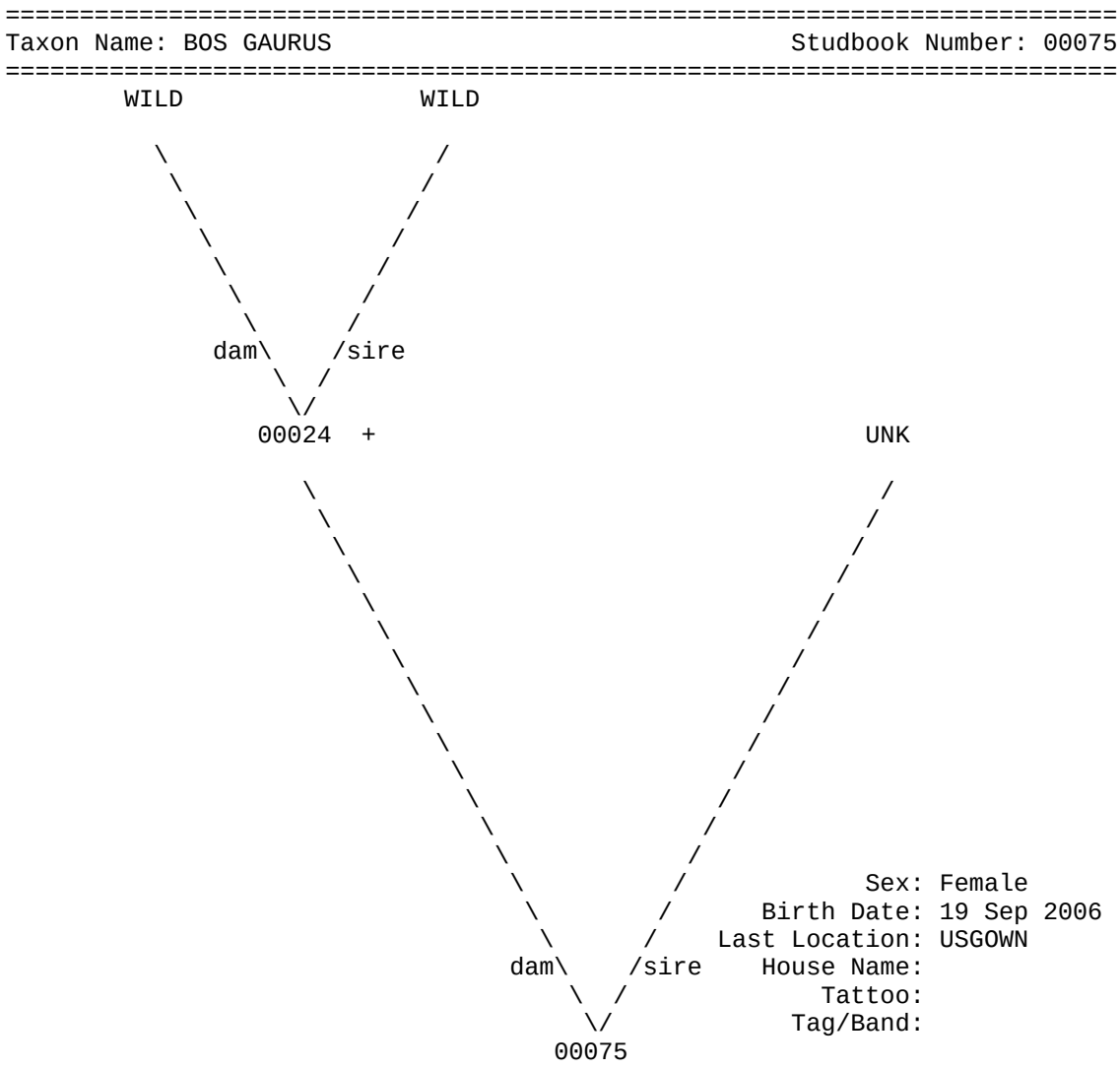


+ Wild-caught... * Appear more than once...

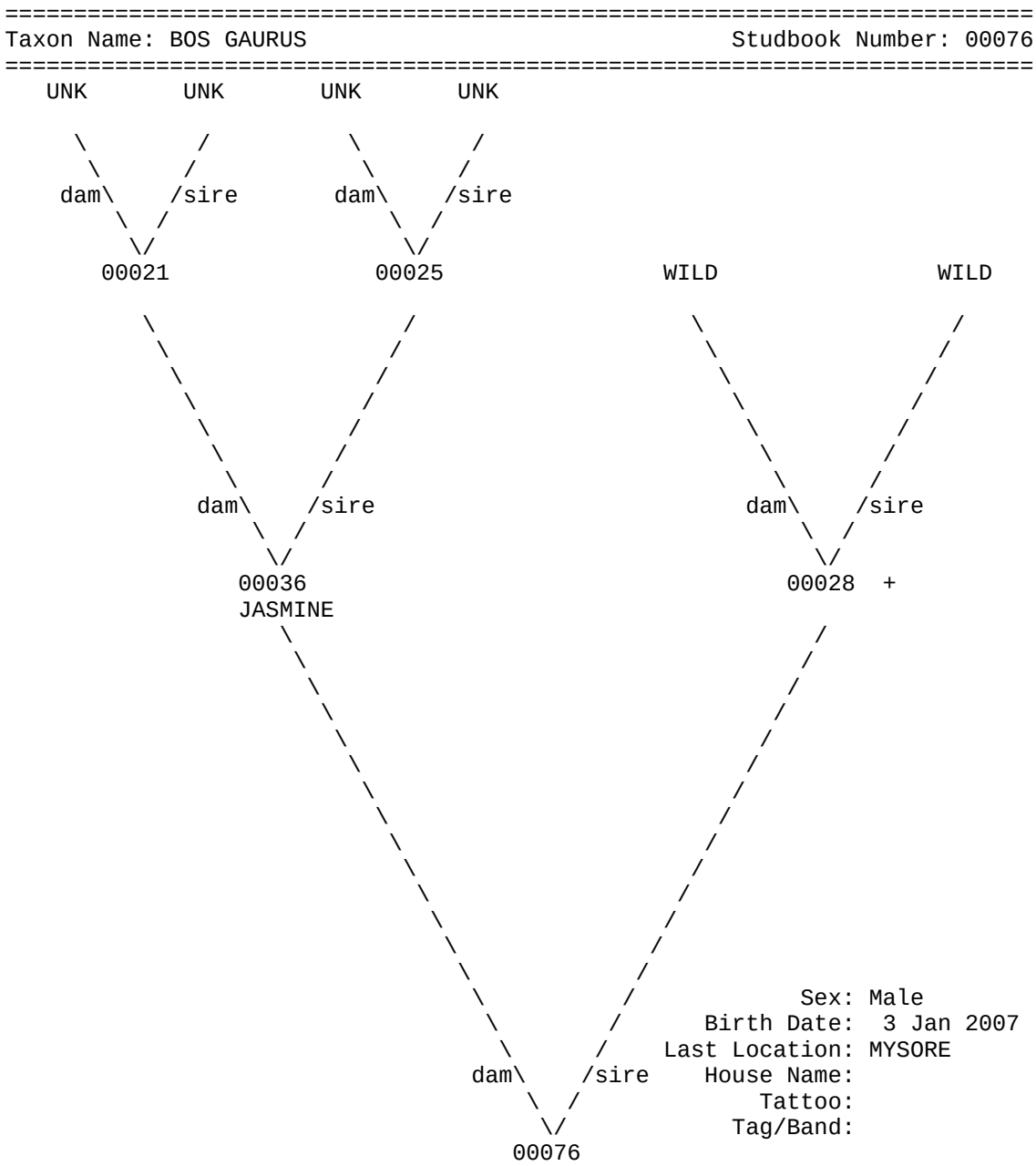

Taxon Name: BOS GAURUS
Studbook Number: 00072
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00025
dam
sire
00072
Sex: Male
Birth Date: 11 May 2006
Last Location: MYSORE
House Name: ANUBHAV
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00073
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
UNK
UNK
dam
sire
dam
sire
00018
MADHURI
00025
dam
sire
00073
Sex: Female
Birth Date: 23 May 2006
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:

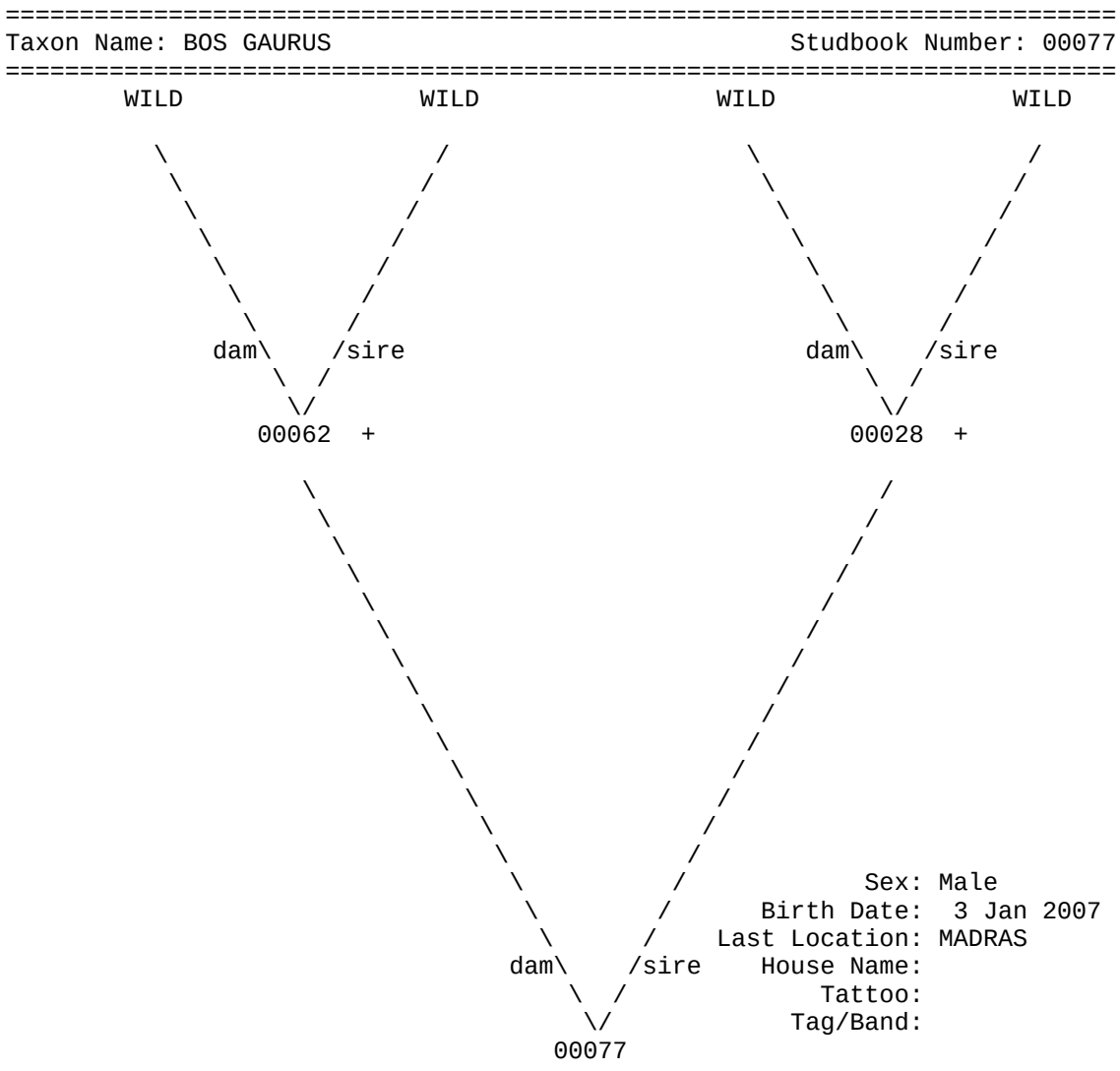

Taxon Name: BOS GAURUS
Studbook Number: 00074
UNK
UNK
UNK
UNK
dam\
/sire
/sire
dam\
UNK
UNK
00009
00008
dam\
/sire
dam\
/sire
00021
00013
dam\
/sire
00074
Sex: Female
Birth Date: 13 Jun 2006
Last Location: BANNERGHA
House Name:
Tattoo:
Tag/Band:


Taxon Name: BOS GAURUS
Studbook Number: 00075
WILD
WILD
dam
sire
00024 +
UNK
Sex: Female
Birth Date: 19 Sep 2006
Last Location: USGOWN
House Name:
Tattoo:
Tag/Band:
dam
sire
00075

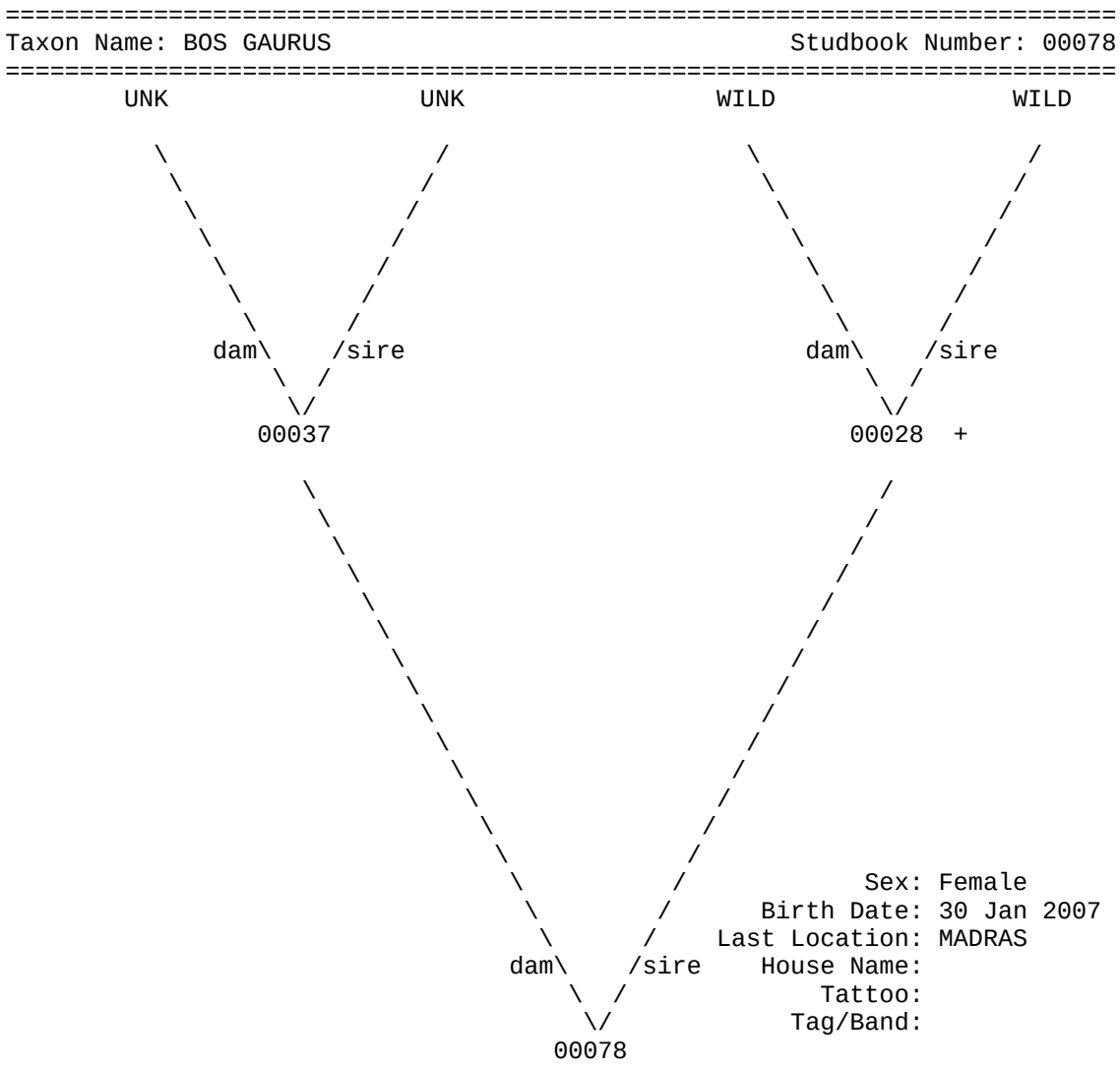
+ Wild-caught...


Taxon Name: BOS GAURUS
Studbook Number: 00076
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00021
00025
WILD
WILD
dam
sire
dam
sire
00036
JASMINE
00028 +
dam
sire
00076
Sex: Male
Birth Date: 3 Jan 2007
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:

+ Wild-caught...

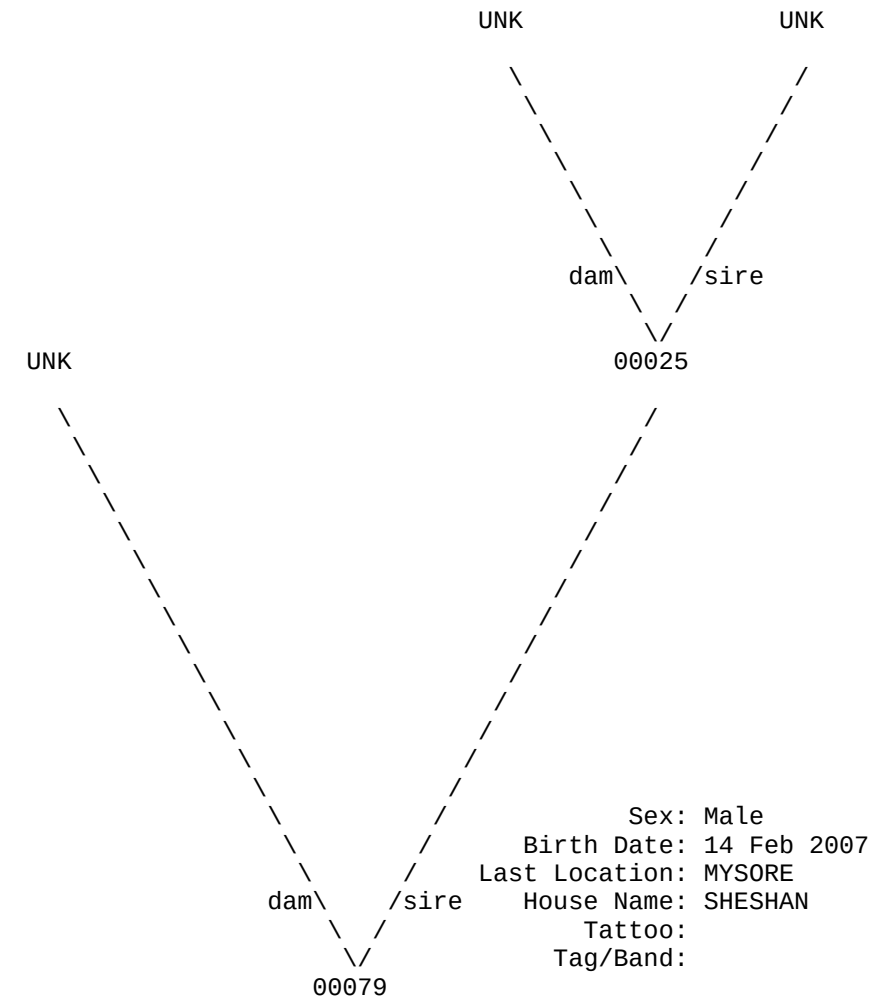

Taxon Name: BOS GAURUS
Studbook Number: 00077
WILD
WILD
WILD
WILD
dam
sire
dam
sire
00062 +
00028 +
dam
sire
00077
Sex: Male
Birth Date: 3 Jan 2007
Last Location: MADRAS
House Name:
Tattoo:
Tag/Band:

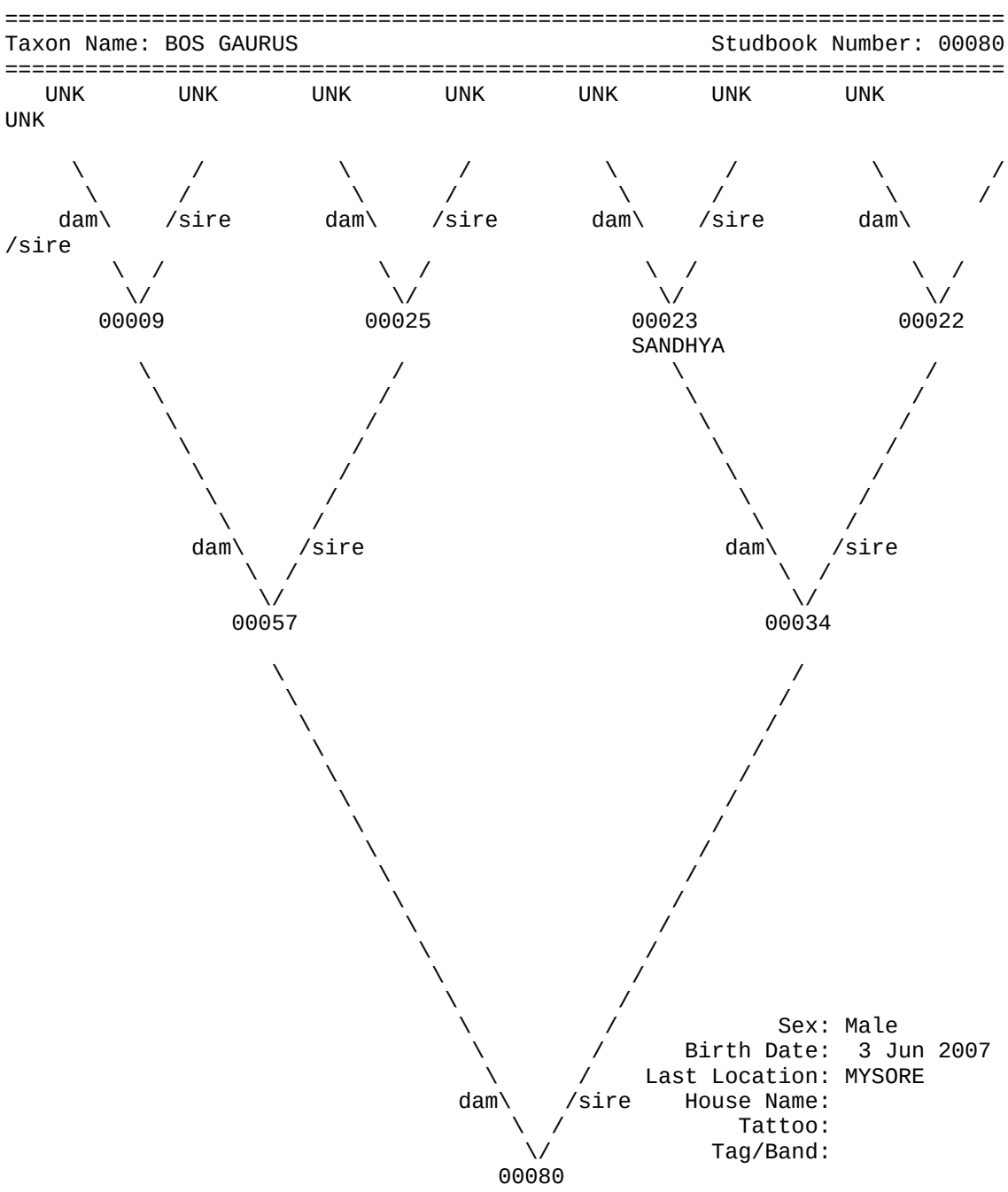
+ Wild-caught...

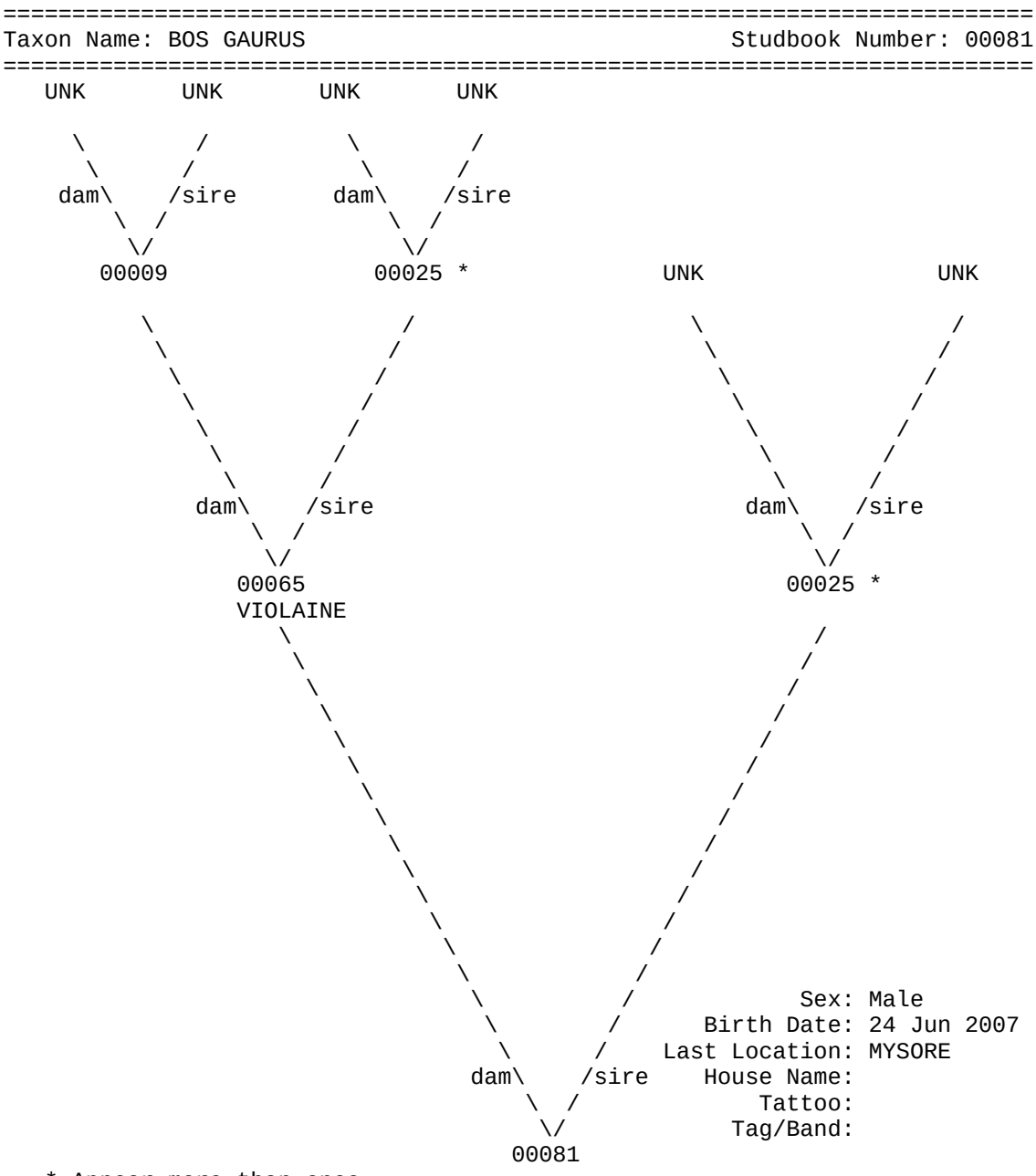

Taxon Name: BOS GAURUS
Studbook Number: 00078
UNK
UNK
WILD
WILD
dam
sire
dam
sire
00037
00028 +
dam
sire
00078
Sex: Female
Birth Date: 30 Jan 2007
Last Location: MADRAS
House Name:
Tattoo:
Tag/Band:

+ Wild-caught...

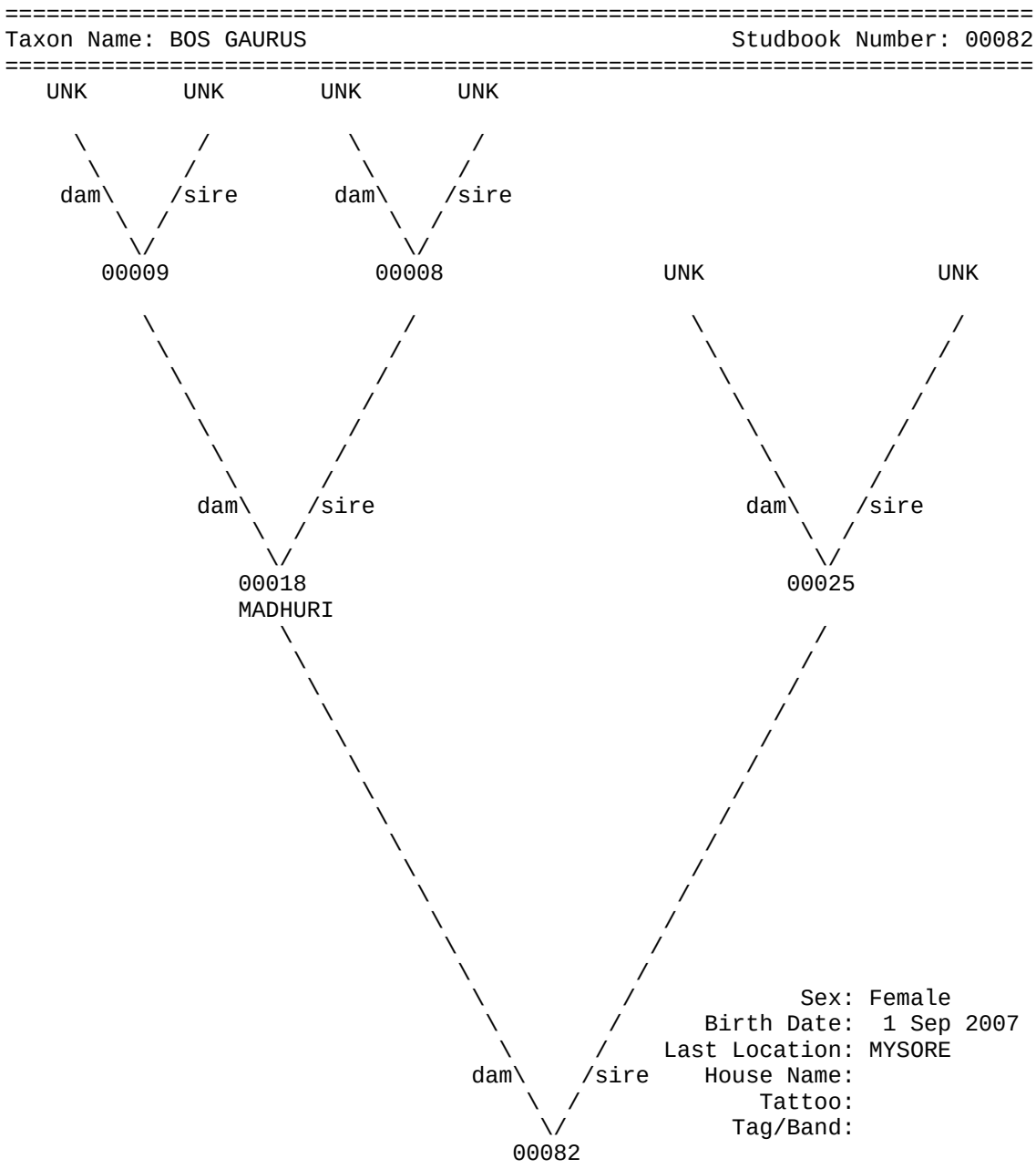
Taxon Name: BOS GAURUS Studbook Number: 00079

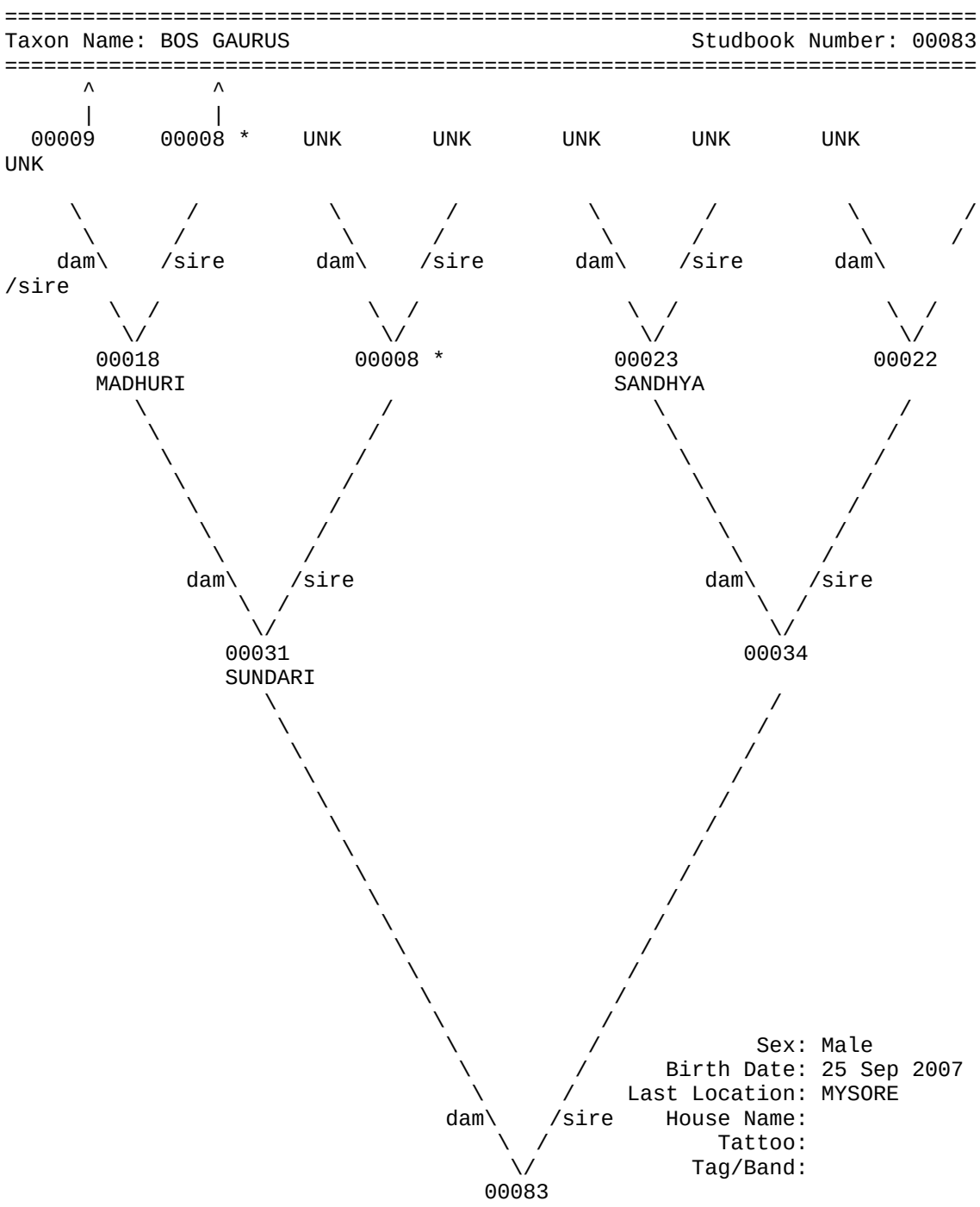



Taxon Name: BOS GAURUS
Studbook Number: 00080
UNK
UNK
UNK
UNK
UNK
UNK
UNK
UNK
dam\
/sire
dam\
/sire
dam\
/sire
dam\
/sire
00009
00025
00023
SANDHYA
00022
dam\
/sire
dam\
/sire
00057
00034
dam\
/sire
00080
Sex: Male
Birth Date: 3 Jun 2007
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:



* Appear more than once...

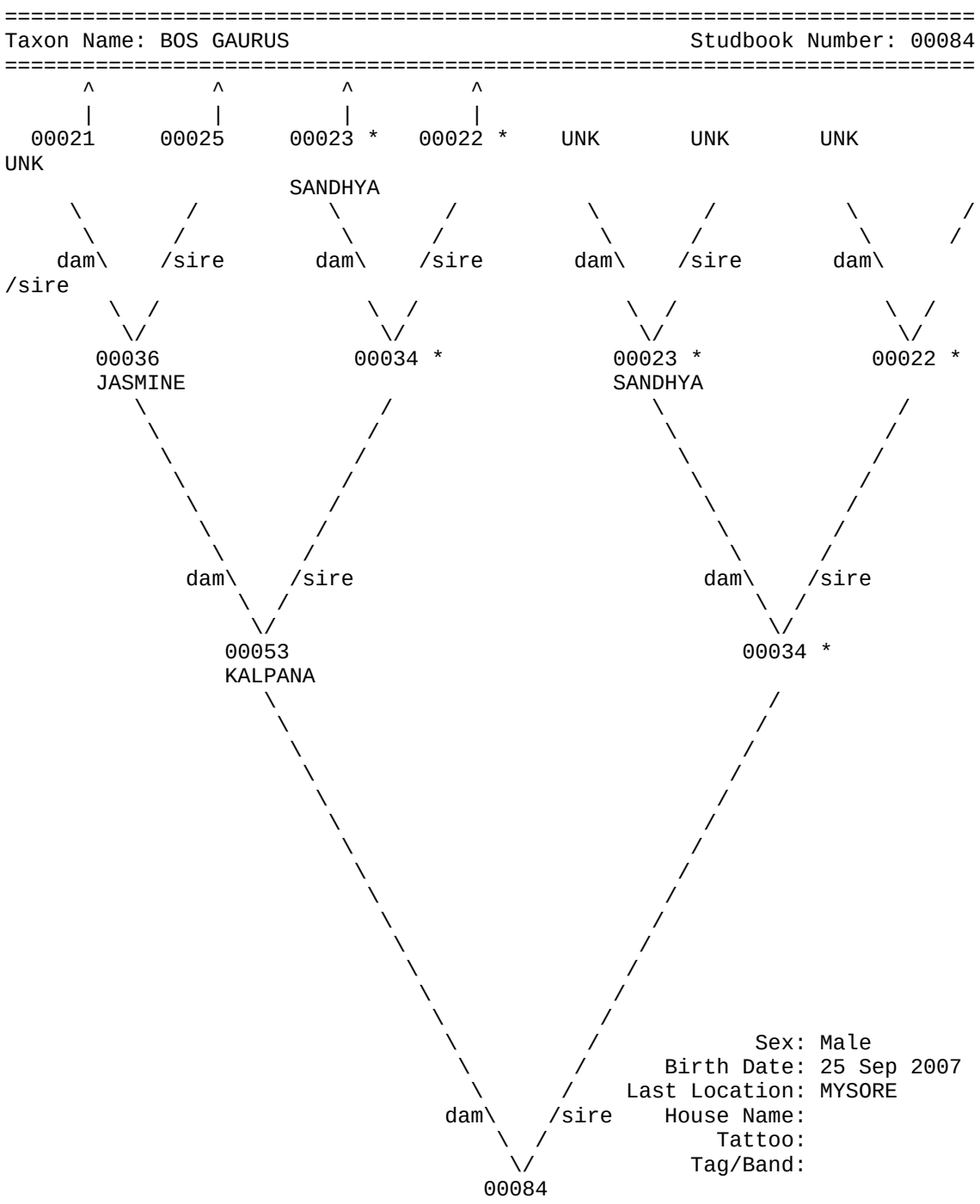

Taxon Name: BOS GAURUS
Studbook Number: 00082
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
UNK
UNK
dam
sire
dam
sire
00018
MADHURI
00025
dam
sire
00082
Sex: Female
Birth Date: 1 Sep 2007
Last Location: MYSORE
House Name:
Tattoo:
Tag/Band:



Taxon Name: BOS GAURUS
Studbook Number: 00083

* Appear more than once...

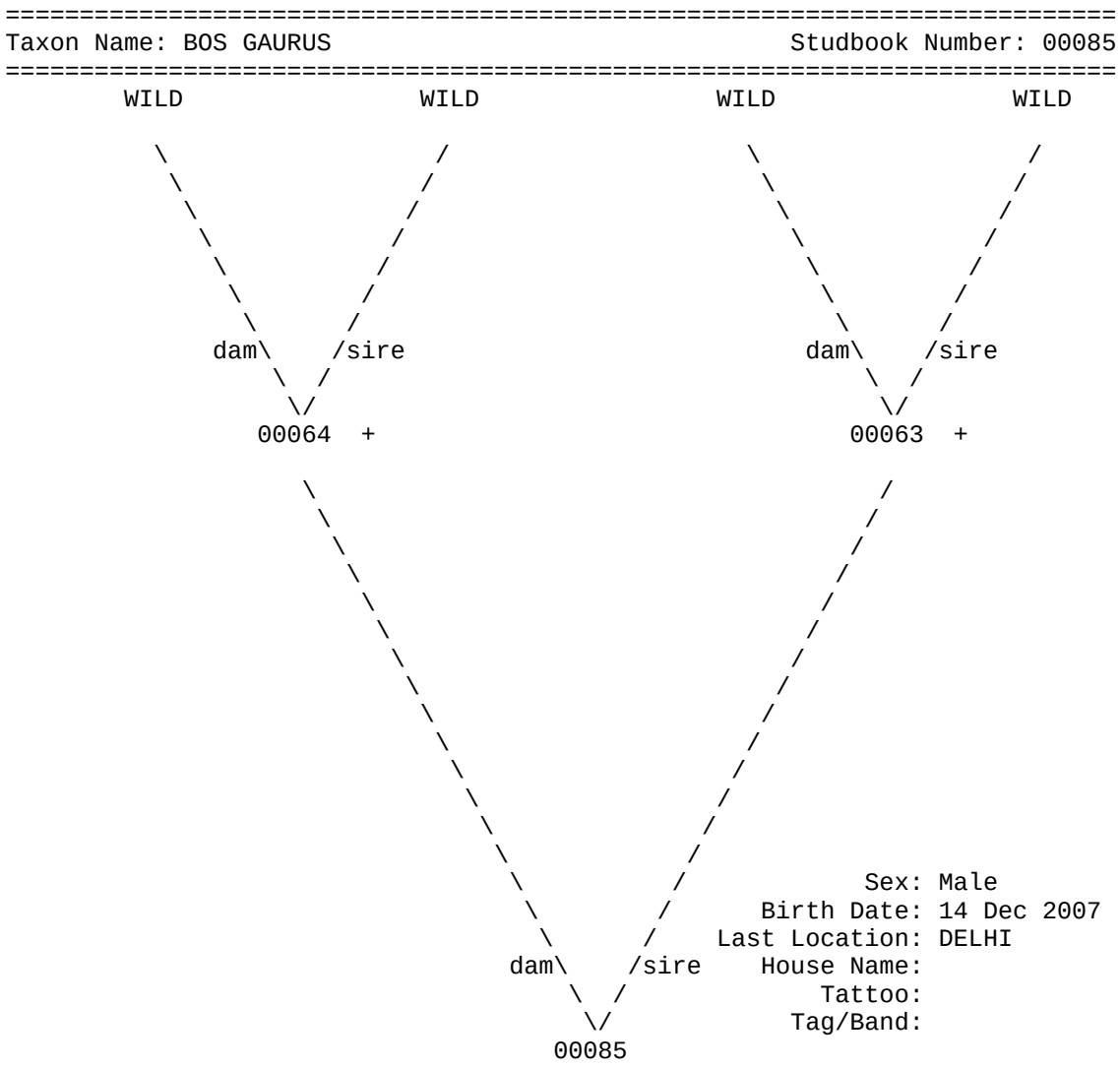
^ Pedigree continues beyond top of page...



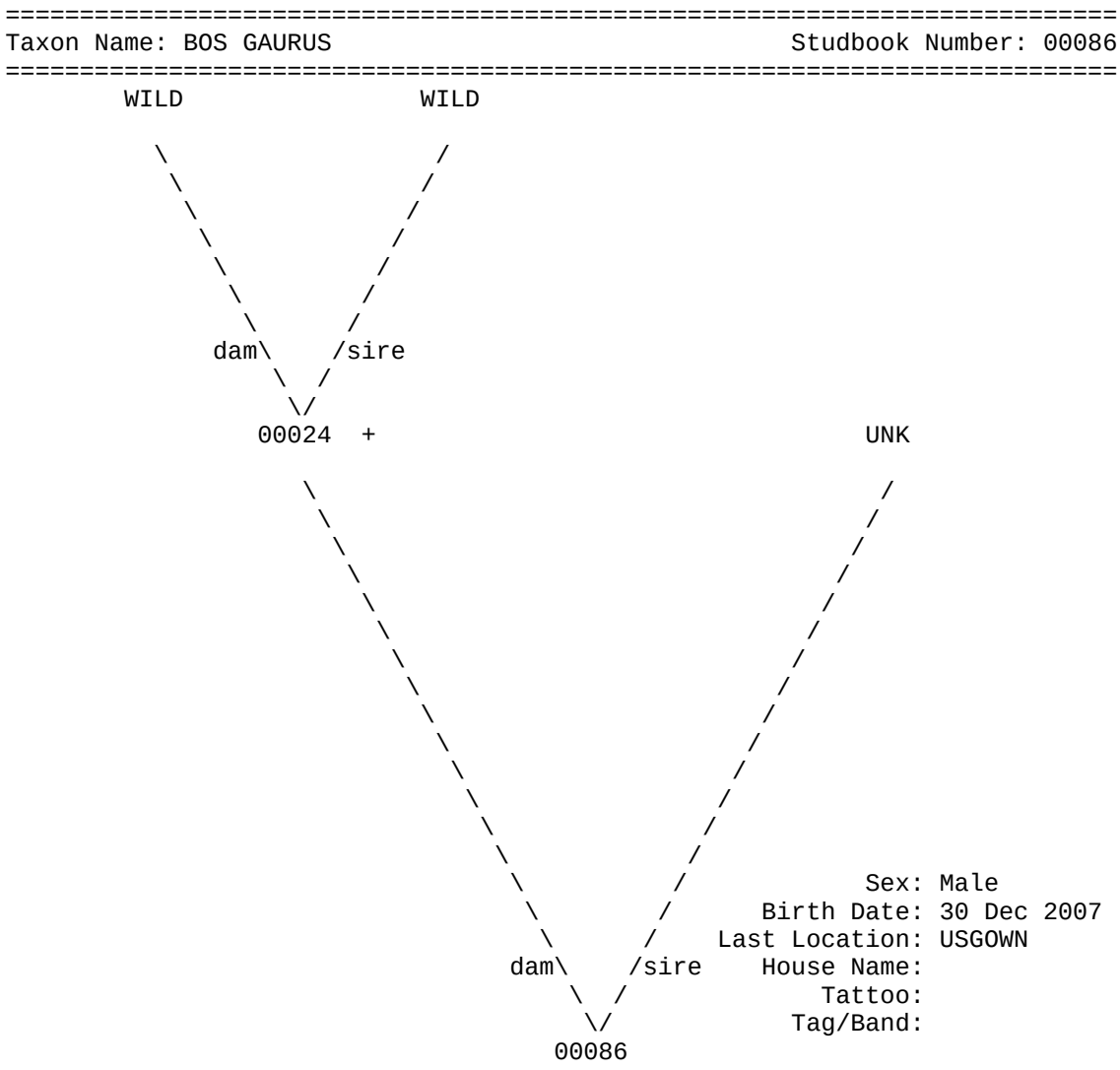
Taxon Name: BOS GAURUS
Studbook Number: 00084

* Appear more than once...

^ Pedigree continues beyond top of page...

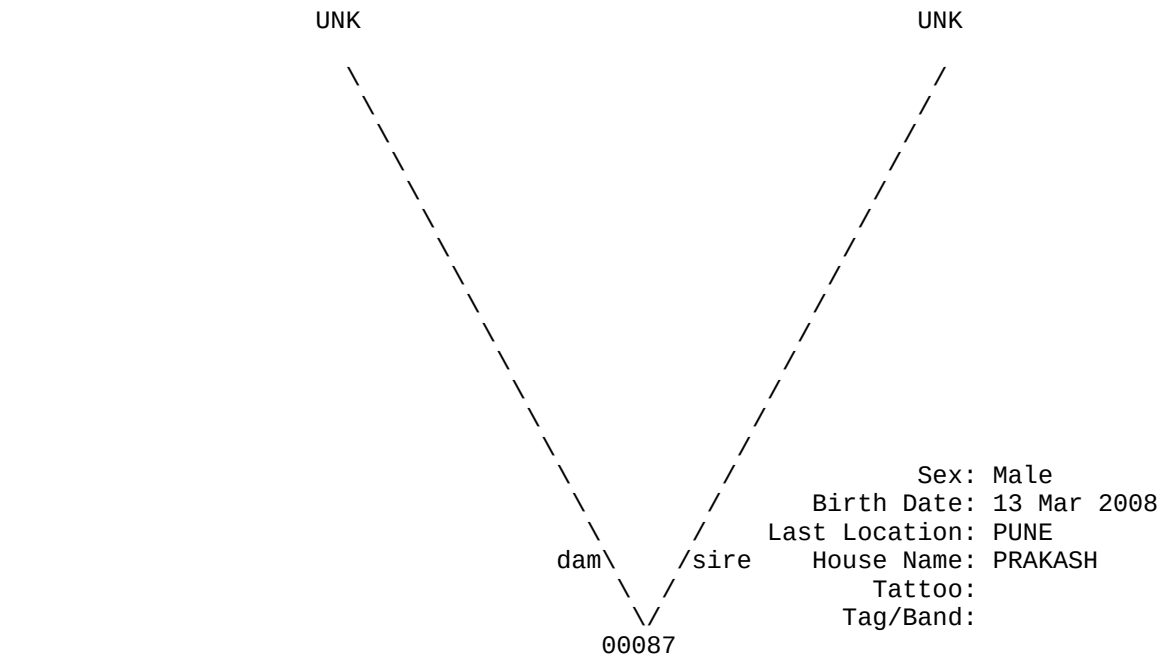

Taxon Name: BOS GAURUS
Studbook Number: 00085
WILD
WILD
WILD
WILD
dam
sire
dam
sire
00064 +
00063 +
dam
sire
00085
Sex: Male
Birth Date: 14 Dec 2007
Last Location: DELHI
House Name:
Tattoo:
Tag/Band:

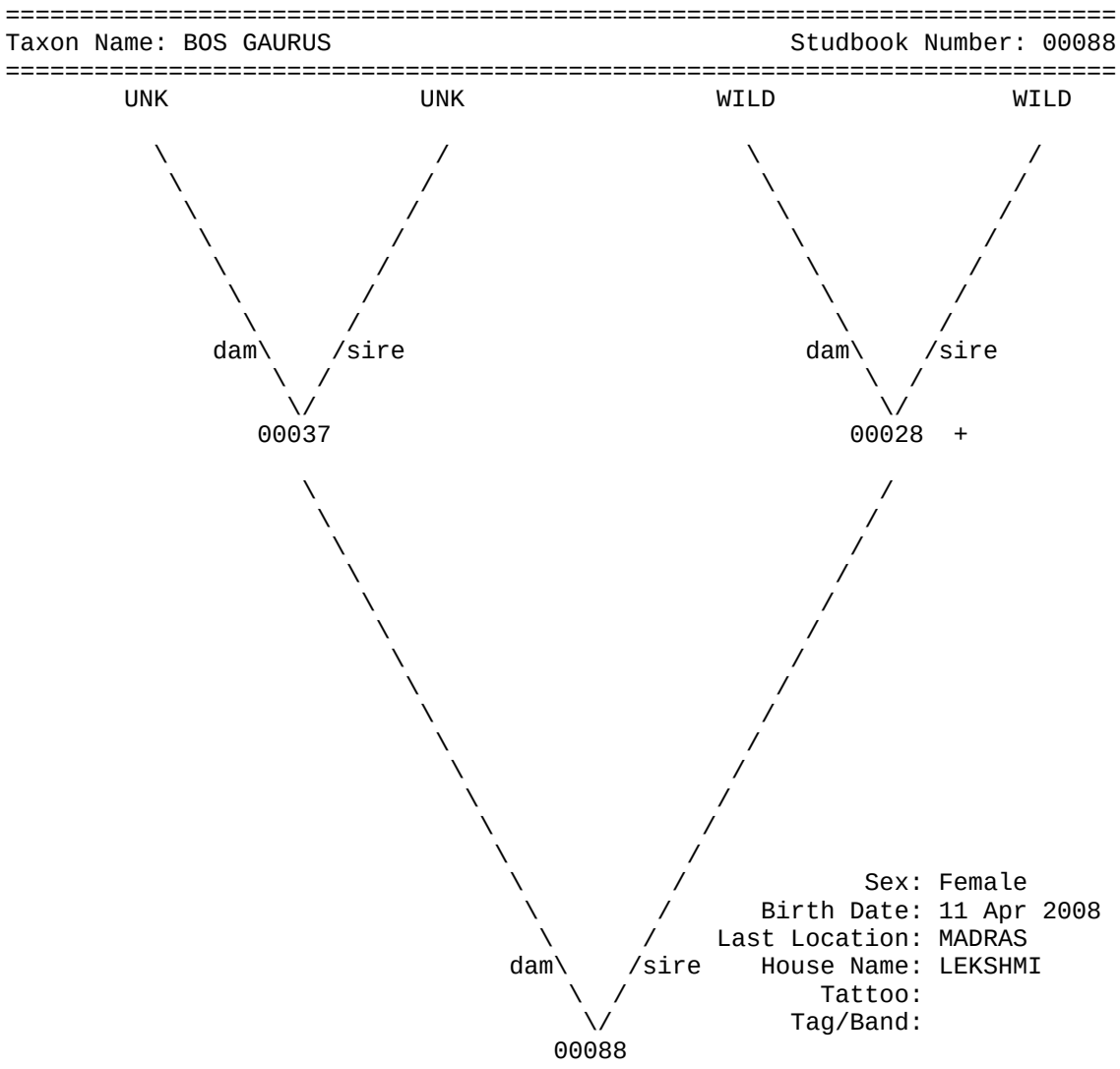
+ Wild-caught...


Taxon Name: BOS GAURUS
Studbook Number: 00086
WILD
WILD
dam
sire
00024 +
UNK
Sex: Male
Birth Date: 30 Dec 2007
Last Location: USGOWN
House Name:
Tattoo:
Tag/Band:
dam
sire
00086

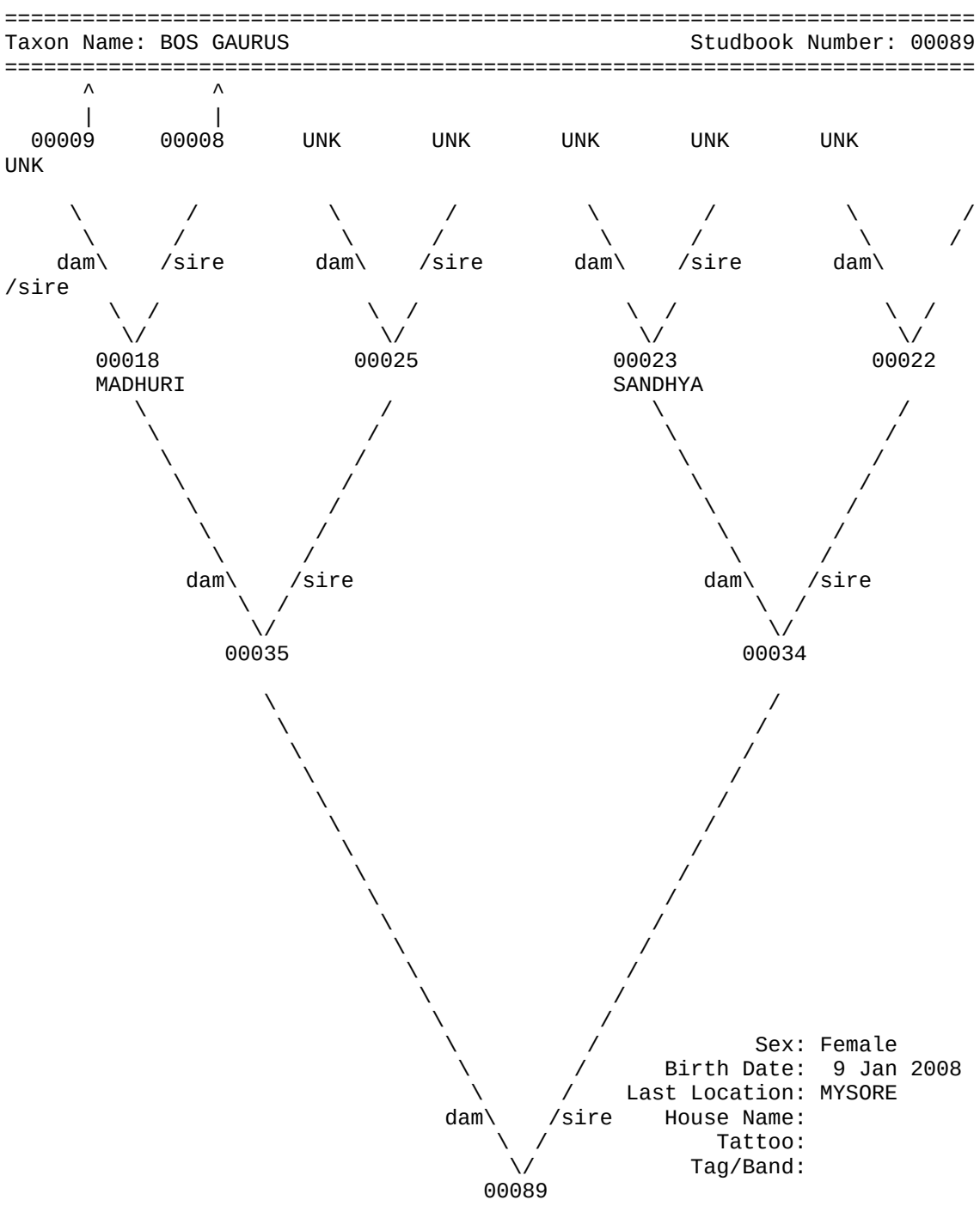
+ Wild-caught...

Taxon Name: BOS GAURUS Studbook Number: 00087



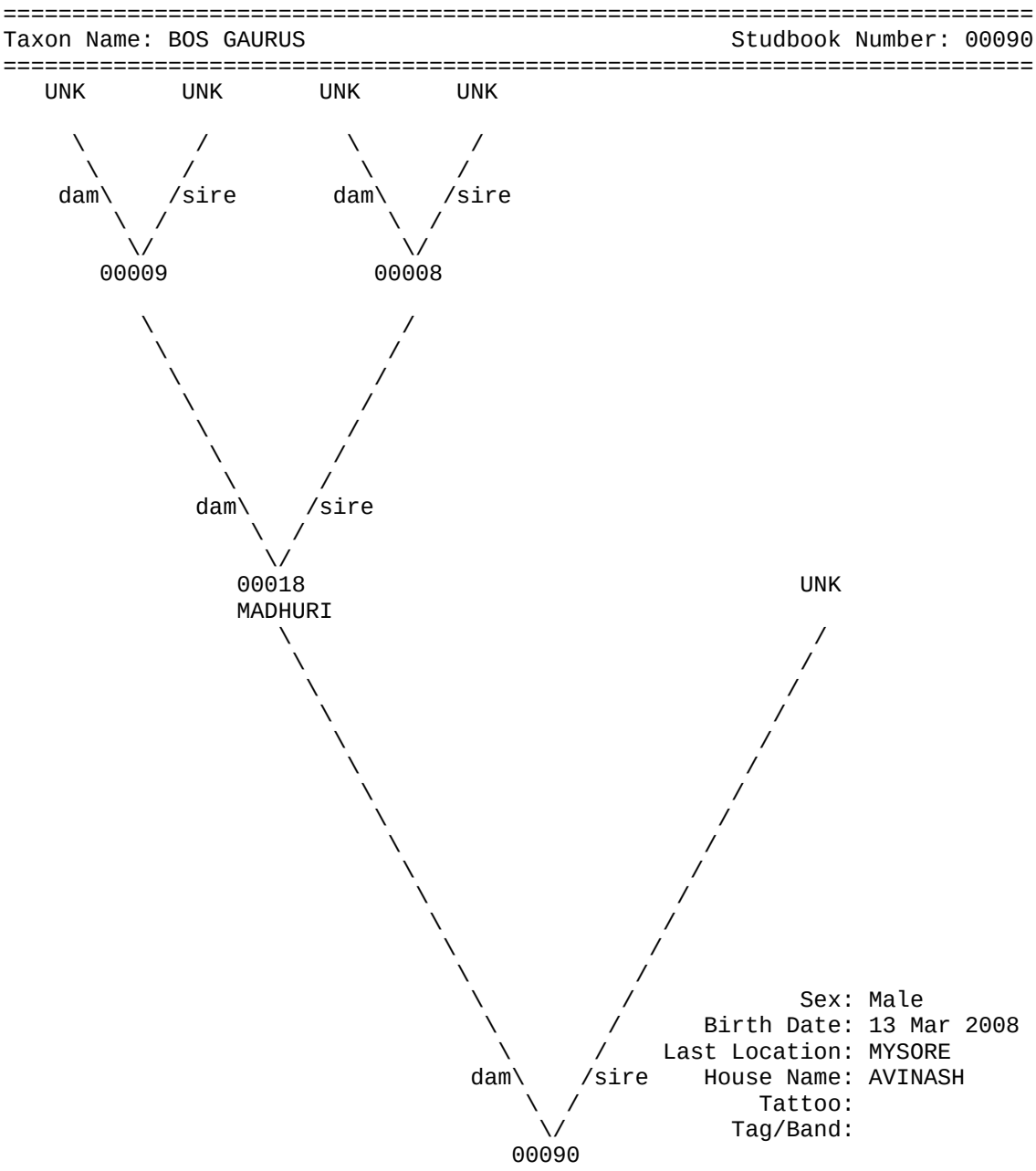

Taxon Name: BOS GAURUS
Studbook Number: 00088
UNK
UNK
WILD
WILD
dam
sire
dam
sire
00037
00028 +
dam
sire
00088
Sex: Female
Birth Date: 11 Apr 2008
Last Location: MADRAS
House Name: LEKSHMI
Tattoo:
Tag/Band:

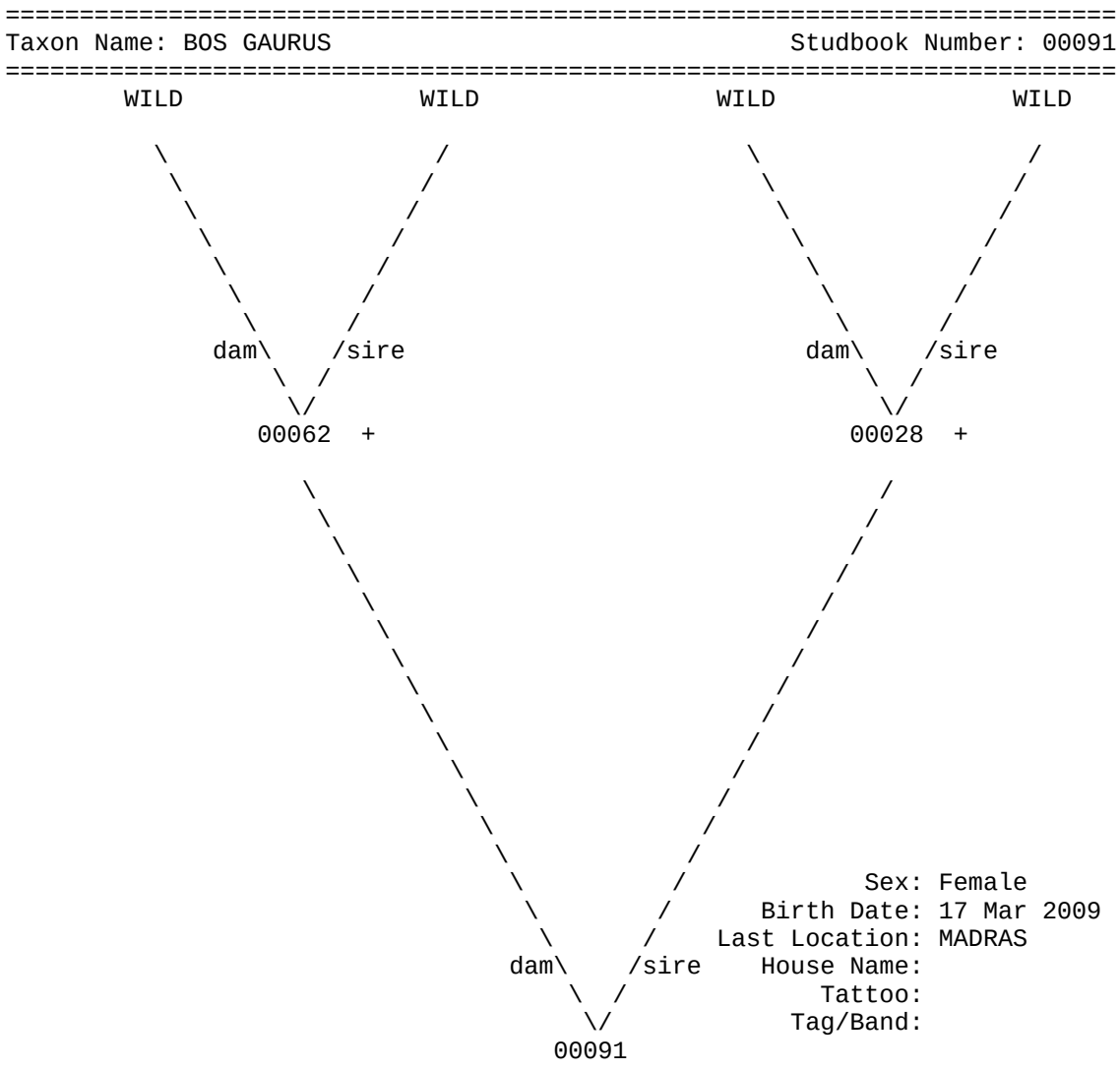
+ Wild-caught...



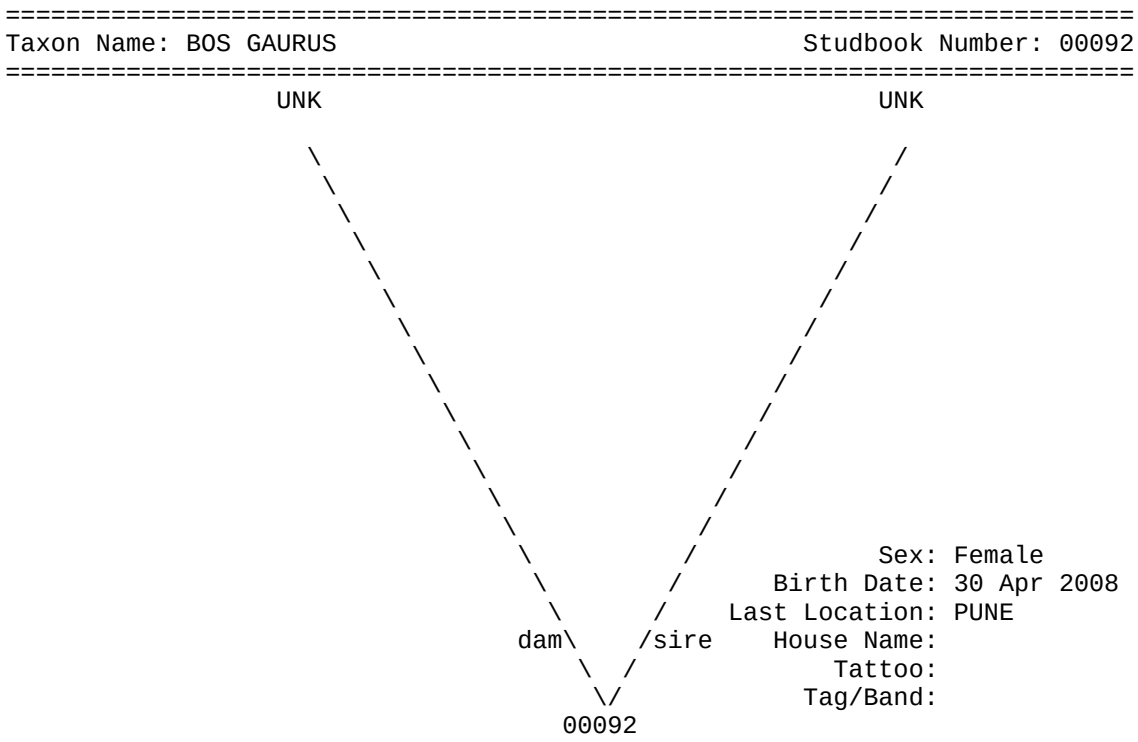
Taxon Name: BOS GAURUS
Studbook Number: 00089

^ Pedigree continues beyond top of page...

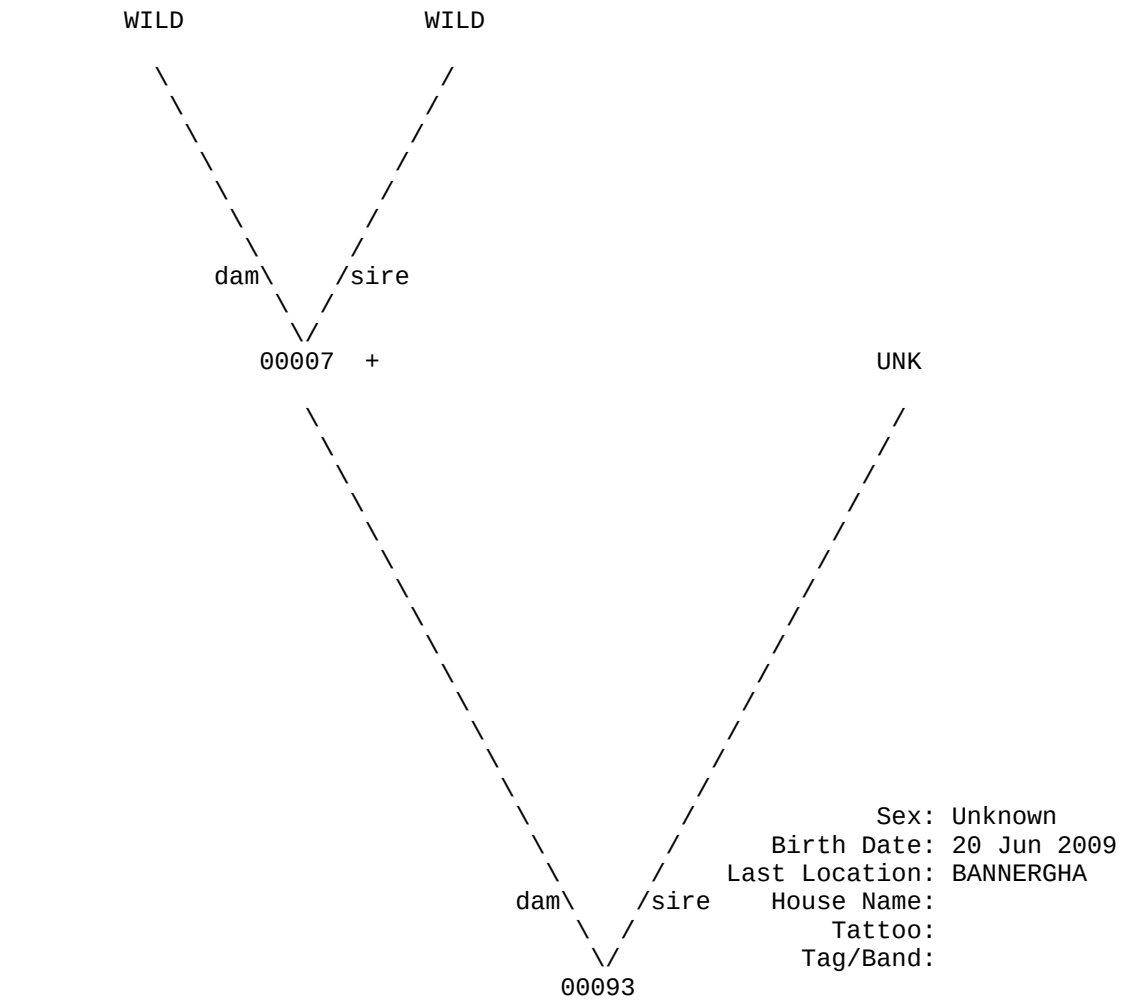

Taxon Name: BOS GAURUS
Studbook Number: 00090
UNK
UNK
UNK
UNK
dam
sire
dam
sire
00009
00008
dam
sire
00018
MADHURI
UNK
Sex: Male
Birth Date: 13 Mar 2008
Last Location: MYSORE
House Name: AVINASH
Tattoo:
Tag/Band:
dam
sire
00090


Taxon Name: BOS GAURUS
Studbook Number: 00091
WILD
WILD
WILD
WILD
dam
sire
dam
sire
00062 +
00028 +
Sex: Female
Birth Date: 17 Mar 2009
Last Location: MADRAS
House Name:
Tattoo:
Tag/Band:
dam
sire
00091

+ Wild-caught...


Taxon Name: BOS GAURUS
Studbook Number: 00092
UNK
UNK
Sex: Female
Birth Date: 30 Apr 2008
Last Location: PUNE
House Name:
Tattoo:
Tag/Band:
dam
sire
00092

Taxon Name: BOS GAURUS Studbook Number: 00093



\+ Wild-caught...

Compiled by: Anupam Srivastav thru Wildlife Institute of India
Data current thru: 31 Jul 2009 Indian Regional
Printed on 27 Mar 2010 using Sparks v1.54