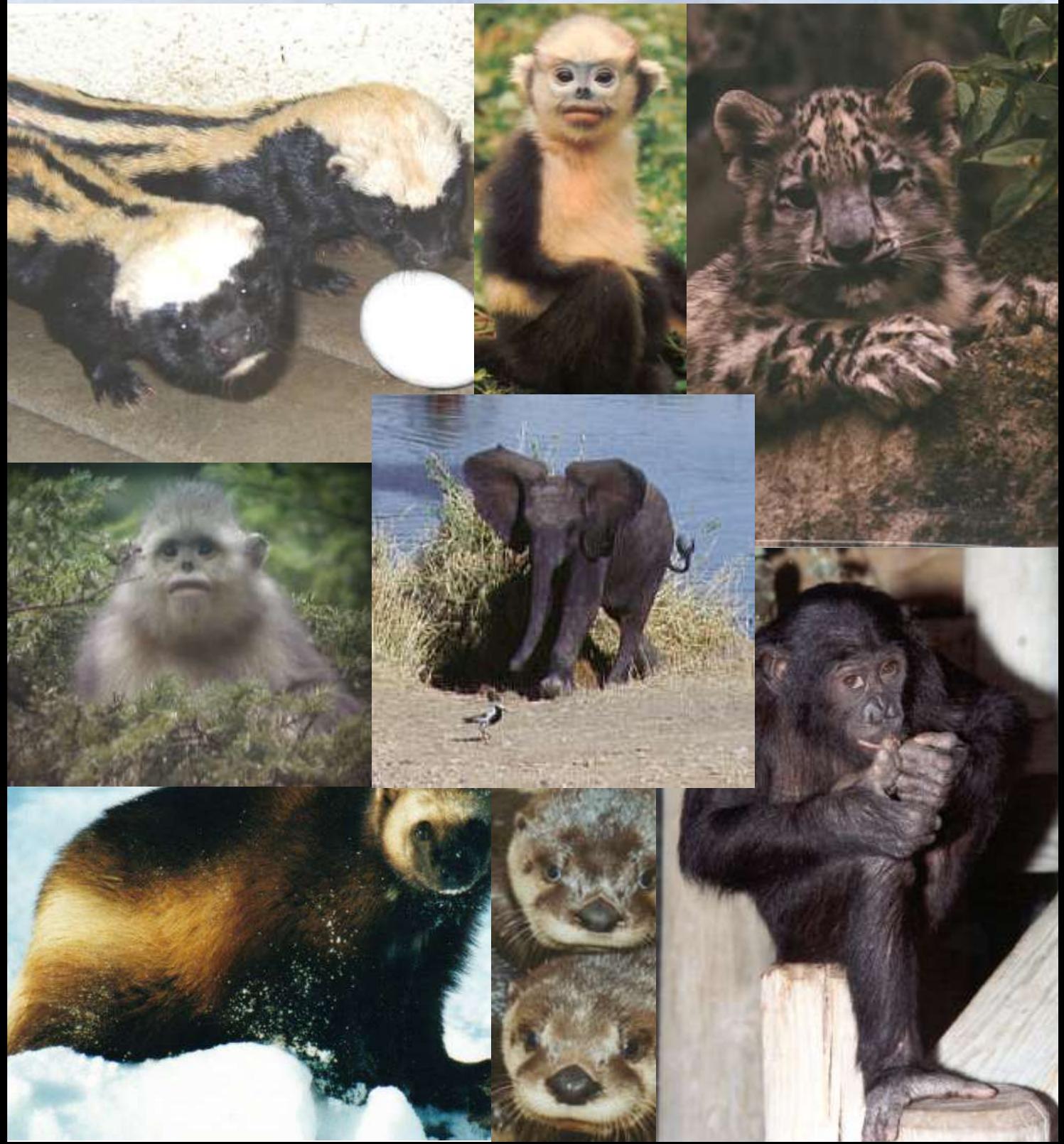




# *Biological Information on Selected Mammal Species, Fourth Edition*

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*American Association of Zoo Keepers, Inc.*

## ***Biological Information on Selected Mammal Species, Fourth Edition***

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## ***Introduction***

*The American Association of Zoo Keepers previously published the Biological Values of Selected Mammal species in 1982, 1985 2<sup>nd</sup> edition, 1987 3<sup>rd</sup> edition. This Fourth edition, renamed Biological Information, is an update and complete revision of previous editions.*

*While every attempt has been made to provide the most correct and current information available, we have undoubtedly left out interesting facts, missed species some readers would like to have seen included, and cited information that may be questioned by others. Information offered by individual observation or personal experience has been included; these people are cited in the references. Unattributed information comes from personal knowledge of the original species researcher or anonymous sources.*

*The volume is designed to give the user a thumbnail sketch of the natural history of a species. Previous editions included physiological data such as heart rate; this edition does not because physical information of this nature is easily available online through ISIS (International Species Information System).*

### ***How to use the Biological Information Database***

*The database is currently available as an Adobe PDF file. Searches can be done by Order, Family, Species Name, or Common Name using find or clicking on the Bookmarks located along the left of the document. Species sheets have been formatted to print on a landscape page format.*

*Animal Orders have been listed following the list used by Nowak in the 6<sup>th</sup> Edition of Walker's Mammals of the World, 1999, Johns Hopkins Press. Species within the orders are listed by Family and then alphabetically by species name. Alphabetical lists are provided for Order, Family, Species by Common Name, and Species by Scientific Name. The Master List contains a listing of all species by Orders which are listed alphabetically.*

*References, for the most part, are given for Orders, some are broken into families, and a few are separated by subfamily. Before checking on a reference care should be taken to insure the correct list is being referenced.*

*As far as possible data from different sources has been reconciled however, there are some cases where contradictory information is included in one field because the references disagree. Weights may vary somewhat, again due to different sources.*

### **Notoryctemorphia References**

1. Nowak,R.M. 1999. Walker's Mammals of the World Vol. 6. The Johns Hopkins University Press, Baltimore and London.
2. MacDonald, Dr. David, ed. 1999. The Encyclopedia of Mammals. Barnes and Noble, Inc.
3. Parker, Sybil P., ed. 1990. Grzimek's Encyclopedia, vol. 1. McGraw Hill Publishing
4. Cronin, Leonard. 1996. Key Guide to Australian Mammals. Reed books, Australia
5. Strahan, Ronald, ed. 1995. Mammals of Australia. Smithsonian Institution Press.
6. Nocon, Wojtek. 1997. *Notoryctes typhlops*. [animaldiversity.ummz.umich.edu](http://animaldiversity.ummz.umich.edu).

### **Ornithorhynchidae References**

1. Nowak, Ronald M. 1991 "Walker's Mammals of the World" 5th Edition John Hopkins University Press, Baltimore and London
2. Parker, Sybil P. (ed) 1990 "Grizmek's Encyclopedia of Mammals" McGraw-Hill, Inc
3. Wilson, D. E., and D. M. Reeder (eds). 1993. Mammal Species of the World. Smithsonian Institution Press
4. Asdell, S. A. 1964 "Patterns of Mammalian Reproduction" 2nd Edition Cornell University Press
5. Nowak Ronald M. 1999. "Walker's Mammals of the World", 6<sup>th</sup> Edition, John Hopkins Univ. Press, Baltimore and London.
9. CITES-listed Species Database 2000 [www.wcmc.org.uk/CITES](http://www.wcmc.org.uk/CITES) CITES Secretariat, International Environment House, 15, chemin des Anémones, CH-1219 Châtelaine-Geneva, Switzerland.
12. IUCN Red Book Database February 2000 [www.wcmc.org.uk/species/animals/index.html](http://www.wcmc.org.uk/species/animals/index.html) WCMC, 219 Huntingdon Road, Cambridge CB3 0DL, UK
13. Macdonald, David (ed) 1984 "The Encyclopedia of Mammals" Equinox (Oxford) Ltd.
14. Fowler, Murray E. (ed) 1986 "Zoo & Wild Animal Medicine" 2nd Edition Saunders Company Philadelphia, PA
15. Fowler, Murray E. (ed) 1993 "Zoo & Wild Animal Medicine" 3rd Edition Saunders Company Philadelphia, PA

### **Paramelomorphia References**

1. Nowak,R.M. 1999. Walker's Mammals of the World Vol. 6. The Johns Hopkins University Press, Baltimore and London.
2. MacDonald, Dr. David, ed. 1999. The Encyclopedia of Mammals. Barnes and Noble, Inc.
3. Parker, Sybil P., ed. 1990. Grzimek's Encyclopedia, vol. 1. McGraw Hill Publishing
4. Cronin, Leonard. 1996. Key Guide to Australian Mammals. Reed books, Australia
5. Strahan, Ronald, ed. 1995. Mammals of Australia. Smithsonian Institution Press.
6. Hand, Suzanne J. 1990. Care and Handling of Australian Native Animals. Surrey, Beatty and Sons, PTY limited
7. Flannery, Tim. 1995. Mammals of New Guinea. Cornell Univ. Press, Ithaca, New York.

### **Perissodactyla References**

1. Nowak, Ronald M. 1991 "Walker's Mammals of the World" 5th Edition John Hopkins University Press
2. Parker, Sybil P. (ed) 1990 "Grzimek's Encyclopedia of Mammals" McGraw-Hill, Inc
3. Wilson, D. E., and D. M. Reeder (eds). 1993. Mammal Species of the World. Smithsonian Institution Press
4. Asdell, S. A. 1964 "Patterns of Mammalian Reproduction" 2nd Edition Cornell University Press
5. Kindon, Jonathan 1997 "The Kingdom Field Guide to African Mammals" Academic Press
6. Alden, Peter 1995 "National Audubon Society Field Guide to African Wildlife" Alfred A. Knopf, Inc.
7. Medical Management of Captive Tapirs (Tapirus sp.) Donald L. Janssen, DVM, Dipl ACZM, \*Bruce A. Rideout, DVM, PhD, Dipl ACVP, and Mark. Edwards, PhD. Zoological Society of San Diego, San Diego, CA 92112, USA 1996 American Association of Zoo Veterinarians Proceedings. Nov 1996.
8. Brooks, Daniel M.; Bodmer, Richard E.; Matola, Sharon (compilers). 1997. Tapirs - Status Survey and Conservation Action Plan. IUCN/SSC Tapir Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. viii + 164 pp.
9. CITES-listed Species Database 2000 [www.wcmc.org.uk/CITES](http://www.wcmc.org.uk/CITES) CITES Secretariat, International Environment House, 15, chemin des Anémones, CH-1219 Châtelaine-Geneva, Switzerland.
10. Siegal, Mordecai 1996 " UC Davis Book of Horses- A Complete Medical Reference Guide for Horses and Foals" Harper Collins Publishers
11. AZA Species Survival Plan [www.aza.org](http://www.aza.org) 1998
12. IUCN Red Book Database February 2000 [www.wcmc.org.uk/species/animals/index.html](http://www.wcmc.org.uk/species/animals/index.html) WCMC, 219 Huntingdon Road, Cambridge CB3 0DL, UK

13. Macdonald, David (ed) 1984 "The Encyclopedia of Mammals" Equinox (Oxford) Ltd.
14. Fowler, Murray E. (ed) 1986 "Zoo & Wild Animal Medicine" 2nd Edition Saunders Company Philadelphia, PA
15. Animal Diversity Web. *Tapirus bairdii*. <http://animaldiversity.ummz.umich.edu>. 1999. Liz Ballenger and Phil Myers. University of Michigan, Museum of Zoology.
16. Groves, Colin P. 1974 "Horses, Asses, and Zebras in the Wild" 1st Edition Ralph Curtis Books Hollywood, FL
26. Nowack, Ronald M. 1999. "Walker's Mammals of the World". 6<sup>th</sup> Edition, John Hopkins Univ. Press. Baltimore, Maryland.
27. Estes, Richard. 1991. "The Behavior Guide to African Mammals". Univ. of California Press, Los Angeles, California.
28. Stuart, Chris & Tilde. 1997. "Field Guide to the Larger Mammals of Africa". Struik Publ., Cape Town, South Africa.
29. Reed-Smith, J. Personal communication Uganda Rhino Foundation.
30. Godby, Kim. Professional horse trainer, personal communication.
31. Kneibel, Anne. Professional stable manager, personal communication.
32. Dulaney, Mike. General Curator, Cincinnati Zoo & Botanical Garden, 2002, Personal Communication.
33. Stoop, Monica, Ph.d. C.R.E.W. @ Cincinnati Zoo & Botanical Garden, 2002, Personal Communication.
34. Reed-Smith, Janice. 2002. Columbus Zoo. Personal Observation.
35. Prater, S. H. 1993. The Book of Indian Animals. Bombay Natural History Society. Oxford Univ. Press. Oxford, New York, Bombay.
36. Nuñez, Cassandra. 2002. Safety first! SWARA. Vol. 25:1 January - April, 2002. pp.35.
37. IUCN/SSC Tapirs: Status Survey and Conservation Action Plan, online version. IUCN-SSC Tapir Specialist Group - Action Plan, 1997.htm
38. IUCN-SSC malayan Tapir Specialist Group - Action Plan, 1997.htm
39. IUCN/SSC Tapir Specialist Group online Action Plan. IUCN-SSC Tapir Specialist Group - Action Plan, 1997.htm
40. Whitaker, J., Jr. & W. Hamilton, Jr. 1998. Mammals of the Eastern United States. Cornell Univ. Press, Ithaca, New York.
41. Plair, Bernadette. 2003. Research Associate, C.R.E.W., Cincinnati Zoo and Botanical Garden. Personal communication.
42. Reinhart, Paul. 2003. Lead keeper, Sumatran rhino barn Cincinnati Zoo and Botanical Garden. Personal communication.
43. Penny, Malcolm. 1988. Rhinos: Endangered Species. Facts on File, Inc. Publications, New York, New York.
44. Laurie, Andrew. 1981. Behavioral Ecology of the Greater One-horned Rhinoceros (*Rhinoceros unicornis*). Journal of Zoology. London, England.
45. Dutta, Arup. 1991. *Unicornis*, the Great Indian One-horned Rhinoceros. Kornak Publishers, India.
46. Jacobsen, Jeanne, 2003. Lead Keeper, Ft. Worth Zoological Garden. Personal Communication.
47. Churcher, C.S. 1993. *Equus grevyi*. American Society of Mammalogists Species Sheets # 453. pp. 1-9. Published 11/15/1993.

### Pinnipedia References

1. Nowak, R.M. 1999. Walker's Mammals of the World. 6th edition, Vol. II. The Johns Hopkins University Press, Baltimore.
2. Ridgway, S.H., R. Harrison eds. 1981. Handbook of Marine Mammals Vol. 1. Academic Press, New York.
3. Ridgway, S.H., R. Harrison eds. 1981. Handbook of Marine Mammals Vol. 2. Academic Press, New York.
4. Riedman, M. 1990. The Pinnipeds Seals, Seal lions, and Walruses. University of California Press, Berkley and Los Angeles.
5. Bonner, N. 1994. Seals and Sea Lions of the World. Facts on Files Publications, New York.
6. Ling, J.K., M.M. Bryden. 1992. Mammalian Species. *Mirounga leonina* No. 391, pp.1-8. The American Society of Mammalogists.
7. Fay, F.H. 1985. Mammalian Species. *Odobenus rosmarus* No. 238, pp.1-7. The American Society of Mammalogists.
8. Seal Conservation Society. [www.greenchannel.com/tec/main.htm](http://www.greenchannel.com/tec/main.htm). 2000.
9. Reeves, R., et al. 2002. Guide to Marine Mammals of the World. National Audubon Society, Alfred P. Knopf, New York.
10. Duerr, R. 2002. Harbor Seals and Northern Elephant Seals. In: Hand-Rearing of Wild and Domestic Mammals. Editor: L. Gage, DVM. Iowa State Press, Ames, Iowa. pp. 132-142.
11. Gage, L. DVM. 2002. Sea Lions and Fur Seals. In: Hand-Rearing of Wild and Domestic Mammals. Editor: L. Gage, DVM. Iowa State Press, Ames, Iowa. pp. 143-149.
12. Ling, J. K. & M. M. Bryden. 1992. *Mirounga leonina*. American Society of Mammalogists Species Sheets #391, pp 1-8. Published 6/5/1992.

**Order:** Perissodactyla (1,2,3)

**Scientific name:** *Ceratotherium simum*

**Other names:** Square lipped rhinoceros (1,2)

**Status in the wild:** CITES - Appendix I as *C. s. cottoni*, Appendix II as *C. s. simum* (9). Listings on the U.S. ESA and by the IUCN - Endangered as *C. s. cottoni* and Lower Risk for *C. s. simum* (3,12)

**Major threats:** Poaching (2,9)

**Geographic range historically:** Formerly found from southern Chad, Central African Republic, southern Sudan, northeastern Zaire (Republic of Congo), Uganda, southern Zambia and from Zambezi River in Zimbabwe and southern Mozambique to the Vaal River in South Africa. (3)

**Geographic range currently:** Now they are much restricted in distribution; in the south of their range they are considered extinct except in eastern Natal (South Africa), but reintroduced into other parts of South Africa (Natal, Transvaal, Orange Free State), Namibia, Swaziland, Mozambique, Zimbabwe and Botswana. Introduced into Zambia and Kenya. In the north of their range, now confined to northeastern Zaire (Republic of Congo). (3)

**Habitat:** Woodlands and plains with grassy areas, scrub lands (1,2) Drier savannahs (13)

**Circadian cycle:** Active early morning, late afternoon and evening (1); both diurnal and nocturnal (13)

	<u>Size</u>		
	<u>General range</u>	<u>male</u>	<u>female</u>
<b>Head to rump length:</b>	3.35-4.2 m (1,13)	3.7-4.0 m (2,13)	3.4-3.65 m (2,13)
<b>Tail length:</b>	50-70 cm (1,13)	70 cm (2,13)	70 cm (2)
<b>Head &amp; tail length:</b>			
<b>Shoulder height:</b>	1.5-1.85 m (1,13)	1.7-1.86 m (13)	1.6-1.77 m (2,13)
<b>Rump height:</b>			
<b>Weight:</b>	1400-3600 kg (1,13)	2.3 tons, 2.04-2.26kg (2,27)	1.8 tons (2) ave. 1600kg (27)
<b>Sexual dimorphism:</b>	Yes, males are generally larger than females. (27)		
	<u>Reproduction</u>		

**Mating Season:** Throughout year (4) with peaks in October to December in S. Africa and February to June in E. Africa. (1,13)

**Birthing season:** Same as mating

**Gestation period:** ~490 days (1,2,13); 16 months (27)

**Estrous cycle:** 38 to 58 days (14); monthly intervals; an estrous female urinates frequently (27)

**Monestrous/polyestrous:** Polyestrous (1)

**Courtship:** Courtship may last 5 to 20 days while the male waits for the female to come into full estrous. When urine testing shows the female is in full estrous the bull will breach the comfort perimeter previously established by the cow. The male courts the female by hic-throbbing and retreat, eventually placing his chin on her rump and attempting to mount her; chasing and horn clashing also may be involved with the courtship display. Persistent approaches may occur over 15 to 20 hours before the female stands to allow the bull to mount. The mating bond may extend for another two to five days past copulation but it is rare that additional copulations occur. (1,27)

**Copulation:** Male astride female from rear. Copulation may last 30 to 60 minutes (14)

**Number of mammae:** Two (27)

**Interbirth interval:** Two to three years (1); 4 years (2)

**Sexual maturity:** Males at 10 years and females at 6 to 7 years. (2,27); sexual maturity may actually occur at four to five years of age but females do not calve until they are 6.5 to 7 years old (26).

**Other information:** A wild 36 year old female was known to reproduce successfully (26).

### Rearing and young

**Young called:** Calf (1,2,14))

**Number of young (range):** One (1,2)

**Condition of young:** Able to stand within a few hours of birth, but remains shaky for two to three days. (1)

**Eyes open:** At birth.

**First leave pouch/den/hide/nest:** Stay with the mother from birth.

**First take solids:** Begins grazing at two months. (27)

**Weaned:** At one year. (27); two years (2); may start as early as two months but take over a year (26).

**Independent:** Stays with the mother for two to four years; previous calf is driven off before birth of the next calf. (1,27) Subadults may form pairings with other subadults; sometimes several of these young animals will join up with a female - associations of this type containing up to six individuals have been observed (26).

**Other information:** The calf runs in front of the mother. (27) Suckling, on demand, for two to three minutes at a time the calf will begin to sample grasses when just a few months of age. (27)

### General

**Life expectancy:** 40 to 50 years (1,2,13)

**Social structure:** Groupings of cows and offspring within defined home ranges; males are solitary and territorial. The non-territorial males survive as "satellites" on the territories of other bulls. (2) Appears to have the most complex social structure of the rhino species; temporary associations of up to fourteen animals have been observed, smaller more stable associations are common, and territorial bulls actively mark and patrol their boundaries. Serious fights between bulls are generally rare except when over an estrous cow when they may escalate into serious confrontations (26).

**Unique behavior(s):** Most complex social structure of all rhino species, only species that is entirely a grazer. (1)

**Senses:** Olfactory, and hearing senses are important; vision is poor. (1,2) Vocalizations include: high-pitched squeals, whining, panting, gruff squealing, hic-throb, snarling, and snorts. (27) Mature males will spray their urine to demarcate their territory, they also scatter their dung after defecating. Communal dung heaps are used by all the animals in a given range (26).

**Coat & coloration:** Yellowish-brown to gray hairless skin; 2 horns, first, or lower one is larger, square upper lip and wide mouth. (1,2,13)

**Dental Formula:** 0/0 I, 0/0 C, 3/3 P, 3/3 M = 24 Total (1,14)

**Diet:** Grasses (1,2), purely a grazer. Often goes to water twice daily but can go for several days, two to four, without if the water is distant. (27)

**Other information:** Enjoy wallowing in mud and taking dust baths. (27) Less excitable therefore, less dangerous to man. When at age two to three years a juvenile is rejected by its mother it may form temporary associations with another animal of its own age or a female with calf. (27) Dung middens are maintained by territorial males and utilized by females, young and non-territorial males. The dominant bull will utilize 20 to 30 middens in his territory; after deposition, the dung is scattered via slow, ritualized kicks. (27)

**Order:** Perissodactyla (3)

**Scientific name:** *Dicerorhinus sumatrensis*

**Other names:** Hairy rhinoceros (1); kyan, kyan-shaw (Burmese) (35).

**Status in the wild:** CITES - Appendix I (9); U.S. ESA and IUCN - Critically Endangered. (3,12)

**Major threats:** Poaching, habitat alteration, destruction, and fragmentation, human encroachment into their habitat. (2)

**Geographic range historically:** Formerly Assam (India), Chittagong Hills (Bangladesh), Burma, Thailand, and Vietnam south through Peninsular Malaysia to Sumatra; probably also southern China, Laos, and Cambodia; Borneo, and Mergui Island. (3)

**Geographic range currently:** Survives in Tenasserim Range (Thailand-Burma), Petchabun Range (Thailand), and other scattered localities in Burma, Peninsular Malaysia, Sumatra, and Borneo. (3)

**Habitat:** Tropical rainforest especially in mountainous regions. (1,2,13) Mainly in hilly country near water, may be attracted to forest margins and secondary growth; some evidence that they can live in a wide variety of habitats from sea level to high mountains (26). It is possible they migrate from sea level to the mountains seasonally as conditions dictate (26).

**Circadian cycle:** Diurnal and nocturnal (13)

**Family:** Rhinocerotidae (3)

**U.S. common name:** Sumatran rhinoceros (2,3)

**Head to rump length:**

**General range**

2.36-3.18 m (1,2,13)

**male**

**female**

**birth**

914 mm (1)

**Tail length:**

50 cm (2)

**Head & tail length:**

1.12-1.45 m (1,2,13)

**Shoulder height:**

1.12-1.45 m (1,2,13)

**Rump height:**

727-1000 kg (1,2,13) 1450-1600lbs. (41)

1500-1600+lbs. (41)

35 kg (2); 23kg (26); 73lbs. (41)

**Sexual dimorphism:**

### Reproduction

**Mating Season:** Appears to be year-around in captivity (33).

**Birthing season:** October to May (1)

**Gestation period:** 400 days (2); 475 days (32)

**Estrous cycle:** Induced ovulators; about a 21 day cycle, if not introduced to the male the cycle may go longer (33,41); the female is receptive for only 24 to 36 hours during this period (41).

**Monestrous/polyestrous:** Polyestrous (14)

**Courtship:** Can be very aggressive, the male will follow/chase the female and place his head on her flank when she stops (32).

**Copulation:** Usually lasts about 30 to 50 minutes; then separated immediately afterwards in captivity (33).

**Number of mammae:** Two (33)

**Interbirth interval:** Three to four years (1,2)

**Sexual maturity:** Males at seven years and females at four years. (2) Probably do not begin to breed until they are seven or eight years old (26).

**Other information:** There has been very little experience with this species in captivity. Appear to have a high rate of early intrauterine embryo loss, based on one captive individual (33).

### Rearing and young

**Young called:** Calf (1)

**Number of young (range):** One (2)

**Condition of young:** Precocial; able to stand within one hour of birth (2). One captive calf stood up at 1.5 hours, walked in a coordinated manner at two hours, attempted to nurse at 2.5 hours and successfully nursed at 3 1/4 hours, and was seen to urinate during the first day (41).

**Eyes open:** At birth

**First leave pouch/den/hide/nest:** Stay with mother from birth.

**First take solids:** ~ four weeks (41).

**Weaned:** 18 months (2); one captive calf was totally weaned by roughly one year (41). A captive calf originally nursed every 1 to 1.5 hours for 6 to 8 minutes; up until the time he was weaned at one year he would still nurse about every 2 to 2.5 hours for roughly 4 minutes (41).

**Independent:** 16 to 17 months (1); the calf may then associate for a time with other young only then becoming solitary when they reach sexual maturity (26). Young will remain in their natal range until they are two to three years of age (26).

**Other information:** In the case of one captive born male calf - originally he gained roughly 4lbs. a day, on average the calf gained 2.5lbs. a day for the first three months, by one year his weight was 884lbs. (41). The cheek teeth of this calf first began to erupt at two weeks and the lower canine teeth began erupting at five weeks (41). The umbilical cord dropped at four weeks. The calf was given access to water for the first time at three weeks (41).

### General

**Life expectancy:** 32 years in captivity (1,13); 35 years given by another source. (2)

**Social structure:** Solitary, except mother and young, and rarely small groups of mothers with young; males are solitary and territorial. (1,2) Each rhino has a well-defined home range that includes a salt lick, female ranges are smaller than males but are generally completely separate from other females except around salt licks (26).

**Unique behavior(s):** Good climber, swims well, has been known to swim in the sea. (1)

**Senses:** Territories are regularly marked by both sexes via urine spray, scrapes, feces, and bent or twisted saplings (26). Eyesight is probably poor as in other rhinoceros species.

**Coat & coloration:** Two horns, front one is larger; the brown to gray-brown colored hide is covered with hair; prehensile upper lip; only a few divisions of hide from skin folds.

(2) *"The pelage is fairly long and dense in calves, is still copious and is reddish brown in young adults, and becomes sparse, bristly, and almost black in older animals."* (26) The skin is very rough; the horns, in captivity show a tendency to become pocked and brittle (there is speculation that the animals need to have proper exhibit furniture to rub their horns one keeping them in shape and wearing off the outer surface, this has not been studied) (42).

**Dental Formula:** 1/0 I, 0/1 C, 3/3 P, 3/3 M = 28 Total (1)

**Diet:** Twigs of young trees, lianas, bushes (1,2) Diet includes fruit, leaves, twigs, bark, and young saplings. *"Favored foods are wild mangoes, figs, bamboo, and all kinds of plants found in secondary growth. Cultivated crops sometimes are eaten. Average daily consumption may be more than 50kg."* They appear to be very dependent on salt licks. (26) In captivity, this species must be fed a diet of fresh browse supplemented by fresh produce, herbivore pellets and a small amount of hay, fresh browse makes up the bulk of the diet (42).

**Other information:** Smallest living rhinoceros it has more hair on it than any of the other species (26).

**Order:** Perissodactyla (2,3)

**Scientific name:** *Diceros bicornis*

**Other names:** Hooked-lipped rhinoceros (2)

**Status in the wild:** CITES - Appendix I (9); U.S. ESA and IUCN - Critically Endangered (3,12)

**Major threats:** Poaching, encroachment on their habitat by humans. (1,2)

**Geographic range historically:** Formerly found in suitable open habitats in Africa south of about 10°N from N Nigeria, Chad, S Sudan and N Somalia, and from Angola, south to Cape Province (South Africa). (3)

**Geographic range currently:** Survives in reserves in Kenya, Tanzania, Namibia, Zambia, Zimbabwe and Zululand (South Africa), and possibly still in Cameroon, Chad, Central African Republic, Sudan, Rwanda, Malawi, Mozambique, Angola and Botswana; widely reintroduced into parts of South Africa. (3) Uganda is working on a program to reintroduce black rhino. (29)

**Habitat:** Bushy plains (1,2)

**Circadian cycle:** More nocturnal than diurnal (13), least active and do most of their wallowing during the heat of the day (27).

		<u>Size</u>	
	<u>General range</u>	<u>male</u>	<u>female</u>
<b>Head to rump length:</b>	3.0-3.75 m (1,2,13)		
<b>Tail length:</b>	60-70 cm (1,2,13)		
<b>Head &amp; tail length:</b>			
<b>Shoulder height:</b>	1.40-1.80 m (1,2,13)		
<b>Rump height:</b>			
<b>Weight:</b>	800-1400 kg (1,2,13)		40kg (1); 50 kg (2)
<b>Sexual dimorphism:</b>			

#### Reproduction

**Mating Season:** Throughout the year with peaks during the rainy season. (1,13)

**Birthing season:** During the rainy season. (1,13)

**Gestation period:** 419 to 478 days (1,2,13); 460 days is the average (43).

**Estrous cycle:** 17 to 60 days (1,14); estrus lasts about three days (27)

**Monestrous/polyestrous:** Polyestrous (1,2)

**Courtship:** Pre-mating bonding occurs between a male and female, so there is no serious fighting as in other rhinoceros species (1); however, as cited by other sources, most fights occur between rhinos of the opposite sex (43). A male will follow a female, cautiously approaching her, urine testing, circling, approaching again and place his head on her rump for brief periods; the female will either stand or leave with the male once again following (27,34). An estrous female will frequently urine-spray, squeal and may feint, or attack, a bull attempting to establish a consortship. When the female is in full estrus the bull will initiate a series of preliminary mounts without erection; these mounts may continue for hours interspersed with bouts of feeding and walking. (27)

**Copulation:** Male astride the female, from rear; intromission may last up to an hour. (13) Copulation lasts about one half hour (27).

**Number of mammae:** Two

**Interbirth interval:** Two to five years (1,2)

**Sexual maturity:** Males at 7 to 9 years and females at 4 to 6 years. (1,2) Females mature at roughly seven years but individuals ranging in age from 3.8 to 5.7 years have conceived; males are closer to ten years of age when they mature but a bull as young as 4.3 years was observed mating (27).

**Other information:** Some females continue to breed after conception (43).

### Rearing and young

**Young called:** Calf (1,2,14)

**Number of young (range):** One (1,2)

**Condition of young:** Precocial; able to stand within one hour of birth. (2) During one observed wild birth the calf stood within ten minutes (27).

**Eyes open:** At birth

**First leave pouch/den/hide/nest:** Stay with mother from birth; the black rhino calf closely follows the dam (27).

**First take solids:**

**Weaned:** 18 to 24 months (1,2); one to two years (27).

**Independent:** 2.5 to 3.5 years, they are driven away when the next calf is born; it is at this stage when they may seek a substitute companion (1,27).

**Other information:** The distress cry of a calf will bring the mother and any other nearby rhinos immediately (27). Calves follow behind the mother (46,34)

### General

**Life expectancy:** 45 years in captivity (1); 40 years (2,13)

**Social structure:** Solitary, except mother and young, and small groups of mothers with young; adult males are solitary, and territorial (1,2); males do not hold territories (43). A fairly sedentary species, the black rhino has overlapping home ranges; females are generally accompanied by young and will allow an immature animal, male or female, to attach themselves to her after rejection by their mother (27). Males will tolerate the presence of other males in their territory if the interloper remains subordinate (27). This species is not as strictly solitary as once thought however, meetings between animals are often tense, at least initially (27).

**Unique behavior(s):** Communicate with vocalizations and by smell, through urine spraying and dung scraping. (1,2)

**Senses:** Olfactory sense is very important in detecting danger; vision is relatively poor. (1, 29) This species emits a variety of vocal calls (27).

**Coat & coloration:** Two horns, front one is usually larger; grey brown skin is hairless; upper lip extends below lower and is prehensile. (1,2)

**Dental Formula:** 0/0 I, 0/0 C, 3/3 P, 3/3 M = 24 Total (1,14)

**Diet:** Branches, creeping plants (2). Consume over 200 plant species from fifty families; considered almost a pure browser the black rhino shows a preference for leguminous herbs and shrubs (27). Branches bitten off by a rhino show a distinct pattern (34). Although capable of surviving four to five days without water by chewing on succulent plants, they will dig for water during drought and travel 8 to 25km daily to reach water (27).

**Other information:** Confirmed wallowers and dust-bathers (27). They can gallop up to 50kph and turn within their own length (27). In times of alarm companions will press their rumps together and face outward (27). They are site-specific defecators, using communal dung piles (46).

**Order:** Perissodactyla (2,3)

**Scientific name:** *Rhinoceros sondaicus*

**Other names:** Lesser one-horned Rhinoceros (2); gainda (Hindi), genda (Maratha) (35).

**Status in the wild:** CITES - Appendix I (9); U.S. ESA - Endangered (3); IUCN - Critically Endangered (12)

**Major threats:** Poaching, habitat encroachment (2)

**Geographic range historically:** Formerly Bangladesh, Burma, Thailand, Laos, Cambodia, Vietnam, and probably South China through peninsular Malaysia to Sumatra and Java. (3)

**Geographic range currently:** Survives in Ujung Kulon (W Java) and Vietnam; perhaps in small areas of Burma, Thailand, Laos, and Cambodia. (3) At one time the three subspecies of the Javan rhino had a large distribution, currently it is considered one of, if not the rarest large mammal (26).

**Habitat:** Tropical rainforest especially in flat low lying areas. (1,2,13)

**Circadian cycle:** Diurnal and nocturnal (13)

**Family:** Rhinocerotidae (2,3)

**U.S. common name:** Javan rhinoceros (2,3)

#### Size

<u>General range</u>	<u>male</u>	<u>female</u>	<u>birth</u>
<b>Head to rump length:</b>	3.1 m (1,2);3-3.2m (26)		
<b>Tail length:</b>	60-70 cm (1,2)		
<b>Head &amp; tail length:</b>			
<b>Shoulder height:</b>	1.6-1.75 m (1,13);1.55 m (2)		
<b>Rump height:</b>			
<b>Weight:</b>	1500-2000 kg (1); 1273 kg (2)		50 kg (2)
<b>Sexual dimorphism:</b>			

#### Reproduction

**Mating Season:**

**Birthing season:**

**Gestation period:** 480 days (1,2)

**Estrous cycle:** 46 to 48 days (1)

**Monestrous/polyestrous:** Polyestrous (1)

**Courtship:** Fighting between sexes (1)

**Copulation:**

**Number of mammae:** Probably two.

**Interbirth interval:** Three years (2); probably every four or five years (26).

**Sexual maturity:** Males at 8 years; females at 4 years (2); males at 6 years; females at 3 to 4 years (1,26).

**Other information:**

### Rearing and young

**Young called:** Calf (2)

**Number of young (range):** One (2)

**Condition of young:** Precocial; able to stand within one hour of birth. (2)

**Eyes open:** At birth.

**First leave pouch/den/hide/nest:** Stay with female from birth.

**First take solids:**

**Weaned:** 18 months (2); calf suckled for at least one year and perhaps as long as two years (26).

**Independent:**

**Other information:**

### General

**Life expectancy:** 21 years in captivity (1); 40 years (2)

**Social structure:** Solitary, except mother and young, mating pairs, and rarely small groups of mothers with young; males are solitary and territorial. (2,26)

**Unique behavior(s):**

**Senses:** Olfactory and hearing senses are acute; vision is less so. (1)

**Coat & coloration:** Single horn; no hair on skin; grey skin forms plates with mosaic pattern over body; prehensile upper lip. (2,13) The single horn is short, there are generally three skin folds over the back (26). Females frequently lack the horn or have a small bump only (26).

**Dental Formula:** 2/2 I, 0/2 C, 6/6 P, 6/6 M =60 Total (1)

**Diet:** Twigs of young trees, lianas, bushes (2)

**Other information:**

**Order:** Perissodactyla (2,3)

**Scientific name:** *Rhinoceros unicornis*

**Other names:** Great Indian one-horned rhinoceros. (2,3); gainda, gargadan (Hindi), genda (Marathi) (35).

**Status in the wild:** CITES - Appendix I (9); U.S. ESA and IUCN - Endangered. (3,12)

**Major threats:** Poaching, habitat encroachment by humans. (2)

**Geographic range historically:** Within the present millennium, Indus Valley (Pakistan) east in northern India to Assam and perhaps northern Burma. (1,3)

**Geographic range currently:** Survives in India (Assam, West Bengal), Nepal and possibly northern Burma. (3)

**Habitat:** Floodplains, grasslands, and wooded meadows. (1,2,13)

**Circadian cycle:** Primarily night, early morning, and late evening (1,13)

**Family:** Rhinocerotidae (2,3)

**U.S. common name:** Indian rhinoceros (2,3)

	<u>Size</u>		
<u>General range</u>	<u>male</u>	<u>female</u>	<u>birth</u>
<b>Head to rump length:</b>	3.55-3.80 m (1,2,13)	3.1-3.4 m (1,2,13)	96-122 cm (1)
<b>Tail length:</b>	70-80 cm (1,2,13)	70-80 cm (1,2)	
<b>Head &amp; tail length:</b>			
<b>Shoulder height:</b>	1.7-1.86 m (1,2,13)	1.48-1.73 m (1,2,13)	56-67 cm (1)
<b>Rump height:</b>			
<b>Weight:</b>	2000-2200 kg (1,2,13)	1545-1600 kg (1,2,13)	40-81 kg (1,2,14)
<b>Sexual dimorphism:</b>			

#### Reproduction

**Mating Season:** Year-around (1,33)

**Birthing season:** Year-around (1,33)

**Gestation period:** 462 to 491 days (1,2,13)

**Estrous cycle:** 21 to 42 days (1,14,); five to eight weeks (43). Females in some populations have short cycles while females in other populations have long cycles; they appear to be in estrus for roughly one 24 hour period during the cycle (33). This species is a spontaneous ovulator (33).

**Monestrous/polyestrous:** Polyestrous (1)

**Courtship:** Males vigorously chase estrous females, sometimes resulting in fighting. (1) The female will spray urine and whistle when she is receptive (32,34).

**Copulation:** Male astride the female from the rear, intromission can last an hour or more and consists of multiple ejaculations. (13,34)

**Number of mammae:** Two

**Interbirth interval:** Three years (1,2)

**Sexual maturity:** Males at 9 to 10 years, females between 4 and 6.5 years (2,1) Females are full grown in the wild at roughly 6.5 years and sexually mature at about 7 to 7.5 years; males are full grown at ten years (26).

**Other information:** This species has the largest pre-copulatory follicle seen in a mammal to date, 12cm (33). An anovulatory (the female does not produce a viable ovum) cycle is observed periodically in this, and other, rhino species; the cause is not known at this time (33).

### Rearing and young

**Young called:** Calf (2,14)

**Number of young (range):** One (1,2)

**Condition of young:** Precocial; able to stand within one hour of birth. (2)

**Eyes open:** At birth.

**First leave pouch/den/hide/nest:** Stay with the mother from birth.

**First take solids:**

**Weaned:** 12 to 18 months (1,2) Calves suckle frequently until they are twelve months, after which they suckle less often until they are roughly 18 months old (26).

**Independent:** Driven away at least one week before birth of next calf (1). Total separation of the calf from the mother occurs at about four years of age (45).

**Other information:**

### General

**Life expectancy:** Up to about 47 years in captivity (1); other sources give 40 years (2) and 45 years (13).

**Social structure:** Loose groups of cows and young animals, males are solitary and seasonally territorial. (2)

**Unique behavior(s):** They are good swimmers (45). Sharp tusks are used for defense, not their horns (1).

**Senses:** Olfactory and hearing senses are strong; their eyesight is regarded to be poor. (1,2)

**Coat & coloration:** Single horn; no hair on skin; skin forms plates with wartlike pattern over body; prehensile upper lip. (2)

**Dental Formula:** 1/1 I, 0/1 C, 3/3 P, 3/3 M =30 Teeth (1,14)

**Diet:** Grasses, aquatic plants and twigs (2)

**Other information:** Their pedal scent glands are used to spread their scent for communication (44).