Dasyurus geoffroii

Western Quoll, Chuditch, Western Native Cat

^ Classification

- **Phylum:** Chordata
- **Class:** Mammalia
- **Order:** Dasyuromorphia
- **Family:** Dasyuridae

Table of Contents

^ Geographic Range

Australian: This species' range once extended throughout much of coastal and inland Australia and included a wide variety of habitats. Dasyurus geoffroii's range has been shrinking throughout the time of European settlement, and presently includes only the southwestern portion of Australia (see below). Some dasyurids collected in Papua New Guinea in the 1970's were classified as D. geoffroii, but these have since been assigned to another species. Two subspecies are sometimes distinguished: D. geoffroii geoffroii - which is restricted to inland Australia and may be extinct, and D. geoffroii fortis - which is restricted to southwestern Australia. Some older references place this species in its own genus, Dasyuroides.

Arnold (1983); Johnson and Roff (1982); Serena and Soderquist (1989a)

^ Physical Characteristics

Mass: 800 to 1400 g

Dasyurus geoffroii is sexually dimorphic, with males averaging 400 g heavier than females. It is one of the largest of the dasyurids. Dasyurus geoffroii looks very much like a mustelid, and has a brown pelage with white spots. It is also white underneath, has a bushy tail, and has five toes on the hindfoot. Arnold (1983) provides a picture. Crown-rump length for mature males averages 347 mm, and for mature females averages 305 mm. Tail lengths are about equal between the sexes (251 mm for mature males and 250 mm for mature females).

Arnold (1983); Johnson and Roff (1982); Serena and Soderquist (1989a); Soderquist (1995).

^ Natural History

Food Habits

Dasyurus geoffroii is best described as a "generalist predator"; however it is primarily insectivorous. Its diet may have differed among the habitats it formerly occupied, but since it is now restricted to the forests of southwestern Australia, most is known about its food preferences there. The species is also characterized by the ability to eat large quantities of food in very short periods of time (e.g. 12% of its body weight in 15 minutes, and 43% of its body weight overnight, with 85% of that occurring in the first hour). Examination of scats has yielded the following average annual values (by volume): 37.6% vertebrate remains, 43.8% invertebrate remains, 11.9% human garbage, and 6.7% other (including plant materials). Vertebrate remains were present in 74.7% of scats overall, invertebrate remains in 83.9%, rubbish in 28.9%, and other food items in 20.5% of scats. The diet of D. geoffroii also varies seasonally, with more invertebrates consumed during spring and summer and more vertebrates during fall and late winter (Australian seasons). In terms of specific food items, D. geoffroii is known to eat bandicoots, rabbits, mice, rats, birds (including domestic poultry), reptiles, and frogs. Most of their invertebrate prey consists of insects from large centipede down to termite-sized. They also scavenge (e.g. kangaroo roadkill) and go through human garbage when it is available. Plant material consists of less than 6% of the overall diet, and most of that is from cycads and blackberry seeds. Captive D. geoffroii like to eat fruits of all kinds.

Johnson and Roff (1982); Soderquist and Serena (1993); Soderquist and Serena (1994); Troughton (1962)

Reproduction

Estrous occurs in D. geoffroii in autumn or winter, with most conceptions occuring during late April to early July. This species is polygynous, and it is suggested that the larger body size in males serves three functions related to reproduction: (1) larger body size helps males compete with other males for mates (intraspecific aggression is known in this species, and the greatest number of injuries occur in males during the breeding season); (2) larger body size makes initially unreceptive (as well as territorial) females less likely to attack males; and (3) the extra weight males carry serves as an energy store for the breeding season. During copulation, male D. geoffroii tend to grip the shoulder region of the female with their teeth, thus leaving tell-tale injuries on the female. When the female becomes pregnant, the pouch develops sebaceous glands, increased vascularization, and a fold of skin which covers the pouch opening. Gestation lasts for 16-23 days. Female D. geoffroii have six mammary glands, and the normal litter size is also six. Polyestry is known to occur, especially in cases where the first litter fails. Newborns crawl into the pouch and attach to the mammary glands, where they remain for approximately seven weeks. Newborn young are protected in the moist and enclosed pouch. Weight and crown-rump length at birth average 11 mg and 4.4 mm, respectively. The mother begins to leave the young in the den while she hunts when they are approximately 9 weeks old. At this point they are still blind, not fully furred, and incapable of thermoregulating effectively. Eyes remain fused until this point. Young

begin eating some solid food at approximately 11 weeks of age. The mother does not hunt for or bring food to the young, and weaning is a gradual process. The size of the young (crown-rump length and cranial dimensions) tends to increase linearly during the first half of their development. Males and females remain about the same size. During the second half of development, males begin to show differences in cranial dimensions and later on show differences in skeletal proportions. The timing of the onset of dimorphism is tied to the nutritional condition of the mother (often, dimorphism manifests itself earlier in captive than in wild animals). Independence occurs when the young are approximately six months of age. Skeletal growth rates remain about the same for males and females after they are weaned. Skeletal dimorphism in mature D. geoffroii is only about 10%, but males may be twice as heavy as females. Females reach sexual maturity at one year old. Males continue to grow into their second year. Unlike some other dasyurids, male D. geoffroii live through several reproductive cycles.

Collins (1973); Serena and Soderquist (1988); Serena and Soderquist (1989a, b); Soderquist (1995); Soderquist and Serena (1990)

Behavior

Dasyurus geoffroii is a solitary animal. It is nocturnal, but is most active at dawn and dusk (crepuscular). Each individual (or a mother and her dependent offspring) will have a den. These dens are usually underground burrows located beneath trees, stumps, or large stones. Dasyurus geoffroii also commonly uses abandoned rabbit burrows. Most burrows have only one entrance, though they may have up to three. This species does not seem to pick den areas based on the amount of plant cover near the entrance(s). Dens are often lined with leaves, which serve to insulate the burrow and protect the young. Most denning goes in during periods of colder weather. Individuals are inactive during the day and rest in their dens. During this time, their body temperatures may fall, even though ambient temperature is the same or greater than during periods of activity. Oxygen consumption rate is also related to temperature. This species can tolerate a wide range of temperatures, and its very low metabolism rate during periods of inactivity allows it to conserve water to the extent that if it eats a steady diet of fresh meat, it may not need to drink at all. Each individual of D. geoffroii maintains a "core area" around its den, as well as a larger area in which it ranges. Male ranges tend to be considerably larger than female ranges (15 sq. km. and 4 sq. km. on average, respectively). Male ranges also tend to overlap with ranges of other individuals of both sexes, and male D. geoffroii are usually not territorial, though they may try to exclude other males during the breeding season. In contrast, female ranges never overlap, and females defend their territories (an exception to this sometimes occurs with mothers and daughters who live nearby). Most recently-weaned animals move into other areas and take up ranges there. Dasyurus geoffroii also has common "latrine" areas where a number of animals will regularly defecate. These animals do not defecate in their burrows, and in captivity use only one portion of their enclosures for this purpose. Both sexes also possess two types of paracloacal glands, and they use urine to mark areas in response to odors left by other individuals. Dasyurus geoffroii has been known to climb and dig for food, but it is primarily a terrestrial animal. They paw through soil and leaf litter looking for prey, and have been known to grab insects out of the air with their paws.

Arnold (1983); Arnold and Shield (1970); Collins; 1973; Serena and Soderquist (1989a); Serena and Soderquist (1989b); Soderquist and Serena (1994)

Habitat

As mentioned above, this species was once of the most widespread of the Australian marsupials, but is now restricted to forests and woodlands of southwest Australia. Discussions with elderly Aborigines indicate the presence of D. geoffroii in the dry grassland environments of Western Australia earlier in this century.

Johnson and Roff (1982); Serena and Soderquist (1989a); Soderquist and Serena (1994)

Biomes: *tropical deciduous forest*

^ Conservation/Biodiversity

Status: endangered

Dasyurus geoffroii is listed as endangered by the Australian and New Zealand Environment and Conservation Council. Much of its loss of habitat has occurred during this century. This decline is attributed to a number of factors, including competition for food with introduced animals such as foxes, feral cats, and dingoes; increased burning of grasslands by aborigines; and its status as a "pest animal" to white settlers. In addition, the introduction of rabbits to Australia may have had both positive and negative effects on D. geoffroii. Large rabbit populations provided a new and abundant food source for D. geoffroii. On the other hand, rabbits were responsible for denuding vegetation from "drought refuge areas" used by many of the endemic species. Droughts in the 1920's and 1930's in Australia are thought to have had a particularly destructive effect on endemic species populations for this reason. A more recent conservational problem involves D. geoffroii and baits set up to reduce the populations of introduced animals such as foxes, dingoes, rabbits, and feral pigs. Many of these baits use a toxin known as sodium monofluoroacetate (or "Compound 1080"). Many endemic animals of southwestern Australia have a high tolerance for this substance because they are used to ingesting (or eating prey which has ingested) certain local plant genera which contain high concentrations of fluoroacetate. Despite this, these baits are attractive to D. geoffroii and may in some cases be fatal. Researchers have proposed a schedule of baiting and have recommended dosages of Compound 1080 which will minimize the impact these have on populations of endangered D. geoffroii while still remaining effective against target species. In particular, baiting should avoid the lactation period for D. geoffroii, since even a sublethal dose for the mother may kill the offspring. Researchers have also suggested making the baits less attractive to these animals and/or using food items which D. geoffroii must ingest more slowly (e.g. using dry meat instead of fresh meat). Fortunately, experiments have shown that due to its relatively large size and high tolerance for this toxin, D. geoffroii is one of the least susceptible of the endemic species to being killed by these baits.

Johnson and Roff (1982); King et al. (1989); Soderquist and Serena (1993); Soderquist and Serena (1994)

^ Economic Benefits for Humans

Positive

This species does not seem to provide any economic benefits to man, besides perhaps a role in controlling rabbit populations. It does, however, play a role in the cultural lives of some aboriginal groups. The name "chuditch" is used for this animal by several aboriginal groups, and sounds like the aggressive call the animal sometimes makes. Other aboriginal names for this animal include "Jajirdi", "Tjilpa", and "Parrtjata". Most groups do not distinguish between D. geoffroii and D. hallucatus. Quolls were a favored source of food for some aborigines, who would blow smoke into their burrows to kill them and then dig them out. They also play an important role in the "dreamtime" mythologies of several groups.

Johnson and Roff (1982)

Negative

Many white settlers considered D. geoffroii a pest animal, which would rummage through garbage and was a special threat to poultry. For this reason, it was often killed on sight.

Soderquist and Serena (1994); Troughton (1962)

^ Other Comments

Much of the recent work on D. geoffroii has been done by M. Serena and T.R. Soderquist in a series of papers beginning in the late 1980's. There has also been a PhD thesis written on the species:

Arnold, J.M. 1976. Growth and bioenergetics of the chuditch, Dasyurus geoffroii. PhD Thesis. University of Western Australia, Perth.

Arnold (1976) was not consulted in the preparation of this species account.

^ References

Arnold, J.M. 1983. Western quoll. in Strahan, R., ed. The Australian Museum Complete Book of Australian Mammals. Angus and Robertson, London: 22.

Arnold, J. and Shield, J. 1970. Oxygen consumption and body temperature of the chuditch (Dasyurus geoffroii). Journal of Zoology, 160: 391-404.

Collins, L.R. 1973. Monotremes and Marsupials. Smithsonian Institution Press, Washington D.C.

Johnson, K.A. and Roff, A.D. 1982. The western quoll, Dasyurus geoffroii (Dasyuridae, Marsupialia) in the Northern Territory: historical records from venerable sources. in Archer, M., ed. Carnivorous Marsupials, Volume 1. Mossman: Royal Zoological Society of New South Wales, 221-226.

King, D.R., Twigg, L.E., and Gardner, J.L. 1989. Tolerance to sodium monofluoroacetate in dasyurids from Western Australia. Australian Wildlife Research, 16: 131-140.

Serena, M. and Soderquist, T.R. 1988. Growth and development of pouch young of wild and captive Dasyurus geoffroii (Marsupialia: Dasyuridae). Australian Journal of Zoology, 36: 533-543.

Serena, M. and Soderquist, T.R. 1989a. Spatial organization of a riparian population of the carnivorous marsupial Dasyurus geoffroii. Journal of Zoology, 219: 373-383.

Serena, M. and Soderquist, T.R. 1989b. Nursery dens of Dasyurus geoffroii (Marsupialia: Dasyuridae) with notes on nest building behavior. Australian Mammalogy, 12: 35-36.

Soderquist, T.R. 1995. Ontogeny of sexual dimorphism in size among polytocous mammals: tests of two carnivorous marsupials. Journal of Mammalogy, 76: 376-390.

Soderquist, T.R. and Serena, M. 1990. Occurrence and outcome of polyoestry in wild western quolls, Dasyurus geoffroii (Marsupialia: Dasyuridae). Australian Mammalogy, 13: 205-208.

Soderquist, T.R. and Serena, M. 1993. Predicted susceptibility of Dasyurus geoffroii to canid baiting programmes: variation due to sex, season, and bait type. Wildlife Research, 20: 287-296.

Soderquist, T.R. and Serena, M. 1994. Dietary niche of the western quoll, Dasyurus geoffroii, in the jarrah forest of Western Australia. Australian Mammalogy, 17: 133-136.

Troughton, E. 1962. Furred Animals of Australia, Seventh Edition. Halstead Press, Sydney.

Reference written by Josh Trapani - University of Michigan - Bio 451
Page last updated Thursday, October 16, 1997 1:19:16 PM