

Our Founding Animal

by Andrew G Wilson Jr

I. Introduction

While Cadillac is given credit for founding the European settlement of Detroit, it was the beaver which brought Cadillac to the shores of the Detroit River. Thus, while our bronze statue of a beaver enjoys the primacy of space in our foyer, Cadillac is relegated to a niche in the Frontiers to Factories exhibit.

In fact, Detroit was just one in a series of beaver-founded European settlements. Others include Albany, St Louis, Montreal, New Orleans and many more. Before the widely-recognized California gold rush, there was a preceding California fur rush earlier in the 19th century.

Perhaps the beaver could also be credited with the survival, if not the founding, of the Plymouth colony. It was trading with Native Americans for fur which paid the Pilgrims' debts and allowed the purchase of supplies for the critical early years of that settlement.

II. The beaver's place in the animal kingdom

The beaver is a member of the order *Rodentia*, which comprises about one third of the mammalian species. The term *rodentia* is derived from the Latin word *rodere* which means "to gnaw". Squirrels are the closest living relatives of the beaver, and, indeed, it does not take much imagination to see the outlines of a ground hog in our beaver statue. The fossil record shows that squirrels' and beavers' ancestors diverged around 90 million years ago. Modern beavers, including our own *castor canadensis*, appeared about 7 million years ago in North America. The only other member of the genus *castor* is the Eurasian beaver, *castor fiber*. While closely resembling each other both physically and in behavior, the two species cannot interbreed.

III. Physical characteristics

Size

1. Contemporary beavers usually weigh in between 25 to 60 lbs. As rodents, they can continue to grow throughout their lives, and the record holder, trapped in Wisconsin, was 110 lbs.
2. Beavers are the world's second largest rodents. The largest is the South American capybara, also semi aquatic, which can weigh 100 to 150 lbs. They resemble a small hippopotamus, and have a reputation as being easily tamed.
3. Extinct beaver species have ranged from muskrat sized to one which was about 6 feet long and weighed around 220 lbs. The latter survived in North America until around 10,000 years before present, and went extinct with the rest of the mega fauna. Too long ago to have been the source of the alternative name for 16 Mile Road. Older estimates of fossil beavers as being as large as a black bear have been discounted as misestimates of animal size based on fossils. That would have been Really Big Beaver Road.

4. *Longevity* - most estimates allow the beaver a life span of 5 to 10 years in the wild, and up to 20 years in captivity.

Adaptations

1. The beaver is a semi aquatic animal, living both in the water and on land. Adaptations to the aquatic environment include:
 - a. valves in the nose and ears to close off those organs from water intrusion on diving,
 - b. lips which can close behind the large incisors to allow underwater gnawing.
 - c. an additional eyelid type covering over the eye, called a nictitating membrane which is transparent. This membrane allows clear underwater vision - built in swim goggles.
 - d. webbed hind feet
 - e. a layer of fat under the skin to provide insulation
2. *Tail* - the beaver's large flat tail serves five functions.
 - a. It acts as a rudder during swimming.
 - b. It acts as a third leg, or as a prop, when the beaver is gnawing on a tree, or walking on his hind legs when his front legs are carrying mud or other materials for construction of dams.
 - c. It acts as a signaling device; the classic slap on the water. [my personal observation of signaling suggests that the beaver has several different degrees, or volumes, of slapping which might convey different meanings to those conversant with beaver language].
 - d. It serves as a temperature regulator. The blood vessels in the tail can be regulated to allow a greater or lesser flow of blood. A greater flow allows cooling of the blood, and thus of the animal, and a lesser flow would tend to conserve core body heat.
 - e. And, lastly, the tail serves as a fat storage organ, which, in turn, made the tail a delicacy to Native American gourmets.
3. *Teeth*
 - a. large incisors grow throughout life, to the extent of about 4 feet of tooth by some accounts
 - b. the front surface of the incisors is enamel and are orange in color. The softer back surface is white and is the dentin. Our teeth are encased in enamel, and the dentin is internal to that.
 - c. The orange color of the enamel of the incisors reflect the fact that iron is substituted for calcium in the enamel. The presence of iron confers greater strength and offers more resistance to acids. Young beaver have white incisors which become the adult orange color with age.



- d. The softer backs of the incisors allow for the self-sharpening function of the teeth. As the front, or enamel, of the lower incisor rubs against the dentin of the upper, the dentin wears away and the teeth sharpen themselves against each other.
- e. The beaver's molars are more conventional and are white.
- f. There is a large gap between the incisors and the molars where we have our lateral incisors, canines, bicuspids and so forth. We have 34 teeth [with "wisdom" teeth] and the beaver only 20.



4. Fur

- a. The fur is in two layers, the longer coarser guard hairs, and the inner denser, finer, softer layer so prized by hat makers, milliners, and elegant well-dressed people.
- b. Beaver fur is not inherently water proof, either on the beaver or in felted hat form. The beaver uses secretions from the castor glands near the anus to oil its fur. Hat makers, milliners, presumably use different forms of waterproofing, since the castor glands are themselves valuable for use in perfumes [imparting a leathery smell], and even in food flavorings.
- c. The fur entraps air, providing supplemental insulation to the layer of fat. However, despite these adaptations to cold water, the beaver is, unlike some fully aquatic animals, prone to hypothermia, or fall in body temperature, with prolonged immersion in cold water. Therefore, the animal must get back in the lodge or out of the water on land within about 20 minutes of immersion.
- d. As we know, beaver fur is particularly noted for conversion into felt for hats. A characteristic of the fur lends itself to the felting process. While all fur and hair has microscopic hooks protruding from the shaft of the hair, beaver fur is replete with these hooks which promotes felting. An analogy might be a piece of Velcro with scant hooks which makes a weak connection with the loop portion, representing lesser fur [e.g. wool]. Beaver fur, with a full complement of hooks, makes a firm bond with the loop portion. The felt made from beaver fur is more rigid and can sustain the sort of wide brim on a hat impossible with other furs, not to mention being more amenable to the sort of elaborate shapes our 17th - 19th century ancestors were so fond of.

IV. Behavioral characteristics

Family life

- 1. Beavers tend to be monogamous, though if one of a pair dies, a substitute mate will be sought.
- 2. Kits are usually 2-4 in number and are born around May. The number is dependent on factors such as food supply, and local population of beaver. They can swim within about 30 minutes of birth. Their first year of life they are rather needy as they learn the basics

and grow. However, help is available, because the kits born the year before, now in their second year, are still around to provide child care services as well as to learn the finer points of crafting dams and lodges. Usually, the kits are kicked out during their second year, though females may be allowed to stay a year longer as they reach sexual maturity.

3. When the kits leave the birth lodge, they seek a suitable location for a lodge, and mate, of their own. Because this journey may take them far from the relatively secure and established home pond/lodge, it is a time of considerable mortality.
4. For rodents, beavers have a low reproductive rate, a long maturation period, and are non-migratory. Their populations can be more dramatically impacted by aggressive hunting. Thus, the numbers of Eurasian beaver, *Castor fiber*, were severely depleted by the time the European explorers arrived on the shores of North America.

Habitat

1. Beavers, of course, want water. The type of body of water available, whether lakes or streams, will drive specific modification of their habitat.
2. The purpose of the beaver dam creates ponds behind the dams. The ponds, in turn serve several purposes. They provide protection from predators. They provide for food storage, as the beavers poke sticks into the bottom of their ponds near the lodge for winter use. They provide for safer food access and transport as the beaver can follow the expanding shoreline of the pond to fell more trees. In addition, the pond is functionally expanded by construction of canals which allow even more safe access to food, and easy water transport thereof.
3. Dams are constructed by first placing larger sticks or logs vertically into the bottom of the creek. Then, more sticks are placed horizontally along the verticals, with grass, mud, stones and the like filling in the matrix.
4. The longest dam on record is about 1/2 mile in Alberta, Canada.
5. Lodges are built in the pond behind the dam. They may be 15 - 40 feet in diameter on the bottom, with a diameter of 6 feet or so above the water.
6. the method of construction is to make a pile of sticks and branches in the desired location, and then gnaw from under water first the entrance, and then the space above the surface of the water. These are usually two room houses, with a lower landing area just above the water's surface, and above that the living area which uses fur, foliage and the like to provide a cozy floor. Last, a ventilation hole is made in the top. Some references mention a third room, a bathroom. Lodges are mostly used for overwintering, so are built or repaired late in the season. Just before freeze-up, a layer of mud is applied. When that mud freezes, it can frustrate most predators. Except human predators.
7. If the beaver finds itself on a large, un-dammable river, or on a lake, it builds a "bank lodge". This can be a pile of branches against a bank, which is often supplemented by burrowing into the bank. These bank lodges will also have the usual features of an underwater entrance and functional spaces. The Eurasian beaver preferentially builds bank lodges, even when the terrain would lend itself to a pond lodge.

Diet

1. The under bark, not the outer layer, is the nutritious food for the beaver.
2. Preferred bark is from aspen, willow, alder, poplar, maple, birch, wild cherry. Conifers will be eaten in a pinch. A beaver colony will fell around 400 trees per year, and they can take down a 6-inch diameter tree in under 20 minutes
3. While we associate beaver with bark as food, they actually prefer soft aquatic plants such as water lilies and sedges.
4. As with any animal, the efficiency of deriving nutrition from a given food source drives food preferences.

V. Conclusion

The beaver is the animal, after our species, which most modifies its own environment for its benefit. What other animal builds two room houses? That, coupled with the beaver's family life makes it easy to understand why some Native American tribes considered beavers human except for their inability to talk. To the beaver, in Native American mythology, was also attributed considerable accomplishments such as the creation of what we know as Lake Superior. And, of course, the quest for beaver fur led to the fur trade and in large part to the conquest of a continent. Certainly an estimable Founding Animal.

VI. Further reading:

The Beaver, by Dietland Muller-Schwarze

this is a scholarly account of the natural history of the beaver

Once They Were Hats, by Frances Backhouse

an entertaining, eminently readable account of the fur trade [up to the present day] with accurate discussions of the animal and its habits.