

Author's name, professor's name, course and date are double-spaced in 12-point, Times New Roman font. Dates in MLA are in day-month-year order.

In the header throughout the whole paper, author's surname should be typed.

Surname 1

Student's Name

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Course

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Title of the paper is centered and not bolded. Additional space after the date is needed.

Anatomy of Whales

Page number is included in the first page. It is flush right. Font: Times New Roman 12 pt.

## Introduction

Whales are a widely distributed and diverse group of fully aquatic marine mammals. They

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comprise the extant families Cetotheriidae (whose only living member is the pygmy right whale),

Balaenopteridae (the rorquals), Balaenidae (right whales), Eschrichtiidae (the gray whale),

Monodontidae (belugas and narwhals), Physeteridae (the sperm whale), Kogiidae (the dwarf and

pygmy sperm whale), and Ziphiidae (the beaked whales). There are 40 extant species of whales.

Two suborders of whales, Mysticeti and Odontoceti, are thought to have split up around 34

million years ago. Whales belong to the clade Cetartiodactyla and their closest living relative is

the hippo having diverged about 40 million years ago. Whales range in size from the 2.6 metres

(8.5 ft) and 135 kilograms (298 lb) dwarf sperm whale to the 34 metres (112 ft) and 190 metric

tons (210 short tons) blue whale, which is also the largest creature on earth. Several species

exhibit sexual dimorphism, in that the females are larger than males. They have streamlined

bodies and two limbs that are modified into flippers. Though not as flexible or agile as seals,

whales can go at incredibly fast speeds, up to 20 knots. Balaenopterids (rorquals) use their throat

pleats to expand their mouth to take in huge gulps of water.

Whales range in size from the 2.6 metres (8.5 ft) and 135 kilograms (298 lb) dwarf sperm

whale to the 34 metres (112 ft) and 190 metric tons (210 short tons) blue whale. Overall, they

tend to dwarf other cetartiodactyls; the blue whale is the largest creature on earth. Several species

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have female-biased sexual dimorphism, with the females being larger than the males. One exception is with the sperm whale, which has males larger than the females.

All whales have a thick layer of blubber (Britt). In species that live in cold water, blubber can be as thick as 11 inches. This blubber can help with buoyancy (for a 100-ton whale), protection to some extent as predators would have a hard time getting through a thick layer of fat, and energy for fasting when migrating to the equator; the primary purpose of blubber is insulation from the harsh climate. It can constitute as much as 50% of a whale's body weight. Calves are born with only a thin layer of blubber, but some species compensate for this with thick lanugos.

Author-page citing style, but in-text citations to a web source do not require a page number.

Whales have a two-to-three-chambered-stomach that is similar in structure to terrestrial carnivores. Mysticetes contain a proventriculus as an extension of the oesophagus; this contains stones that grind up food. They also have fundic and pyloric chambers (Cook and Wisner 120).

### **Locomotion**

Whales have two flippers on the front, and a tail fin. These flippers contain four digits. Although whales do not possess fully developed hind limbs, some, such as the sperm whale, possess discrete rudimentary appendages, which may contain feet and digits. Whales are fast swimmers in comparison to seals, who typically cruise at 5–15 kn (9–28 km/h or 6–17 mph); the fin whale, in comparison, can travel at speeds up to 47 kilometres per hour (29 mph) and the sperm whale can reach speeds of 35 kilometres per hour (22 mph). The fusing of the neck vertebrae, which increases stability when swimming at high speeds, decreases flexibility; they can't turn their head. When swimming, whales rely on their tail fin to propel them through the water. Flipper movement is continuous. Whales swim by moving their tail fin and lower body up and down, propelling themselves through vertical movement, while their flippers are mainly used for

In-text citations to books include author's surname and page number. If there are two and more authors, 'and' is included in between. Punctuation is unacceptable.

steering. Some species log out of the water, which may allow them to travel faster. Their skeletal anatomy allows them to be incredibly fast swimmers. Most species have a dorsal fin.

Whales have several adaptations for diving to great depths. In addition to their streamlined bodies, they can slow down their heart rate to conserve oxygen, blood is rerouted from tissue tolerant of water pressure to the heart and brain among other organs, and hemoglobin and myoglobin store oxygen in body tissue; they have twice the concentration of myoglobin than hemoglobin.

## Senses

### *Whale Ear*

A Level 2 heading should be flush with the left margin, italicized, and title case.

The whale ear has specific adaptations to the marine environment. In humans, the middle ear works as an impedance equalizer between the outside air's low impedance and the cochlear fluid's high impedance. In aquatic mammals, such as whales, there is no great difference between the outer and inner environments. Instead of sound passing through the outer ear to the middle ear, whales receive sound through the throat, from which it passes through a low-impedance fat-filled cavity to the inner ear. The whale ear is acoustically isolated from the skull by air-filled sinus pockets, which allow for greater directi

### *Eyesight*

Titles of published works (books, journals, films, etc.) are italicized.

In the article *Acoustic Traditions of Killer Whales* by Ford (1985), it is stated that the whale eye is relatively small for its size, yet they do retain a good degree of eyesight. As well as this, the eyes of a whale are placed on the sides of its head, so their vision consists of two fields, rather than a binocular view like humans have. When belugas surface, their lens and cornea correct the nearsightedness that results from the refraction of light; they contain both rod and cone cells,

meaning they can see in both dim and bright light, but they have far more rod cells than they do

A Level 3 heading should be centered, bolded, and capitalized.



### **Visual Pigments**

Whales lack short wavelength sensitive visual pigments in their cone cells indicating a more limited capacity for color vision than most mammals. Most whales have slightly flattened eyeballs, enlarged pupils (which shrink as they surface to prevent damage), slightly flattened corneas and a tapetum lucidum; these adaptations allow for large amounts of light to pass through the eye and, therefore, a very clear image of the surrounding area. In water, whales can see around 10.7 metres (35 ft) ahead of itself, but, of course, they have a smaller range above water. They also have glands on the eyelids and outer corneal layer that act as protection for the cornea.

### **Conclusion**



Conclusion restates the problem the paper addresses and can offer areas for further research.

Whales are a widely distributed and diverse group of fully aquatic marine mammals. They comprise the extant families Cetotheriidae (whose only living member is the pygmy right whale), Balaenopteridae (the rorquals), Balaenidae (right whales), Eschrichtiidae (the gray whale), Monodontidae (belugas and narwhals), Physeteridae (the sperm whale), Kogiidae (the dwarf and pygmy sperm whale), and Ziphiidae (the beaked whales). There are 40 extant species of whales. The two suborders of whales, Mysticeti and Odontoceti, are thought to have split up around 34 million years ago. Whales belong to the clade Cetartiodactyla and their closest living relative is the hippo having diverged about 40 million years ago.



Reference page should be entitled 'Work(s) Cited' (regular type and centered).

urname 5

## Works Cited

Britt, Roy R. Unlikely Cousins: Whales and Hippos. 2004. Web. Aug. 5, 2015.

<<http://www.livescience.com/102-cousins-whales-hippos.html>>

Cook, Jack J., & William L. Wisner *Killer Whale!* New York, NY: Dodd, Mead, 1963. Print.

Ford, John K.B. Acoustic Traditions of Killer Whales. *Whalewatcher (Journal of the American Cetacean Society)* 19 (1985): 3-6.



References should be listed in alphabetical order and include the necessary details for each type of source. 0.5" hanging is required. **Important:** full authors' names are required.