

# Learning material

# Whales and dolphins

[www.firmm.org/kids](http://www.firmm.org/kids)

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**Photos:** *firmm*

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The worksheets are available free of charge at [www.firmm.org/en/kids](http://www.firmm.org/en/kids)  
and may be passed on.

Last modification: June 3rd, 2020

## Dear teachers, dear parents,

your children are enthusiastic about whales and dolphins? Then we have something in common! The foundation firmm is committed to the protection of these animals in the Strait of Gibraltar and offers respectful whale watching for tourists. We want to help as many people as possible to understand and appreciate marine mammals, because we believe that:

### Only what we know and love, we are willing to protect

Our material is suitable for children from 9 to 99 years. We think that there is something for everyone to discover. Work out the topics together by taking a quiz and discover interesting facts in our texts. Following each topic, your kids can write down the most important information in the worksheets, create their own little quiz or make up their own whale story. This encourages creativity.

And if you bind your children's self-designed pages into a booklet, they will have a nice memory and the information is always at hand.

We hope you have fun while discovering and we are looking forward to welcoming you soon with your entire family.

Cordially

Katharina Heyer and the *firmm*-team



The *firmm*-team in Tarifa (Spain)

## Where do you want to start?

We have prepared many exciting topics in these worksheets. You can explore them one after the other, or simply pick out what your children are most interested in. You know best what suits the age and previous knowledge of your child.

The following topics are waiting to be discovered:

### Whales and dolphins in general

- What distinguishes a whale from a fish?
- What distinguishes toothed whales from baleen whales?
- What are right whales and rorqual whales?
- How did the whales adapt to life in the water?
- What did the ancestors of the whales and the Archaeoceti ("ancient whales") look like? How do we know this?

### The foundation *firmm* and the Strait of Gibraltar

- Where is the Strait of Gibraltar and why is it so special?
- Where do the nutrients come from and why are they so important?
- What does the foundation *firmm* do in the Strait of Gibraltar?

### The whales and dolphins in the Strait of Gibraltar

- What species of whales and dolphins can be found in the Strait?
- What are the characteristics of each species and what dangers are they facing?

## Annex

With all this information, the respective worksheet may not be sufficient. In the annex you will find the sheet "I know even more". Simply print out this sheet whenever your children want to add more information and pictures on a topic.

You will also find in the annex:

- a cover sheet for your children's whale booklet
- pages for own whale stories
- question and answer sheets for your own quiz questions

# Whales and dolphins in general

## Content:

### A whale is not a fish

- quiz sheet
- answer sheet for the quiz
- worksheet - A whale is not a fish

### Toothed whales and baleen whales

- quiz sheet (can also be used in relation to the texts as reading comprehension questions)
- answer sheet for the quiz
- texts on toothed whales and baleen whales (4 pages)
- worksheet - Toothed whales and baleen whales

### From terrestrial animal to marine mammal

- quiz sheet
- answer sheet
- cards primeval whales (picture and description to cut out and assign; solution in the 2nd text on evolution)
- texts on the evolution of whales (2 pages)
- worksheet

## Quiz – A whale is not a fish

Name: \_\_\_\_\_

Check the right answers.

	<b>fish</b>	<b>both</b>	<b>no one</b>	<b>dolphin</b>
Who has fins?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who moves the tail up and down?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who can breath under water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who is a mammal?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who has scales?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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## Quiz – A whale is not a fish

Name: \_\_\_\_\_

Check the right answers.

	<b>fish</b>	<b>both</b>	<b>no one</b>	<b>dolphin</b>
Who has fins?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Who can breath under water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who is a mammal?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who has scales?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Answers – A whale is not a fish

The answer is also available as video on: [www.firmm.org/en/kids](http://www.firmm.org/en/kids)

### Who has fins? – both

Fish usually have two pectoral fins, pelvic fins, anal fins, at least one dorsal fin and a caudal fin.

Whales/dolphins on the other hand have two pectoral fins (flipper), one caudal fin (fluke) and usually a dorsal fin.

### Who is moving the tail up and down? – dolphin

The caudal fin of fish is vertical and moves back and forth; whales, on the other hand have a horizontal tail fin, which they move up and down when swimming. At the water surface, we can therefore tell the difference between a dolphin and a shark: If the dorsal fin of a swimming animal is constantly visible on the surface, it must be a shark; the dolphin's fin would dive down again and again. (You will also find a video on the above mentioned page.)

### Who can breathe under water? – fish

Fish have gills and can filter oxygen directly from the water. Whales on the other hand have lungs and can only absorb oxygen from the air. This means that they have to come up to the water surface again and again to breathe. But some whales can stay underwater for a long time. (You can learn who can hold their breath for how long by looking at the cards about the whales in the Strait of Gibraltar.)

### Who is a mammal? – dolphin

While fish are independent from the beginning, whales are suckled during the first months. Due to their lack of lips, however, the animals cannot actively suckle - the milk is injected into the calf's mouth by its mother.

### Who has scales? – fish

Scales are a typical feature of fish - mammals usually have a fur. But whales have smooth skin; a fur would hinder them in swimming and as protection against the cold it is also not effective in the water. To protect against the cold, marine mammals have a layer of body fat under the skin called blubber. In cold waters it can be over 50 cm thick.

# A whale is not a fish

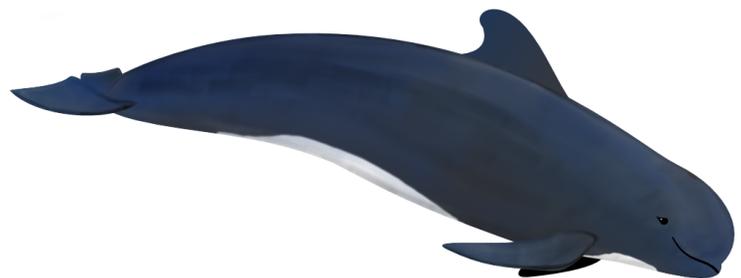
## Mutual characteristics

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## Differences



## Characteristics Whale/Dolphin

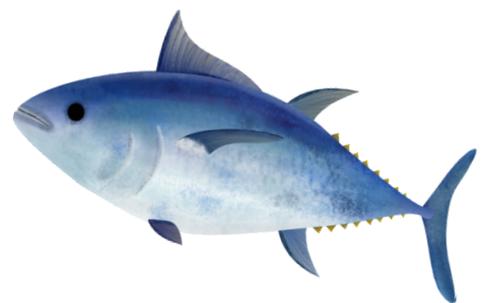
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## Characteristics fish



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## Quiz – Toothed whales and baleen whales

Today's whales are divided into toothed whales and baleen whales. Do you know the difference?

Check the correct statement.

**Question 1: Most whales living today are...**

- A toothed whales
- B baleen whales

**Question 2: In the case of toothed whales...**

- A all teeth have the same shape
- B there are incisors, canines and molars



**Question 3: Baleen whales have ...**

- A one nostril
- B two nostrils



**Question 4: The baleens are...**

- A horn plates in the mouth instead of teeth
- B remains of fur on the chin of baleen whales

**Question 5: The longitudinal folds in some baleen whales ...**

- A serve as food storage as in camels. You only see them when the whale hasn't eaten for a long time.
- B expand during feeding so that the whale can take in a lot of water.

## Answers – Toothed whales/baleen whales

### Question 1 – A

Of the approximately 80 whale species living today, only 15 are baleen whales. In the Strait of Gibraltar there is only one baleen whale (the Fin Whale), all other whales are toothed whales.

### Question 2 – A

Toothed whales use their teeth mainly to grab and hold on to the slippery prey. They swallow the prey then, however, mostly in one piece. The teeth of the whales have therefore adapted so that all teeth serve the same purpose.

### Question 3 – B

Toothed whales only have one nostril, it's called a blowhole. But baleen whales have two nostrils, termed a pair of blowholes. When viewed from above the blowhole on baleen whales looks like a nose.

### Question 4 – A

Instead of teeth, baleen whales have baleen plates in their mouth. It looks a little bit as if broom bristles would hang down from the upper jaw. Thanks to the baleens baleen whales are able to feed on the smallest creatures, such as krill. With their mouths open, the whales take in water and food. Then they close their mouths and press the water out. The food gets stuck and is swallowed down.

### Question 5 – B

Baleen whales are divided in right whales and rorqual whales. The rorqual whales, which include the Fin Whale, have longitudinal folds on the belly. They can expand and contract like an accordion. When rorquals swim through a school of fish or krill, the folds expand and so the whale can take in a lot of water. When the whale closes its mouth, it contracts the folds again, the water flows out and the food gets stuck to the baleen plates.

( In the case of right whales, which have no folds, the water flows continuously into the front part of the mouth and out at the sides. To make sure that the food gets stuck, the baleens of the right whales are longer at the sides than in front. Gray whales filter in portions like rorquals, but have no folds and shorter and more robust baleens. They use them to filter animals such as crabs and mussels from the water, which they whirl up from the sea floor).

## Toothed whales and baleen whales

Scientists roughly divide whales into toothed whales and baleen whales. There are about 80 species of whales today, most of which belong to the toothed whale family. Only 15 whale species are baleen whales. In the Strait of Gibraltar we only see one baleen whale several times a year: the Fin Whale. Very, very rarely we can see a Minke Whale. And only exceptionally, it even happens that a Humpback Whale comes into the Mediterranean Sea.

### Toothed whales have teeth. Do baleen whales have beards?

The scientific name for baleen whales is Mysticeti which means "moustached whales". However, whales have lost their hair in the course of evolution, and there's no moustache remaining! Instead of teeth, baleen whales have fibrous plates in their mouth, which are called baleens.

### Blowhole in toothed and baleen whales

The blowhole of toothed whales and baleen whales is also different: toothed whales have only one outer blowhole, baleen whales have two.



Pictures on the left: Above you can see the open blowhole of a toothed whale. Below you can clearly see how the hole is closed when diving down so that no water can enter.

Pictures on the right: The breathing hole of baleen whales reminds a bit of a nose. The area is slightly arched and there is a partition wall between the two nostrils.

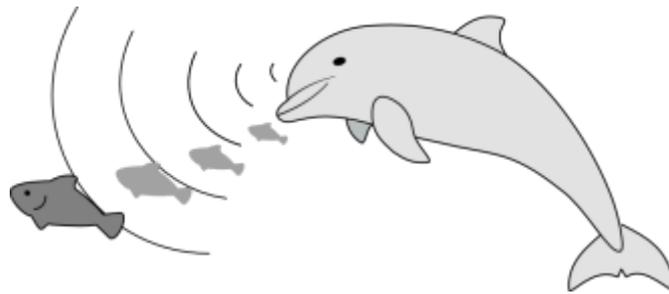
## Toothed whales and baleen whales

### Toothed Whale - Grit your teeth!

Already the land living ancestors of whales fed at least partially on fish. The ancient whales still had different teeth to grab, tear and chew the prey. In the whales of today all teeth look the same and serve only one purpose: to grab and hold on to the slippery prey. Chewing is not an issue for whales - the catch is swallowed in one piece.



But first the whales have to find their food. They cannot always rely on their sense of sight in murky waters and the dark depths of the oceans. But toothed whales have developed an ingenious ability: echolocation. Like bats, they emit sounds that are reflected by objects in their environment.



### How does echolocation work?

To perceive their environment, toothed whales emit clicking sounds. If they hit an obstacle, the signal is reflected and transmitted via a layer of fat in the lower jaw to the whale's inner ear. In this way, the whale can tell whether the echo is coming from a rock, another whale or a prey animal, for example.

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Did you know that blind people can also learn to orient themselves by echolocation?

You can find some videos about this on YouTube.

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## Toothed whales and baleen whales

### Who pulled the teeth of baleen whales?

The ancient whales already conquered different areas of life and adapted to conditions and food. The earliest representatives of the baleen whales had still teeth and lived near Antarctica, where there existed already a lot of plankton at that time.

So the whales changed their diet from fish to krill. Krill is very nutritious but also miniscule. The whales could grab small animals with their teeth; they probably sucked in the plankton. And gradually they adapted to this food source.



The ancient whales first got teeth with several sharp tips, which held back the food in their mouths like a grid. Over millions of years, these teeth developed into frayed horn plates with which the baleen whales filter the food out of the water today.



Although baleen whales feed on tiny creatures, they are among the largest animals on earth. The blue whale is the largest animal on our planet, measuring up to 33 metres in length.

How baleen whales find their prey has not yet been researched. They have no sonar system comparable to toothed whales. But still they seem to be able to detect shoals of krill and even estimate their size. This is important for whales to know, because swimming with their mouth open slows them down enormously. It is therefore not worthwhile to open their mouths for a small swarm of krill.

### What's krill?

Krill is the name given to small shrimp-shaped crustaceans. They drift in the sea as plankton and only grow to about 5 cm in size.



## Toothed whales and baleen whales

We divide baleen whales into right whales, pygmy right whales, rorquals and gray whales.



The Bowhead Whale is a right whale.

### Right whales

Right whales filter their food continuously. The water flows in at the front of the mouth and out at the side. Since the baleens are longer at the sides than in the front part of the mouth, water and plankton enter the mouth, but only the water flows out again. The food remains in the baleens. When enough food has accumulated, it is pushed into the throat with the tongue.



Pygmy Right Whale

### Pygmy Right Whale

Very little is known about Pygmy Right Whales. With their slender bodies and fins they resemble rorquals. But they have no folds.

### Rorquals

Rorquals have longitudinal folds at the throat. The inflowing water stretches the folds so that large quantities of food can be absorbed. When the whale closes its mouth, the water is squeezed out again. The food sticks to the baleens and is swallowed down.



The Blue Whale is a rorqual.

### Gray Whale



Gray Whales have short, robust baleens. They can use them to filter crabs and mussels from the water, which they whirl up on the seabed.

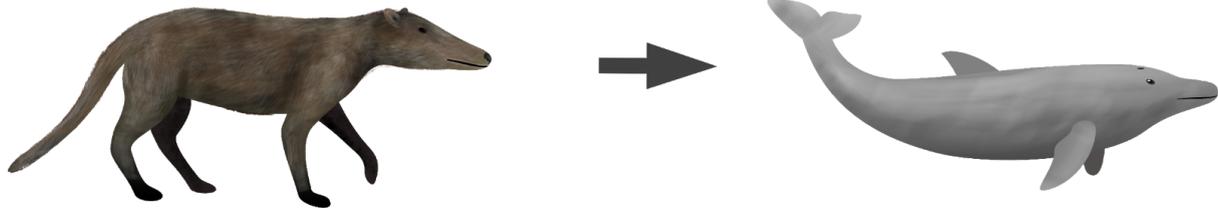


Today Gray Whales only exist in the Pazific Ocean.



## From land animal to marine mammal

Within 10 millions of years, whales evolved from land animals to sea animals. How did they adapt to life in the water?



Check the right statement.

### Question 1: Legs

- A The front legs became pectoral fins, the hind legs became the tail fin. The tail became the dorsal fin.
- B The front legs became pectoral fins. The tail became more powerful and formed a fluke. The dorsal fin was newly formed.

### Question 2: Fur

- A Whales have a smooth skin.
- B Whales have a transparent fur.

### Question 3: Body shape

- A Thanks to their shape the whales can swim faster.
- B Whales swim very slowly and have therefore become fat.

### Question 4: Ears

- A Whales no longer have a sense of hearing and orient themselves only by sight and smell.
- B Whales do not have external ears but can still hear very well.

### Question 5: Nose

- A Whales do not have nostrils any more. They breathe through their mouth.
- B The nostrils are located at the highest point of the head.

## Answers – From land animal to marine mammal

You can find the answers to the quiz as an explanation video on:

[www.firmm.org/en/kids](http://www.firmm.org/en/kids)

### Question 1: B

The front legs became pectoral fins. In skeletons of modern whales, the bones of the pectoral fins resemble those of a hand. The hind legs have receded. The Basilosauridae and Dorudontinae still had tiny hind limbs. As can be seen in the ancient whales, the tail became stronger and stronger and eventually formed a fluke. The dorsal fin is a neof ormation.

### Question 2: A

The ancestors of the whales have lost their fur in the course of evolution. Fur would create too much resistance in the water; therefore the whales would not be fast swimmers. A fur in the water does not protect against the cold anyway. Instead, whales have developed the so-called blubber, a protective layer of fat underneath the skin.

### Question 3: A

Like fish, whales have a spindle-shaped or streamlined body. This shape causes less turbulence and less resistance in the water and makes whales fast swimmers.

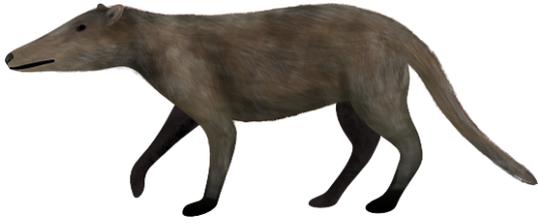
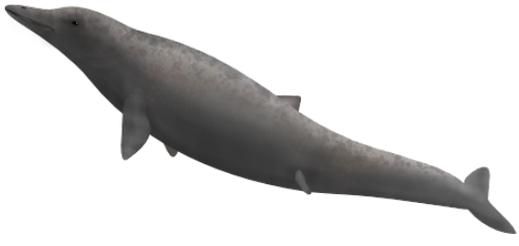
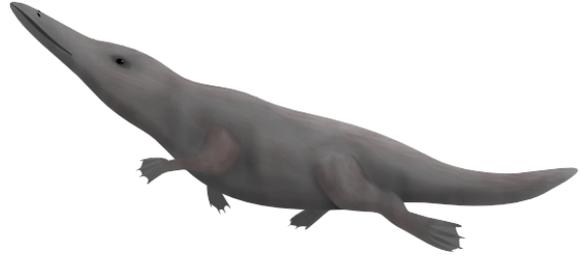
### Question 4: B

Ears would also create resistance in water, so evolution has rationalized them away. Nevertheless, whales can hear very well. Sounds are perceived via a layer of fat in the lower jaw and are transported to the inner ear.

### Question 5: B

The nostrils of whales moved higher and higher during evolution. Now, when they emerge, whales do not always have to stick their heads out, which saves energy.

However, the nostrils are now only used for breathing, so the animals can no longer smell. When diving down, the nostrils are closed so that no water can get in.

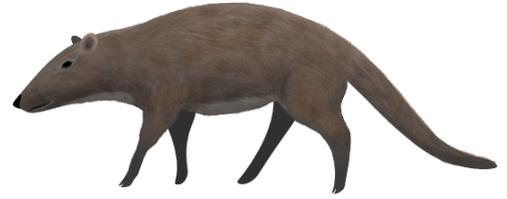
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<p><b>Ambulocetidae</b></p> <ul style="list-style-type: none"><li>● 49 million years ago</li><li>● short legs</li><li>● powerful feet</li><li>● strong tail supports swimming</li></ul>	<p><b>Basilosauridae</b></p> <ul style="list-style-type: none"><li>● 41-35 million years ago</li><li>● very slender body</li><li>● nearly 20 m long</li><li>● tiny hind legs</li><li>● tail with a fluke</li></ul>
<p><b>Pakicetidae</b></p> <ul style="list-style-type: none"><li>● 50-48 million years ago</li><li>● land animal</li><li>● about the size of a wolf</li><li>● hunted in coastal waters</li></ul>	<p><b>Remingtonocetidae</b></p> <ul style="list-style-type: none"><li>● 46-43 million years ago</li><li>● long, pointy snout</li><li>● similarity with a crocodile</li><li>● probably hunted actively like an otter for fish</li></ul>
<p><b>Dorudontinae</b></p> <ul style="list-style-type: none"><li>● 41-35 million years ago</li><li>● about 5 m long</li><li>● tiny hind legs</li><li>● tail with a fluke</li></ul>	<p><b>Protocetidae</b></p> <ul style="list-style-type: none"><li>● 47 million years ago</li><li>● shortened neck</li><li>● similarity to seals</li><li>● muscles in the tail</li><li>● nostrils further back</li></ul>

## From land animal to marine mammal

### Evolution of the whales

The ancestors of whales were even-toed ungulates, so whales are more closely related to pigs or cows. The link between land creatures and whales today is the Indohyus, which is about the size of a cat and probably already searched for food in shallow water.



### Why did the animals return to the water?

Adverse living conditions could have been the reason for conquering new habitats. Many primeval whale fossils were found in Pakistan and India - so the evolution of whales began in the region around India. It was very warm and dry there 50 million years ago. The Indian subcontinent began to collide with the Eurasian plate around this time, so the area must have been very prone to earthquakes.

### How do we know how the evolution of the whales took place?

Scientists derive the evolution of whales from fossils. They must be well knowledgeable about the history of the earth and the anatomy and lifestyle of animals. They try to deduce a relationship between fossils and species living today through common characteristics. DNA studies support such theories or show the scientists that they were wrong.

The ancestors of whales have been identified mainly on the basis of a thickened ear bone. Today this bone is found exclusively in whales. Fossils of the Pakicetidae also had an ankle joint with a double-rolled joint surface, which is an exclusive feature of even-toed ungulates.

The density of the bones indicates the date from which the animals were frequently in the water. The principle is known of hippopotami, which can move in the water with little effort thanks to their dense bones.

With the help of dental examinations it was possible to detect that the Ambolucetidae still drank fresh water. It is therefore assumed that they lived near rivers. The Protocetidae already drank salt water. So their kidneys must have adapted too, because salt water is lethal for land mammals.

## From land animal to marine mammal

### The primeval whales

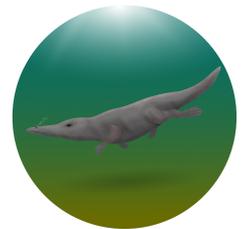
The primeval whales clearly show the gradual adaptation to the body shape of modern whales, even though certain stages of development may have existed parallel to each other or some species may have evolved earlier than others.

The **Pakicetidae** were still land animals and their appearance reminded a little bit of a wolf. They found their prey in shallow water.



Scientists do not agree whether the **Ambulocetidae** could still move on land or were already living in the water. Probably the animals lurked in the shallow water for prey, similar to today's crocodiles.

Even better adapted to life in the water were the **Remingtonocetidae**. With their long snout they probably already actively hunted for fish, similar to today's otters.



The **Protocetidae** had developed a more streamlined body. They were good swimmers and had a shorter neck which was more suitable for diving. Muscles had formed on the tail.

The **Basilosauridae** had only tiny hind legs. The nostrils had already moved further back, but for breathing they probably still stuck out their head. The long, slender body was very suitable for hunting in shallow bays.



Significantly smaller were the **Dorudontidae**. They lived at the same time as the Basilosauridae and also had tiny hind legs. The Dorudontidae are believed to be the origin of the modern whales and dolphins. (The suffix -nae indicates that Dorudontinae are only a subfamily. For a long time they were classed among the Basilosauridae family, but this is doubted today).



# Foundation *firmm* and the Strait of Gibraltar

## Content:

### The Strait of Gibraltar

As an introduction to the topic or to check reading comprehension, you can find a quiz on: [www.firmm.org/en/kids](http://www.firmm.org/en/kids)

- general information (text)
- reason for the abundance of nutrients in the Strait (text)
- connection nutrients - whales (text)
- worksheet

### The foundation *firmm*

Detailed information on our work can be found in the foundation and research sections at [www.firmm.org](http://www.firmm.org)

- general information about the foundation (text)
- insight into our work (photo-identification)
- worksheet

## The Strait of Gibraltar

The Strait of Gibraltar lies between Europe and Africa, more precisely between Spain and Morocco.

The narrowest part of the Strait is only 14 km wide and is located off Tarifa. In good weather you can see from Tarifa to Africa as in the picture below.



Many migratory birds on their migrations between Europe and Africa pass through here and use this narrow spot to cross the sea.

But the Strait is also one of the most frequented waterways in the world. It is the only link between the Atlantic and the Mediterranean. If you want to travel by ship from the Atlantic into the Mediterranean or vice versa, you have to pass through here. And that's not all. The shipping route to the Indian Ocean through the Mediterranean Sea and the Suez Canal is much shorter than the route all around Africa.

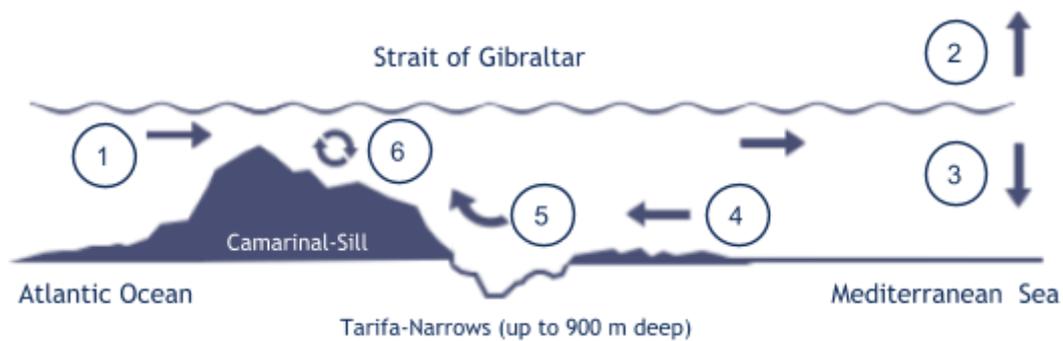


About 300 merchant ships navigate through the Strait of Gibraltar every day, which means that about every 5 minutes a cargo ship passes by. In fact, the Strait is much too loud, dirty and hectic for marine mammals. And yet there are seven species of whales here. Why? You'll find out in the next few pages.

## The Strait of Gibraltar

The biodiversity in the Strait of Gibraltar is the result of the many nutrients in the water. Let's dive in and see how it works!

In the diagram you can see why the Strait is so rich in nutrients.



- ① At the surface, water flows from the Atlantic Ocean into the Mediterranean Sea.
- ② More water evaporates in the Mediterranean than is added by rainfall or rivers.
- ③ This makes the water in the Mediterranean saltier and heavier. It sinks into deeper layers.
- ④ After about 180 years the water reaches the Strait of Gibraltar again.
- ⑤ As it climbs the Camarinal sill nutrients are transported from the seafloor to the surface. Such areas are called upwelling regions.
- ⑥ The nutrients mix with the inflowing Atlantic water and are distributed towards the Mediterranean Sea.

## The Strait of Gibraltar

But what do the nutrients have to do with whales? Where there are many nutrients, there is a lot of plankton. Plankton is the name given to all living creatures that passively drift around in the water. These are small algae, crustaceans or eggs and larvae of fish. Most plankton is so tiny that you can only see it with a microscope.

Almost all the animal life in the ocean depends on phytoplankton, the plant plankton. Like plants on land, it produces oxygen, which marine animals need to survive. For this, however, phytoplankton needs nutrients, as fertiliser, so to speak. Where the nutrients come from, you have already learned.

Phytoplankton does not only produce oxygen, it is also food itself for zooplankton, the animal plankton. Zooplankton is eaten by other animals and so on - the bigger ones eat the smaller ones.



Algae and dinoflagellates are phytoplankton, copepodes are zooplankton.



Everyone benefits from the biodiversity in the Strait - including the whales. At least that was the case once. Meanwhile we find out that there are many emaciated animals. We humans simply take far too much fish out of the oceans ... and also otherwise we treat our environment quite carelessly.

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### Did you know that we owe every other breath to the sea?

50 percent of the oxygen in the air comes from phytoplankton.  
So it's just as important for our survival as land plants.

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## The Strait of Gibraltar

Where is the Strait of Gibraltar? (countries, continents, oceans)

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Where on the map is the Strait of Gibraltar?



How many large ships pass through the Strait every day?

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Why are there nevertheless whales here?

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## The foundation *firmm*

In 1998 the Swiss Katharina Heyer founded the foundation *firmm* – *foundation for information and research on marine mammals*. The purpose of our foundation is information and research for the protection of marine mammals.

In Tarifa, our location in Spain, we research the whales and dolphins of the Strait of Gibraltar and offer whale-watching trips and observation weeks. In this way we reach many people and can convince them to treat the sea and its inhabitants with respect.



Over 25,000 guests per year take part in our whale watching trips in the Strait of Gibraltar. In the introductory lectures before the trips we provide them with a lot of interesting information about the whales in the Strait.



In addition, many families come to our observation weeks every year. We also host groups of schoolchildren or students who, together with their teachers, take lessons on the subject of whales and dolphins.

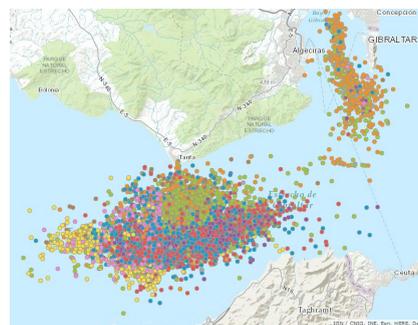
But we do not only share our knowledge on the spot, we also share it over the internet: Through our website [www.firmm.org](http://www.firmm.org) we reach more than 200,000 interested people every year. Maybe you would like to give a presentation about whales at school? On our website you will find plenty of information:

[www.firmm.org](http://www.firmm.org)

## The foundation *firmm*

### *firmm's* research

On our trips we record all sightings in the Strait of Gibraltar. That means we make a note of when we saw which animals and where; how many there have been, how they behaved and so on. In the office everything will be transferred to our database. That way we can create position maps like the one in the picture on the right.



Using the position maps, we learned, for example, where the Pilot Whales are at certain times of the day and at certain tide levels. When a new ferry connection was planned, the maps enabled us to achieve a more whale-friendly route.

### Photo-Identification

Photo identification helps us to learn even more about the whales. Pilot Whales can be distinguished by the shape of the fin, for example. But also scars or other injuries help us to identify individual animals.

Grindwale – calderones comunes – pilot whales I



In 2015 our marine biologist checked the pictures in our database for injuries and diseases. There had been over 35,000 photographs collected! On 788 pictures there were anomalies: injuries, emaciation, tumours etc. In a scientific paper published in the scientific magazine *Aquatic Mammals* in 2020, we described possible causes.

In the meantime, we also record the number of sport fishing boats during each tuna fishing season. Often they pass directly through schools of dolphins with their fishing lines extended and are thus responsible for many injuries of Pilot Whales, Bottlenose Dolphins and small dolphins.

## The foundation *firmm*

This is what I know about *firmm*:

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# The whales and dolphins in the Strait of Gibraltar

## Content:

### Whales in the Strait of Gibraltar

- 1 text and worksheet for each whale species
- sheet with all types of whales to write on
- cards with information about the whales for discovering, learning and playing

### Dangers for whales

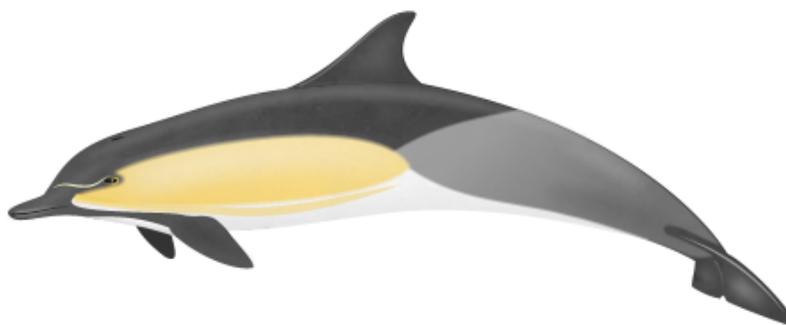
- worksheet on dangers for whales (the information is available in the descriptions of the species and in the texts about the foundation *firmm*)
- worksheet "What we can do" (here the children can write down their ideas on how to reduce the threats to whales)

More detailed information on the individual whale and dolphin species including a photo gallery and videos can be found at [www.firmm.org](http://www.firmm.org)

## Whales in the Strait of Gibraltar

### Common Dolphin

You can easily recognize Common Dolphins by their patterns: Imagine a lying 8, yellow in front and grey in the back, the cape under the dorsal fin forming a V.



Often Common Dolphins travel in large groups, but they usually keep their distance from our boats. It's the smallest species of dolphin in the Strait. With a length between 1.70 m and 2.30 m, these animals are on average about as long as a door is high.

Small but powerful! With a top speed of 65 km/h they belong to the fastest dolphins. They can hold their breath for up to 8 minutes and dive to a depth of about 200 m.



The name Common Dolphin originates from the fact that they used to be widespread. But today this species is highly endangered in the Mediterranean. Why? Mothers and young animals like to stay in coastal areas because there they are safe from sharks. But we humans are also very active near the coast: sewage, shipping and fishing destroy the habitat of the animals and make their food scarce.

## Whales in the Strait of Gibraltar

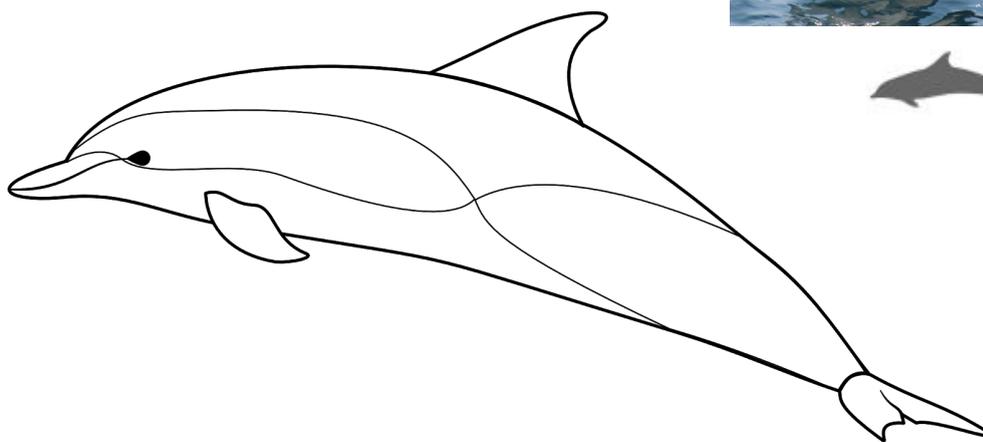
### Common Dolphin

Size: \_\_\_\_\_

Speed: \_\_\_\_\_

Diving depth: \_\_\_\_\_

Diving time: \_\_\_\_\_



**This is what I know about Common Dolphins:**

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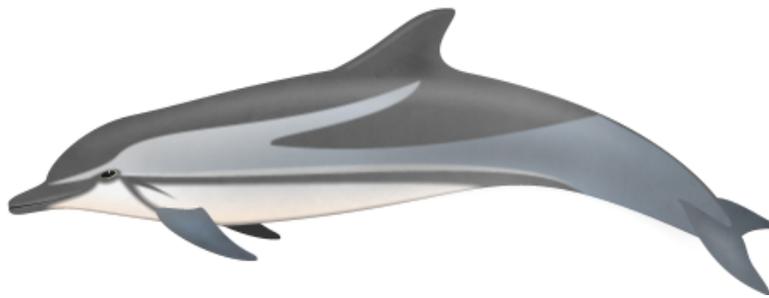
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## Whales and in the Strait of Gibraltar

### Striped Dolphin

The name Striped Dolphin (or Blue-white Dolphin) already reveals what we have to look for in this species: the bluish stripe on the side.



Since they often travel together with Common Dolphins, it is important to know the difference. Because they differ only slightly in size. Striped Dolphins, with 1.80 m to 2.50 m, are only slightly bigger than the Common Dolphins.

Striped Dolphins can dive up to 10 minutes and 200 m deep. They are also very fast swimmers with a maximum speed of 65 km/h. Moreover, they are very active: we often observe them bow riding in front of container ships, hunting or jumping. However, they usually keep a certain distance to whale-watching boats.



From the end of July on, Striped Dolphins are seen in particularly large schools - this can be several hundred animals. Young dolphins are also always present. However, as they are already at birth almost half the size of the adult animals, the babies are not easy to spot.

## Whales in the Strait of Gibraltar

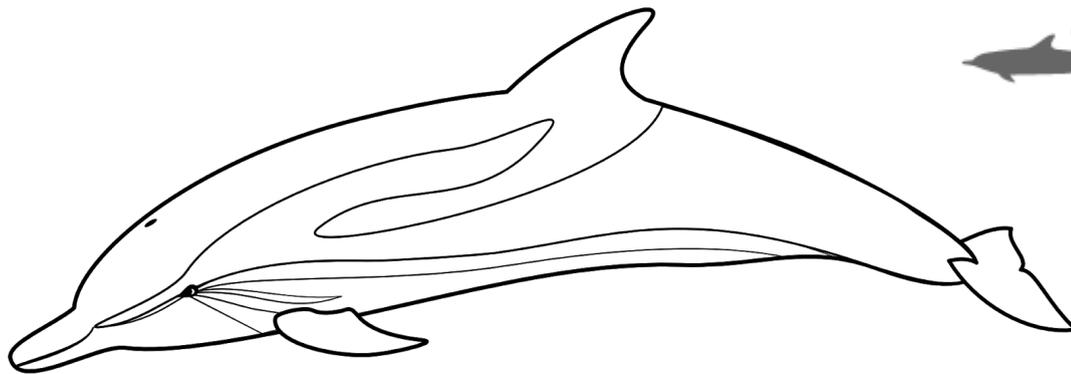
### Striped Dolphin

Size: \_\_\_\_\_

Speed: \_\_\_\_\_

Diving depth: \_\_\_\_\_

Diving time: \_\_\_\_\_



### This is what I know about Striped Dolphins:

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## Whales in the Strait of Gibraltar

### Bottlenose Dolphin

Bottlenose Dolphins can be found in all oceans of the world and depending on their habitat they differ in size and colouring. In the Strait of Gibraltar they reach a length of about 3 metres, have a dark cape, light grey sides and a light belly. With a maximum speed of 35 km/h they are not among the fastest swimmers, but they reach diving depths of 300 m and can stay there for up to 20 minutes without catching their breath.



Bottlenose Dolphins often endure a sad life in dolphinariums. Still today many animals are caught every year. Even if they always seem to smile - it is a hard fate for the animals. Only very few of them survive the stress of being separated from their families, transported and kept in far too narrow chlorine pools. Up to now these dolphins cannot be successfully bred in dolphinariums, so you have to get additional animals from the sea time and again.



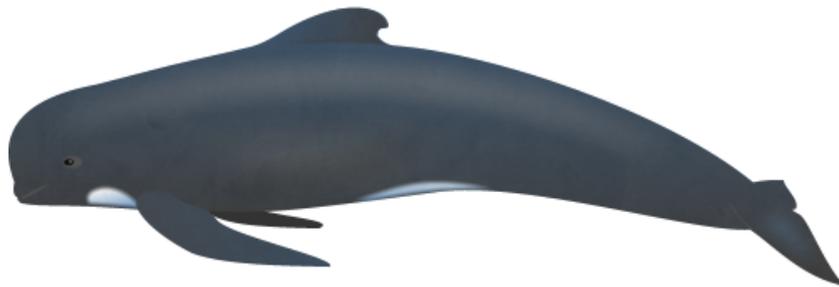
On our trips in the Strait we often accompany these powerful swimmers for a while. You can see very well how much space these animals actually need and that they do not belong in a dolphinarium.



## Whales in the Strait of Gibraltar

### Pilot Whale

Pilot Whales are easily recognized by their round head - their scientific name *Globicephala melas* means black bulbous head. The name Pilot Whale refers to the fact that the school is led by a lead animal (the pilot), followed blindly by the rest of the group. Unfortunately, this is why mass strandings occur again and again.



Pilot Whales can hold their breath for 20 minutes and dive over 800 m deep. Although they belong to the dolphin family, they are already quite large at 4-7 m in length. Although they can reach a top speed of 35 km/h, they usually swim at a leisurely pace ... unless the Orcas are in the Strait. In the first weeks the Pilot Whales migrate to the Mediterranean Sea, but then they join together to form larger groups and return. Sometimes we could even watch them chase the much bigger Orcas out of the Strait.

Some Pilot Whales know *firmm's* boats so well that they approach confidently. They proudly present their offspring to us and watch us curiously and with interest.

In the Strait of Gibraltar we often see Pilot Whales with injuries. The greatest danger for these animals is sport fishing. Hobby fishermen often drive carelessly at high speed through a group and injure the animals with their extended fishing lines. Sometimes the entire fin is cut off.

## Whales in the Strait of Gibraltar

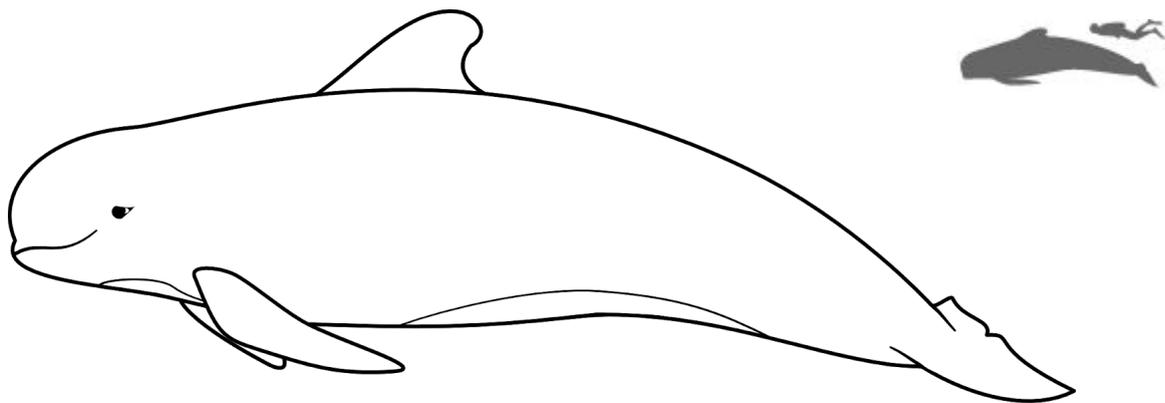
### Pilot Whale

Size: \_\_\_\_\_

Speed: \_\_\_\_\_

Diving depth: \_\_\_\_\_

Diving time: \_\_\_\_\_



**This is what I now about Pilot Whales:**

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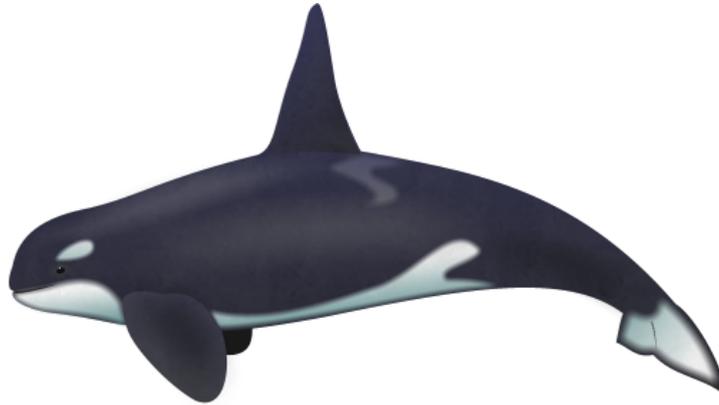
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## Whales in the Strait of Gibraltar

### Orca

Orcas are the largest dolphins, ranging from 5.5 m to 9.80 m in length. The families are usually led by an older female. The males can be easily recognized by their high fin. Killer Whale is another name for this species. It originates from the fact that Orcas hunt other marine mammals in some parts of the world.



The Orcas in the Strait of Gibraltar have specialized in tuna. Orcas can dive up to 15 minutes and 250 m deep, but with a maximum speed of 55 km/h they cannot compete with the tunas, which reach up to 80 km/h. That's why the Orcas of the Strait have developed a clever tactic: they lurk among the tuna fishers and simply snatch the desired prey, worth several thousand euros, from the fishing hook. The only thing left behind is the fish head. The fishermen naturally try to keep these animals away from their boats. But for the Orca calves this easy prey means a higher chance of survival.



The tuna stocks in this area are declining steadily. Tuna is a popular food fish and unfortunately already heavily overfished. In addition, the tuna here is already caught on its way to the spawning grounds. This is why the animals cannot provide for offspring, so there are fewer and fewer tunas and therefore Orca sightings are becoming increasingly rare.

## Whales in the Strait of Gibraltar

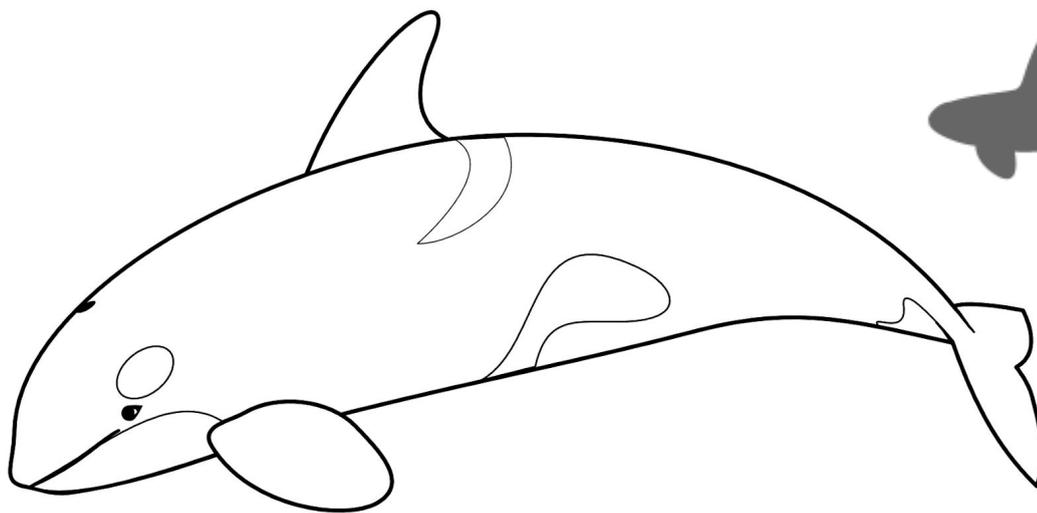
### Orca

Size: \_\_\_\_\_

Speed: \_\_\_\_\_

Diving depth: \_\_\_\_\_

Diving time: \_\_\_\_\_



**This is what I now about Orcas:**

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## Whales in the Strait of Gibraltar

### Sperm Whale

With a length between 11 m and 18 m, the Sperm Whale is the largest toothed whale. In the Strait, the Sperm Whales drift on the surface between two dives and fill their blood with oxygen. Because the blowhole of the Sperm Whales is in the front left, the animals have a blow that is ejected diagonally forward to the left. We can see them from far away.



How long can you actually hold your breath? A Sperm Whale can hold its breath for 80 minutes! It can dive down to 3,000 m and reaches top speeds of 30 km/h.

Sperm Whales have been heavily hunted in the past. The Sperm Whale's spermaceti, a waxy liquid in the whale's head, was much sought after. It was used to make candles, lamp oil, lubricant and rust protection. Between 1920 and 1960 there were also whaling stations in the Strait of Gibraltar. The number of Sperm Whales in the Mediterranean has still not recovered from this.



Today, collisions with ships and plastic pollution are the main reasons why there are fewer and fewer Sperm Whales. At the end of February 2018, a starving Sperm Whale stranded in the Spanish Mediterranean Sea with more than 29 kg of plastic bags, ropes and fishing nets in his stomach. Toothed whales actually catch their prey in a targeted manner. Therefore we fear that they will not find enough food and hunger will drive them to eat everything.

## Whales in the Strait of Gibraltar

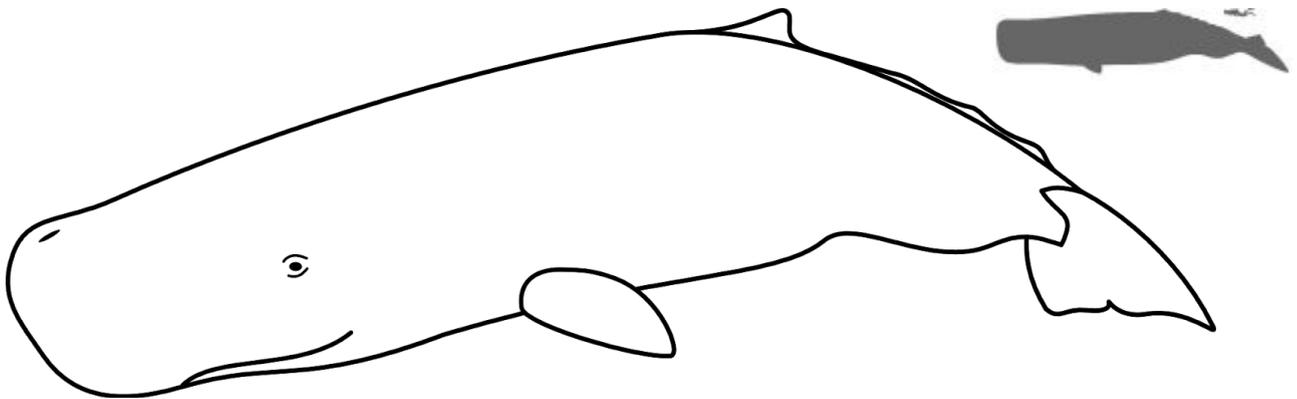
### Sperm Whale

Size: \_\_\_\_\_

Speed: \_\_\_\_\_

Diving depth: \_\_\_\_\_

Diving time: \_\_\_\_\_



**This is what I now about Sperm Whales:**

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## Whales in the Strait of Gibraltar

### Fin Whale

The Fin Whale is with 18-22 m length the second largest animal of the world. It is only surpassed by the Blue Whale, which can grow up to 33 m long.



It is very rare that we see a Fin Whale during whale watching. It is estimated that about 90 animals swim through the Strait every year. But they are fast, can dive 450 m deep and stay under water for about 15 minutes. But when they surface, we can easily recognize them by their blow. Baleen whales have a double blowhole, so the blow is ejected upwards in two clouds.

Most of the Fin Whales that pass through here spend the summer in the Atlantic Ocean and the winter in the Mediterranean. But there are also some animals that swim towards the Mediterranean in summer. We assume that they belong to a group living here that was almost wiped out by whaling.



With a maximum speed of 40 km/h this rather fast swimmer did not play a role at the beginning of whaling. It was only with the use of motor ships that Fin Whales were hunted. Then, however, violently!

With our few sightings we cannot say whether their numbers are recovering despite pollution and overfishing. We can only hope.



## Whales in the Strait of Gibraltar

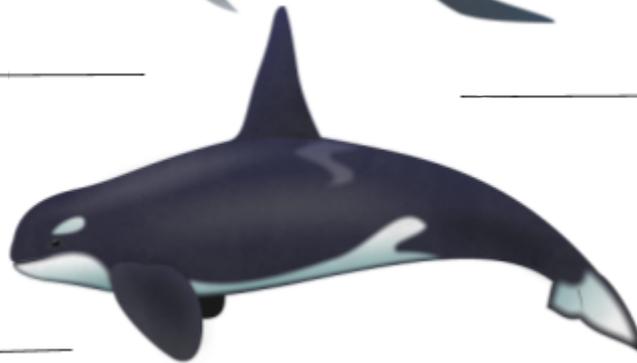
In the Strait of Gibraltar you can see seven species of whales.  
They are called:



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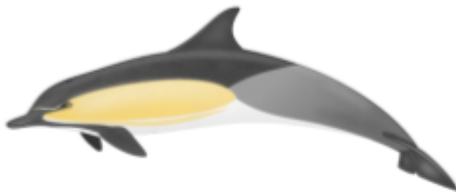
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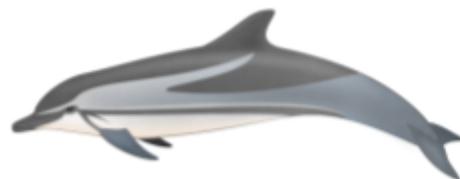
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## Instructions

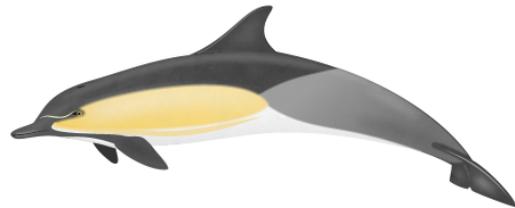
Cut out the cards and find other players. Everybody gets one card.

One after the other asks a question (Who is the tallest/fastest?) and you compare your numbers. You will learn a lot about the whales and dolphins in the Strait of Gibraltar.

Create a game by giving points for the records. By cleverly asking questions, everyone can collect points for "his" whale (Who is the smallest / slowest?).

Think about your own rules for the game.  
Have fun!

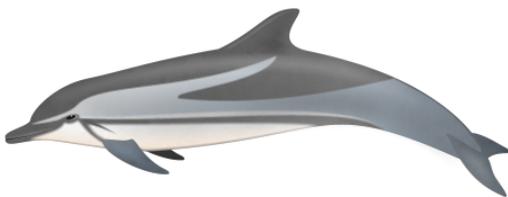
## Common Dolphin



Size: 2,3 m  
Weight: 135 kg  
Maximum age: 40 years  
Food: 10 kg/day  
Speed: 65 km/h  
Diving time: 8 min  
Diving depth: 200 m

[www.firmm.org](http://www.firmm.org)

## Striped Dolphin



Size: 2,5 m  
Weight: 150 kg  
Maximum age: 50 years  
Food: 15 kg/day  
Speed: 65 km/h  
Diving time: 10 min  
Diving depth: 200 m

[www.firmm.org](http://www.firmm.org)

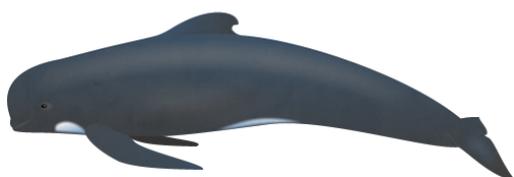
## Bottlenose Dolphin



Size: 4 m  
Weight: 650 kg  
Maximum age: 50 years  
Food: 36 kg/day  
Speed: 35 km/h  
Diving time: 20 min  
Diving depth: 300 m

[www.firmm.org](http://www.firmm.org)

### Pilot Whale



Size: 7 m  
Weight: 3.500 kg  
Maximum age: 60 years  
Food: 27 kg/day  
Speed: 35 km/h  
Diving time: 20 min  
Diving depth: 800 m

[www.firmm.org](http://www.firmm.org)

### Orca



Size: 10 m  
Weight: 9.000 kg  
Maximum age: 80 years  
Food: 100 kg/day  
Speed: 55 km/h  
Diving time: 15 min  
Diving depth: 250 m

[www.firmm.org](http://www.firmm.org)

### Sperm Whale



Size: 18 m  
Weight: 50.000 kg  
Maximum age: 80 years  
Food: 1.500 kg/day  
Speed: 30 km/h  
Diving time: 80 min  
Diving depth: 3.000 m

[www.firmm.org](http://www.firmm.org)

### Fin Whale



Size: 22 m  
Weight: 80.000 kg  
Maximum age: 100 years  
Food: 2.000 kg/day  
Speed: 40 km/h  
Diving time: 15 min  
Diving depth: 450m

[www.firmm.org](http://www.firmm.org)

## Dangers for whales

Being a whale is not always beautiful, but sometimes also dangerous.

I know why:



### Fishing

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### Dolphinariums

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### Shipping

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### Plastic

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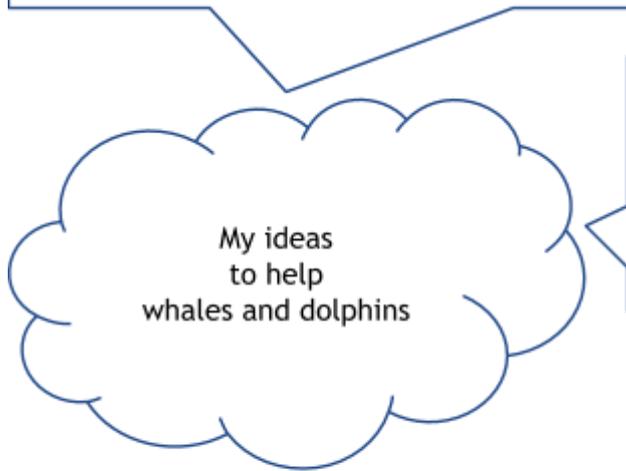
## This is what we can do

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# Annex

## Content:

### Cover page for own booklet

Use this sheet as a cover page when binding the child's worksheets into a booklet.

### I even know a lot more

Print this sheet whenever the children want to add more information after completing the worksheet.

### My whale story

Encourage your children's creativity and let them write their own stories or adventure reports on the topic of whales (3 differently designed sheets).

### Question and answer sheets for your own quiz

Your kids are real whale pros now? Then let them create their own quiz to test the knowledge of family, friends and classmates.

### Closing words

**This is what I know about**

# **Whales and Dolphins in the Strait of Gibraltar**

**by**

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## I even know a lot more

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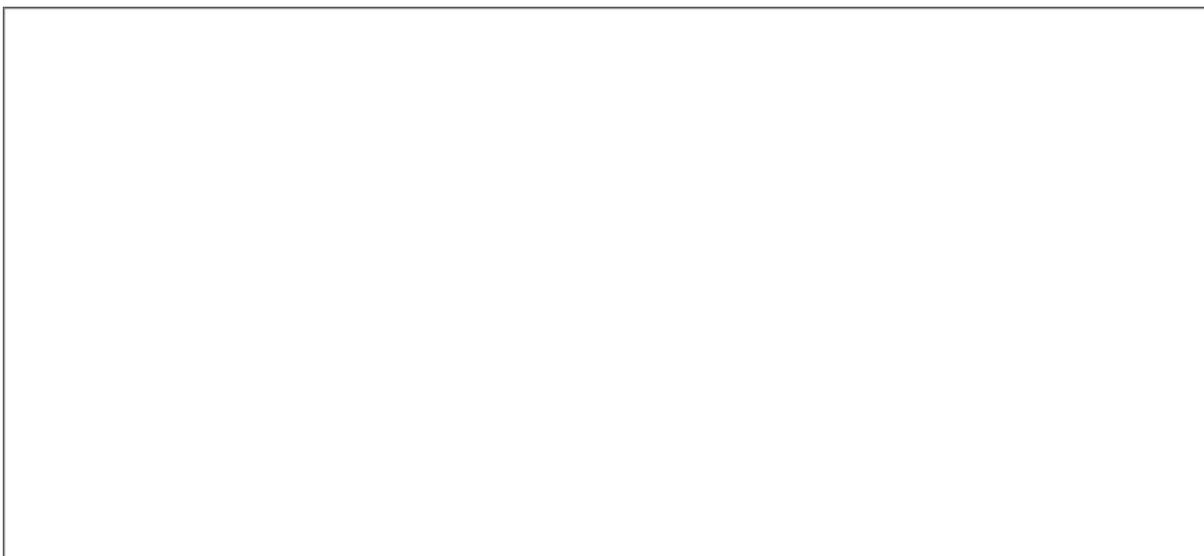
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## My Whale Story

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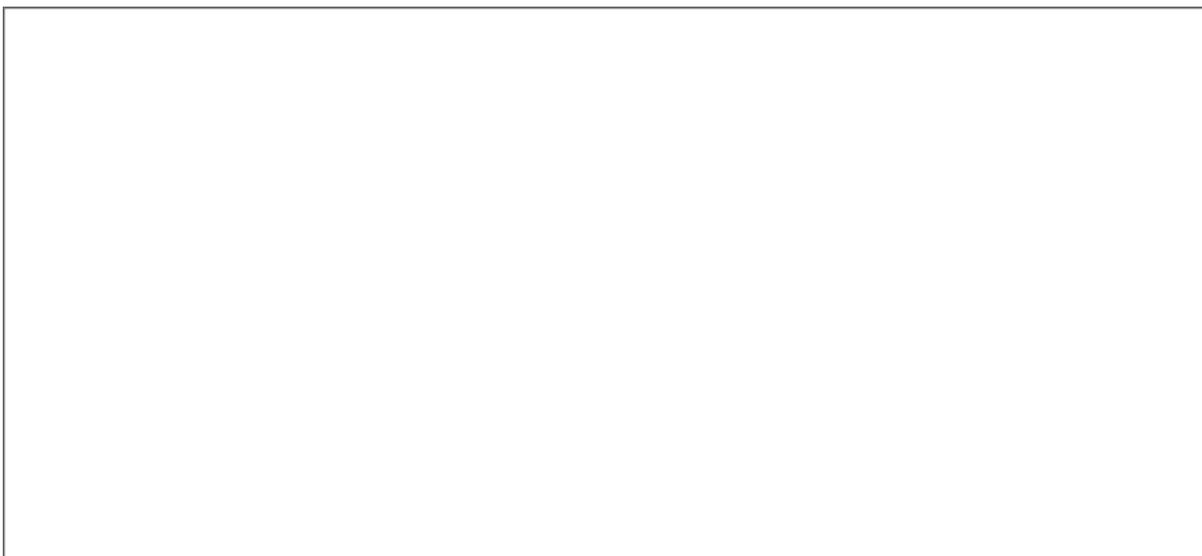
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## My Quiz Questions

Question 1 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 2 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 3 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 4 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 5 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

## My Quiz Questions

Question 6 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 7 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 8 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 9 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

Question 10 \_\_\_\_\_

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

# Quiz

Name: \_\_\_\_\_

Mark the right answers with a cross.

	A	B	C
Question 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

# Quiz

Name: \_\_\_\_\_

Mark the right answers with a cross.

	A	B	C
Question 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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# Quiz

Name: \_\_\_\_\_

Mark the right answers with a cross.

	A	B	C
Question 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Question 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Closing words

We hope you and your children had a lot of fun with our materials and are now even more enthusiastic about whales and dolphins. Of course we can only offer a small part of our knowledge here. If you want to learn more about the animals and our insights, please visit our website. In our blog we also report regularly about particularly impressive encounters.

Maybe you have even got the desire to experience these fascinating marine mammals yourself? From April to October we offer two-hour whale watching trips from Tarifa (Spain). In addition, we offer whale and dolphin observation weeks with two activities per day for whale and dolphin fans - ideally these are trips, in case of bad weather lectures or hikes. We look forward to welcoming you soon personally.

## You would like to support us?

As you know from our materials, data based on solid research is the basis for educational projects. With your donation, we can rapidly advance the evaluation of our data in order to use it for the protection of marine life.

For some of our whales and dolphins you can take over a symbolic sponsorship. These animals have been known to us for a long time - we know their history and therefore have been able to learn a lot about their social behaviour. For your sponsored animal you will receive a sponsorship certificate and a free ticket for an observation trip (unlimited validity).

You are also welcome to share our knowledge and learning materials with family and friends so that more and more people become actively involved in protecting the whales and oceans.

All information about the animals, the trips, observation courses, donations and sponsorships can be found on our website:

[www.firmm.org](http://www.firmm.org)