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# SPACE MAPS





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*What do we see with our*  
**NAKED EYE?**

With your nose up, even from the Earth you can see Space! Ours is one of the billions of planets in the Universe that revolve around a star (ours is the Sun). The other stars, the other planets and celestial objects surround it. Find out what you can see even without a telescope or without boarding a spaceship.

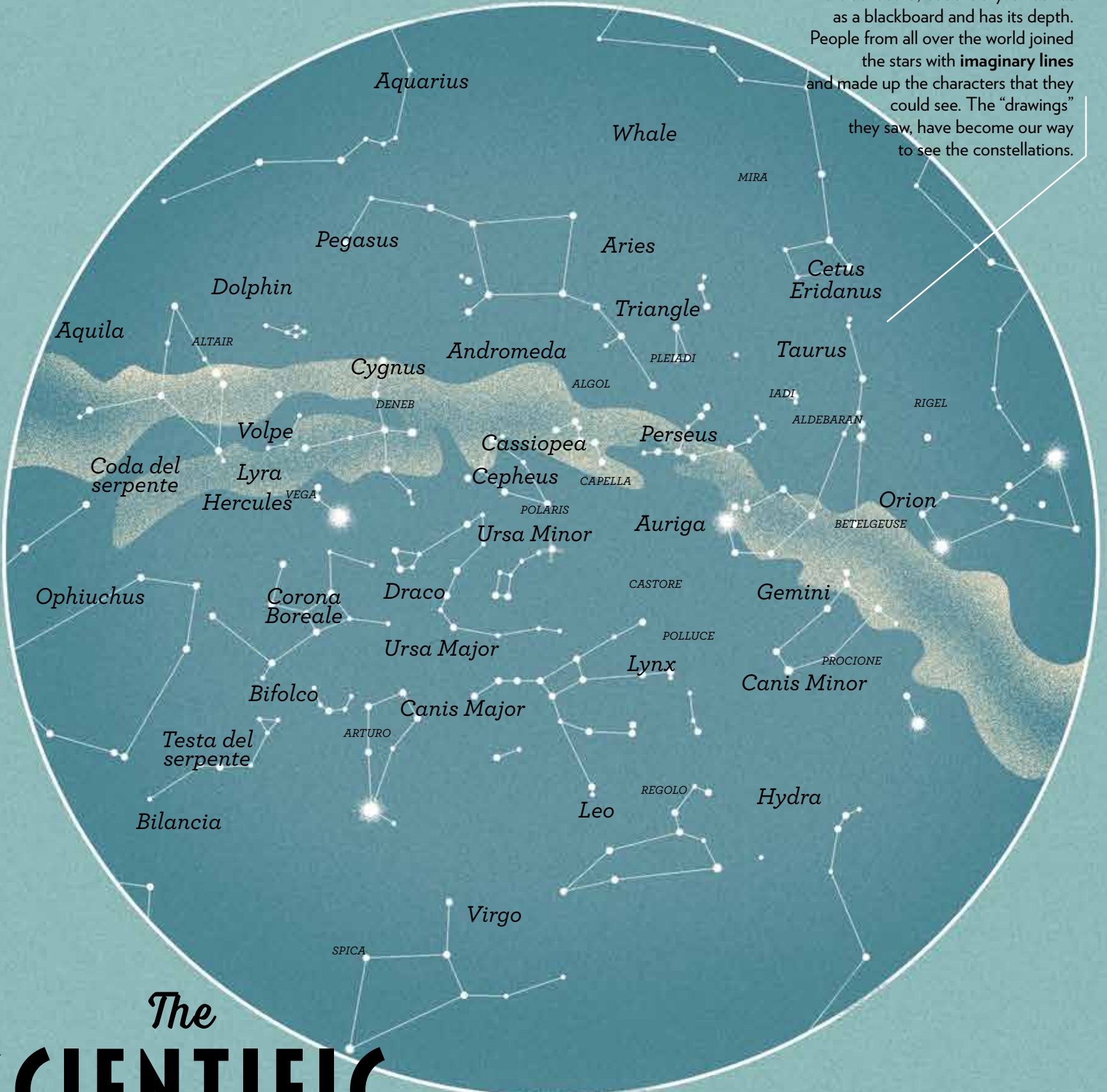


NORTHERN HEMISPHERE

### CONSTELLATIONS

Stars look like white dots on a blackboard, but the sky is not flat as a blackboard and has its depth. People from all over the world joined the stars with **imaginary lines** and made up the characters that they could see. The "drawings" they saw, have become our way to see the constellations.

CELESTIAL EQUATOR



# The SCIENTIFIC map of the sky

**A**ncient people didn't know how to represent the starry sky, which shined like a dome on their heads, and came up with the idea to imagine it as a reflection of a big mirror, representing it in a circle. Today, we use the same circular maps: on the left we find the northern hemisphere, that you see if you are at the North Pole, while on the right there is the southern hemisphere, which you see if you are at the South Pole. From North Pole you cannot see the sky of the other part of the world and viceversa. And what about those who live in other part of Earth? **The visible portion of the sky isn't always the same.** It depends where you are, the day and time.

### ALWAYS POINTING NORTH

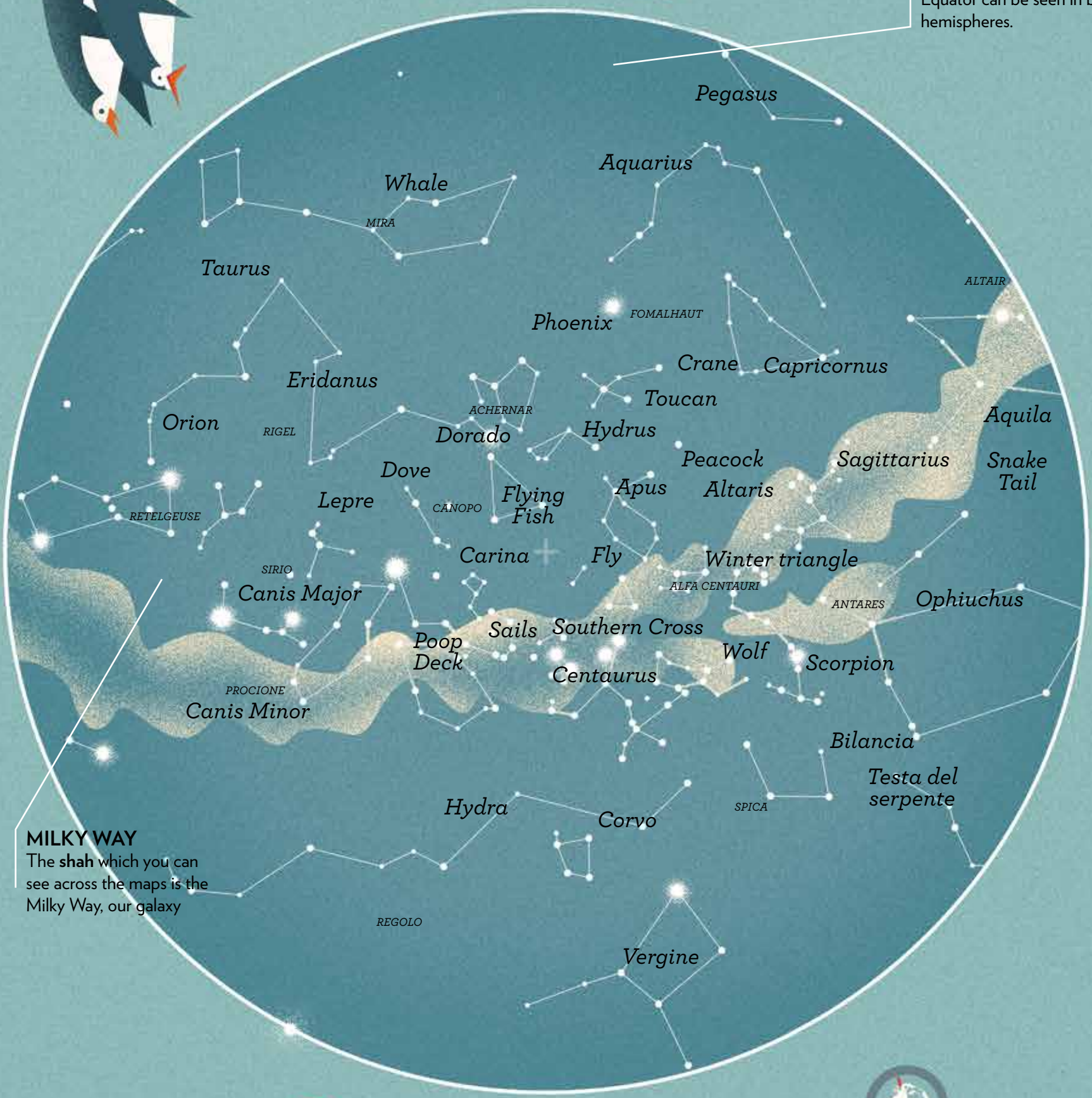
At the center of the left map (Celestial North Pole) you can see the **Polaris**, a very lumious star which always points North. If you look at the center of the other map (Celestial South Pole), instead, there is not a single star pointing south! To better orientate, there are other very useful stars: the **Southern Cross** and **Alpha and Beta Centauri**.





SOUTHERN HEMISPHERE

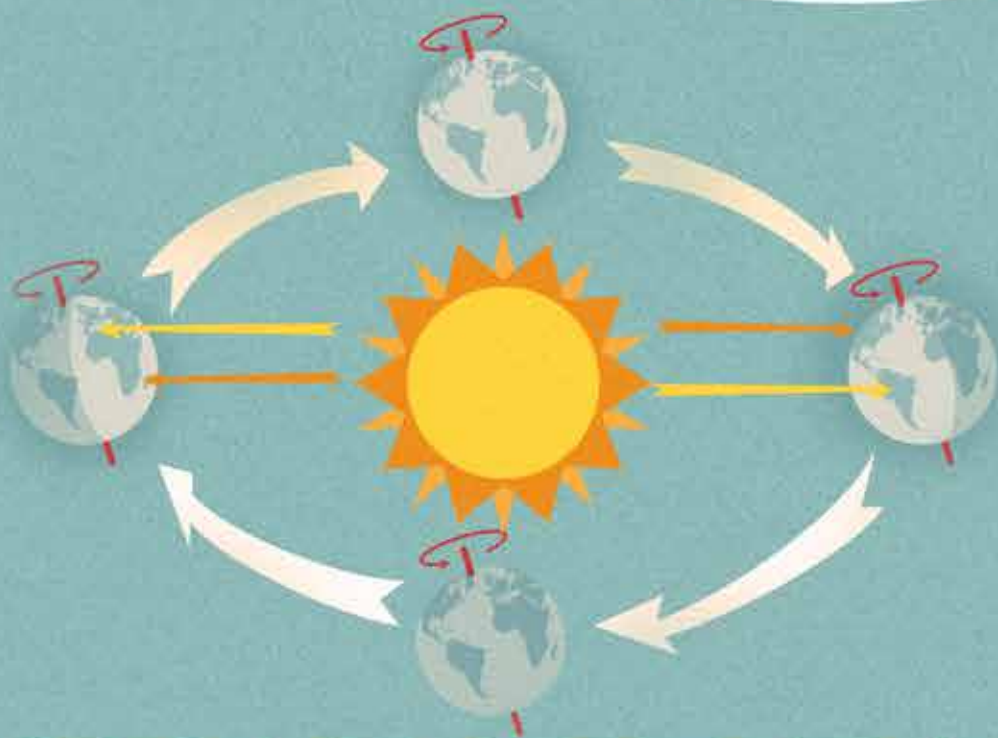
The constellations above the Equator can be seen in both hemispheres.



CELESTIAL EQUATOR

**MILKY WAY**

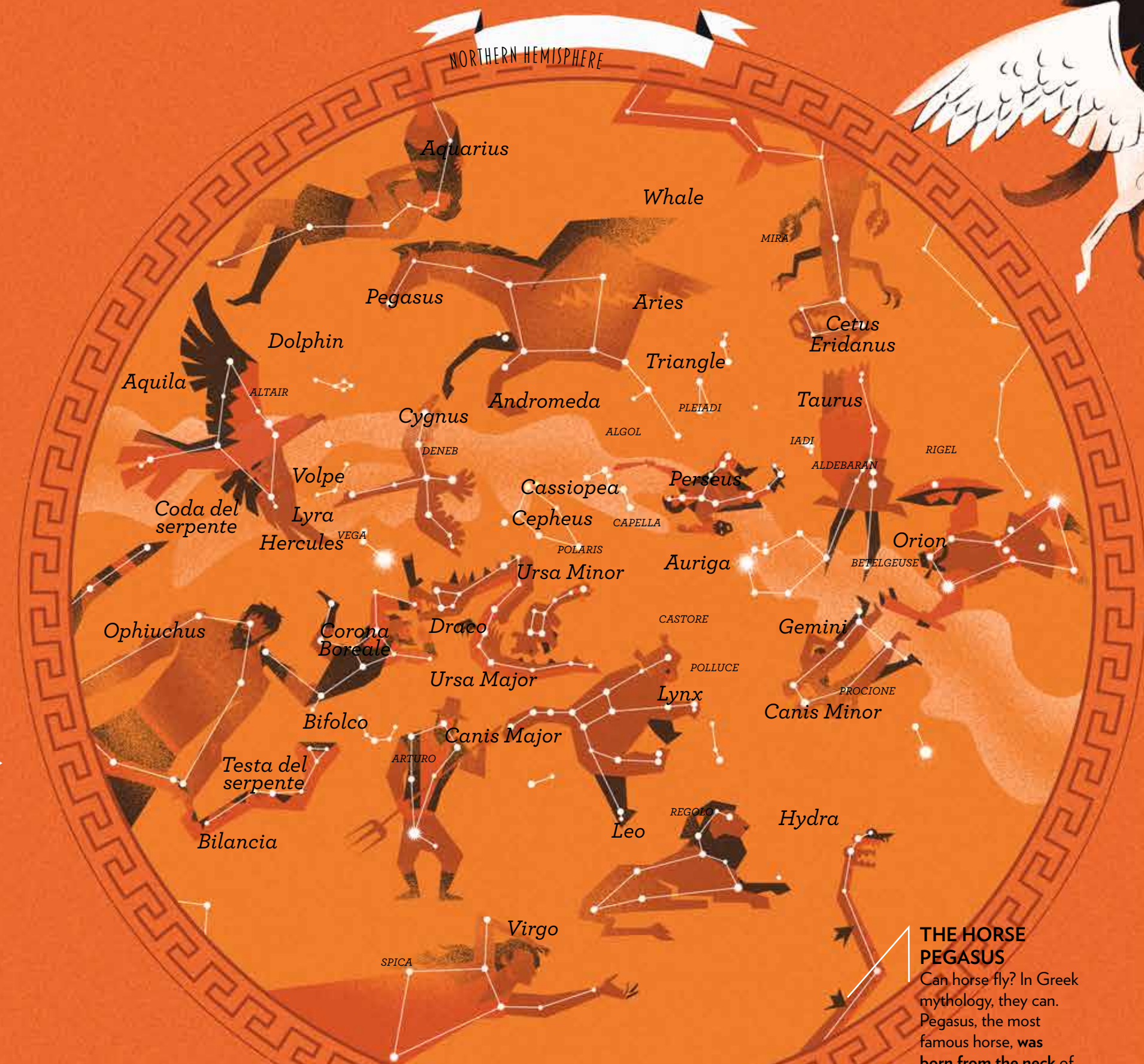
The *shah* which you can see across the maps is the Milky Way, our galaxy



*And yet it moves!*

The Earth isn't still (even if you believe so), but it **rotates on its axis** (rotation time) and **spins around the sun at the same time** (sidereal period). The first movement creates day and night, and makes it seem that the Sun and the stars are moving, just like when you are on a carousel and look the world around you. The sidereal period allows the alternation of seasons. How is it possible? We owe this to the Earth inclination, related to how the sun rays reach our planet throughout the year: if the rays are hitting directly our planet, we have warmer weather; if they reach us in an oblique way, we have colder temperatures.





## The MYTHOLOGICAL map of Greek-Roman sky

Even Ancient Greeks, looking up to the sky, imagined many figures and called the constellations with the names of **mythological characters**. You will find Perseus, Princess Andromeda, the winged horse Pegasus, the hero Hercules or Medusa, able to turn people into statues with a single stare. The International Astronomical Union, decided to use this mythology as the international reference, adding further constellation “invented” after the Greeks, because they couldn’t see them yet. On this page, you can see the constellations of the northern hemisphere, on the right the ones of the southern hemisphere.

### THE HORSE PEGASUS

Can horse fly? In Greek mythology, they can. Pegasus, the most famous horse, was born from the neck of Medusa when Perseus beheaded her. Pegasus was also Zeus, the King of Gods’ horse, and it used to tow the Chariot of Thunder.



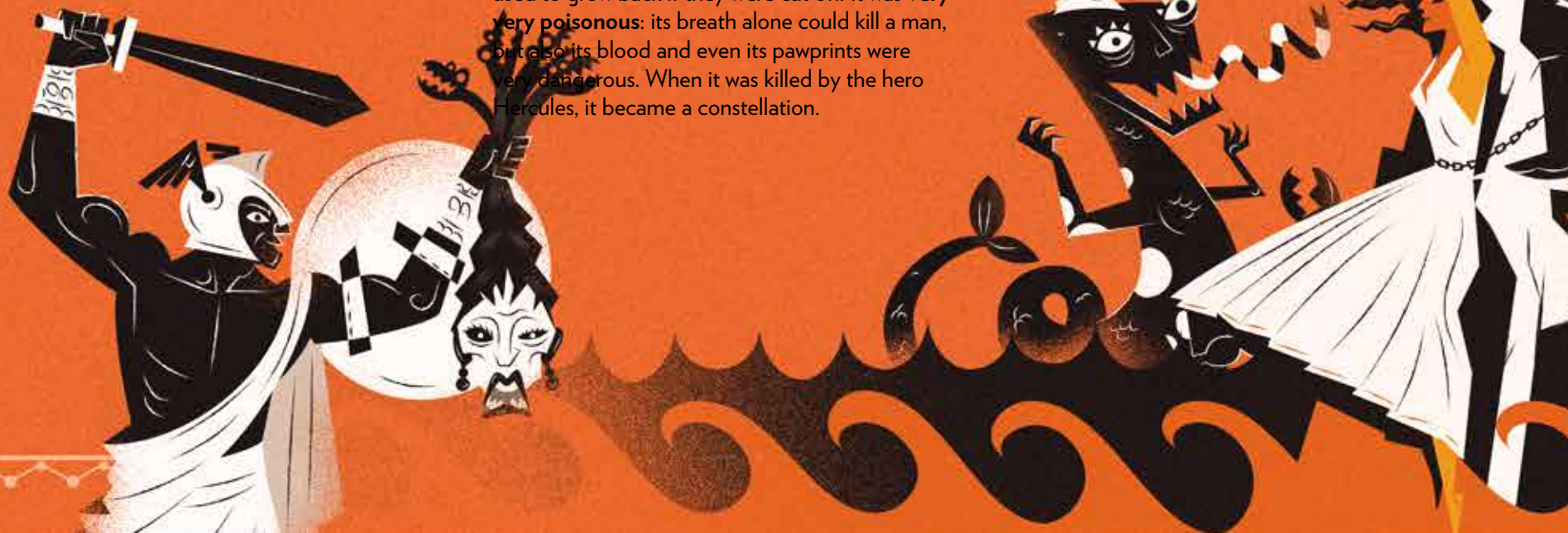


SOUTHERN HEMISPHERE

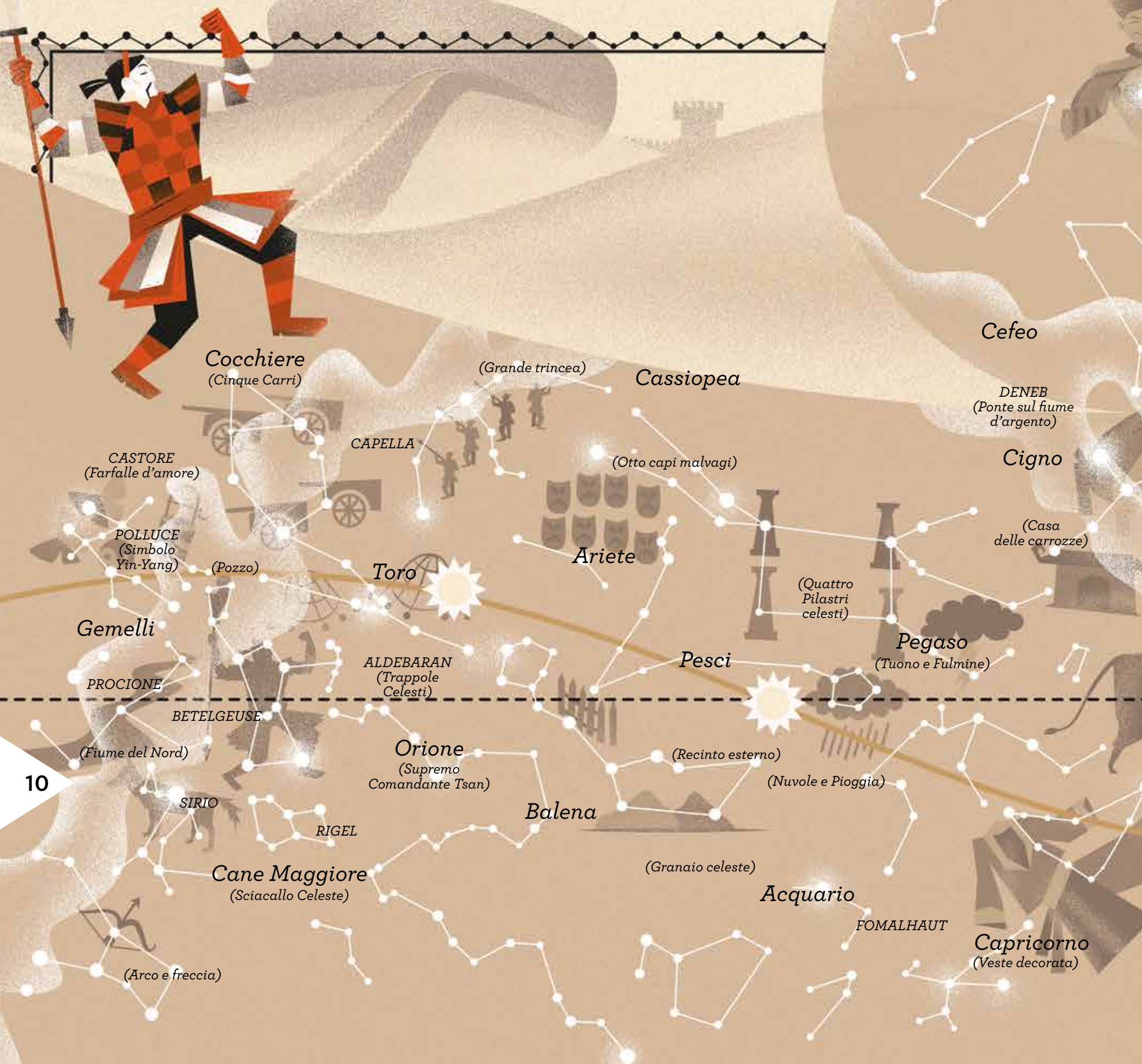


**HYDRA, THE MONSTER**

Hydra is a very scary mythological character! It was a **huge sea snake** with many heads that used to grow back if they were cut off. It was **very very poisonous**: its breath alone could kill a man, but also its blood and even its pawprints were very dangerous. When it was killed by the hero Hercules, it became a constellation.





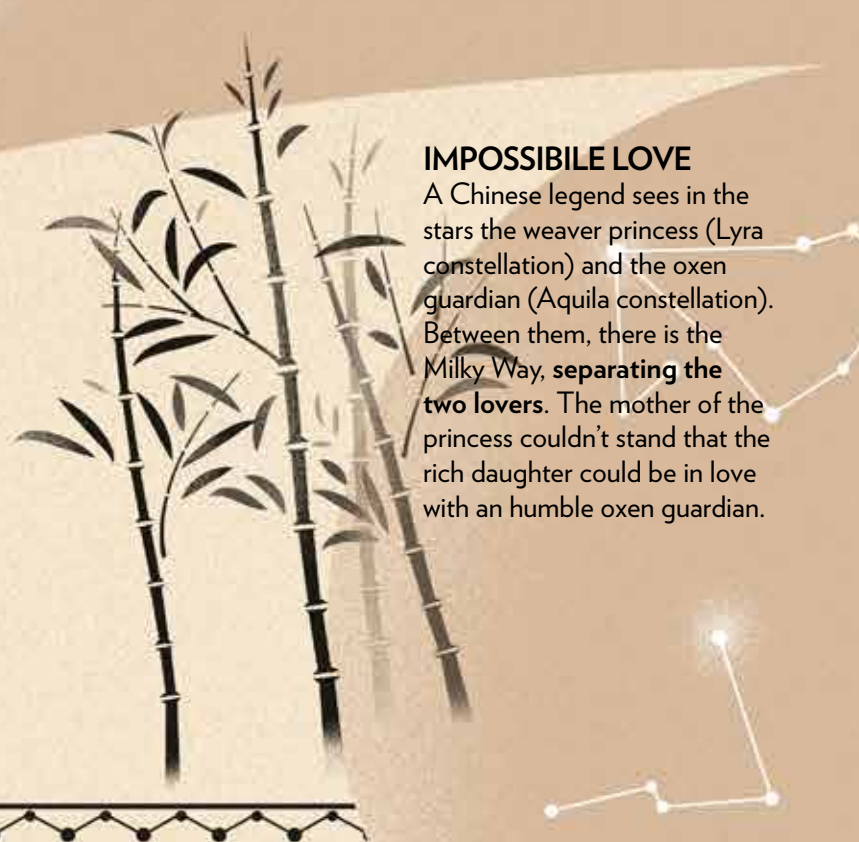


# The sky of Ancient CHINESE

**E**ven if China is very far away from Greece, their latitudes are very similar: the stars shining over the heads of ancient Greeks are more or less the same that were shining in China. But, in the same stars, ancient Chinese saw different shapes. In this equatorial map you can see, overlaid on the Greek-Roman mythology, the stars of **Chinese Mythology**. Being an equatorial map, you cannot see the Polar star, but is interesting to know that the Ancient Chinese saw in the Polar star, the one around which all the stars apparently rotate, the place where the **heart of the Emperor** was set, around which revolve all the stars in the sky.

## IMPOSSIBLE LOVE

A Chinese legend sees in the stars the weaver princess (Lyra constellation) and the oxen guardian (Aquila constellation). Between them, there is the Milky Way, **separating the two lovers**. The mother of the princess couldn't stand that the rich daughter could be in love with an humble oxen guardian.





### THE CHINESE COMMANDER

The Ancient Chinese didn't know Orion the Giant, and in his place, they saw the supreme commander Tsan. Even he was wearing a belt where there are the three stars which form Orion's belt.



**Ercole**

**Bifolco**  
(Tappeto dell'imperatore)

**Corona Boreale**

(Filza di sacchi di monete)

**Leone**  
(Acqua Corrente)

VEGA

**Lira**  
(Principessa tessitrice e gazze)

(Mercato d'autunno)

ARTURO  
(Grande Corno)

REGOLO

ALTAIR

**Aquila**  
(Bovaro Reale)

**Ofiuco**

**Cancro**

(Corno)

**Vergine**  
(Carro)

(Arco e freccia)

(Ruota Celeste)

SPICA

**Corvo**

**Idra**  
(Vecchio Pio)

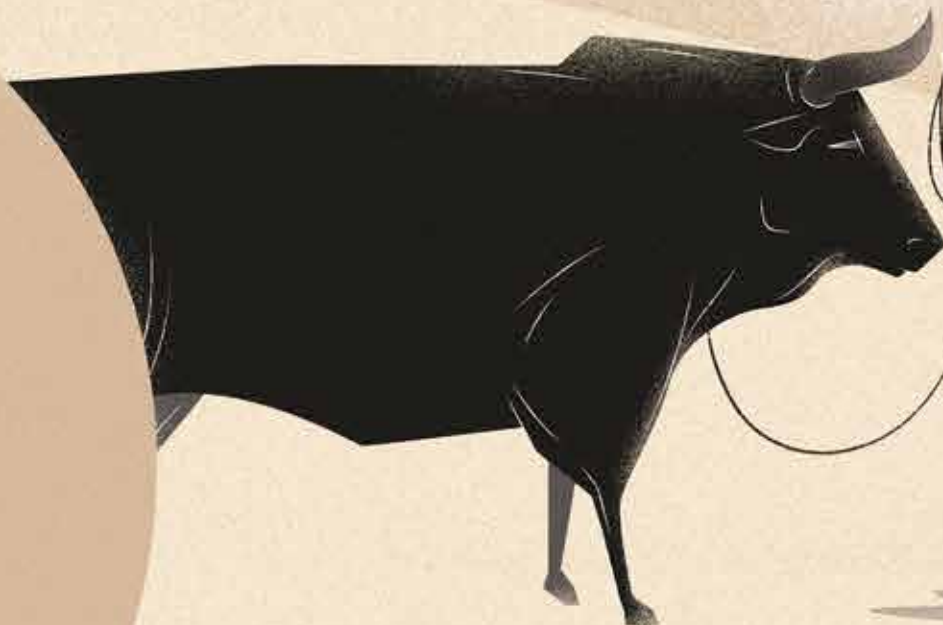
(Torre di guardia)

**Bilancia**

**Sagittario**  
(Tartaruga)

**Scorpione**  
(Grande Fuoco)

**Corona Australe**





# The sky of the AFRICANS

Africa is a very large continent located at the turn of the equator. This is why the celestial landscape varies greatly depending on the state. Our map refers to the part of Africa that is in the southern hemisphere, that is under the terrestrial equator, on the side of the South Pole. Around there, you can see many very interesting constellations that Africans have interpreted according to their culture and their traditions. You can then see the animals that live here, such as zebras and giraffes, or the daughters of the god of heaven.



## THE GOD OF HEAVEN

Three zebras had escaped death shortly, and so they had run so fast that they ended up in the sky, perfectly aligned and exactly in Orion's belt. The Pleiades (a small group of stars in the constellation of Taurus) were **the daughters of the god of heaven** (the star Aldebaran of the same constellation). When the father threw his arrow at the zebras, the blow failed and the arrow was lost under the eyes of a ferocious lion watching (Betelgeuse, the red star of Orion). He ended up right behind the animal (where there is the sword of Orion enclosing the nebula) and the god of heaven couldn't recover it.



## THE LOST ROAD

The **Milky Way** was the embers ended in heaven launched by a wife in love who wanted to show her husband, lost at night among the wild beasts, how to find the way home. His act of love created the Milky Way, which is why it is called by many the "star road".





**AFRICANS GRANDMOTHER**

Canopus is the second brightest star in the southern sky. It is a white yellow supergiant placed at a distance of about 1,200 light years from us. For the Bushmen it was "**Grandma Canopus**": she had a stomach full of food and light, and the Bushmen prayed for her to give them a little. According to other peoples, instead, it was the constellation "Ant's egg", because it is as big and bright as the eggs of the ants they ate.

**SPACE FIRE**

Antares, the red star of Scorpio, was called the "star of the extinguishing fire" because it appeared in the sky late at night, when the fires were now extinguishing and leaving only the red embers to burn.







### GOD OF HEAVENS

The black god is responsible for all the heavens. He wore the Pleiades on his ankle, but tapping his foot four times led them to his temple.

Cocchiere

CAPELLA

DENEBO

Cigno

CASTORE

POLLUCE

Toro

Ariete

Gemelli

Pegaso

PROCIONE

ALDEBARAN

Pesci

BETELGEUSE

Orione



14

SIRIO

Balena

RIGEL

Aquario

Cane Maggiore

Capricorno

### ORION

Long Band (in the constellation of Orion) is a boy who decided to mistakenly move the location of his tribe. He then had to retrace his steps. For the Navajo it represents **planning** and **programming**.

## The sky of the NAVAJOS

**F**ather Sky and Mother Earth are at the center of many myths and legends of the Navajos, one of the most famous tribe of the Indians of America. There are many constellations in which different peoples have placed different figures and imagined extraordinary stories. In particular, the Navajo Indians, people of the sky, have set most of their stories among the stars. Our map refers above all to their mythology.



## The stories of Navajos

The **first woman** and the **first man** revolve around the Polar Star and bear witness to the balance between masculine and feminine: the Navajos wanted to remember that around one fire there is only one man and one woman. Other Native American populations have imagined different stories. According to the Iroquois Indians, for example, the four of the Seven Stars of the Big Dipper are a **big female bear**, while the stars of the rudder are **three hunters** who pursue it. The closest to the bear is an archer, while the second is a hunter with a large pot in his hand. In fact **Mizar**, the second star of the rudder of the Big Dipper, is a double star and, if you look closely, you can see a little star shining next to it, called **Alcor**, which is precisely the pot! The third hunter is a bit back, because it often stops to collect wood!



VEGA

Corona Boreale

Lira

Ercole

Bifolco

ALTAIR

ARTURO

Leone

REGOLO

Aquila

Ofiuco

Cancro

Vergine

15

SPICA

Corvo

Idra

### CORVUS

In the constellation of the Corvus, they saw a **Man with spread legs**, a man with his feet firmly planted on the ground that examines the Earth from above to see what happens.

Sagittario

Scorpione

### SCORPIO

In place of the Scorpio there is **The First Great**, an old man with a stick that symbolizes old age and the desire to reach an advanced age.

Corona Australe





# The SOLAR system



**T**he Earth is not the only satellite of the Sun. There are other planets orbiting around the Star along with our Planet. There are 8 of them: **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus e Neptune.** With the planets, there is a multitude of planetoids, asteroids and comets floating around. The whole system of these celestial objects and the dust orbit around them, is called Solar System.

## PLANETS' ORBITS

The planets move around the Sun along elliptical orbits, a **fixed path in the shape of an egg**. As a planet approaches the Sun during its motion, the Sun accelerates it so much that the planet can move away. But as the planet moves away, the Sun attracts and brakes it, and so the planet draws closer together. It's a bit like when you're on a swing and someone pushes you: first you move away and get speed then your speed is canceled and the swing changes direction.

Sun

Jupiter

16

Mercury

Venus

Moon

Mars

Earth

## ASTEROID BELT

Between Mars and Jupiter there is an **area very rich in asteroids**, rocky celestial bodies of irregular shape that revolve around the Sun along elliptical orbits just like the planets. Sometimes the orbit of an asteroid can be altered by the gravitational pull of a planet and the asteroid can crash into the surface of the planet causing craters.

## AVERAGE ORBIT SPEED OF EARTH

It is the speed at which the **Earth moves around the Sun** and is about 30 km/s. If the Earth accelerates to a speed of 42 km/s, the Sun's attraction would overcome and our Planet would disperse in the Universe. And who would find us then?



### HOW WAS IT BORN?

The Sun, planets and every other object in the solar system were born about 4.6 billion years ago. They all originated from a **single cloud of gas and dust** that rotated in space and accumulated in a disk with the Sun in the center. Around it, other clusters were forming, colliding, moving away and finally giving rise to the objects of the solar system.

2

3

### OORT CLOUD

Comets formed long after the orbit of Jupiter and move along very elliptical or even parabolic orbits. An astronomer has compared them to **huge balls of dirty snow**. Scientists think around 100 million comets around the Sun orbit.

Uranus

Neptun

Saturn

### KUIPER BELT

Beyond the planets, far from the Sun, there are many interesting objects, including Pluto. Being so far away they are not very easy to study. However, they seem much larger than those of the main asteroid belt.

### PLUTO

Poor Pluto: it has been relegated! First it was considered the ninth planet of the Solar System; today it is considered a dwarf planet. Why? The astronomers have discovered many other small planets similar in size and to not to do anyone wrong they decided to treat them all the same way.

### Rocky planets vs gassy giants

Not all planets formed in the same way. The matter of the disk that gave rise to the solar system was warmer in the vicinity of the Sun. This is why the planets closest to our star (the first four) are made up of **heavier and non-volatile elements**, and are therefore rocky. Even on Earth the heat evaporates liquids: if you boil salted water for a long time at the end only the salt remains, which is not volatile and does not evaporate. During the formation of the solar system, moving away from the Sun, on the other hand, there were the most volatile and light elements. This is why the four outer planets are gaseous and therefore **do not have a solid and well-defined surface** ... in short, you could never land on it because you would sink into the center!



## EMISPHERE 1

It's the **highest mount** of Mars: it is over 25 km high and is more than 600 km wide.

MOUNT OLYMPUS

NORTH POLE

Here there is a large amount of **water in the shape of ice** with high concentration around the poles. Just like on Earth, the amount of ice varies depending on the seasons.

It's a very long canyon carved into the rock 5.000 km long, 500 km wide and 5-6 km deep. If it were on Earth, it would go from London to Cape Town!

VALLES MERINERIS

### ARSIA MONS AND ITS CAVES

How could **caves** be missing on the red Planet? On the Arsia volcano, 19 km high, seven dark and huge caves have been found.

DEIMOS

PHOBOS

# MARS

*the red planet*

Its color is not due, as the ancient Greeks believed, to the bloody battles wished by the god of war, but simply to the rust that has formed on the planet because it is very rich in iron. The red planet is the fourth planet of the solar system in terms of distance from the Sun and is the one most similar to ours. Its dimensions are intermediate between those of the Earth and those of the Moon. Many will be the problems not only for the very low temperatures, but also for an atmosphere very toxic to us because it consists mainly of carbon dioxide for us unbearable! What's more, this pestilential atmosphere is also super thin. This learnt you almost wish not to live there, but you know how it is, human beings always want to discover new places!

### IDENTITY CARD **MARS**

Planet Type	terrestrial
Distance from the sun	4° planet, 228 millions km away
Circumference	21.344 km
Revolution Time	686 days
Rotation Time	24 hours and 34 minutes
Average Temperature	-63° Celsius
Satellites	2 (Phobos e Deimos)





**MARS SKY**

The sky on Mars is not blue like the one you're used to, but it's **red** because iron oxides in powder form are suspended in the atmosphere.

The diameter of this huge **impact crater** is 10,000 km, bigger than the dimensions of Asia, Europe and Australia combined.

**VASTITAS BOREALIS**

These spiral **lava curls** measure more than 30 meters in diameter. They formed because the lava that came out of the volcanoes of the Elysium mountain had different speeds: the faster one coiled around the slower one.

**SYRTIS MAJOR**

This is a **volcanic area** which extends for more than 1,500 km.

**ELYSIUM PLANITIA**

This is Mars' second volcanic area for extension; it is completely covered by a **layer of ice**.

**ATHABASCA VALLES AND CERBERUS PALUS**

This **fracture of the crust** of Mars has probably originated from volcanic lava.

**RECORDS**

Mount Olympus is the **highest mountain structure** not only of Mars, but of the entire solar system. Imagine, that its height is about 3 times higher than the one of Mount Everest, a true paradise for hikers! Mars also has the **largest crater of the solar system** formed by the huge impact of a comet or an asteroid.

**Martians Myth**

In 1877 the Italian astronomer Schiaparelli was the first to make a map of Mars, mistakenly baptizing a dense **network of furrows**. Due to a translation error, the channels become "artificial channels" and astronomers were convinced that they have been excavated by **hypothetical Martians** to bring water from the polar ice caps to their crops near the equator. Although today any trace of life has been denied, the myth of the strange green extraterrestrials originating in Mars continues.



# The ORION SKY

**O**rion is a big constellation, clearly visible with your naked eye in the winter nights. It is close to the celestial equator and can be seen from **everywhere in the world**; this is why nearly every people has imagined stories and placed figures between its stars. The most sparkling stars are seven and, following Greek-Roman mythology they represent the shoulders, **knees** and three-starred belt of the great giant Orion. If you look at it with a telescope, you can see a portion of deep sky, full of stars of each age, nebulae and planets.

## 1 ORION NEBULA

If you look closely in this point, you can see even with your naked eye, a portion which isn't a star, but a nebula: a part of the sky very **rich with gasses and dust**. It is 1.270 light years away from us, and it extends for 24 light years.



## 2 HORSE HEAD NEBULA

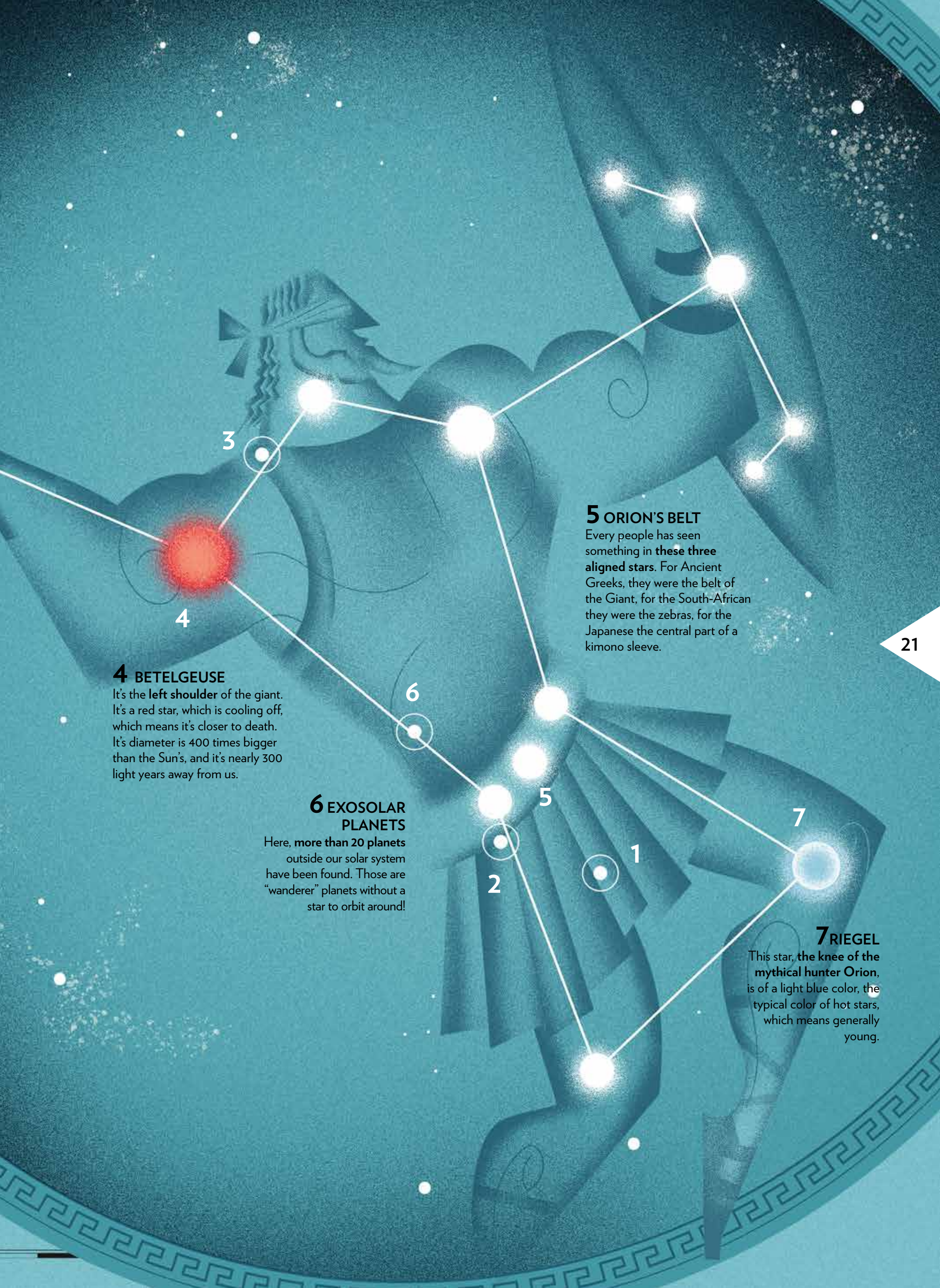
This **dark nebula** is over a light nebula, forming the shape of what astronomers saw as a horse head. Can you see it?

## 3 PLANETARY NEBULA

This is a type of emission nebula consisting of shell of **ionized gas**. They are called "planetary" by mistake: astronomers, at the beginning, thought this nebulae were including planetary systems, but they aren't! Even scientists aren't infallible!







#### 4 BETELGEUSE

It's the **left shoulder** of the giant. It's a red star, which is cooling off, which means it's closer to death. It's diameter is 400 times bigger than the Sun's, and it's nearly 300 light years away from us.

#### 6 EXOSOLAR PLANETS

Here, **more than 20 planets** outside our solar system have been found. Those are "wanderer" planets without a star to orbit around!

#### 5 ORION'S BELT

Every people has seen something in **these three aligned stars**. For Ancient Greeks, they were the belt of the Giant, for the South-African they were the zebras, for the Japanese the central part of a kimono sleeve.

#### 7 RIEGEL

This star, the **knee of the mythical hunter Orion**, is of a light blue color, the typical color of hot stars, which means generally young.



# The CRAB NEBULA

In the distant 1054 some Chinese and Arab astronomers observed with the naked eye in full day a new shining star in the sky. Many centuries later, it will be discovered that it was not actually a star, but the result of the explosion of a supernova, that is an **extraordinarily violent stellar explosion**, the rest of which is the crab nebula. This nebula is getting bigger and bigger and the gases that compose it expand at a speed of 1,500 km / s, x times the speed that manages to reach the most modern Formula 1 car!

## A LIGHTHOUSE IN SPACE

You can picture the pulsar like a lighthouse with two beams of radio waves aligned.

The particles that form them - above all electrons - unlike a lighthouse in the port do not emit only light, but radio radiation, X and gamma rays directed in two precise opposite directions that start from the pulsar. With their telescopes, astronomers then see an **intermittent signal** coming and going regularly, just as you do when you look at a lighthouse.



## MAGNETIC FIELD

Near the center of the pulsar, a very powerful magnetic field is formed, that makes the electrons splash at the speed of light. It is precisely the electrons that make the supernova so **radiant**, which is seen to shine even during the day.

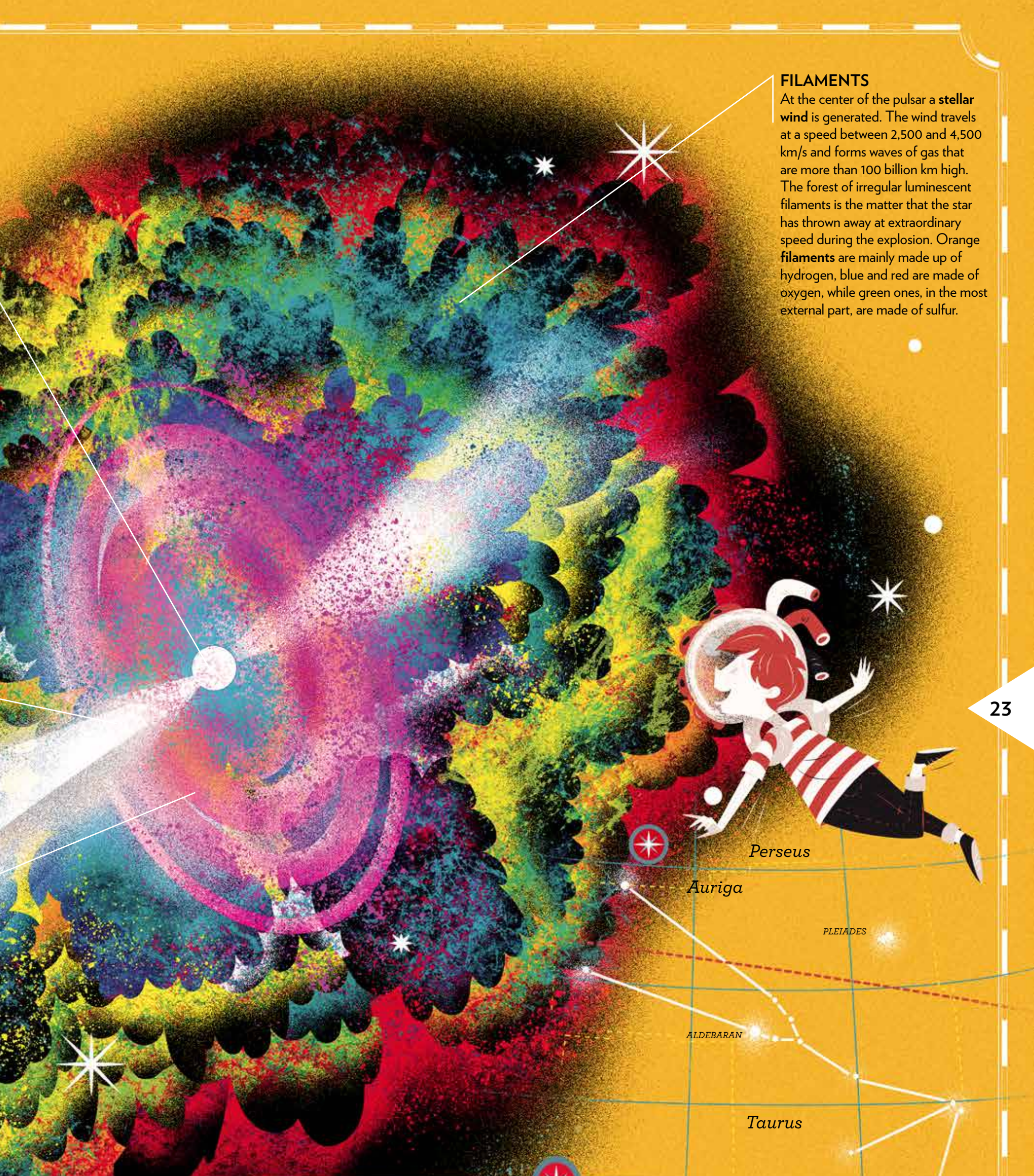
## THE PULSAR, CADAVER OF STARS

In the middle of the nebula there is a neutron star, or pulsar, which rotates on itself at a **great speed** of 30 turns per second. Its mass is very dense: it is one time and half the one of the Sun, but concentrated in a sphere of 10 km wide. Despite the quite small dimensions, it produces an energy equal to 100.000 times the Sun's one. That's quite impressive, for a dead star!



## FILAMENTS

At the center of the pulsar a **stellar wind** is generated. The wind travels at a speed between 2,500 and 4,500 km/s and forms waves of gas that are more than 100 billion km high. The forest of irregular luminescent filaments is the matter that the star has thrown away at extraordinary speed during the explosion. Orange **filaments** are mainly made up of hydrogen, blue and red are made of oxygen, while green ones, in the most external part, are made of sulfur.



### *Where is it?*

The crab nebula is located about 6,500 light years from Earth: this means that the light of that enormous explosion observed for the first time in **1054** had happened more or less in **5400 BC** and it had traveled all those thousands of years before reaching our planet. Today it's no longer visible to the naked eye, but if you want to imagine it, you must look in the direction of the **constellation of Taurus**.



The title 'SPACE MAPS' is rendered in a vibrant, 3D style. 'SPACE' is in large, bold, blue letters with a yellow-to-orange gradient and a thick red outline. 'MAPS' is in smaller, white, outlined letters with a blue-to-cyan gradient. The background is a dark blue night sky filled with numerous white stars of varying sizes and brightness, some with prominent diffraction spikes.

Modern telescopes have opened new eyes on space and have designed new maps. There are many questions to which the new spatial maps can give an answer: where do we see the darkest sky on our planet? Where are the astronomical observatories? And where can the constellations be found? Where are the solar system planets and those who orbit around distant stars? The circular maps of the planets and satellites are alternated with flat maps of parts of the galaxy and of other scenarios. Each map allows you to deepen the spatial geography to better orientate in our Universe.