

WEIRD AND WONDERFUL

The Grunion

MOST fish spawn (lay their eggs) in water, but there is one amazing fish called the Grunion which goes to a lot of trouble to spawn out of the water. These fish live in the Pacific Ocean off southern California, USA. They seem to have some kind of "clock" inside them, because the females choose a special time to spawn — the only time when the eggs could hatch safely.



A Grunion

Wikipedia photo by Eric Wittman

In the spring, at the times of either the new or full moon, which produce the highest tides, hundreds of grunion can be seen riding in on the waves, then dragging themselves up the beaches just out of reach of the tide. Amazingly, they arrive about 15 minutes *after* the highest wave, then the females push their tails into the sand and release their eggs, before slithering back into the sea again. The eggs lie buried in the dry sand for about 10 days, out of reach of the water, until the next high tide. Then, when the water touches the eggs, they hatch, the tiny young fish pop out, and are washed out to sea.

This whole operation is very wonderfully timed. The grunion has to spawn at one of the highest tides, which only happen twice a month in the spring, otherwise the eggs would be washed into the sea before they were ready to hatch. The eggs have to be timed to hatch when the second high tide reaches them. If they hatched too

early or too late, the baby fish would never be able to reach the sea, and would die. Their life — and the grunion's future — depends on that second high tide to hatch them and wash them into the sea.

It seems impossible to believe that the grunion's behaviour came about through evolution. These fish could never have gradually learned the right time to spawn - they had to get it right the first time! They have to "know" that they must spawn at the time of the first high tide, so that their eggs will hatch at the next high tide. Fish aren't intelligent enough to work out such complicated things. Someone must have designed them to live the way they do, and that Someone is God!

GOD'S SON GIVES LIGHT AND LIFE!

One of the most beautiful sights on earth is the sunrise. The eastern sky gradually becomes light, and slowly turns into a golden glow before the sun appears. The sun "rises" every day as the earth turns, even when clouds hide it, as it has been doing ever since God created it. We also know the exact times of sunrise and sunset each day throughout the year. God has placed our world at just the right distance from the sun so that we can enjoy its light and warmth. Without the sun there would be no light or life.



The Bible tells us that there is also spiritual light and life, and this comes from God, too. We have all sinned against God in many ways, and this means we are in spiritual darkness, separated from God. God, who sent light into the world in the beginning, has sent Jesus, His Son to give us spiritual life and light. He died on the cross, and rose again to overcome sin's darkness. Jesus said, "I am the light of the world. The person who follows me will never live in darkness. He will have the light that gives life." (*John 8: 12*). Believing in Jesus is like stepping from darkness into light. A light that will last for ever, and continue in heaven when this life is over— a place where "they will not need the light of a lamp or the light of the sun. The Lord God will give them light." (*Revelation 22: 5*)

PUZZLE ANSWERS

WORD SQUARE
 1. Oxygen. 2. Eclipse. 3. Ozone. 4. Energy. 5. Sunburn. 6. Glucose.

JUMBLED PLANETS
 1. Saturn. 2. Mars. 3. Jupiter. 4. Uranus. 5. Neptune. 6. Venus.

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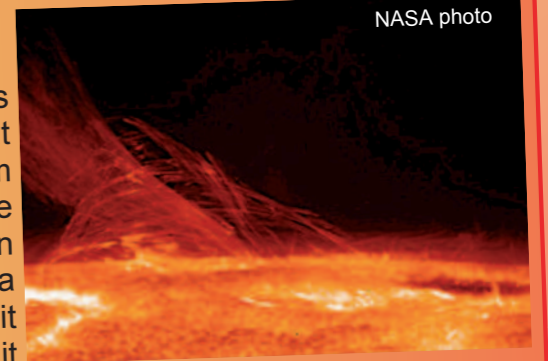
THE SUN

The star we can't live without!

There are billions of stars in the universe — many much larger than the sun, but the sun was specially designed to enable us to live on earth. We depend on it for warmth and light and no life could exist without it.

A BALL OF FIRE

The sun is a huge ball of fire —so large that a million earths would fit inside it. The temperature on its surface is about 5,500 deg. C., and huge *prominences* rise like flames from its surface (right). But the temperature at the centre could be as high as 15 million degrees! The sun is about 150 million km (93 million miles) away from us. Although this seems a long way, it is the right distance for life on earth to exist. If it were much nearer, the earth would be scorched, and if it were farther away the earth would freeze. Many people believe that this all happened by accident, but we believe that God designed it like this, so that our special planet would be a suitable home for us.



NASA photo

The sun is so bright that looking at it directly could cause blindness. Astronomers have been able to study the sun during a solar eclipse, when the moon blocks the sun's light (see page two).

Capturing the sun's energy



If humans designed a machine that could turn sunlight, water and a poisonous gas into food and oxygen they would be thought very clever. Yet all over the world the leaves on millions of trees and plants are doing just that. We breath in oxygen and breath out carbon dioxide. Plants turn this back into oxygen; we call this *photosynthesis*. If there were no



This house uses two methods to capture the sun's energy: panels that heat water, and others that convert sunlight into electricity. Once the panels have been fitted, the sun's energy is free!

plants on earth the atmosphere would become poisonous and everything would die. Plants also turn sunlight into energy. Every leaf is like a tiny factory turning the sun's energy into glucose — a form of sugar. The sun is a huge power plant, producing more power every hour than the whole world uses in a year! That's why more and more people are trying to capture that energy, which is clean and free, and will never be used up.



These solar cells in the Israeli desert convert the sun's energy into electricity. (Wikipedia photo by David Shankbone)

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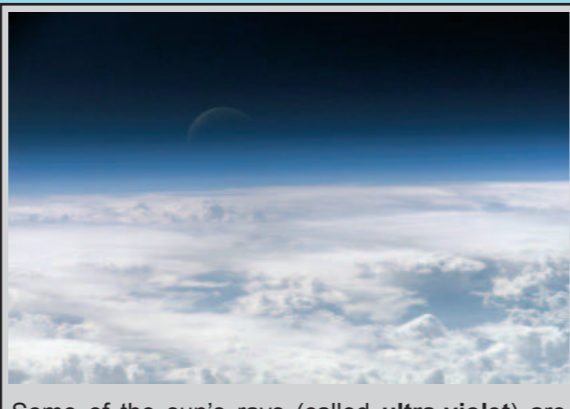
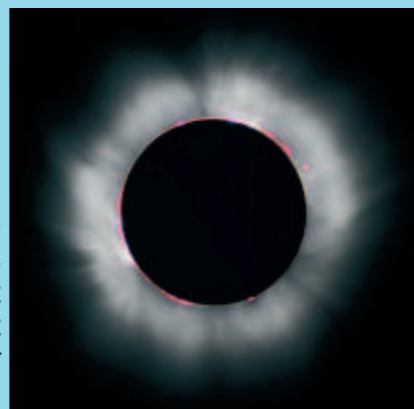
THE WONDER OF AN ECLIPSE

The perfect fit of the moon over the sun helps us understand how the sun works

The Bible tells us that God created two special lights — the sun and the moon. Although the sun is 400 times larger than the moon, it appears to be the same size in the sky. This is because the sun is 400 times farther away! Sometimes the moon passes in front of the sun, and fits over it perfectly, blocking out its light (right). We call this a **total eclipse**, and although it only lasts a few minutes, it has enabled scientists to learn a lot of things about our sun that they could never have learned otherwise, because it is too bright to look at directly.

Most other planets in our solar system have moons, but the size of these moons means that total eclipses never happen. Is it just by accident that the sun and moon appear the same size in our sky? Many scientists don't think so, but believe it is part of God's special design which helps us understand our world, and the special star that gives us light and life.

Although we couldn't live without the sun, it does produce harmful *ultra-violet* radiation. God has provided protection from the worst of this through the *ozone layer*. Other planets don't have this protection — they don't need it because they have no life. In spite of this shield, strong sunlight can still harm us by causing sunburn and skin cancer, so it is always wise to protect ourselves (left) when the sun is strong.



Some of the sun's rays (called **ultra-violet**) are harmful and could destroy all life on earth, but our atmosphere contains a layer of an invisible gas called **ozone**, which acts as a protective shield.

Wikipedia photo by Luc Viatour

www.crt.org.uk

GOD MADE THE EARTH BEFORE THE SUN!

THE Bible tells us that God created the earth before the sun, to show us that He, not the sun, is the source of all life. God warned His people, the Israelites, "When you look up at the sky, you see the sun moon and stars... But don't bow down and worship them. The Lord your God has made these things for all people everywhere." (*Deuteronomy 4: 19*).



In spite of this, for thousands of years people in many parts of the world have made the sun into a god and worshipped it. The ancient Egyptians worshipped the sun-god Ra (left). They believed he travelled across the sky each day in a boat, and that a large serpent called Apep tried to destroy Ra every night by eating the sun-boat. Some people even believed that Ra was killed, and reborn every morning.

In ancient China, when an eclipse happened, people thought a huge dragon was trying to eat the sun, so they made a lot of noise to frighten it away. When the eclipse ended, they believed they had succeeded, so did the same whenever eclipses happened! Worshipping the sun is foolish, and forbidden by God. He created the sun, He is the One we should worship!



In India, many people worshipped the sun-god Surya, and built sun temples, like this one in Modera. (Wikipedia photo by Uday Parmar)



Stonehenge, England may have been built as a temple for sun worship. Even today, some people go there on the longest day to greet the rising sun

Photo: clipart.com

Planet earth is not a chunk off the sun!

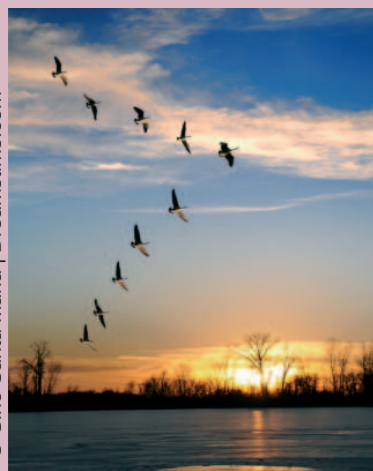


Many scientists believe that the objects in our solar system, including earth, began as a swirling cloud of hot gas and dust. They tell us that some of this dust began to stick together, and that some chunks were thrown outwards, which later cooled down to form the planets and moons. Other scientists say that this would never work, since these lumps would collide and break apart again.

The Bible tells us how our solar system began. In Genesis chapter one we read that God created the earth before the sun, moon and stars. Surely He knows how He did it!

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NATURE NOTES by the editor



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Have you ever seen flocks of birds such as geese flying in the shape of a "V"? (left) They often do this when migrating during autumn and spring. People who study flight have discovered that by flying in the "V" formation the birds use less energy, because of the way the air flows from one bird to another, giving "lift" to the following birds. They have to flap their wings less, and can fly much further than they could if they were flying alone. The bird at the front of the "V" works hardest, but when it gets tired it drops back and another bird takes the lead. Any birds which drop out of the formation are quickly pushed back into line. Flying like this is really useful for birds that often travel hundreds or thousands of miles. It also helps the birds to keep contact with each other.



Photo: NASA

Some human engineers believe that aircraft can save fuel by copying the way flocks of birds fly. They have found that by flying planes in formation (above right) those following the leader get extra "lift" just like the birds. They suggest that if large planes going to the same place could fly in formation they would save as much as one tenth of their fuel. Once again, the birds — or rather God — did it first!

— Geoff Chapman

PUZZLE CORNER

IN EACH SQUARE A WORD IS HIDDEN. JUST FIND THE FIRST LETTER. CLUES ARE ON THE RIGHT

1	H	N	E	2	E	C	Y	3	N	O	Y
	T	O	G		I	L	G		E	Z	O
	A	X	Y		P	S	E		P	C	S
4	E	N	H	5	N	U	S	6	O	S	E
	F	E	R		B	N	E		C	U	W
	M	Y	G		U	R	K		G	L	K

- The gas we breath in.
- This makes the sun dark.
- A layer of this gas protects us.
- The sun produces lots of this.
- Strong sunlight can give us this.
- Plants make this from sunlight.

JUMBLED PLANETS

Unjumble the names of the planets below:

- Trusan
- Rams.
- Trujpie.
- Nusrua.
- Tunneep.
- Suven.

(Answers on the next page)