

Symbiotic Super-tough Photosynthetic



And NOT a plant!

THE BASIC MODEL

LICHENS At first glance, lichens might look

a bit like moss. But don't be fooled! Lichens are not plants. In fact, they're not just one organism, they're

two, or sometimes, even three.

Lichens are fungi growing with a

species of algae or cyanobacteria,

living together in a symbiotic

hardy and adaptable. Lichens can be

found in every climate and continent

on Earth, from the frozen deserts of

Antarctica to the tropical jungles of

can all be traced back to this one

realize that the idea and word itself

ont modern world, and it's neat to

living together of unlike organisms."

coined the term SYMBIOSIS-", the

a new word. So in 1879, scientists

was so novel and important it needed

this "dual hypothesis" was accepted.

carefully with a microscope) before

individual member of the lichen (and the proof of teasing out each

idea easily. It took years of debate

Lichens grow on bark and wood, rocks, soil, houses, underwater, even on cars or the backs of turtles! They

can grow on anything that stays in the

same place for a long time without

They have an incredible variety of

shapes, from flat round pods to

antler-like tusks or thready filaments.

But all lichens are relatively small, so

to appreciate them, you have to get

moment to kneel down and peer at

the rocks and logs and see what kinds

of lichens you can discover.

the reindeer (or caribou).

an important tood for

The fruticose lichen is Siadonia rangiferina is

like miniature shrubs.

Tubular or bush-like. These lichens often look

Often has an almost pebble-like pattern.

true tottose ficuens do.

have an actual "skin" or lower layer (cortex) like

pnt the lichen doesn't

The edges lift up from the substrate somewhat,

Next time you're outside, stop a

DNEK2E;

FICHENS ARE INCREDIBLY

OUTPERS

FICHERS

FICHER

MORE CATEGORIES THAN

THERE ARE EVEN

FRUTICOSE

SQUAMULOSE

moving.

down close.

Other scientists didn't accept his

Once it was accepted, the concept

Symbiosis is a common concept in

incredible organism: lichen.

This dual system is remarkably

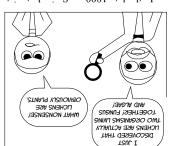
relationship.

the Amazon

PHOTOSYNTHETIC ALGAE OR CYANOBACTERIA PRODUCE SUGARS AND OTHER FOOD, WHICH THEY SHARE WITH THE FUNGI.

FUNGI MAKE UP THE OUTER SHELL PROVIDING MINERALS, WATER, AND SHELTER FOR THE ALGAE.

"enslaved" an algae. dual organism of a fungus that had as commonly believed, but instead a the idea that lichens weren't plants, named Simon Schwendener put forth In the late 1800s, a Swiss botanist





'rootlets" that attach the lichen to its substrate. the lichen even grows look very much like small plants. The fungal part of are so leat-like that they have a distinct upper and ower surface. Some specie Leaf-like. These lichens



feracissima, which grows on cement sidewalks. Firedot Lichen, Caloplaca pieces of the substrate as



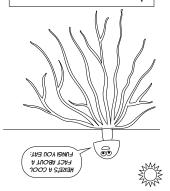
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well. One example of a rustose lichen is: Sidewalk

very close to the surface or substrate. Cannot be lifted off without removing Crust-like. Grows flat and

WOSL COWWON LKEES OF LICHEN

OF THIN STRANDS CALLED HYPHAE. OF THE FUNCUS IS UNDERGROUND, A MASS THE FUNCUS - THE FRUITING BODY. MOST A MUSHROOM IS JUST A SMALL PART OF



fungi are the farmers and the algae of lichen as a small farm where the It's perhaps more accurate to think

photobiont they are partnering with.

are the crops.

can also switch which type of (photobionts). Several mycobionts without any algae or cyanobacteria of lichen, the mycobiont can survive definitely in control. In some types the lichen (the mycobiont) is arrangement, but the fungus part of exactly. They both benefit from the dependent on each other? Not where both partners are equally Are lichens equitable relationships





There are more than 15,000 species of lichen, and some of them are very long lived—thousands of years old!

Lichens can have an incredible variety of colors, from neon-yellow to orange, red, brown, gray or green. Lichens become dormant when dry, entering a state of hibernation or stasis. When they get wet, their color and shape change dramatically as the fungal filaments absorb water and the algae or cyanobacteria resume photosynthesis.

since the late 1800s. used to measure and study air quality Because of this, lichens have been

of the first organisms to be affected. toxic gasses, the lichens will be some levels of lead, sulfur dioxide, or other airborne pollutants. If there are high makes them very vulnerable to to grow on any surface, but it also This remarkable ability allows them minerals and nutrients from the air. roots. Lichens absorb most of their minerals from the soil through their Plants absorb their nutrients and

LICHEN DON'T HAVE ROOTS.

OTHER NUTRIENTS ЯΙΑ ЯΙΑ ИІТВОСЕИ AIR/RAIN MATER S Ca Mg Fe САКВОИ ЯΙΑ CO⁵ H⁵O N b K ГІСНЕЙ

Some lichens are so regular in their

CIRCULAR GROWTH THAT SCIENTISTS

MEASURE THEIR DIAMETER TO DATE ROCKS

IT'S CALLED "LICHENOMETRY."

POTASSIUM, AND IRON. NUKOREN' BHOSBHOKNS ESSENTIAL THINGS LIKE WATER, NURIENTS FROM THEIR ROOTS PLANTS GET MOST OF THEIR S Ca Mg Fe

HO N P K OTHER NUTRIENTS ROOTS ROOTS NITROGEN ROOTS **MATER** ЯΙΑ CARBON INAJY

Sensitive to Air Quality

B	A	A	X
B	C		D
F	E	A	D
E	G	Ð	X