(How) The Bugs Strike Back

Have you had antibiotics?

Orange-flavoured medicine that had to live in the fridge.

They have names like penicillin or amoxicillin.

A bug (E .coli)

What is an antibiotic?

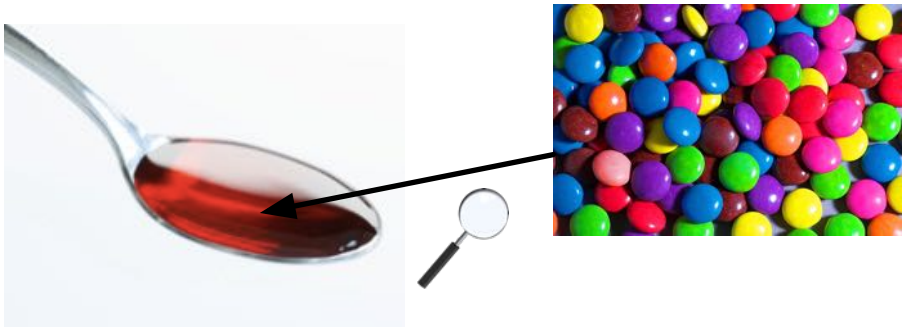
They are molecules with special shapes that kill bugs.

What are molecules?

They are the small bits of stuff that everything is made from.

How small is a molecule? Really, really small.

How many molecules are in one teaspoon of amoxicillin?



If each molecule was as big as a smartie, there would be enough to cover the UK to a depth of 1 km.

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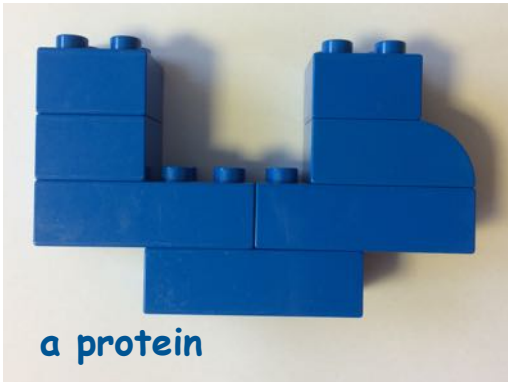
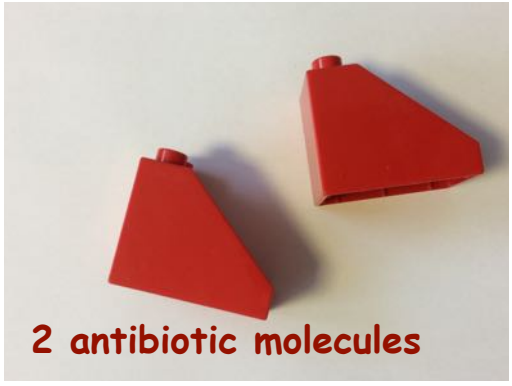
How do antibiotics work?



a protein

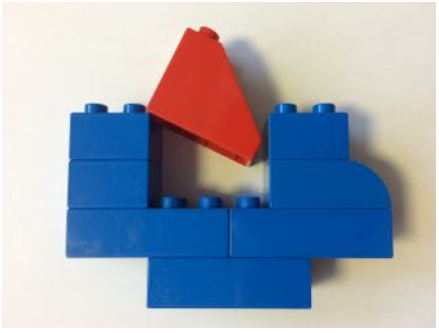
Bugs have **proteins*** that help them grow.

A bug (E .coli)

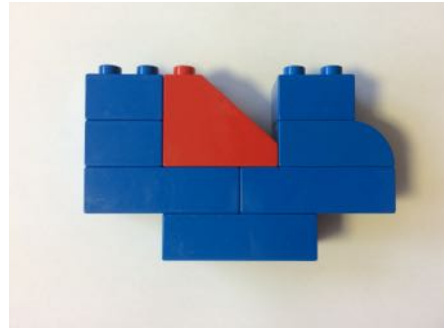


2 antibiotic molecules

Antibiotics bind and stick to the proteins, preventing them from working and the **bug** dies.



antibiotic binds to **protein**



protein no longer works

=

bug cannot grow

⇨ Can you make a **protein** which binds the **antibiotic**?

use **green** LEGO

* bigger complicated molecules that do useful things

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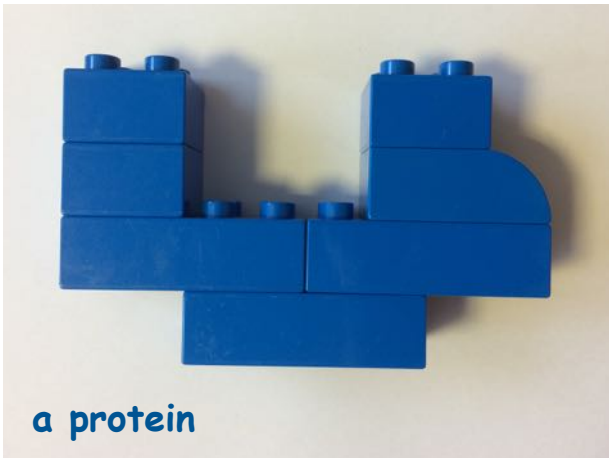
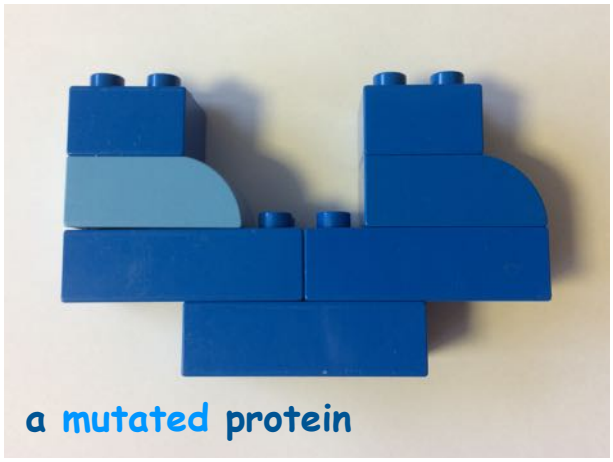
How do antibiotics stop working?

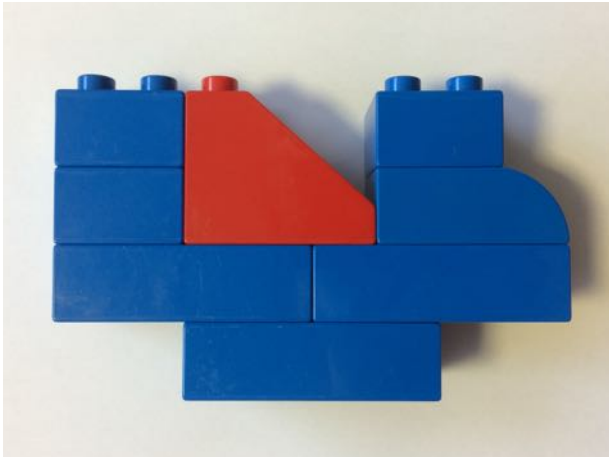
The **proteins** change their shape so the **antibiotic** can't fit



a protein



a mutated protein



bug cannot grow

bug can grow

Can you change your **protein's** shape so the **antibiotic** doesn't work anymore?

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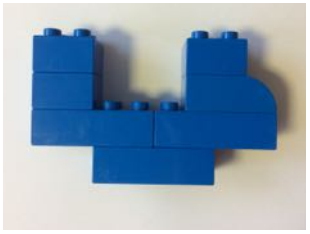
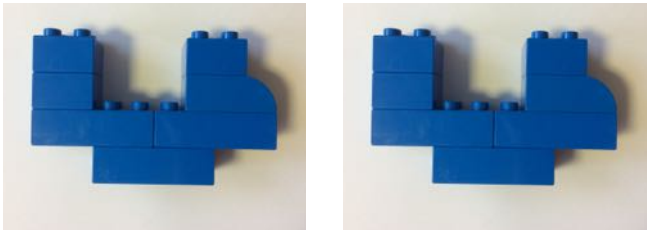
How do the changes happen?

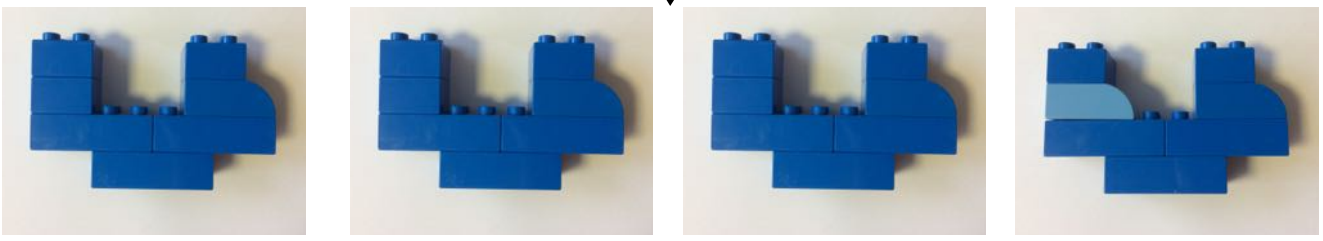


to grow, **bugs** make more **proteins**

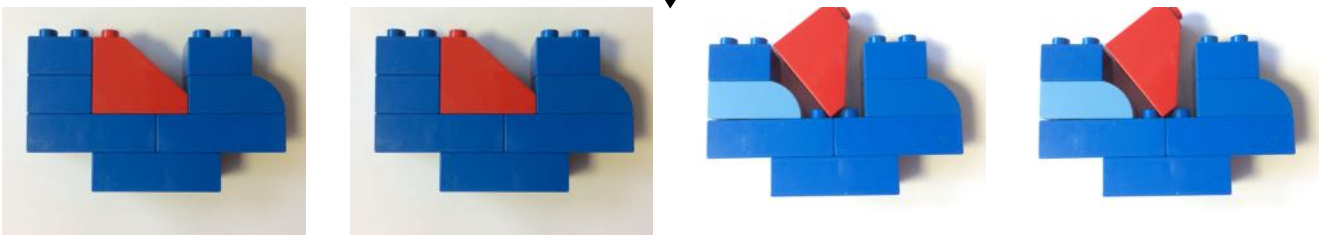


sometimes a **mistake** is made

(Dance Mat)

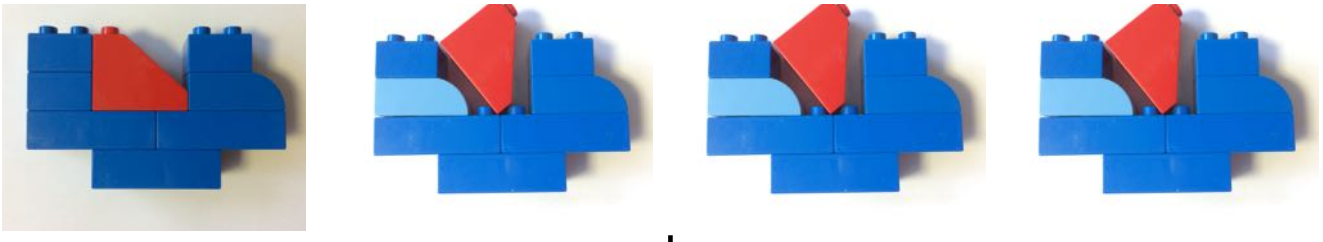


treat with **antibiotics**



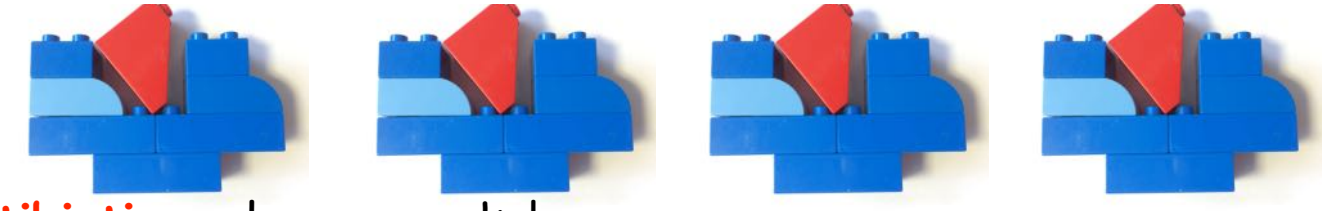
antibiotic can stick:
bug dies

antibiotic can't stick:
bug grows



(Wristband game)

(Coconut Shy)



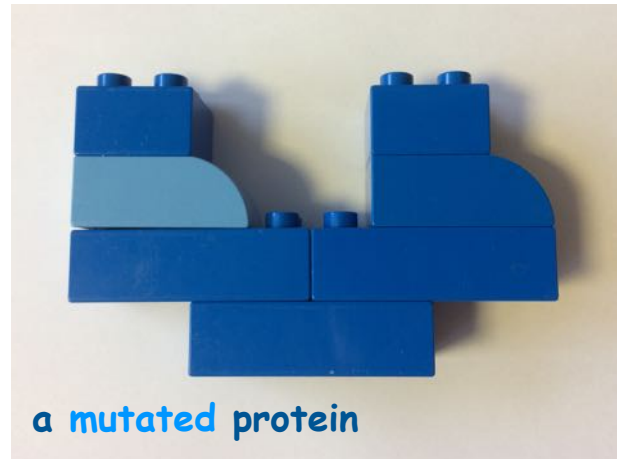
antibiotic no longer works!

(How) The Bugs Strike Back

Why do we need new antibiotics?

Make new antibiotics that can fit into the mutated protein

+



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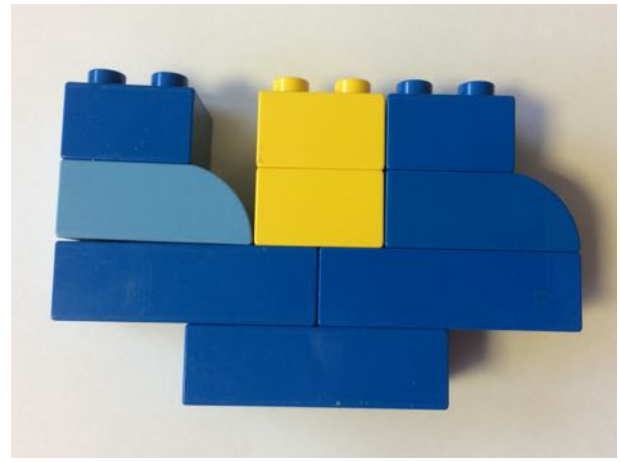


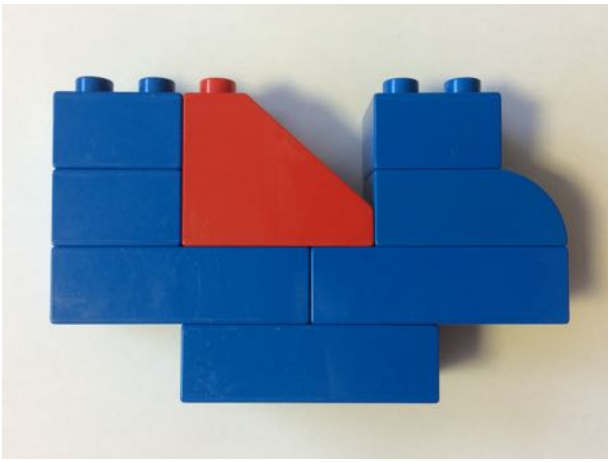
←

bug cannot grow

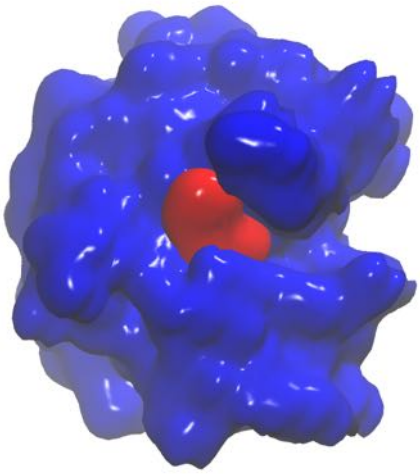
⇨ Can you design a new antibiotic that fits into your protein?

(How) The Bugs Strike Back

Real molecules!

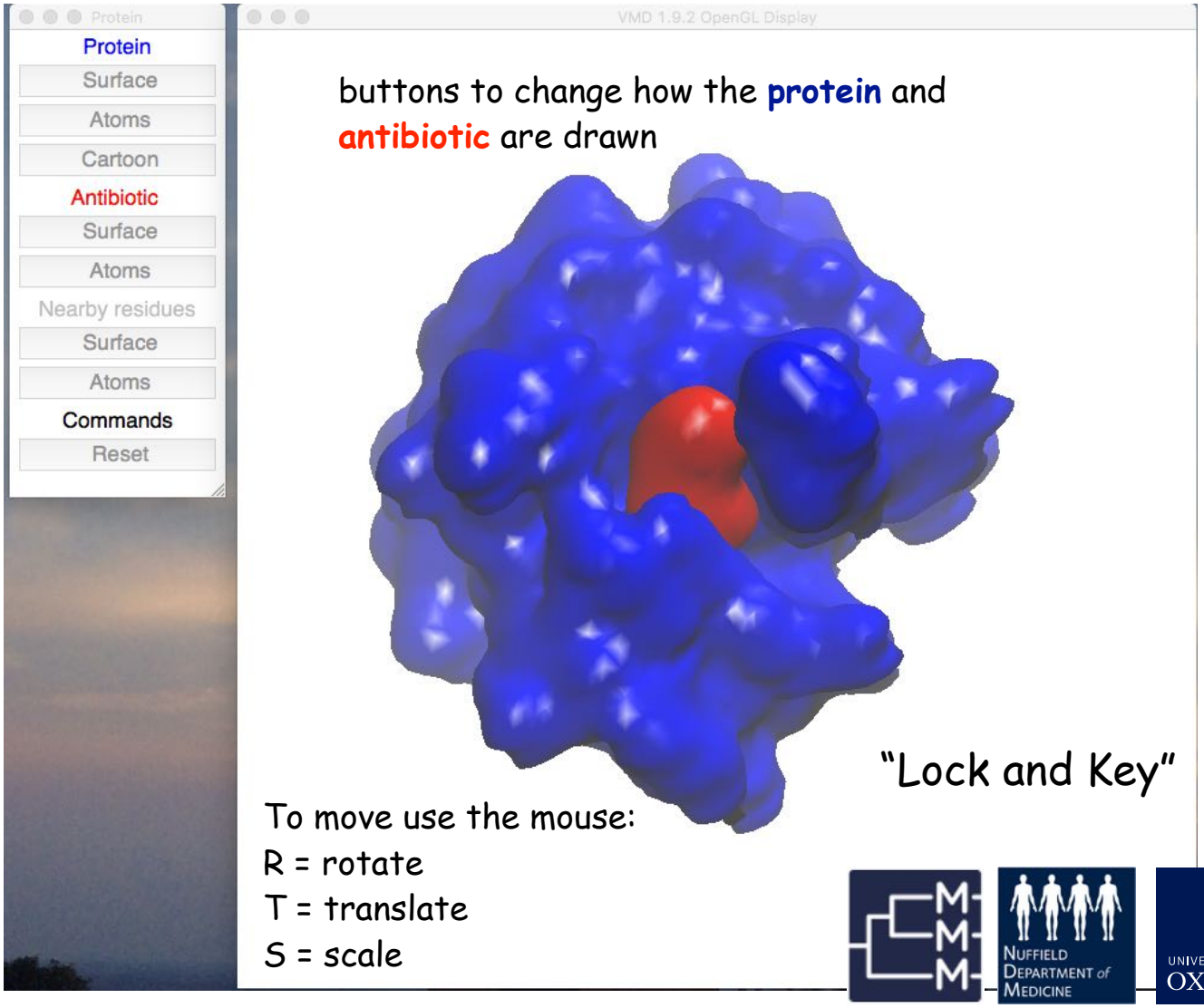


LEGO model of **antibiotic** bound to a **protein**



Kleb. pneumonia **penicillin binding protein** bound to **amoxicillin**

⇨ Look at the 3D structure on the laptop



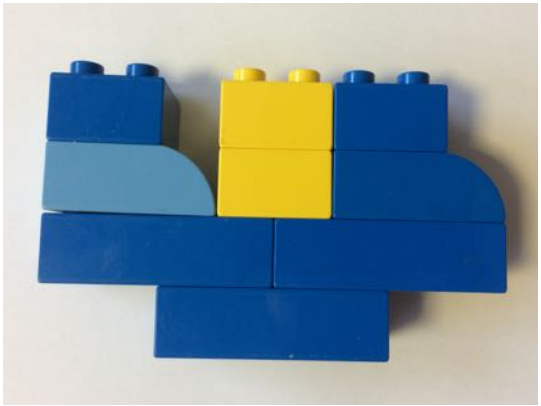
(How) The Bugs Strike Back

What does this all mean?

Only take an **antibiotic** if you have an infection that can be treated by it

If we are given **antibiotics** we should finish the bottle

We should use the best **antibiotic** for each infection



New antibiotics are needed that can treat resistant bugs