The WONDER WEEKLY

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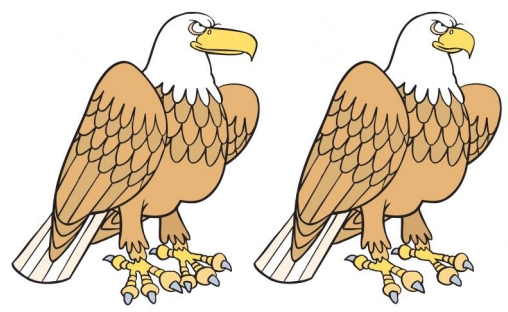

THE SCIENCE BEHIND BAKING A CAKE

Pictures: iStock/ tbralnina/ cheche22

HAVE you ever baked a cake?

If you have, feel free to consider yourself a chemist.

It is quite remarkable to think you can combine basic ingredients like self-raising flour, eggs, sugar and butter and produce something so nice to eat.

Particularly when you consider the mixture (or batter) enters the oven as a thick, gooey liquid, and comes out as crumbly, moist cake.

Well, cooking isn't magic.

Cooking is science.

Each ingredient in a cake has a role to play.

Obviously sugar makes the cake sweet, and eggs bind the other ingredients together.

But it is the way the ingredients are mixed and react in combination that makes cake, and other baking, a scientific success.

The texture of cake is partly the result of the air bubbles we create when we beat the eggs and sugar together.

Wheat flour, which contains two proteins called glutenin and gliadin, provides the cake with its structure. When you add the liquid ingredients to cakes, the glutenin and gliadin combine to form a new protein called gluten.

Gluten acts like a glue to hold food together.

Butter coats the flour and helps prevent the creation of too much gluten.

The less butter a recipe contains the more gluten created, and the thicker the texture of the cake.

If you get your recipe right, your cake holds together but is not too dense and chewy.

Eggs often provide all the liquid (water) you need for a nice moist cake.

This liquid turns to steam in the oven, which helps to cook and expand the structure of the cake.

Egg yolks are good emulsifiers, which means they keep the other ingredients from separating.

Eggs contain proteins, and when we beat the eggs those proteins break up and then get tangled up and act as a net to hold in the air bubbles.

Heating those proteins makes the net stronger and helps to create a light, fluffy cake.

Sugar also locks in moisture, because it bonds to water molecules.

We use self-raising flour in cakes because it contains a raising agent—baking powder.

Sometimes cake recipes include baking powder (or bicarbonate of soda).

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The hare and the rabbit riddle

Pictures: iStock/ Byrdyak/ mlharing

RABBITS and hares might be members of the same family, but don't be fooled, they are distant relatives at best.

And by the way, jackrabbits are actually hares.

While rock hares, hispid hares and Belgian hares are rabbits.

Confused?

Well you are not the only one.

Rabbits and hares belong to the Leporidae family, which is part of a larger order of animals called Lagomorphs.

Pikas, such as the cute little beast pictured right, are also Lagomorphs, but they belong to the Ochotonidae family.

To add to the complexity, there are 91 different Lagomorphs - 32 species of hares, 29 species of rabbits and cottontails, and 30 species of pikas.

Anyway, let's stick with distinguishing rabbits from hares for now.

They do look similar, although hares, top picture, are generally much larger than rabbits and have longer ears.

But there are some major differences between them.

Newborn hares, which are called leverets, are more prepared for life. They need to be because hares live aboveground.

Rabbits are born without fur, with closed eyes, and need parental care to survive.

Most live and breed in burrows, although cottontails and hispid hares (rabbits remember) form nests.

Introduced to Australia, rabbits and hares have spread to most parts of the country and are threat to native species.

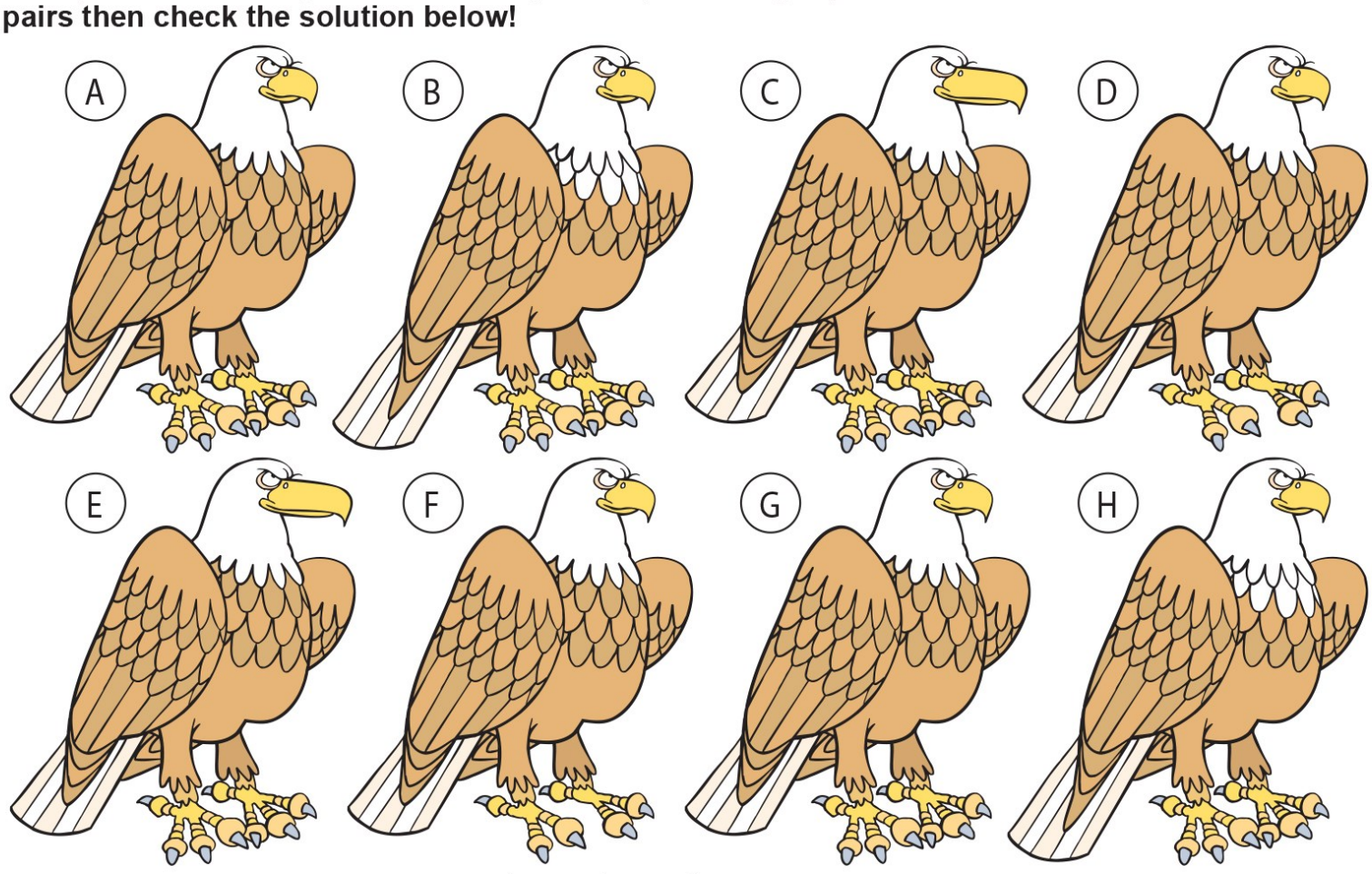
In fact they may have caused the extinction of several ground-dwelling mammals in arid lands.

Rabbits were introduced to Tasmania in the 1820s, and are now widespread and common around the state.

They compete with native species for food and shelter, and are also a threat to native plants.

Mixed up BALD EAGLES

Four pairs of bald eagles are mixed up. Each pair is slightly different from the others. Match the pairs then check the solution below!



SOLUTION: A + G, B + H, C + E, D + F

Artwork: www.johnpollyfarmer.com.au/

Raising cakes with a chemical reaction

From Page 1

Baking powder contains sodium bicarbonate and two acids.

One of these acids is called monocalcium phosphate.

When added to the liquid ingredients, sodium bicarbonate and monocalcium phosphate react to release bubbles of carbon dioxide and water.

This is called leavening, which is basically a foaming reaction that lightens and softens the mixture.

Baking powder also contains a buffer such as corn starch, to prevent this reaction happening before you want it to.

The second acid in baking powder is either sodium acid pyrophosphate or sodium aluminium sulphate.

They won't start reacting with the sodium bicarbonate until you add heat by putting the cake in the oven.

This means the batter rises for a long period of time, creating lots of bubbles and a fluffier cake.

Baking powder was developed by English food manufacturer Alfred Bird in 1843, and it created a food revolution.

Before that people used yeast as a leavening agent, and baked goods were often sour or bitter.

Baking powder reduced the amount of time and labour required to make bread, and led to the creation of new types of other baked goods, including cakes and biscuits.

So thank goodness for Alfred.

Alfred Bird was a chemist before he became a food manufacturer, and invented both egg-free custard and baking powder, after turning to science to help his wife Elizabeth, who was allergic to eggs and yeast.

Perhaps you might like to try baking a cake this week.

Ask an adult family member to assist you, as ovens and other kitchen appliances should not be used without adult supervision.

If you don't have a recipe, but have online access, you might like to try this one for pound cake: www.taste.com.au/recipes/basic-pound-cake/24f3a38c-3b84-4a85-b221-e8956f0d2bf8

Children's University Tasmania members can earn stamps in their passports for this challenge at the discretion of their school coordinators.