151. Lots of things are mysteries. But that doesn't mean there isn't an answer to them. It's just that scientists haven't found the answer yet.

For example, some people believe in the ghosts of people who have come back from the dead. And Uncle Terry said that he saw a ghost in a shoe shop in a shopping center in Northampton because he was going down into the basement when he saw someone dressed in gray walk across the bottom of the stairs. But when he got to the bottom of the stairs the basement was empty and there were no doors.

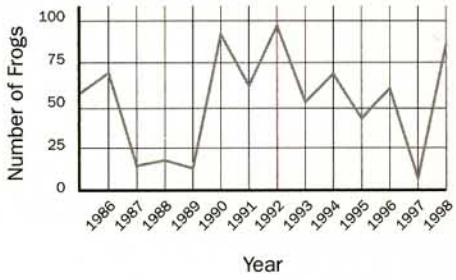
When he told the lady on the till upstairs, they said it was called Tuck and he was a ghost of a Franciscan friar who used to live in the monastery which was on the same site hundreds of years ago, which was why the shopping center was called **Greyfriars Shopping Center,** and they were used to him and not frightened at all.

Eventually scientists will discover something that explains ghosts, just like they discovered electricity, which explained lightning, and it might be something about people's brains, or something about the earth's magnetic field, or it might be some new force altogether. And then ghosts won't be mysteries. They will be like electricity and rainbows and nonstick frying pans.

But sometimes a mystery isn't a mystery. And this is an example of a mystery which isn't a mystery.

We have a pond at the school, with frogs in it, which are there so we can learn how to treat animals with kindness and respect, because some of the children at school are horrible to animals and think it's funny to crush worms or throw stones at cats.

And some years there are lots of frogs in the pond, and some years there are very few. And if you drew a graph of how many frogs there were in the pond, it would look like this (but this graph is what's called *hypothetical,* which means that the numbers aren't the real numbers, it is just an *illustration*)



And if you looked at the graph you might think that there was a really cold winter in 1987 and 1988 and 1989 and 1997, or that there was a heron which came and ate lots of the frogs (sometimes there is a heron who comes and tries to eat the frogs, but there is chicken wire over the pond to stop it).

But sometimes it has nothing to do with cold winters or cats or herons. Sometimes it is just maths.

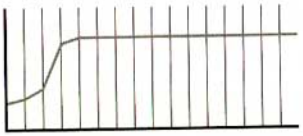
Here is a formula for a population of animals

$$N_{new} = \lambda\,(N_{old})\,(1 - N_{old})$$

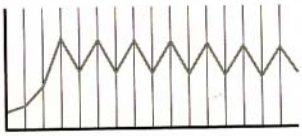
And in this formula **N** stands for the population density. When $N = 1$ the population is the biggest it can get. And when $N = 0$ the population is extinct. N_{new} is the population in one year, and N_{old} is the population in the year before. And λ is what is called a constant.

When λ is less than 1, the population gets smaller and smaller and goes extinct. And when λ is between 1 and 3, the

population gets bigger and then it stays stable like this (and these graphs are hypothetical, too)



And when λ is between 3 and 3.57 the population goes in cycles like this



But when λ is greater than 3.57 the population becomes chaotic like in the first graph.

This was discovered by Robert May and George Oster and Jim Yorke. And it means that sometimes things are so complicated that it is impossible to predict what they are going to do next, but they are only obeying really simple rules.

And it means that sometimes a whole population of frogs, or worms, or people, can die for no reason whatsoever, just because that is the way the numbers work.

from "The Curious Incident of the Dog in the Nighttime" by Mark Haddon (Vintage Books, New York, 2003) , p. 100-102.