

A change for the better?



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Amazing changes take place as living creatures, including humans, grow into their adult form: tadpole to frog, toddler to teenager.

These texts are about extraordinary changes, real or imagined, that happen to people and animals.



In this opening of a short story, Gregor, a young man in his early twenties, wakes up to face an extraordinary situation: he has changed into a gigantic beetle.

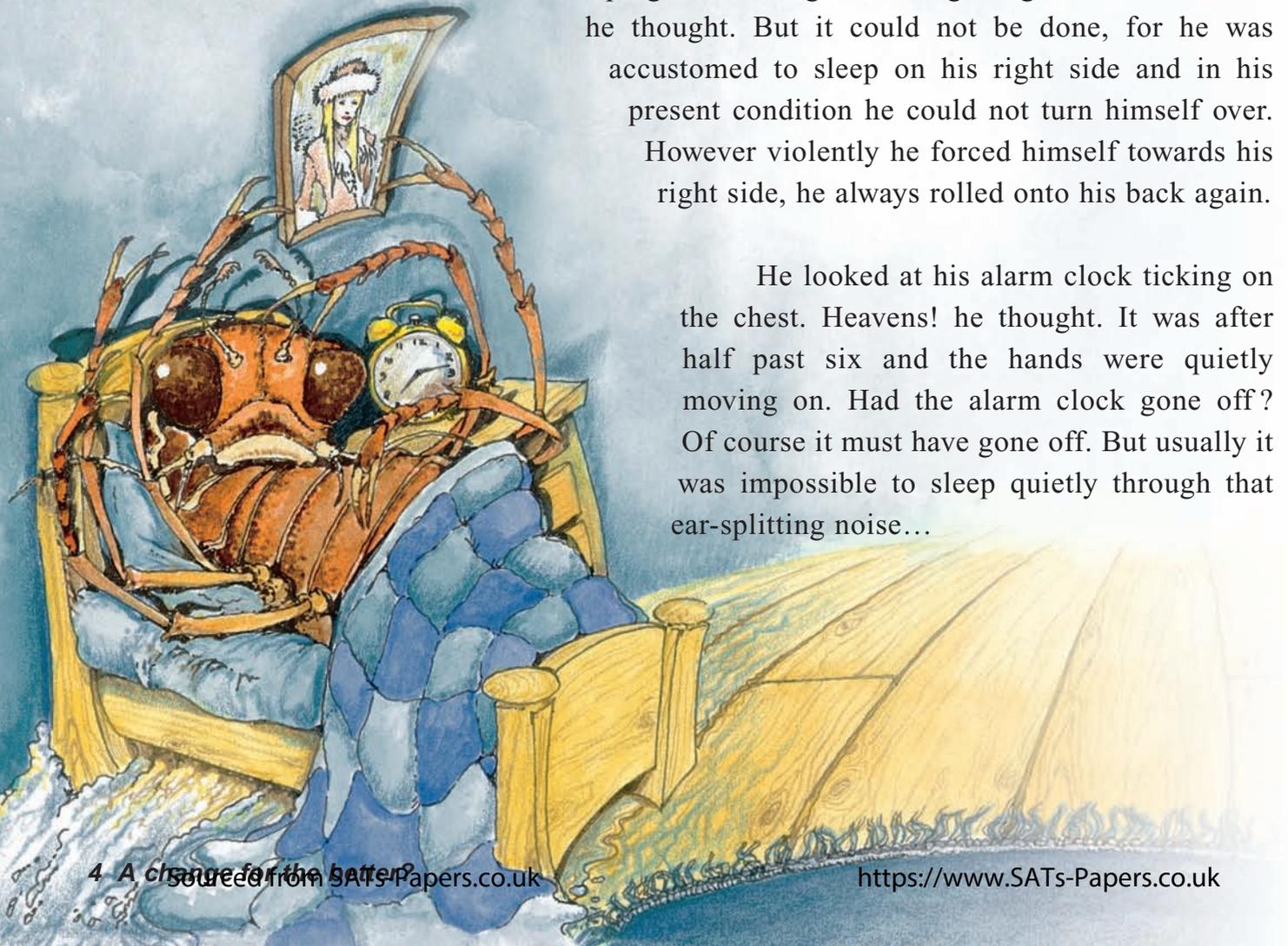
Transformed

As Gregor Samsa awoke one morning from uneasy dreams, he found himself transformed, in his bed, into a gigantic insect. He was lying on his armour-plated back, and when he lifted his head a little he could see his dome-like brown belly divided into stiff, arched segments. The bed quilt was about to slide off his rounded belly completely. His numerous legs, which were pitifully thin, waved helplessly before his eyes.

What has happened to me? he thought. It was no dream. His room, an ordinary bedroom, lay quiet between the four familiar walls. Above the table hung the picture which he had recently cut out of a magazine and put into a frame.

Gregor's eyes turned next to the window, and the overcast sky made him feel quite melancholy. What about sleeping a little longer and forgetting all this nonsense? he thought. But it could not be done, for he was accustomed to sleep on his right side and in his present condition he could not turn himself over. However violently he forced himself towards his right side, he always rolled onto his back again.

He looked at his alarm clock ticking on the chest. Heavens! he thought. It was after half past six and the hands were quietly moving on. Had the alarm clock gone off? Of course it must have gone off. But usually it was impossible to sleep quietly through that ear-splitting noise...



As this was running through his mind, there came a cautious tap at the door. ‘Gregor,’ said his mother’s voice, ‘it’s nearly quarter to seven. Haven’t you a train to catch?’ Gregor really wanted to explain everything, but he just said: ‘Yes, yes, I’m nearly ready.’ He had a shock as he heard his voice answering hers. It was unmistakably his own voice, but with a persistent, horrible, twittering squeak behind it like an undertone.

He *had* to get out of bed. To get rid of the quilt was quite easy; he only had to inflate himself a little and the quilt fell off by itself. But the next move was difficult, especially because he was so broad. He needed arms and hands to hoist himself up; instead he had only the numerous little legs which never stopped waving in all directions.

Gregor thought that he might get out of bed with the lower part of his body first. But this lower part proved too difficult to move. When finally, almost wild with annoyance, he gathered his forces together and thrust out recklessly, he bumped heavily against the end of the bed. So he tried to get the top part of himself out first, but when he got his head over the edge of the bed, he felt too scared to go further. He knew that if he let himself fall in this way he would injure his head. And he must not lose consciousness now. It would be better to stay in bed.

But then, after a repetition of the same efforts, he lay in the same position, sighing deeply and watching all his little legs struggling against each other more wildly than ever. He told himself it was impossible to stay in bed. He had to risk *everything* for the smallest hope of getting out of it.

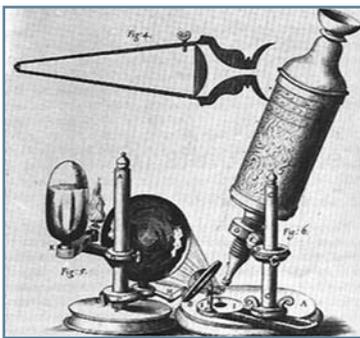
So he said to himself: ‘Before it strikes a quarter past seven I *must* be out of this bed, *without fail*.’ And he set himself to rocking his whole body in a regular rhythm, with the idea of swinging it out of bed. This way, he could keep his head from injury by lifting it when he fell. His back seemed to be hard and was not likely to suffer from a fall on the carpet. His biggest worry was the loud crash he would make, which would probably cause anxiety, if not terror, to his family. Still, he *must* take the risk...

Jan Swammerdam was a Dutch scientist who was very enthusiastic about insects. In this extract from a book about scientists, the writer describes how Swammerdam's work in the 17th century changed people's understanding of insects.

The man who loved insects

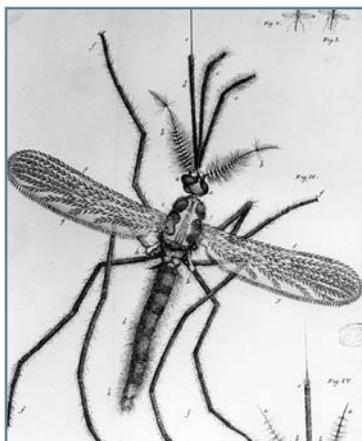


Jan Swammerdam



17th-century microscope

For thousands of years, people believed that insects were very simple creatures. For example, it was thought that insects had no internal organs. People also believed that insects were the result of 'spontaneous generation'. In other words, it was thought that flies came from nowhere, and that maggots came from mouldy cheese. Another belief was that insects changed into different creatures as part of their life cycle. People knew that caterpillars turned into butterflies but they thought that caterpillars and butterflies were two completely different species. Jan Swammerdam, the man who loved insects, changed all that.



Swammerdam's drawing of a mosquito

Jan Swammerdam was born in Amsterdam in 1637. From his early childhood he was very interested in insects. This annoyed his father, who wanted him to be a doctor. Jan did study medicine and made a number of important medical discoveries, for example about how people breathe. However, he never worked as a doctor.

His real interest was in insects. In the late 1660s, Swammerdam began to study them closely using a microscope, an expensive piece of equipment only recently invented. He had to use his microscope outside, on summer mornings, to allow the maximum amount of light to reach the lens. He then wrote his observations up in the evenings, and illustrated them with detailed and accurate drawings.

What did Swammerdam's studies reveal? First of all, he discovered that insects contain complex internal organs. In fact, internally, they are as sophisticated as animals that are much larger. He also discovered (and this was perhaps his most important discovery) that there is no such thing as 'spontaneous generation'. As Swammerdam himself stated, 'All insects hatch from the eggs of the female of the same species.' The third major discovery he made was about an insect's life cycle: egg, larva, pupa and adult are simply different forms of the same creature. This was dramatically demonstrated when Swammerdam publicly dissected a caterpillar and revealed what he described as 'a butterfly hidden and perfectly contained within its skin'. The audience was astonished.

For Swammerdam, entomology, the study of insects, was not a dull or dry academic subject; it was an absorbing pastime which fired his imagination. This is reflected in the vivid language he used to describe his scientific observations: the nerves of a beetle larva seen through a microscope are described as 'shooting like sunbeams'; the wings of a moth as 'delicate as the finest muslin*'.

Swammerdam's lifelong fascination with insects gave him considerable satisfaction. He reared a wide variety of insects in his room – and even on his own body! Although many people regarded him as eccentric, Swammerdam made a significant contribution to biological science.

*muslin = fine cotton fabric



egg



larva



pupa



adult

Life cycle of an insect

In this article, the writer explains the dramatic changes that take place during adolescence, as young people become teenagers. She also reports on how recent research is beginning to offer new explanations of why adolescents behave as they do.

What's really going on in a teenager's brain?

Can you believe your eyes? Is it the same person? When you look at a photograph of a teenager as a small child, it is hard to believe that it *is* the same person. For parents, it can be difficult to accept that their cute little toddler has become a complete stranger. Steve Johnson, the father of a teenage boy, says he doesn't understand it: 'He's changed – overnight. He won't get his hair cut and never finishes any homework. And as for getting him out of the house in the mornings...'

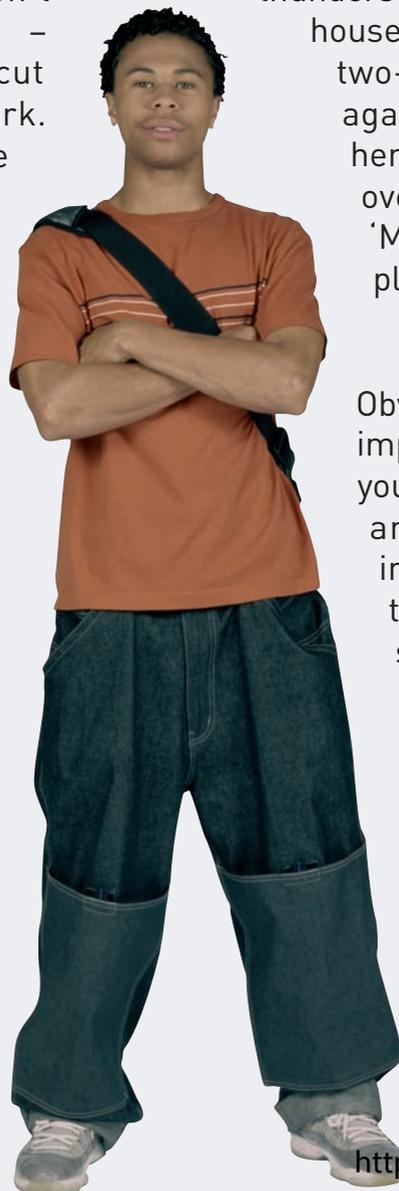
This is nothing new. Even Aristotle, the famous philosopher of Ancient Greece, said teenagers appeared 'changeable in their desires'. And Shakespeare described adolescence as largely a time for 'stealing and fighting'! For Ellen Liddle, the mother of twins, adolescence was like a thunderstorm crashing all round her house: 'It was like having a pair of two-year-olds in the house again.' Lisa Grey, a teenager herself, says she sometimes feels overwhelmed by her feelings: 'My moods are all over the place from day to day.'

So what's really happening? Obviously, adolescence is an important period of change when young people develop emotionally and physically, becoming independent and establishing their own identities. At the same time, they have to go to school, take exams and think about their futures. But why do teenagers who are usually friendly and thoughtful sometimes become grouchy for no reason, slam doors or forget to phone home?

From this...



...to this





For many years scientists blamed hormones. It was believed that the brain was fully developed by the age of three. But now, in ground-breaking work, scientists have discovered that the teenage brain is actually undergoing a dramatic transformation. 'We used to think that if there were brain changes in adolescence they were slight,' says Elizabeth Sowell, one of the USA's top researchers in the area. 'Now we are bowled over by what we discover about the teenage brain every day.'

So, it is the brain, *not* hormones, that is behind the baffling behaviour of teenagers. Research has shown that the teenage brain is a giant construction project. In fact, the changes taking place in the brain at this time are so great that adolescence may be as important as early childhood in terms of brain development.

The teenage brain may be maddening and muddled but it is also amazing. After all, it is the teenage brain which begins to grapple with complicated ideas such as honesty and justice. It develops empathy, the ability to understand other people's viewpoints. It also has to absorb huge amounts of knowledge and develop independent ways of thinking.

'I love teenagers,' says one woman with two grown-up children. 'I like their ability to think for themselves, to argue and get excited by ideas. Most of all, I like the way I can learn from them!' Perhaps this view, and the knowledge that the adolescent brain is still growing and changing, will give some reassurance to teenagers like Lisa, and to parents like Steve and Ellen.



The human brain

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