

Biology Assembly

Welcome back to school. I hope you had a restful, relaxing and enjoyable half term break. I would like to use this assembly to remember Biology Week, which took place just before the holiday. In that week we really celebrated the subject of Biology, and the extraordinary natural world in which we live. I would like to revisit the theme, and see whether I can add my small contribution to the various events and activities that have already taken place.

The science of Biology is the study of the extraordinary complexity that is life. Since they first emerged on this planet about 4 billion years ago, living things have multiplied, branched out and evolved into a staggering number of species, each of which contains a vast quantity of individual biological processes. No one knows exactly how many species there are, but the latest estimate is around 8.7 million. And it is further estimated that living species make up just 1% of the total number of species that have existed. 99% - over 5 billion - have already become extinct. What I love about Biology is that it is all about life. The ideas and processes studied in Maths and Physics could take place in a dead universe – a lifeless wind blowing on a dead planet would cause a rock to fall and bounce in exactly the same way as it does on Earth. There is a certain austere beauty about that, but the beauty in Biology is more accessible to me.

The basic concepts of biology are common to all species: the cell, the gene and the process of evolution. But the combination of these three leads to almost unimaginable variation. This morning I would like to celebrate the strangeness, the utter weirdness of life. In addition, we may find that animals have much to teach us about themselves and their extra-ordinary capacities. Along the way, we may also find some advice for life.

I would like to focus on just three species: sea squirts, slime moulds and birds of paradise. This is what a sea squirt looks like.



It is a relatively simple potato shaped creature that is found in every ocean on the planet, and at every depth of water. It is eaten in South Korea; unappealingly, its taste has been compared to rubber dipped in ammonia. The sea squirt has two openings to its body. It draws water in

through one, and expels it again through the other, filtering it to find food. The baby sea squirt is a little like a tadpole, swimming around to find a suitable rock on which to settle. When it has found the perfect spot, the sea squirt attaches itself and will never move again for the rest of its life. So far, you may consider the sea squirt and its life rather unremarkable. Well, consider this. Once the sea squirt has attached to the rock, it does something extraordinary. Having no further need for thinking, the sea squirt eats its own brain. The brain is reabsorbed into the body and the sea squirt lives the rest of its life without one. I don't know whether I am appalled or impressed by the sea squirt, but I think everyone in the room has probably met the human equivalent of the animal. That is to say, a person who has settled upon an idea or an opinion and feels no need to think any further on the matter. They might as well have absorbed their own brain. Human sea squirts, if you like.

The slime mould also has much to teach us. It comes in two forms, and both provide metaphorical guidance for our lives. This is a slime mould.



The first kind of slime mould is a single celled organism, by definition brainless. These single cells move around the forest floor, feeding off decaying wood. If the ground remains moist and there is a ready supply of wood, then all is well. However, if

circumstances become adverse, the slime mould does something remarkable. The single cell organisms come together in a swarm to form a much larger multi-celled creature. This creature is able to move around by itself, reproduce and engage in complex behaviours to ensure its survival. When difficulty passes, the slime mould breaks up again into its individual components. I was recently reminded of the slime mould at HMC conference, observing the behaviour of my fellow heads of private schools. Schools generally move around independently, rather brainlessly doing their own thing. However, when threatened, they can merge to form a super organism that is capable of more sophisticated behaviour and can defend itself. Then it falls apart again. There are plenty of other examples of human slime moulds, where only external threat or challenge will prompt passive individuals to be willing to work together to become more complex and thoughtful.

The other kind of slime mould is even more remarkable. In this animal, there is only ever one cell. However, that cell can be enormously large. It spreads itself out in a fan shape, searching for food. When it finds a food supply the slime contracts to form a single thread, which connects up the various food sources to move nutrients around the single cell. Here is a clip of a slime mould doing just that: <https://www.youtube.com/watch?v=GwKuFREOgmo>.

The remarkable thing here is what this mindless single celled organism can achieve. The picture you see on the screen is of a slime mould eating flakes of oats. However, look at it again. These oat flakes have been arranged to mimic the location of railway stations in towns around the Japanese city of Tokyo. Tokyo is represented by the large central lump of food. The threads the slime mould has made to connect the oats take exactly the same routes as the paths of the real railway tracks between the stations. Somehow, a mindless blob of jelly has reproduced the best efforts of Japan's railway engineers to achieve an efficient network. Somehow, we find that complex behaviour can be mirrored and modelled by the repetition of the simplest processes. In other words, keep getting the little things right and you might just find that you have cracked a bigger problem that you never thought you could tackle. Let the humble slime mould inspire you.

Finally, I would like to share a short film on the mating rituals of birds of paradise. These magnificent birds live on the island of New Guinea; their displays to impress and attract their mates are remarkable. Let's see them in action: <https://www.youtube.com/watch?v=nWfyw51DQfU>.

From this, I take five pieces of advice for you. First, if you want to attract a mate, tidy up. Second, if you see the one that you want, give a wholehearted effort to attracting them. Third, bringing a bit of bling to the party will do you no harm. Fourth, you might make yourself look a little silly in doing so. Finally, even your best efforts may sometimes go unrewarded. Never mind, pick yourself up and try again.

Biology and nature have much to teach us, about themselves and about ourselves. Let's open our eyes to the beauty of the natural world and enjoy, as much as we can, its study.