

#### Section 4

In today's lecture, I'm going to be talking about microplastics.

Microplastics are tiny pieces of plastic (1) ..... Recently there's been a greater awareness that there are large quantities of plastic waste — big and small — in the environment. (2) ..... in the oceans has received widespread attention, but far less is known about the effects of microplastics (3) .....

Microplastics can enter the environment via a number of different sources. Threads and microfibres (4) ..... every time they're put in a washing machine, and these find their way into the water system. Other sources include big pieces of plastic waste (5) ....., and these break down into microscopic particles over a period of time. (6) ....., factory waste is another route, as are tyres which wear down as cars, lorries and so on (7).....

We already understand some of the impacts of microplastics from studies (8)..... There is evidence that microplastics harm small creatures in a variety of ways, such as by damaging their mouths, or by impairing their ability to feed, for example when microplastics (9) .....

Surprisingly perhaps, it is likely that (10) ....., as these have been detected in a wide range of food and drink products, including bottled water, as well as in water that comes direct from the tap. What's more, (11) .....

have also been found to contain microplastics.

However, it's important to underline that there is not yet conclusive proof that microplastics (12) ..... In many countries, including here in the UK, there is legislation which prevents manufacturers from adding plastic microbeads to shower gels, (13) .....

It is very difficult to accurately estimate the total amount of microplastic particles in the soil as (14) ....., but we do know they are carried in the air and deposited in the soil by rain. What's more, (15) ..... used by both farmers and gardeners contain microplastics.

A team from the Anglia Ruskin University in Cambridge has carried out a study of the effects of microplastics on (16) ..... These worms, which live in topsoil, are an essential component of our agricultural system. By feeding on soil, (17) ....., thereby making it more fertile.

The researchers (18) ..... whether the introduction of microplastics into the soil — and the subsequent ingestion of these by earthworms — would impact soil quality and (19) ..... The short answer was, yes, it did. After placing three different types of microplastic particles into the soil, they planted (20) ..... The particles of microplastic, which included (21) ..... and conventional high-density polyethylene, or HDPE, were then ingested by the earthworms in the soil. The result was that the worms (22)..... What's more, a lower percentage than normal of the rye grass seeds germinated, and the researchers concluded that this was (23) ..... of the earthworms being unable to fulfil their normal role in (24)..... The team also discovered that there was an increase in the amount of acid found in the soil, and this was attributed mainly to the microplastic particles from (25).....

The conclusions of the study make for very interesting reading — I've included the reference in the notes to give you (26) ..... To summarise, the authors proposed the idea that we need to regard soil as we would regard any other process in nature. This means we should (27) ..... soil being dependent on decaying and dead matter constantly being passed through the bodies of earthworms. That is, when soil becomes impoverished by (28) ....., not only ecosystems but also the whole of society are negatively impacted.