

Why do we eat what we eat?

Let's imagine, as a thought experiment, that the world as we know it ends. There's a global catastrophe. Civilisation has collapsed and the vast majority of humanity has died. But you've fallen in with a community of other post-apocalyptic survivors.

What now...?

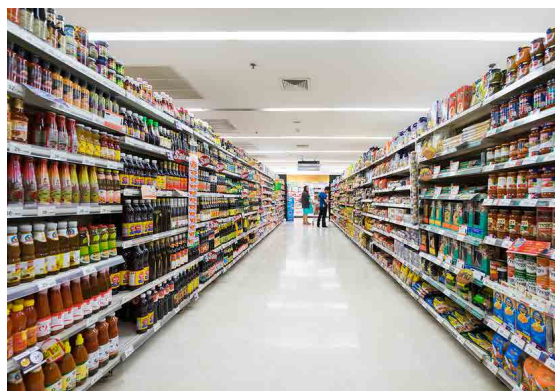
What science and technology would you most need to know -- not just in the immediate aftermath but in the long-term, to go about rebuilding a new society for yourselves from scratch? Could you reboot civilization? What would be the one book you would want handed to you as a post-apocalyptic survivor that told you all the most important knowledge from history about how to make and do things for yourself?

This is the book that I've written. The conceit behind *The Knowledge: How to Rebuild our World from Scratch* is that it's a quick-start guide to civilisation itself. As a scientist, I wanted to explore all the behind-the-scenes fundamentals of how our world works, and what discoveries and inventions enabled civilisation to advance over history. I thought the best way to explore how civilisation works and all that we simply take for granted in our modern lives was to imagine that suddenly none of it was there any more. In this article, we'll focus on food – why do we eat what we eat?

Early days

If the majority of humanity were to suddenly perish, the survivors won't need to immediately begin making everything they need. There'll be of stuff left lying around from the dead civilization. There'll be a 'Grace Period' during which the survivors could forage for what they need.

*The end of civilisation
– from the movie
Resident Evil*



Help yourself before someone else gets there.

With food, you're not going to need to start farming straight away. Simply go into a supermarket and help yourself to all the preserved food lining the shelves. How long do you think a single supermarket could support one person? To work this out, I multiplied I together all the food stocked in an average supermarket and dividing it by the amount you would need to eat per day to stay alive. And the answer comes out that a single supermarket could support one person for 55 years!

The fundamental point I'm trying to make here is that the reason all of us living in the developed world today no longer fear starving to death is that we've developed technologies to effectively preserve food. We developed the canning process in the early 1800s, and later learned how to exploit the gas laws to create little pockets of artificial winter in a refrigerator. This preservation and stockpiling of food has enabled us to build modern civilisation. We worked out how to stop bacteria or mould eating our food before a person was ready to eat it.

Fancy a drink?

Ensuring clean drinking water will be another of your top priorities. How can you use science to know for a fact that the water you are about to put to your lips and drink isn't going to kill you -- that it's not contaminated with typhoid or cholera or other waterborne diseases? When you're scavenging through the post-apocalyptic world, all you need to do is to find some ordinary kitchen bleach, and if you dilute this down enough -- DO NOT DRINK CONCENTRATED BLEACH! -- you can use it to chemically disinfect water. Diluted swimming pool chlorine will work just as well. These are the chemicals sodium hypochlorite and calcium hypochlorite. Chlorine will kill germs in the water, to make it safe for you to drink, in fact, municipal tap water is disinfected using chlorine.

But there's an even simpler method you can use to disinfect water. This technique is known as SODIS, or solar disinfection. Put your suspect water inside an empty plastic bottle, and leave it out in the sunshine. The water is very shallow, so ultraviolet rays can shine through and kill any microbes. A day or two later the water will be safe to drink.

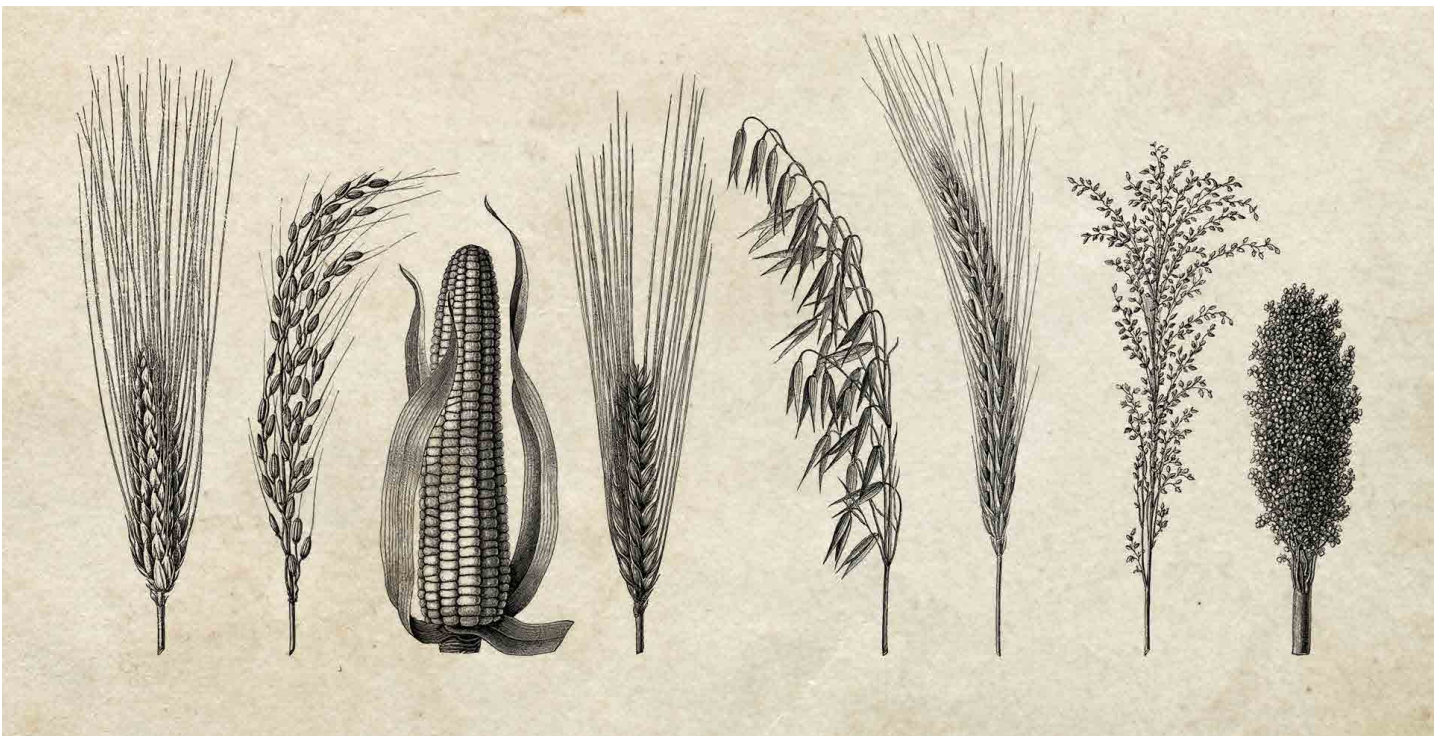
Alongside food and water, fire has been a fundamental part of the modern human lifestyle. Amongst other things, it is used to cook our food -- again, to kill microbes so that we don't get ill.



Solar disinfection of water, seen here in practice in Indonesia

Get growing

As the Grace Period draws to a close, and you've eaten all the canned food left lying around, you're going to have to have worked out how to grow your own crops. And it turns out there is a really deep, fundamental question about everyday life. Why is it that every day of our lives for breakfast we munch a slice of toast or bowl of cereal -- we eat wheat, rice, corn, or oats? And not just for breakfast -- these are the staple crops for all our meals. Why is it that over 10 000 years ago with the very beginnings of agriculture our ancestors chose to cultivate these crops, rather than the thousands of other plant species in the natural world?



Let them eat grass -- a selection of cereal crops.

These are all examples of cereal crops -- the most important group of plant species throughout human history. Wheat, rice, and maize have supported every civilisation across Europe, Asia and the Americas. The fact that cereal crops serve as staples means that throughout the history of civilisation, humanity has supported itself by eating grass. The cereal crops are all fast-growing and nutritious species of grass. We are no different from the cows or goats or sheep that we leave out to pasture.

But humanity has a problem. We didn't evolve with multiple stomachs like a cow to be able to effectively digest that grass, so rather than applying our stomachs to the problem, we've had to apply our intelligence. The two most important inventions for helping us digest grass have been the water wheel and the windmill.

These are ways for harnessing natural energy sources: hydropower and windpower. The crucial part of both of these is the pair of cylindrical slabs of stone -- the mill stones -- that are forced to turn over each other. We put our grain in between them and grind that down into flour. We then take the flour and we bake bread with it, using fire to help break down and release the nutrients. The millstone is like a technological extension of our own molar teeth -- it does the same thing as our own bodies but much more effectively -- and the oven that we use for baking bread or the pot we use for boiling rice is like an artificial stomach that we use to help release the nutrients for our bodies.



Save your muscle power -- use a windmill.

An instinct for preservation

Growing crops to eat is only the first problem. You then need to preserve that nutrition to stop it decomposing before you're ready to eat it. Humanity has used a variety of strategies. You can dry grain to stop it going mouldy, and a similar trick works well for thin slices of meat. Salting also works well. For fruit you can turn it into jam, with a high sugar concentration, and pickling with high acidity is good for vegetables. In all of these preservation techniques what you're essentially doing is modifying the environment within the food so that bacteria or mould cannot grow, but the nutrients remain for human consumption -- by making it too dry or too salty or too acidic for microbial survival. And there's a really interesting reason why we preserve with high acidity (i.e. pickling) but never high alkalinity: alkalis cause any fats in food to turn into soap, which would taste awful.

So the next time you bite down into a juicy burger, complete with a wheat-based bun, pickled gherkins and sweet ketchup, think about the thousands-of-years-old technologies that it represents!

Prof. Lewis Dartnell is an astrobiology researcher at University of Westminster, and author of The Knowledge.

Look here!

Lewis Dartnell is author of *The Knowledge: How to Rebuild our World from Scratch*.

You can explore lots of videos, articles and how-to guides, and buy the book, at www.the-knowledge.org

