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### Mining for Minors: a Young Person's Guide to the Earth's Riches

By **Roger Burt**

It is a simple fact that everything we have – everything that people make – is made out of something that is either grown or dug up. We can have wooden houses, grass skirts, leather jackets – or brick houses, concrete roads, steel nails, aluminium saucepans etc.

From the earliest cave men onwards, people have been trying to make use of more and more things that are extracted from the ground (minerals), starting with the 'stone age', going on through the 'iron age' into the 'steel age' and today in the 'plastics age'. For thousands of years they were very limited in the number of different minerals that they could use, being largely confined to simple and slightly shaped stones and flints. However, gradually people noticed that the effects of fire and heat could 'release' metals from the stone that they were held in and that these metals could prove very adaptable for use in tools and weapons. 'Bronze' weapons, made from copper and tin (s)melted out of the rock proved much better than simple stone hammers and everyone soon wanted them. Iron was even better but it needed much higher temperatures to smelt it and it wasn't until much later that people could make it – and even when they could, it was difficult and expensive and most tried to use something else or minimise how much they used. So even though it was invented at the beginning of the 'iron age' around 4,000 or 5,000 thousand years ago it wasn't used in great quantities until about 300 years ago. Until then, wood and other grown products provided the raw material that most people used.

It all changed around 1700 with the discovery of new ways of smelting metal – copper, tin, iron - using coal. Before that they had to rely on charcoal, made from wood, and it was getting very expensive. But coal was cheap in England, Wales and Scotland and we had a lot of it. It was fairly easy to dig up and could be got to towns and industries without too much trouble and expense (particularly when they had the idea of digging canals to float it along on barges). Very quickly there was a great expansion of the production of all of the metals, particularly iron, and they were used to make the machinery and build the factories and towns of the industrial revolution. Without all of the new, and cheaper, metals there could not have been an industrial revolution. But things didn't stop still. Around 1860 the iron makers developed new ways of making steel from iron. Steel is much harder and better for most purposes than iron, and soon nearly everyone was using it. It enabled them to build bigger buildings and bridges and to make stronger and faster tools and machinery. Today most of the metal that we use – for cars, fridges and chairs etc – is steel. The metal makers also began to discover how to

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extract more, unusual metals from their rock or ‘ores’ – such as manganese and tungsten – and how to combine them with steel to make it extra hard. These ‘alloys’ could be used for making special cutting tools – know as ‘machine tools’ - and making protective armour for battle ships. Once electricity became available at low prices, aluminium began to be produced in very large quantities and became a major new construction material for everything from large constructions to pots and pans.

At the same time that the metal makers were getting better at what they could do, and how cheaply they could make things, the ‘quarry’ industry was getting better and bigger at producing stone, gravel and cement for building. The slate quarries produced the material to cover the roofs of all of the new houses that were being built and the china clay pits produced the materials to make tiles, pipes, basins and toilet bowls. The pottery industry also made the goods to go in the houses – the cups, plates and dishes. Large quantities of sand were dug up to make glass for windows and jars and salt pits produced a product that was essential for a wide range of activities, from chemicals production, to pottery and cooking. The very big cotton and woollen cloth making industries also used lots of alum and potash produced from mines and quarries in different parts of the country.

But the most important new development of the 1870s, 1880s and after was the production – not by mining or quarrying but by drilling and pumping – of oil. Not very much was found in Britain but soon a lot was being produced in other parts of the world. It could be ‘refined’ to produce oil or petrol to use in engines, but it could also be used to make ‘plastics’. Slowly at first, with artificial fibres like rayon to use in making clothes, it began to show how useful and versatile it could be and then, from the mid-twentieth century, lots of different plastics began to be evolved and are probably the most common material that we all use today.

So while cave men had to live for thousands of years in the ‘stone age’ and their successors for thousands of years in the ‘bronze and iron ages’, we are lucky to live in the ‘steel, aluminium and plastics’ age with thousands of different machines and gadgets which make our lives so much easier, safer, healthier and happier. Without digging stuff up, we would have none of them.

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Dr Roger Burt is Professor Emeritus in the History Department of the School of Humanities and Social Studies, University of Exeter, UK