CHEMICAL CITY

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PART THREE

ICI AND THE SENSES

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Chemical City

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PART ONE

SYNTHETIC BEGINNINGS TO FUTUROLOGY

SYNTHETIC BEGINNINGS

Synthetics are the technical wonder story of the last 150 years, in a chemical and industrial sense. In this area of Teesside, as elsewhere in the world, the quest began in the nineteenth century to produce synthetically things that were available in nature but lacking for one reason or another. Perhaps supplies were absent, if only temporarily, or it was realised that it could be cheaper to cook up substances in the laboratory. Maybe it was desirable to attain substances in more controllable ways, or it was deemed right to make more stable forms, or given quantities at will. Perhaps the synthetic versions were more effective or useable than their natural counterparts.

And so, it is not that synthetics were understood broadly as inferior, second best to a natural source, but rather, and increasingly, and perhaps still today, though the tide is turning, they were seen to be better than their relations that existed in nature. More and more synthesis got underway.

There is a history of synthetic production in Billingham, at Wilton in Teesside, and at other sites nearby, and it is a history that goes back before the First World War. The chemical industry of the nineteenth century here, as elsewhere, was concentrated on two products, textiles and fertiliser. These outputs clothed and fed bodies, the increasing numbers of bodies, urbanised, massified, industrialised and modernised bodies. Textiles and fertilisers angle chemicals towards life and living, warmth and food. In the early days, matter to be collected and processed to these ends of gaining the stuff for clothing and the stuff that encouraged the growth of food included sulphuric acid, alkalis, soap, dyestuffs and fibres. It was the work of the twentieth century chemical industry to extend the availability of this stuff by producing synthetic versions or substitutes. Its task was to generate more cheaply, more quickly, chemical compounds that could do the necessary work for processes in the textile and fertiliser industries – and their spin-offs, such as explosives. Through synthetics, reaction times might be optimised, processes scaled up and more. This was a work of speed up and of overcoming time and space. This was the work of the company Imperial Chemical Industries (ICI), which came into existence in 1926, following the merger of Nobel Industries Ltd, Brunner, Mond and Company Ltd, the United Alkali Company, and the British Dyestuffs Corporation. These companies combined to make a beast of many parts. Thousands of people were employed in the various sites in five main product areas: alkali products, explosives, metals, general chemicals and dyestuffs. Production of textiles and fertilisers in time was supplemented from the 1930s by pharmaceuticals, a development from the dyestuffs industry; and by fully synthetic fibres, such as nylon and polyethylene terephthalate and, in addition, by thermoplastics.

ICI was a culture, a body of workers and plants and managers and social lives. It strode a world and it was entangled in its localities. The company magazine reflects all this. In these years of the 1930s and 1940s the company magazine, *ICI Magazine*, shows its concerned face. A body of workers must be trained, in health and safety procedures, for the most part, and photography will be used to offer lessons in how to operate around toxic chemicals, at heights, in proximity to fire. In return, the company will run football teams and social clubs, and in time, there will be medical centres and housing. And the workers will be invited to show how they have learned to look, through photography competitions, and they will be congratulated on their modest achievements in hobbies, their marriages, their births and commiserated at their deaths.

I am not presenting something systematic here. I have been working through materials, histories, companies' histories and self-presentations predominantly, in order to build up a picture of ICI, in particular, and in the context of the chemical industry more broadly. I want to lay out some of the themes that have come up, ones that recur and ones that shift over time. Is it possible from a context of heavy industry and material processing to stimulate poetic and creative thinking around the ways in which our lives and the lives of those who went before us were enmeshed with synthetic chemicals and the dreams that seem to ooze and seep from them as by-products? There is something specific about synthetics, about the synthetic chemical industry. Close by, intermeshed within the chemical industries of Billingham and Wilton, there is the production of steel and heavy engineering, beneficiary of the iron found in the Cleveland Hills that overlook Teesside, and a little further away in Tyneside, there is shipbuilding. These industries have something grand-scale about them – they make vast things, bridges that span the harbours and rivers of the world, ships that float across the seas, bigger than any building. But chemistry, the synthetic production in this area, made barely things, gases, chips of plastic, stuff to make dyes and paints from, small things, but then they were small enough to find their way everywhere, to distribute themselves like atoms or fleas and accumulate, forming environments, more or less perceived, clothes, the fertiliser in the soil in which our vegetables grow. At one time, Billingham, Wilton and North Tees held the biggest concentration of chemical plants in the world and there were so many things produced from the chemicals made here that the world of a certain period was saturated by matter from here. Cyanide from Billingham mined gold in the Arctic, in Australia and South Africa. Products were sent from here to Argentina, India, China, everywhere. Plants were built. Products were received from the whole world too. And all this is part of a competition that is vast – the German competitors had to be smashed in war and their markets taken. But there were always more competitors – Italians with their alkalis, the Japanese with non-ferrous metals. Nothing can rest. Reactions and catalysts are constant. What counts as the centre of the world? Teesside could – in the striking diagrams ICI promulgated for trade fairs and in its company magazines. At least for a moment. And are not these diagrams in which the North East of the UK sits at the centre of the region, the country, the world, another type of synthesis? A synthesis of ideas, of concept, of world view.

One of the most striking things that occurs in reading *ICI Magazine*, as it developed into the 1950s and 1960s, is its harnessing of the sense of colour, its visual boldness, its dramatic design. It represents an image of a world that is beautiful, from its factory interiors and exteriors, be they in Billingham or Brazil, Singapore or Welwyn Garden City, a world that is vast and where trade flows easily across borders, and synthetics beautify the world and produce abundance, fertility, more beautiful fabrics and wallpapers and coatings, and chemicals that promise modern worlds. Had DuPont, the US chemical company, not taken the slogan already, ICI would claim to deliver 'Better Living Through Chemistry'.

This story is one to explore in this context of Cleveland, because it is the very landscape that is crushed and melted and blasted and exploded, in order to bring about this new chemical world of synthetics. The region's plentiful deposits of coal and iron ore and minerals such as anhydride seemed to seal a fate. The landscape produces an economy, a social system, a mode of life and everything associated with that, even if that landscape is transformed beyond recognition. It is a place ground up and reconstructed by science and technology and then exported across the country and across the world, finding its way into people's homes, onto their bodies, into their bodies – if we think of fertilisers – and resourcing more abstract imperceptible chemical transactions that are crucial to industry. The Billingham site on the north bank of the Tees river lent itself to this process by its very features that have swirled and buckled for millennia: its water that gave good access and plentiful supply for industry, its coal for heat and transformation, its seam of the mineral anhydrite. But it is not just a landscape that remakes a world synthetically. It has to be coaxed and fought. Who does that? There was a workforce – there is a much smaller one now, shaped by this industry, dependent on it to reproduce itself. By 1965, ICI employed 29,000 workers in its Teesside plants.

The area, its families, those drawn in from across the region and the country and beyond, thrived from this production in the postwar period, when state-subsidised investment helped modernise manufacturing, and in the so-called white heat of the technological revolution, roads, schools, health facilities and homes for workers were built, but only if these met with the needs of ICI. There was council housing built around Wilton, for example. It was a company that looked after its workers such that women wearing nylon tights, made from ICI products, could be compensated if the acids and alkalis on the ground at the plant splashed onto their legs and burnt holes. But at the same time, this way in which these chemicals helped remake a world and all its contents, it was also a company whose workers at Wilton, processing Terylene, turned yellow from their contact with the dyestuff.

Industries develop over time, like strange beasts one thing leads to another. What led to this chemical combination? The factory at Billingham was established to produce synthetic ammonia for war purposes. A farm, Grange Farm, in the village of Billingham-on-Tees, was chosen for the chemical works, where ammonium nitrate was to be produced in what was originally known as the Government Nitrogen Factory. The Germans had synthetic ammonia – having developed a process to fix

it from nitrogen in the air – and it was used to make explosives for war. Britain wanted some too and needed to work out how to deploy the same process. Submarine blockades meant that the British state was unable to import natural nitrates from Chile.

Research took too long and the goal was not reached before the armistice. Brunner, Mond took over the factory and continued research, eventually copying, or synthesising, the German ammonia plant at Oppau, Ludwigshafen. As well as ensuring Britain had a supply of explosives from nitric acid, should they be required, ammonium sulphate was to be produced as plant fertiliser. The land offered itself up to this production – it opened an important chapter in synthesising materials. That chapter does not close, even if factories do – it produces history, affinities, precedents that shift over time.

The bold colours, the saturated colours of photography, the vibrant diagrams of scientific process and trade routes alike in the magazines point out a hopefulness, a sense of sunshine eternal that seems distant now. What makes it distant? That the factories no longer produce jobs for life and that means a disappearance of that intangible commodity, if it is one, whose name is never far away, when talking of skilled manual labour of the recent past: pride. It is distant too because it might seem that many of those synthetic products are responsible for the toxicities that harm our planet and cause extinction and damage to animals and humans and plant life. We wake up to this damage, the damage of plastics everywhere and never ever decaying. But we also understand that there is a future for synthetics, that there is ingenuity in making things from other things, but responsibly and that may need to be done if there is nothing left of the original stuff. To make anything and everything by our own hands, by tricking nature, or outwitting it, remains also part of the image of utopia.

NATURE AND THE ELEMENTS

There is something elemental about industrial chemical production. Elemental in the sense of relating to or embodying a process of nature. The factory's blast furnace is like the heat at the centre of the earth, producing reactions, through immense heat bringing about chemical change. In this, it is a replication of nature in miniature. Billingham's mission was elemental, in that it was to take the elements and make something else of them, a form that holds within itself all the elemental power of nature and its capacity for production and destruction. The Billingham factory was created to turn air and water through the use of fire into explosives, to destroy vastly, and fertilisers, to produce exponentially. The process is repeatedly described in the various issues of the company magazine. In May 1954, a description of ammonia for processes producing nitric acid, ammonium nitrate (some of which is used for blasting explosives), urea for plastics and the nylon produced by the Billingham factory of Dyestuffs Division, describes it all as made of wind and rain. The fire is described elementally here too: at Billingham coke is made. Drivers ram it from the ovens and the red-hot lumps cascade into a truck,

to be quenched with water. ‘Hissing, billowing clouds of steam roll skywards – a delight to the spectator.’[1] This delight is nature in transformation into something synthetic. It does not stop being nature. It is nature augmented. It is nature synthesised.

Inside tall steel towers, in the making of ammonia, reactions are triggered by catalysts as nitrogen is seized from the air and hydrogen taken from water. In the process, large quantities of carbon dioxide are removed from the mix – this is used further for making ammonium sulphate, but some is solidified and turned into dry ice – marketed by ICI as Drikold – a coolant, a solid frozen mass that is as if the snow of the landscape, the foggy and cold air had been solidified and made into something usable, controllable – a coldness that can be conjured at will to keep fruit and flowers fresh-seeming, to allow fish to travel to distant markets, to make the artificial snow needed for artificial ski slopes. Drikold was made on Teesside and in its early days, it was a product used for cloud seeding, for the control of the elements, for the control of weather. The clouds were seeded over Teesside with Drikold for the first time. New clouds, synthetic clouds, were made here in 1931 and caught on film.

And if attention turns here to the skies above Cleveland, what did the landscape’s interior offer up? In an illustrated article in *ICI Magazine* from October 1951, a vision of the Billingham underworld was painted. Eight hundred feet beneath Billingham existed a maze of tunnels, divided by 5,000 broad pillars of rock and abuzz with electric trains and diesel wagons, criss-crossing 200 miles of well-lit roads arcing up and downhill in pursuit of the seams. The mine is a square mile, a square mile of blasted rock, whose relation to the abstract transactions of the square mile of the City of London, where finance is concentrated, is certain, but difficult to grasp. To reach this underground city, each miner draws a numbered brass token from the clerk at the pithead office and hands it to the banksman as he enters the cage. Here, beneath the ground, is a hell of production, with exploding gelignite, noise, smells. The magazine article describes the scene in mythical terms: when the shot is fired it is as if a furious giant slams the Gates of Heaven, as a vicious sheet of sound whips through each miner’s body. This works is for the mining of anhydrite, 19,000 tons a week of which is hauled to the surface to feed the plant. Anhydrite means ‘without water’ and so next to the sea and river sits a mass of rock that lies where the sea once was and is now evaporated. This calcium sulphate or dehydrated gypsum gives up its calcium for cement and the fertiliser Nitro-Chalk. Its sulphate goes into sulphate of ammonia, another fertiliser and into sulphuric acid, hydrogen sulphate. From beneath itself the factories’ main products are extracted. And the world should smile for, we are told, cement is in short supply, fertilisers are essential for growing grass to feed the cows and replace the animal food which we cannot afford. Sulphuric acid is valuable in the context of a world sulphur shortage.

We have been thinking about matter, materials, what this mineral is and what it can become. I want to say some more about matter.

[1] All quoted matter taken directly from *ICI Magazine*, which was published 1928–87.

MATTER AND MATERIALITY

ICI, like other chemical companies, explored matter and its properties. This matter makes histories, or changes history, changes the world and what the world is and has within it, in being changed itself or in initiating changes. The matter here in this location of Cleveland extends from the solidity of rock to the abundance of liquid water to the gaseous air and beyond – and it lent itself to certain uses. This matter made certain arrangements possible and played its part in shaping what could be made. Transport systems brought other substances into the area or transported stuff out and across a corporate body so more and more small bits could link together in chains to produce larger things that became ever so necessary to the world, where once they had never existed, or not in that form. What were the materials that emerged from ICI at Billingham and Wilton?

Plastics were an important part of the production here. These come now always under the dark sign of being cursed as an imminent waste, after use, that will never waste away, a toxic surplus that refuses to die. It is indeed the case that they are born of waste. Crucial to the bringing of thermo-setting resins and plastics to market was the availability from the 1920s onwards of urea and methanol, which is a feedstock for the production of olefins – ethylene and propylene – for these were waste by-products of the ammonia synthesis process at Billingham. There were plastics of various sorts over the years, some of which had brand names that passed into popular lexicon. There was Perspex for one. This was an acrylic plastic material, invented in 1932, and designed for cockpit covers and gun turrets for military aeroplanes. It also found a use in economic modelling in the 1940s, in a field of hydraulic macroeconomics. Economist William Phillips built out of Perspex and a hydraulic pump salvaged from a Lancaster bomber the mechanism for a modelling of economy by 'fluidic logic' in 1949 with his MONIAC (Monetary National Income Analogue Computer), or Phillips Hydraulic Computer or the Financephalograph. Plastic pipes and tanks named after parts of the economy hung off a two-metre-high wooden board, as differently coloured waters cascaded or pumped from one part of the mechanism to another through sluices and troughs: flowing out to health and education, savings or investment, pumped back up to the treasury as taxation at varying speeds. In this way, a kind of Keynesianism in Perspex imagined the economy, a circulating and managed system, like the civically maintained pipes of a city connected to bathtubs and reservoirs.

If economics could benefit from the thermoplastic's ability to model any shape, resist fluids, be robust and unobtrusive, it was also the case that home economics could benefit too. In the ICI magazine from April 1957 an Ideal Homes exhibition kitchen is displayed, with its Perspex elements, along with Darvic PVC and nylon. There were also Alkathene housewares displayed in the shop window, brightly coloured polyethylene products, first released by ICI in 1939. And if proof were needed that these vibrant materials promised not only to stimulate the new lives that might be led amongst synthetic products, it was also the case that they themselves possessed a certain liveliness, at least a commodity fetishised liveliness.

The *ICI Magazine* from July 1957 gives details of the animated advertisement *The Alkathene Circus*, directed by Etienne Raik, shown in 700 UK cinemas from June to November of that year, in which, as the magazine copy puts it: 'gaily coloured cups, saucers, salad-shakers, kitchen brushes – 200 "Alkathene" objects in all – appear to be endowed with a life of their own'.[2] One product, Perspex, could move from war-designated uses to home use. Such a pattern occurred again and again. There was Holoplast, for example, made from raw materials from Billingham as an inflammable panel for partitioning in war ships. Made of Kraft paper doused in resin and subjected to heat and pressure, it found uses in schools and other buildings as internal walls and workbenches. It even became external walls and so marked out the separating spaces of the modern world. This panelling of laminated plastic once furnished with a scratch-resistant, polished mahogany finish and a thin band of aluminium had been heat-shrunk around its perimeter to cover the honeycomb edge of the surface was used in the late 1940s by furniture designer Ernest Race to make tables, which defined, with their tapering legs and light colours, the lighter design of the contemporary post-war look.

Another key product from ICI was developed in 1941. It was polyethylene terephthalate fibre, known as Terylene. Billingham provides the raw materials of paraxylene, ethylene glycol and nitric acid to make a substance that forms hard ivory-like threads, which will be melted, extruded and drawn into fibres by the plastics division. So successful would this plastic fibre be, and was determined to be, that a huge new factory was built at Wilton, opening in the 1950s. Here Terylene could be spun, by feeding chips of Terylene polymer, into melt heads, and then forcing them out under high pressure through spinnerets which are steel plates perforated with tiny holes. The streams of molten polymer cool into fine threads, which are then combined into yarn and wound onto bobbins. Processes keep elasticity in the threads, as they are twisted together. Once Terylene appears in the world, the visibility of synthetic life increases dramatically. Terylene makes clothes. Terylene sells itself through fashion, through the photographs of models draped in Terylene, there to be looked at. Terylene is a wonder stuff. It was a material under research for war purposes in the early 1940s. But when it came, it was not for a world of struggle but of ease. Terylene negates work – 'no ironing' states *ICI Magazine* in August 1950, and endlessly again after that and in countless adverts. The pleats are permanent. Terylene never dies, but fashion does, so there will always be the need to buy more. Graphics and photographs in the magazine, for example, the one in the November 1956 edition called 'Round the Shops', show examples for men and women and children. The clothing is bright, garish even, the colours unmodulated, homogenous, never fading, colours on evenly woven never-creasing or deliberately permanently furrowed fabrics.

But Terylene is not just for fashion. Terylene's fibres tie the whole world together, as it finds its way into garments, underwear and lingerie, shirts, ties, blouses and electrical cords, chemical filtration nets, ropes and cords. Terylene net curtains are resistant to sunlight, to the damaging effects of wash and wear. Unlike stretchy

[2] *The Alkathene Circus*, Les Cineastes Associes, Etienne Raik (dir.), 1957, https://www.youtube.com/watch?v=Ij34YI13DSQ.

nylon nets, Terylene is crease-resistant and pleat retentive, for those last years when lives will be led behind synthetic nets. By 1958, according to the April edition of *ICI Magazine*, its price has fallen sufficiently that the 'poorest fishermen in India are trying out "Terylene" nets' and may decide its long life makes the extra cost worthwhile.

Fabrics will multiply – synthetic voiles, marquisettes, satins and taffetas will simulate a life led in luxury, on the cheap. But there is not only luxury. Ulstron came too in 1960, made from polypropylene, for more prosaic ends, as bristles and pan scrubbers, a competitor to nylon and natural fibres, and cheaper. And then there was Crimplene, whose patent ICI bought after its invention at the end of the 1950s. It was a heavy texturised cloth of polyester, an augmented Terylene. Its name was a pun. It nodded to the ICI headquarters at Harrogate, for the Crimple Valley was nearby. But crimp has the sense of folding or twining together. Crimplene was usually double-knit – two fabrics twined into one, thick, a real coating for the body. An advertisement from *The Observer*, 25 September 1960, condenses the sense in which these synthetic fibres contract into themselves all possibility in the world, they are magic weaves of multiplicity. Crimplene, it states,

> … looks pleasantly weighty, yet feels light as a feather. It feels soft, yet can take any amount of wear. It has all the plusses of 'Terylene'.
> Anything made of 'Crimplene' – however haute couture it is – can be washed at home (even in a washing machine) and hung out on the line to dry without losing its shape. No ironing. Sounds too good to be true. But it is true.

What can now be true in the world is not those eternal verities of old, but lab-made desire. And the 1960s will usher in – we are reminded in passing – for those who believe and who win – a world of domestic appliances, with their promised labour-saving, to allow the giving of more time over to our new beauties.

Crimplene came to be the material for working women's and men's going-out clothes. The colours were bright. It was easy to cut. It did not fray. It held its shape and could be dripped-dry. It was the stuff of A-line skirts, then miniskirts, of multicoloured men's shirts and slacks. It held a promise of pleasure and leisure.

Fabrics and fibres began their life at Wilton. At Wilton, a tall slender chimney stretched 200 feet into the sky with a pilot light at the top, the flare stack. At Wilton, thick black oil arrived from the Middle East, often passing through the Suez Canal, and some was taken for the olefin products, all those compounds made of hydrogen and carbon whose names end with 'ene', such as Ethylene and Alkathene, Propylene and Butadiene. Ethylene and Propylene are used as chemical feedstocks to fuel vast chemical reactions, but they were also material for other products. Ethylene was made into antifreeze for cars and as a building block to produce polyethylene, PVC, and styrene. Propylene found its way into paints and Perspex and plastics such as Polypropylene. Alkathene was used for polythene and Terylene. Butadiene was used for the Butakon range of plastics and artificial rubbers for hoses and shoe soles. We become plastic people.

BEING HERE

How do people live amongst this? What is it like to live in a landscape that makes or remakes worlds, synthetises environments, takes the air and water and makes it bright or pliable or hard and scratchy? How does the air smell? Can the gushing water be heard? What sounds escape? Does the way in which the time codes of nature are cracked, the ways in which the effects of time's *longue durée* are arrested by dry ice, or the processes that nature carries out slowly are speeded up under heat and pressure, feed into dreams and thoughts and self-image? There is a film, by an amateur filmmaker from the Cleveland Cine Club, called *If I film at 2fps…*, a speeded-up race through the streets of Middlesbrough to the north bank of the Tees, in order to reach the factory in time to clock in.[3]

And what other lives are lived here, adapting to the presence of synthetics? In March 1956, the *ICI Magazine* reported on the birds in the Tees estuary. They were coming inland, hanging around the factory. They were attracted, it was said, by the warmth of the air above the pipe bridges and the smell of ammonia. Well over a million starlings which 'make the night hideous with their piercing chatter' and leave droppings inches thick all around (ironically it was absence of that guano which encouraged the whole chemical venture back in the day). But in these times, the birds are shot. 'It is hoped', states the magazine, that 'that the shooting will demoralise the masses and drive them to roost outside the factory area.'

In the 1960s, some of the research at ICI was devoted to the making of aerosol substances and mechanisms. It was observed to be a growth area, with some 70 million aerosols consumed during 1963 by what are termed 'an ever more aerosol-conditioned public'. It is observed that by 1970 annual production in Britain is expected to reach 200 million, all this modification of air for insecticides, as was the first use of aerosols, and perfumery, cosmetics, polishes, hair lacquers, air freshening, mothproofing, lacquering, painting, pharmaceutical, veterinary or horticultural uses. The claim is made: 'the aerosol has become, and is destined to become still further, an indispensable adjunct – if not indeed a positive symbol of what has significantly been called the Press-Button Age.'

The Press-Button Age – an image of ease, of lazy transformation of environments, of a synthetic atmosphere in a can to be deployed at will, anywhere, anytime. If word is on pressing the button, might mention here also be made of the fact that already in the 1940s research at Billingham, under Maurice Hodgson, contributed towards the Manhattan Project of developing the atomic bomb.

FUTUROLOGY

In the company magazine from December 1959, there is a report on the full-automation of the anhydrite mine. These are signs to come. At first the harbingers seem good. The full automation will bring about an increase in leisure.

[3] *If I film at 2fps…*, Cleveland Cine Club, 1965, https://player.bfi.org.uk/free/film/watch-if-i-film-at-2fps-1965-online.

This leisure will be enjoyed in homes that are bright and beautiful and fully synthetic. They will need barely to be cleaned. Propathene, ICI's brand name for Polypropylene, can make everything in its image, from children's toys to cups and saucers, to hospital trays, food wrap and washing machines and suitcases. In April/May 1963, the magazine lists the 20 plastics in commercial production, the most important being acrylics, nylons, fluorine-containing plastics, Polypropylene, silicones, polyurethanes, polyformaldehydes, melamines, and reinforced plastics based on polyesters or on epoxies. Each is,

> available in many grades and formulations, and some in different physical forms such as liquids, lumpy solids, powders, granules, sheets, films, rods and tubes. Some are used as virtually pure materials, some have many different materials compounded with them to modify their properties (including their prices) – additives such as plasticisers, extenders, fillers, heat stabilisers, light stabilisers, antistatic agents, antioxidants and pigments. Some grades show subtle differences of physical forms such as different particle shapes or particle size distribution.

There is a world of plastics, making a plastic world. In May/June 1968, the *ICI Magazine* reports that people are becoming bolder in their relation to colour. The new bright colours, the light materials, have educated taste or are responses to new tastes. By May 1969, ICI is convinced it can play a role in 'Making Tomorrow Happen', as its article is titled. The contribution speculates on a future into which ICI should fit, or it should mould. It is the usual vision of more consumer-purchasing power, less work, higher quality of life, more automation. The article asserts:

> Nor should we forget that by 2000 AD nearly 16 per cent of the population (11 million) with leisure will be over the age of 60. Lightweight clothing, lightweight household objects, gardening tools, etc., will be very much in demand.

But the article's author was not ignorant of the negative possibilities looming. In the 1960s, there is more and more attention paid by ICI and the chemical industry to the role of computing. The author of 'Making Tomorrow Happen', Norman MacLeod, a chemical engineer, states:

> There is a negative side. Although the growing power of the computer to store knowledge about many aspects of an individual's life and history is recognised as being in some cases beneficial, misuse of this power would be an unwarranted interference with the privacy of the individual. For my own part, I believe that society must be prepared to resist such misuse.
>
> Another prospect also repels. The use of new drugs, which might be developed and might have the effect of enabling people's minds to be conditioned, would have to be rigidly controlled. We take measures to control certain drugs which, on balance, have a bad effect on people –

> such as heroin. We may have to protect society from the misuse of new technological developments in the same way.

It is time to turn to the negative sides of all this. In the December 1958 edition of *ICI Magazine*, a feature on 'The World of Toys' crows about the competitive advantage that toys made of polythene from ICI now have in the world, beating Germany, the great rival. It is salutary to think of these toys remaining young, as those who played with them grow old, and bobbing on seas that were never really meant for them and contributing to the plastic tangle that pollutes the planet. A recent newspaper article gives evidence of that:

> ARCTIC JUNKY Plastic Sugar Puffs toy from 1958 washes up in the Arctic 59 YEARS later to give a chilling warning about plastics in our ocean.
>
> The replica of the RMS Mauretania has washed up in the Arctic – 1,500 miles from Britain – after contending with huge waves in the powerful North Atlantic Current.[4]

Over time, the toys of an eternally bright childhood leak their being into the water. These things degrade over time, long times, even if they were born of speeded-up time. The Terylene garments that held their own wash after wash slowly give up their substance as they are subjected to slight shifts in humidity, the impact of oxygen or heat. They gather dust, more dust than natural fibres, for they are electrostatic. Greenhouse gases like nitrous oxide and volatile organic compounds are emitted by synthetic fabrics, as they age, as they are destroyed, as they sit in landfill. When they are washed, microfibres escape into the environment. These things break up. They start to return to what they have been, but their afterlives last for hundreds of years and so they only gradually get there.

The landscape, the sea, the air, now subjected to chemical loads, remains, but it is through plastics, through synthesis, an elemental background that evinces a memory and a storage capacity. Chemical cycles mesh with life cycles and exceed them. It all goes round and round and some processes end and sometimes nothing comes of it. That is chemistry. Mostly something comes of it, a process, if only for a while. Social, biological, chemical life coexists, co-develops, shapes and unshapes, forms and deforms, and not as an ongoing chain of progress but as a cycle, as repeated returns to the conditions that exist, to what can be done in the circumstances, given these elements, these people, but, also, and uncontrollably for us, these policies, this demand. There were flows here, still are, flows of chemicals, of money, of bodies, or materials, of traffic. There are visibly fewer of some of those things now. Ways of life unravel, but not fully. Like Terylene threads, the process of decomposition is slow and complex, productive and destructive. Remnants remain. That they remain can be a problem. Or it can be another starting point.

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[4] Holly Christodoulou, 'Arctic Junky Plastic Sugar Puffs Toy', *The Sun*, 20 December 2017, https://www.thesun.co.uk/news/5178336/sugar-puffs-plastic-toy-1958-warning-oceans/.

PART TWO

THE HIGHPOINTS AND THE LOW ONES – IN, OVER, AROUND AND UNDER THE CHEMICAL FACTORY

WHO IS MAKING THOSE CLOUDS?

The factories soared above the horizon. They poked into the clouds, which hung on them on dull days. They made their own clouds and fog too. Brown and grey clouds. These mingle with the clouds in the sky and with the fog on the ground. Fog and clouds imprint themselves onto countless photographs. For as long as the factories have existed, they have made the air thick. A photograph of the Ammonium Sulphate Towers in Stockton in 1971 shows a white haze over everything and grey clouds drifting out from the tall thin stacks.[5] You can tell which way the wind was blowing that day. The cooling towers make large fat clouds, white and thick. When the cooling towers of the ICI Lackenby Nylon plant at Wilton were demolished on 22 April 2012 at 11:30 in the morning, they gave out of themselves their final dense white clouds, spreading first from the base and then forced up through the crumbling tower itself – these drifted together into one great exiting cloud. The incinerator at Billingham uttered long grey clouds in the diminishing evening light. Photographic agency Alamy Stock has many high resolution photographs of ICI Teesside. The irony is that the high resolution shows largely a detailed rendition of blur. Where is the focus when there is nothing to focus on? The night-time photographs show deep grey clouds with orange halos around them, the factory illumination gleaming through. Sometimes the clouds are on fire.

The towers made clouds of gas and steam. These clouds made more clouds, or smogs. Smoke and sulphur dioxide derived from burning, for example, make condensation nuclei, or cloud seeds and these encourage condensation at ground level, which results in opaque fogs. But it was also the case that clouds were seeded in Billingham, that is to say, deliberate and real ones of rain. Or more accurately, the clouds that hung high above the land were prodded and supercooled and made to release their watery contents. A film made by the Billingham ICI Film Unit in 1931, titled *Weather Experiments*, documents the process of seeding clouds. ICI Billingham produced dry ice, whose brand name was Drikold. The film begins with a radio announcement of the weather forecast. Viewers see a meteorological officer listening in to the forecast from his living room. He switches off the radio so that he might convey to us the value of weather forecasts. He tells of how wind speeds are measured and wind direction monitored. Inflatable balloons are launched. Weather stations supervised. All this must be known so that the country can keep running what needs to be run. In this film world, men smoke as they read charts. And teletype data flows in. We see how nature works away and instruments measure it. But revealed here, in this film, too, is how the weather can be manipulated, the clouds formed by human ingenuity. Cylinders of Drikold are moving along a conveyor belt and packaged into bags. This Drikold is placed on aeroplanes that travel above the clouds. In this film, 300lbs of Drikold is released from the rear of

[5] Photograph of Ammonium Sulphate Towers (1971) by Fred Starr, Picture Stockton Archive, https://picturestocktonarchive.com/2014/12/10/ici-ammonium-sulphate-tower-1971/.

a plane, while inside the navigator records the atmospheric conditions and observes the location of the penetrated cloud. Its watery load streams down the windows of the aircraft. Rain has been made. ICI are weather modifiers. ICI can rule the heavens.

The experiments continued, or resumed, becoming part of military training, for sudden rainfall might bog down an enemy's movements or prevent the crossing of a river. Or a shower might clear the fog on an airfield or divert a storm system from the path it was on. Documents can be found that speculate on rainmaking possessing the potential 'to explode an atomic weapon in a seeded storm system or cloud', one made in just the required place. The thought continues: 'This would produce a far wider area of radioactive contamination than in a normal atomic explosion'.[6] In August 1949, ICI worked with the Royal Airforce to generate rain through seeding clouds. A Vickers Wellington TIO training aircraft, which was based at RAF Middleton St George, outside Darlington, flew three sorties with a crew to drop Drikold over the North East and the North Sea. HQ Flying Training Command observers were able to report on 'a good shower' at the cloud's base, on one flight, but, on the other two days, there was only a light drizzle that evaporated in the air. The experiments using Billingham chemicals continued and, on 15 August 1952, they may – some suggest – have caused a flash flood in Devon, in the village of Lynmouth.[7] Alongside from some hints in official documents, unofficial reports insist that aeroplanes were circling the area before the catastrophic downpour. Whose stories? Whose histories? Thirty-five people died, water poured from the moor into the village, sweeping away buildings and bridges. The Squadron leader joked that the efforts to make rain, called officially Operation Cumulus, was known to them as Operation Witch Doctor. From Billingham, a hell could be whipped up far down in the South of England. And a storm from precipitated clouds, heavy with dense particles that have been shot into its body, might drop its water load some hundreds of miles away. History is meddled with by nature. Nature is subjected to covert histories. A drought in the North East in the autumn of 1955 again raised the issue of bringing rain to parched land – for the problem had returned home. Billingham's ICI factory was threatened with closure and management required aircraft to spread its own chemicals in the skies above, so that they might go on making more clouds.

More clouds of what? Of ammonia, or its by-products for one from 1924. Ammonia was to make possible the feeding of the world, for one of its main uses was as a fertiliser for food production. Left to itself, or rather to what German scientist Justus von Liebig designated the 'robbery system' of agriculture, which in the name of economic expediency did not replenish nutrients in soil, the world, so stated chemist and physicist William Crookes in 1898, could never consist of more than two billion people and the possibility for endless expansion, new markets, new lives would be lost. A plant intended to turn ammonia into explosives in wartime could be easily adapted in peace time as a plant to foster plants, as was Billingham. This artifice was on the side of the living. Fritz Haber and Carl Bosch, a chemist and an engineer, developed processes to synthesise ammonia in Germany. ICI adapted these. Synthesising ammonia from atmospheric nitrogen meant feeding streams

[6] John Vidal and Helen Weinstein, 'RAF rainmakers "caused 1952 flood"', *The Guardian*, 30 August 2001.
[7] *Ibid*.

of steam and air into gas generators that contained hot coke-made water gas and producer gas. The streams were purified and catalysed, and compressed and scrubbed and washed and converted. Massive amounts of natural gas provide hydrogen. Great amounts of carbon dioxide is produced as by-product. How much energy was needed? How many jobs were made to undertake this action on air? Nature is captured and contorted and twisted into something akin to itself, but not quite itself, like a seeded cloud, made of humans, a relation of the wind and rain, but once or twice removed.

Nature is remade by factory labour. It is and is not itself. There is a rift. Nature can outbid its offering through augmentation – synthesis. Labour is remade by the nature that buffets it and by the factory that contains it. Earth is seeped with agrochemicals. Fertility is not natural abundance but a result of a supplementation made necessary by soil exhaustion – which provides profitable business opportunities. Air is snatched in and puffed out into again. This is the industrial cycle. The nature around the factory changes. Lives lived here to adapt the presence of synthetics. In March 1956, the *ICI Magazine* reported on the birds in the Tees estuary. The birds were coming inland, hanging around the factory. They were attracted, the article stated, by the warmth of the air above the pipe bridges and the smell of ammonia. Well over a million starlings, which, the report notes, 'make the night hideous with their piercing chatter'.[8] And they leave droppings inches thick all around. Ironically it might be noted it was dwindling supplies of those natural nitrogen-rich mineral deposits, made up of excrement, eggshells and the carcasses of dead seabirds – or guano – overly mined by indentured Chinese labourers and indigenous South American people, that encouraged the whole quest for chemical substitutes back in the early days.[9] But in modern times, the birds are a nuisance. They have adapted too well to this new nature. They must be shot. 'It is hoped', states the magazine, 'that the shooting will demoralise the masses and drive them to roost outside the factory area.' Nature is resettling out of place. It must be displaced.

Nature or what seemed like it caused havoc elsewhere too, as became apparent a few years later, when the effects on the air around Billingham were subject to debate in the House of Commons. On 29 July 1964, a debate is recorded in *Hansard*, under the title 'Atmospheric Pollution, Stockton'. Bill Rodgers, the Labour MP for Stockton-on-Tees, raised 'a matter of great concern' to his constituents and one that he and his predecessor had been concerned with for a long time. It was, he observed, 'a specific kind of industrial pollution', and it appeared 'in Stockton, and which is of a very specific origin'.[10] He goes on:

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[8] All quoted matter taken directly from *ICI Magazine*, which was published 1928–87.

[9] The fertilising power of seabird excretions was discovered at the start of the nineteenth century in Peru, and European chemists began a quest to analyse and emulate it in an environment in which soil fertility was depleting and the population was growing. An industry arose, unregulated, damaging to the labourers, subject to sharp practices in pursuit of the big profits, and a trigger of wars; it crashed only once the chemists had secured means to replicate the fertile power in the lab. For further information see: Ewald Schnug, Frank Jacobs and Kirsten Stöven,' Guano: The White Gold of the Seabirds' in Heimo Mikkola, *Seabirds*, InTech Open, 2018.

[10] All quotes relating to Bill Rodgers are from his speech 'Atmospheric Pollution, Stockton', *Hansard*, vol.699, 29 July 1964, https://hansard.parliament.uk/Commons/1964-07-29/debates/1e391867-c94b-498d-a5de-705194ab3109/AtmosphericPollutionStockton.

> At one time there was something which was known as the 'cat smell' on Tees-side. That appears to have been substantially dispersed, and what I am discussing is what is popularly known as the 'fish smell'. I cannot say that this smell emanates in such a way as to pass into my constituency alone and into no one else's. This I would regard as a rather single-minded exercise on the part of I.C.I. I think that at times it affects the constituency of my hon. Friend the Member for Middlesbrough, West (Dr. Bray) and also that of my hon. Friend the Member for Sedgefield (Mr. Slater), and I am sorry that it originates in his constituency, although I do not hold him responsible for it. There are times, also, when it is traceable as far away as Darlington.

Rodgers pointed out that Stockton suffered more than other areas from the smell, caused by amines from ammonia, because of the direction of the wind at certain times. Nature conspired further to plague the town: there was the sea fret or coastal fog, result of a 'temperature inversion which makes what would be an unpleasant smell quickly dispersed something which persists and hangs over the town for a considerable time'. It was very peculiar and more unpleasant than other industrial smells and fumes. Rodgers quoted from some of the many letters he had received about the matter, producing a sensory archive of what it was like to live and breathe in the vicinity of ICI in the 1960s. One states:

> We have just had what might have been two beautiful days completely ruined by haze and stinks, which have been particularly bad over Portrack, where I teach. I have had the misfortune to be developing a catarrhal cold and the discomforts of this have been greatly increased by the pollution of the air.

Another writes:

> I would like to know how much longer the people in Stockton-on-Tees will have to suffer the horrible smell that comes over from I.C.I. I work in a nursery school and the only nice days of this year are spoiled for the children.

From a third: 'My two children's health is suffering, as they have had terrible coughs for the past three or four months. The doctor cannot do anything about it as it is the fumes getting on their chests.' Another constituent states that conditions have forced him to take the decision to move out of the area.

The fishy smell irritated existing industrial diseases, such as chronic bronchitis. Rodgers drew evidence from a diary that had appeared in the newspaper, the Northern Echo. It stated that on 3 May 1962, the fish smell superseded the cat smell. ICI, at Billingham, had accepted responsibility, giving the explanation that the smell stemmed from sporadic leakages from the methylamine plant. In July 1962, the smell hung over 60 square miles. A new plant was being prepared and it was said it would cut the leakages to a minimum – it did not. Again and again there were insufferable seepages. The Alkali Inspectorate's Report at the time noted leakages as a result of breakdowns and accidents, or units operating erratically and relief

valves that need to be opened – and the years rolled on. The chairman of Stockton Borough Council's Health Committee noted that, 'On every occasion when the atmosphere is heavy and the wind is in the north-east quarter we get it. That is the sum total of the matter: when the wind is in the north-east quarter and there is the right level of humidity, one gets this in Stockton.' Now and again, ICI accepted the works as the source of the smell. But along with the stomach-turning smell, there was complacency in the air. The Alkali Inspectorate, which was established in 1864 following the Alkali Act 1863, operated under the principle of 'prudent tolerance', which balances the needs of industry with the protection of the public. Rodgers pushed responsibility back to the government:

> I do not hold I.C.I. responsible for this nuisance. It is its job to manufacture and sell, but it is the job of the Ministry to control and not expect that its simple moral authority will require a large private firm to do what might be in the best public interest.

Rodgers noted, in summary, that Stockton-on-Tees helped to pioneer the Industrial Revolution 100 years before, but now became the victims of that expansion. It was the case the factories mingled with the mists and trapped emissions and the emissions slow down the dispersal of the mists – the air is thick and smells of fish. The Parliamentary Secretary, Mr Corfield, pushed the problem back to those who lived there – their domestic production of smoke was equally to blame. He assures the House that in time the engineering problem will be resolved, but could give no time scales or guarantees. 'I am not a chemist, and not a very good engineer', he stated, but even so, he understood that the situation was not straightforward. Solutions were hard to find. Work had to go on. There were clouds to be made. Threads to be spun. Fertile dust to be compressed. Orders to fulfil. History to be made. Nature to be remade.

HOW MANY LABOURS?

Who were the chemists and the engineers? Who were the chemical plumbers, the lorry and shovel drivers, the chargehands and plastics representatives, the electrical fitters, the laboratory technicians, the Works clerks, the messenger boys and girls, the typists and secretaries, the platers, the road-tanker loaders, the biscuit sorters, the gatesmen, the anhydrite miners? Who were the machine operators who prepared fibres, spun, twisted and wound threads? Who were the thread spinners and the cloud makers? Who were the thousands and thousands of people who fashioned the modern world from here?

In 1935, Bertolt Brecht wrote a poem titled 'Questions from a Worker Who Reads'. It transposes work, an everyday, continual activity, to the world of myth and ancient and more modern empires, and asks who made the materials that underscored and enabled the power of kings. Who are the names that are lost to history and who made history possible?

> Who built the seven gates of Thebes?
> The books are filled with names of kings.
> Was it the kings who hauled the blocks of stone?
> And Babylon, destroyed so many times.
> Who built the city up again each time?[11]

If mythic times are to be evoked – the area of Teesside had its own demi-God. In the 1820s, the railway came to the marshlands and meadows, first running from Stockton to Darlington and then on to provide coal staithes from the Eston Hills, Cleveland. This was a start that catalysed industrial development. It brought about a new town, poised between coal deposits and iron ores and it was called Middlesbrough, but it was also dubbed, by Gladstone, the prime minister of the time, who visited in 1862, 'an infant Hercules', and this tiny hero would be one who, with every cry and whine and whistle, breathed out ever more carbon gases into the atmosphere. One hundred years later, the ground and the water and the air was polluted and the future uncertain. A Teesside plan was developed in the 1960s to make a city fit for the new millennium. Architect and town planner Franklin Medhurst, the man who arrived to develop the plan, wrote of his first view of Teesside, in 1965, enveloped in a haze of pollution, sun diminishing:

> The sharp line of the Cleveland Hills marked the northern fringe of the North York Moors as we approached the long, hardly perceptible descent into the Tees valley. At the same time we were conscious of a slight hazing of the crystal sunlight, slowly thickening until some fifteen miles from the valley towns we were driving in mist with the sun's orb rapidly dimming and an obvious chill coming through the car's ventilation system.[12]

By the time the car reaches Stockton – with his family, come to move into the area – there is a 'fetid fog'. Its density reminded him of his first encounter with the area – from the skies, on a U-Boot hunting mission in the North Sea, just after the war had ended. The aircraft was surrounded by grey, then tawny-yellow, orangey-brown and black clouds, 'clouds of hell', the clouds over Teesside. From the air, it seemed to him like Hell, but it was a city of flaming furnaces, which had forged the weapons of war, the ships and more in steel and iron. In amongst it, almost inconceivably, were people, the workers, eaters, sleepers, shoppers, players and, more than anything, the cleaners, who dealt with the daily smutting of washing on the line, the dusty grit that blew in, the filthy clothes. And what of that which could barely be seen? In 1965, the airman was a driver and he approached the fog from the ground, and came to find ways to lift it, or eliminate it, to give the towns a centre and something approaching a civilised future. The old Ironmasters district between Stockton and Middlesbrough, which had been aflame with production, was derelict. The roads were potholed, the metal gates rusting. Hercules was a fateful model to choose for Middlesbrough. While he was stronger than any mortal, his strength meant that he willingly endured hardships and he suffered setbacks. He died an untimely death, tricked by a centaur who managed to get him clothed in a poisoned cloak. What

[11] Extract from Bertolt Brecht, 'Questions from a Worker Who Reads', 1935.
[12] All quotes relating to Franklin Medhurst are from Franklin Medhurst, *A Quiet Catastrophe*, Citizens Papers, 2013.

poisons would cloak Teesside over the years? What stories and myths of the dignity of labour? How to honour the work and dedication and ingenuity of those heroes of industry, those on the shop floor, in the plant, under the ground, without forgetting the hardships, the setbacks, the suffering and the unfairness. And while the workers may have vacated the area around the Ironmasters district, as those ironworks and engineering works closed down, they still made their journeys to the edges, to the town's penumbra, its cloudy suburbs, where new clouds were made – by the deep-water Teesport or the ICI plant at Wilton, a somewhere that seemed a galaxy away from the poorly towns, a corporate, globalised suburban space, a place where routes were arc-lit and illegible industrial structures were floodlit, and where, yet again, in different industries, those involving petrochemicals, raw materials were manufactured and exported elsewhere for further processing, so wealth was made, but it did not settle much in the vicinity, unlike the pollution. And dirt attracts dirt – waste incinerators that would be out of place elsewhere come to join the other dirty industries. In 1966, Stockton Borough submitted a planning application – new homes were to be built at Haverton Hill in Billingham, and it was found that the sulphur levels there were very high, so high indeed, according to the County Analyst for Durham County, that 'when it rains at Haverton Hill it rains dilute sulphuric acid.' [13] It was popularly said that even the birds coughed there.

THREADS

The airman in the sky, once he had emerged from the bottom of the weather cloud that became a fog of pollution, saw the flaming factories, but what he thought about were the workers who kept them alight, and smashed and extruded and spun and drove and smelted and gathered and sorted and dug the matter and materials, to make products. He also thought about those who played and learned and cleaned amongst the flames and the ash and the dust, which is to say he imagined the penumbra or cloud around the factories' labour. The cloud in the factories' midst covered those who did not work at the factory, some wives, the children, the pensioners. They did not work there, but they smelt it, they breathed it. It was their atmosphere too. How did they live amongst it? What is it like to live in a landscape that makes or remakes worlds, synthesises environments, takes the air and water and makes it bright or pliable or hard and scratchy? How does the air smell today? Is it better than yesterday? How far can we see down this street? Are you coughing now? Can the gushing water around the plant be heard? Do the chemicals in it modulate the sounds or does it sound like the purest stream water? What sounds escape from under the ground?

What sensory perceptions of the factories slip into memories. Voices commenting online, in response to images in the Stockton picture archive, recall:

> In the 1950s when I was growing up in Billingham we often felt the blasting in the mine, crockery rattled and ornaments on the mantelpiece would shuffle about, does anybody else remember this?

[13] Medhurst, *op.cit.*, p.57.

Was this a collective experience above the ground, just as there was one below? Beneath the factory, men stumbled for eight hours a day along narrow unlit tunnels, airless, uncomfortable, wrestling with machinery, that once it was expended ended up in what was colloquially known as the Dead Man's area, a place where broken machinery lay abandoned. And then came the periodic blasts rippling out from down there, waves expanding as circles across the environment, meddling with the arrangements in the kitchen and living rooms. The factory extends beyond itself.

The factory buries itself in us, in our senses, and also in our memory. What we hear and feel can be shared and confirmed or countered by others, especially now, as the logging and remembering of experience takes place through the various channels of the internet and does not go away again. Nine years ago there was a thread on the Teesside Subreddit board about signs and signals from the factories around Middlesbrough. Reddit user Deanbbmv asks:

> What is that siren that goes off every now and then?
> Usually it likes to go off as early as it can too, but occasionally it'll go off in the afternoon. Sometimes daily, sometimes it'll be weeks apart.
>
> I've done some googling but all I can find is a non-existent post on the Gazette site. I assume it's from one of the chemical plants, which if so is it just a rather loud alarm for shift change, or is it a 'Warning people of Middlesbrough, this plant is soon about to explode. Think of the mutants for Futurama and you get the idea.'

ScubaCJ replies:

> I'm in the sixth form at Macmillan Academy [Middlesbrough], and I hear it pretty much every tuesday morning at around 10am. I'm fairly sure it's one of the chemical plants testing the siren, but I could be wrong.
>
> One thing is for sure, hearing that siren on a foggy morning is scary as shit, it's like Silent Hill all over again.

Ashleypenny Parmo Eater contributes: 'haha I remember from when I used to live in Boro, it is something down the old ICI plants I think but I have no idea what it signifies!' Bethurz comments: 'I don't think anyone knows.' But Ashleypenny Parmo Eater retorts with: 'It's to signify that there's a fresh batch of Mutagen ready for any passing turtles.' The references to dystopian science fiction are reinforced – Futurama, Silent Hill, experiments with DNA, are predictable in a place whose blazing chimneys piercing the night sky are said to have prompted the opening scene of Ridley Scott's *Blade Runner* (1982), and where Aldous Huxley's Brave New World (1932) was set and where, in Stockton, George Orwell's *Nineteen Eighty-Four* (1949) found its first form, as *The Last Man in Europe*.[14] ColdFusion87 returns the conversation to something more factual:

[14] George Orwell [Eric Blair] lived in the village of Carlton, Stockton-on-Tees in 1944–45. An early version of his novel *Nineteen Eighty-Four* was titled *The Last Man in Europe*.

> It may be a daily test of the warning siren. I mean if there is a massive problem at one of the chemical plants they'd need to make sure the sirens are all fully functional!

Someone now anonymous offers: 'As far as I know it's something going off inside the Corus plant.' And the last word in the thread goes to Panda_snizzle

> I could even hear it in Stockton, but I still have no idea what it's for besides it's from the ICI/ Corus plants. When my bf (he's from Essex) first heard it he thought it was a WW3 siren... :P

The web, Facebook local history group pages, Discord servers, Instagram, Twitter all produce a shower of memories and queries about life amongst the chemical industry. There is thread after thread. As many threads as were made from plastic pellets in Teesside? Nekogyph's Flickr feed shows a photograph from the Dorman Museum, Middlesbrough, titled 'ICI Threads'. It is of four spools of synthetic threads, two red, one black, one blue.[15] They are to the side of a case that also contains a spoon, a plastic strip and two leaflets. One is a brochure for a Style 44 Winding Machine, which coiled the thread onto bobbins at high speed. The other is an explanation through diagrams of 'The Manufacture of Synthetic Filament Yarns and Stable Fibre', with its specification of the processes of melt spinning and drawing and processing. Behind it all is a slightly creased and neatly folded white overall with the ICI logo in black on the left side, just above the heart. In the comments to the photograph, Bolckow notes: 'My dad's overall :)'. This is an overall generic and not unique – as is the essence of the uniform. But this too is a specific one, worn by a man, who had a child and who passed through a particular place and time and made that history and shaped that world.

Threads are made, and more threads come, but these now are the threads on the web. Threads about threads. Yarns about yarns. Just as it is possible to find – and laugh about in comments that deprecate ourselves and our ancestors – thousands of advertisements held in various online repositories that preserve evidence of past dreams and hopes and promises: 'The more Bri-Nylon socks he has, the brighter he will be!', 'Fashion's more fun in "Crimplene", 'Get in the picture with ICI Fibres', 'Tough. Elegant. "Terylene"!', 'Keep your child safer-from-fire in Bri Nylon', 'Cosak: Spells action', 'Only "Crimplene" gives twosomes such versatility', 'Burton forecast a blazing summer in "Crimplene"'. These synthetic yarns are staged in boldly coloured advertisements that found a home in publications such as The Sunday Times Colour Section, which was first published in February 1962. Glossy magazine colour and the use of photography accorded with the bold colours of the new synthetic fibres. The advertisements' rhetoric of sunny days to come and passionate lives lived in polyester fashions – in baby doll nighties and drip-dry suits – persuaded those who had the money and energy that good things could come through 'the white heat of technology', as Prime Minister Harold Wilson's speech in 1963 phrased it.[16]

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[15] https://www.flickr.com/photos/nekoglyph/23818756218/

[16] Harold Wilson's 'Labour's Plan for Science' speech was given at the Labour Party Conference, Scarborough, 1 October 1963.

We can pick up the threads of what was, find many threads that lead to stories and questions and answers about what happened in the chemical factories and around them. History proliferates. Many tellers become like the mythical weavers Arachne, Athena, Ananke, Philomela, Penelope, Isis, Neith, Tayet, The Norns, Frigg, Saulė, Holda, Spider Woman, Amaterasu, Mokosh, Habetrot. The filaments they spin tangle and worlds are made, fates are fastened, stories are told, histories made and forgotten. The world is made in stories. History is woven in stories.

THE END OF STORY AND THE LAST MAN

The airman had a plan, the Teesplan.[17] Teesside was unique on earth, it seemed to him. The towns were dying, mouldering under the fug of pollution, the waters polluted, the ground contaminated, and de-industrialisation left hulks of factories and warehouses, amidst what had been attractive Georgian and Gothic Victorian and Edwardian streets and buildings, built along a meandering river. Economic activity had moved to the edges, to the new port, to the new factories. There was production. There was work, more and more of it, but it had not urbanised the area in the conventional manner. Rather it had left the older coherent towns to rot. In the *Middlesbrough Evening Gazette*, in March 1977, the airman, Franklin Medhurst, wrote the following:

> In no other region of Britain or elsewhere can you find a renaissance in industrial growth without a renaissance of the urban structure. Yet this was the situation in the six towns. Surging busy industrial centres sat cheek by jowl with the torpid, weary indolence of towns.[18]

Stockton-on-Tees had been a handsome town, that grew up with the industries that emerged there, and it had a fine town hall and a music hall, a theatre, an impressive hotel, remarkable inns. These were historic meeting places, mainstays of community life. The airman had a plan that would hold on to what was worth holding on to and bring back a sense of coherence. The towns of the Tees Valley were to work in unity, to thread the tangle of pearls strung along a coiling waterway into a conurbatory chain, and there would be order, according to need and logic. Stockton was to be the pedestrianised historic centre, for shopping and entertainment. Middlesbrough was to be the regional centre. Redcar was to become a summer leisure resort. Much of the plan – including the proposal for a unitary authority as city, with a distinct focus in each of the towns and its recommendations around pollution alleviation and substandard housing – was junked, along with the planner, who was supposed to leave the area under a cloud. A reorientation towards demolition and identikit rebuilding, the imposition of a dual carriageway, cutting off the river, and the requirements of a modernising industrial economy took place under cover of another fog, a still hazy one comprised somehow of corrupt planners and councillors, dealing behind firmly closed doors, government interference and cost-cutting.

[17] Franklin Medhurst was a former RAF World War Two pilot.

[18] Medhurst, *op.cit.*, p.121.

Perhaps the plan assumed that it had as much right to determine what life was and could be in the area as other forces that had a stake there. The chemical companies made the atmosphere, provided the means to sustain the self, seeped into all areas of life – were in themselves an atmosphere. Journalist Martin Walker wrote an article in *The Guardian* on 23 March 1983, titled 'The Region Betrayed by False Gods', on the 'new feudalism' of the modern multi-national corporation:

> If you work for ICI along the River Tees you can buy your wines on the ICI label, fill up your car at the ICI garage, buy your clothes and suitcases and bedding at cut rates at the ICI shop. If there is no work for you, you can draw your pay and spend your time watching videos on ICI's Mickey Mouse shift. Your local newspaper will be ICI's *Billingham Post*, and for senior employees, school fees can be paid by ICI scholarships.[19]

These towns were company towns. Until they were no longer. The story, the history, starts to unravel. Everything changes, just as it always does, all the time. Or nothing changes, but it just goes on rotting and inertia sets in. But that too is change. It is the change of decay – the counter-symbol to paints that never fade, dyes that never wash out, fabrics that never crease, polypropylene bowls that never crack or pall, ropes that never fray.

In 1977, industrial sociologists Huw Beynon and Theo Nichols wrote *Living with Capitalism: Class Relations and the Modern Factory*. The book develops a picture of working life in a fictional factory called ChemCo, described as a Riverside plant. Here pearls of nitrate fertiliser were made. It could have been ICI at Teesside. If names and locations were blurred and hidden, the interviews were real and were recorded between 1970 and 1973. This ChemCo plant was run by the then newest process technology of the chemical industry, a system whereby production takes place ceaselessly within enclosed vessels, which are monitored and controlled by the manipulation of levers. In the process production at ChemCo, the monitoring and adjustment function is seen as an enriched labouring environment, cleaner, more skilled, less physical, and, most importantly, fewer workers and vastly augmented productivity. In the real-world, in the 1960s, ICI had built new plants at Billingham and Wilton according to such modern methods. These formed at this point the biggest petrochemicals and general chemicals complex outside of the US. The polythene plants were the third largest in the world and the biggest in Europe. Here was the massive processing of materials in sealed machines. This automated process led over time to a vast increase in outputs and a diminishing of the workforce. To be a worker here was to repeatedly observe gauges and dials, note down temperature, pressures and rates of flow and record these on log data sheets. The interviews in the book on ChemCo cloud the sunny vision of process technology. They gave details of the tough physical labour, the dragging around of raw materials and the sacks of fertiliser, the finished product. They bore witness too to the loneliness and stress of the control room workers, left alone with their thoughts and the noise of the plant, at all hours of the day and night.

[19] Medhurst, *op.cit.*, p.139.

The shift system was disruptive to life patterns – there were shifts of eight hours, from 06:00–14:00, 14:00–22:00 and 22:00–06:00 and these rotated throughout the week. It might be that a worker did the 06:00–14:00 shift on Monday and Tuesday and, then, on Wednesday and Thursday it would be the 14:00–22:00 shift, before moving once again to a 22:00–06:00 shift for Friday, Saturday and Sunday. The Monday and Tuesday afterwards were then days off.[20] Perhaps the process technology system and the way it had to be managed had something more in common with a monstrous foreboding of it as seen in Fritz Lang's 1927 film *Metropolis*, when an exhausted and panicked worker overstretches himself again and again in moving the hands on a clock-like machine to follow the impulses of rapidly flashing lightbulbs. Beynon and Nichols write about the dust that is so thick the workers can no longer be seen and mention that on Teesside ICI there was just such a store where, as *The Guardian* reported, after a court case in 1973, the dust was two feet deep and there were 'fertiliser dust stalactites hanging from the roof'.[21] The punishment for this breach of the Factories Act 1961 was a risible £50 fine. In 1969, a blast ripped through the air of Teesside, on 21 January, from the Polythene No. 2 plant at ICI Wilton. A cloud of cyclohexane gas leaked out and suffused a diesel high-lift truck. Though the driver acted swiftly to switch off the vehicle, the gas was sucked in to engine and exploded. Workers died and were injured.[22] To be in the newest factories, with process technology, was not always a clean and controlled process. Ron Angel's 'Chemical Workers Song' from 1964, channelling the complaints of others, stressed living and breathing, or dying and choking, amongst all these clouds of gas and dust and pools of toxicity:

> A process man am I, I'm telling you no lie
> I work and breathe among the fumes that trail across the sky
> There's thunder all around me, poison in the air
> A lousy smell that smacks of hell, dust all in my hair[23]

The managers in their interviews for Beynon and Nichols, however, give voice to their sense of logic and rationality in overseeing the factory's operations. They seem blind to their existence in an irrational market. Modes of management are changing in the period observed. The New Working Arrangement, a nationally negotiated deal, was introduced in the late 1960s, and operating effectively to curtail the power of the trades unions, through incorporation into the structure. The deal disallowed local pay negotiations at plant level, instead introducing a nationally negotiated pay system, based on a classification within seven grades and calibrated, by managers, against a set of qualities that were awarded points, which were used to determine recompense. The qualities were Memory, Visualisation, Original Thinking, Disparate Attention, Even Temperament, Co-Operativeness, Leadership, Agility and Sensory Accuracy.[24] At a local level, it had to appear that

[20] David Walker, 'Occupational Health and Safety in the British Chemical Industry, 1914–1974', doctoral thesis, Strathclyde, 2007, p.27.
[21] Huw Beynon and Theo Nichols, *Living with Capitalism: Class Relations and the Modern Factory*, Routledge and Kegan Paul, 1977, p.12.
[22] See for example, Facebook threads that discuss the incident, https://www.facebook.com/groups/185590928184604/permalink/2008702005873478/?comment_id=2009314792478866.
[23] Extract from Ron Angel, 'Chemical Workers' Song', 1964.
[24] Discussed by John Charlton, *Socialist Worker*, no.155, 22 January 1970, n.p.

the union was strongly involved in the world of the factory. At ChemCo a check-off system for union subscriptions was brought in, dues taken directly from wages by the employers, and a closed shop, which meant all workers had to be bound in to the union, which meant there was 100% union membership, but its existence was for the most part on paper and it made it less likely that there would be unofficial or wildcat actions. ChemCo's managers took an interest in who was elected as union shop stewards – with foremen encouraging certain candidates to stand, especially those who had never had previous involvement in trades unionism before coming to work at the site.[25] At ICI, in the 1970s, managers attempted to introduce the Weekly Staff Agreement, an increased productivity deal. ICI was angling to become the largest textile manufacturer in the world and was buying up other companies. Sir Peter Allen, the chairman had been on a fact-finding mission to the US, where DuPont was the major competition to ICI. He claimed that the US firms were able to use two-thirds less labour to achieve the same ends. The aim was to get more from less, or fewer. Management claimed that without the deals, which some of the militant workforce members opposed, there would be redundancies. Resistance was partial – and in any case, the organised workers of the chemical industries had long tended to work in partnership with management. Sir Alfred Mond, first chairman at ICI, argued that, 'the best answer to socialism is to make every man a capitalist'.[26] What he meant by this was to bind the workers by whatever means – ideological, structural – into the success of the system that exploited them, such that they would consider it their duty to makes its smooth functioning in their interest. To this end, Mond had introduced what were seen as perks that were 'voluntary acts' on the part of the employer, not a result of trades union negotiations: share-ownership schemes, holidays with pay, company housing, a company magazine and recreation clubs.[27] This is how you forge company men. Also, in its earliest days, from 1929, ICI formed Works Councils for labour-management cooperation and trades union membership at ICI fell until the 1950s, in contrast with other sectors. By the postwar period, these workplaces had none of the militancy of coal miners or engineering workers, against whom the new working directives were primarily targeted later in the century, in a period of increasing rebellion.

The teeth of the union were pulled at fictional ChemCo and real-world ICI. But they were about to fall out anyway. Work was changing – administrative and service sector expansion, call centres, tax and social security processing, less heavy industry. Fewer employees in the heavy industry that did exist. More precarity. Few jobs for life. No living within the paternalistic cradle of the super-employer, who made your bowls, curtains, cutlery, clothes, the fertiliser that grew your food – and provided a social life and structure, with clubs and holidays and beanos and training. No more long service milestones. But there are still clouds over Teesside, meteorological ones and manufactured ones, and there are still threads to make and threads to follow and threads to untangle.

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[25] Beynon and Nichols, *op.cit.*, p.115.
[26] W. J. Reader, *Imperial Chemical Industries, A History, Volume II, The First Quarter-Century 1926–1952*, Oxford University Press, 1975, p.60.
[27] Colin Gill, Ralph Morris and John Eaton, *Industrial Relations in the Chemical Industry*, Saxon House, 1978, p.87.

PART THREE

ICI AND THE SENSES

END OF DAYS FOR ICI

ICI was a powerful company from its beginnings in the 1920s and all through the years of war. It got on to a strong footing in the period following the Second World War. As decolonisation occurred and across the world trade connections and markets recomposed, it held its own against major competitors in Germany and elsewhere. ICI's fortunes mirrored that of the wider UK manufacturing base, of which it was a substantial part. In a sense, it was a bellwether company: if the going was tough at ICI, it would be hard going across manufacturing in the UK and this would be reflected in its share values. The company's fortunes – literal tangible monetary fortunes – peaked in the 1980s. John Harvey-Jones was leading the company in 1984 when it made an unprecedented £1 billion of pre-tax profits. By 1989, two years after Harvey Jones's departure en route to becoming a TV celebrity businessman with the series *Troubleshooter*, ICI's profits were an amount in excess of £1.5 billion. But this was the peak. From this point on, ICI began its slide into economic decline, as the effects of recomposition in the chemical arena worked through.

ICI had been a company that, like other vast company conglomerates of the first half of the twentieth century, such as IG Farben in Germany, had been built up on the basis of vertical integration of all its parts. From its large headquarters in London and an intricate arrangement of control groups and committees, ICI had managed an array of products and processes through its product divisions – mostly heavy chemicals – and sold and manufactured these in the UK and the Commonwealth. Substantial investment in research and development meant that there were constantly new products and new processes coming on stream. Business lines that had become outmoded were replaced by new ones from across the company. Plants grew, and in the process became sprawling complexes, with new facilities bolted on. Product streams proliferated, as divisions picked up on the inventions developed in another area and developed uses for them. ICI pushed into European markets in the 1960s and US ones in the 1970s. In this decade, things began to change. Tariffs were reduced, and so new players entered the scene. There were fewer innovations and rates of growth slowed down. The large company, with its concentration of power in its headquarters and its complex array of divisions, found it hard to react swiftly to broader events or to change direction quickly and in response to developing circumstances. But, eventually, change was forced on it by an all-encompassing circumstance, when economic recession beset the UK economy in 1980–81. Harvey-Jones came in, or rose up spectacularly, having been a trainee work study manager on Teesside in 1957 and on the board of directors from 1973. He stripped back the management structure, breaking up the interconnectedness of ICI with its centralised structure to allow fast reaction times

at its edges: speed rather than direction is said to have been his motto. This former seaman and naval intelligence officer claimed that the winds of opportunity could always be mobilised to veer and tack as needed. ICI undertook a plastics swap with British Petroleum in 1982, exchanging polyethylene for polyvinyl chloride (PVC), and so it moved away from a historic core product line, one of its own invention. Plastics, fibres and industrial chemicals were combined in a subsidiary called ICI Chemicals and Polymers and remodelled through joint ventures, divestments and product swaps with other companies. Years of recomposition began.

Under Harvey-Jones's leadership from 1982, ICI cut back operations, shrank the corporate headquarters, laid off tens of thousands of workers, reducing the workforce by a third. This allowed profits to rise again, and shares climbed, though not to the peaks of a decade before. The debts were hefty. The domestic industrial customer base had been rapidly retracting since the 1980s began. Competition was globalising. Burgeoning strict environmental controls in certain regions of production dampened the ability to make profits and made closures or divestments a desirable strategy. A more selective focus was attempted under new leadership, restricting lines to seven sectors in the early 1990s: pharmaceuticals, agrochemicals and seeds, specialities, explosives, paints, materials and industrial chemicals. The company was seen as 'in trouble', and a corporate takeover company, Hanson, tried to move in on them, in a hostile takeover, buying, initially, 2.8%. Resistant to this takeover, ICI was pushed to more extreme measures to regain market share.

A demerger took place. The organisation was split in two, into new ICI and Zeneca, a bioscience, pharmaceutical spin-off. The bioscience sector extended aspects of the company's traditional connections between divisions, given that areas of drugs and agroscience had over the years cleaved together. Pharmaceuticals had been developed through a mingling of organic chemistry and biology – to cite two examples, one of the breast cancer treatments developed by ICI drew on agrochemical work on anti-fungal agents and, in a broader sense, the science of dyeing had been a stimulus for new drugs in the 1930s and 1940s. Zeneca was oriented towards high-costing bioscience products that fulfilled specific needs or produced particular effects. The chemical lines of the remaining part of ICI were more diverse in form – paints, explosives and many more plastics and other things – but all of it was to be made in large quantities and sold at cheap prices.

Its fortunes were not saved. ICI withdrew increasingly from bulk chemicals and sold off more and more product lines. It also acquired products, as it shifted towards consumer-oriented products. Its paint line Dulux had remained a successful part of the company and so, its attentions turned more to embellishing environments and bodies. It went into the manufacture of perfumes, cosmetics, artificial flavourings, acquiring, for example, Quest International from Unilever in 1997. Quest made flavours for snacks, chewing gum, dairy products. It made perfumes too. ICI could enhance the world through chemical consumption in more intimate environments. ICI acquired National Starch, which made food additives, such as those that keep

cornflakes crispy, as well as adhesives and resins. From crunching up the landscape, swallowing the wind and the rain, to make explosives and fertiliser, ICI turned its chemical knowledge to another type of immediate environment, that of the self. The press-button age of the 1970s had shown the way: environments could be carried in a tin, or rather specific masking environments of air freshener could. Strawberry flavour could be imitated in 300 ways. Something that claimed to be banana, but only ever tasted of artificial banana, could be synthesised. Perfumes and deodorants, hand creams and lip glosses could coat bodies and enhance, supplement or negate their natural smells and sheens. A synthetic world of imitation and deceit was at hand.

To give some intellectual substance to their shift of direction towards the sensory, in 2002, ICI, under chief executive Brendan O'Neill, engaged an Oxford University academic, Charles Spence, to write a report on a new age, post-bulk chemical age of multi-perceptual settings. It was titled 'The ICI Report on the Secrets of the Senses: In association with Oxford University'. Brendan O'Neill provided the introduction, which laid out the transformation in ICI's sense of its mission:

> It is by getting closer to the consumer that we are able to create imaginative solutions to the challenges of a modern lifestyle and to delight the senses. Over recent years ICI has changed, evolving from a more traditional chemicals business to a specialty business that stimulates the senses through the supply of ingredients for food, flavours, fragrances and personal care products, as well as decorative paints. ICI is increasingly being recognised as a vital ingredient in satisfying sensory needs.[28]

ICI produces ingredients. ICI is itself the ingredient, the spice of life, the icing on the cake. The new approach of producing stimulating specialities was given the name 'Sensism'. Sensism was to be a science that aimed to increase the capacity for pleasure, love and success. The brochure was full of highly colour photographs, of lovers kissing or caressing fingers on oily body parts, or girls and women smelling flowers, spinning tops a blur of red and rainbow, power-dressed women emotionally satisfied in their offices on telephones, blood red wine gushing into a glass. Sensory superpowers are the aim. The report concluded: 'Sensism is nothing short of breaking the code for the way we live'. The report diagnosed a lack, an existing sensory depletion, the result of an overemphasis on the visual: 'We live in a visually dominant society, which has marginalised the more emotional senses of touch and smell.' We long for touch, insist the promulgators of Sensism. We need more than the distanced senses of vision. We need stimulation that enters the body or caresses its surfaces. We desire olfactory stimulation: molecules penetrating the nose. We need soothing background music to shop to, soft tones seeping into our ears. We need motivating wall colours and coverings, which work on our emotions in a subtle science of atmosphere. We need to apply our scientific knowledge to our food's textures. Inside our mouth, its crunch and creaminess, its prickles and slurps

[28] All quotes relating to the report: Charles Spence, 'The ICI Report on the Secrets of the Senses: In Association with Oxford University', 2002, http://blindnessandarts.com/papers/ICIsensessynopsisdocument.pdf.

will remake our senses. The report noted an emergent self-indulgence that was to be encouraged across society. This new, postmodern self-indulgence, was one, the report stated, that did not take on the shape of 'hedonistic excess', but was rather 'an elemental and biological need, rooted deep within the body'.

Beyond the anhydrite locked in the ground and ready for making into commodity chemicals, ICI turned its attention to something intangible, a need buried deep inside the human body. The elemental is in us, in our biology, not in the ground. It is there, but it needs to be supplemented, manipulated, chemically addressed. ICI will bring it up and out. Several times within its report, the phrase appears: 'Sensism: a central biological necessity as crucial to our wellbeing as the air we breathe.' The air we breathe is not the whipping wind at the Teesside coast that is captured to make a chemical empire. It is an ideology that characterises experience in the postmodern epoch. Spence's research spoke of 'taking charge' of the senses, through ICI's new products. Food and drink feature prominently, for ICI's acquisition of Quest International was the context of the report. It described recent developments with the use of colour additives in relation to the experience of taste:

> Adding red to strawberry yoghurt, for example, will increase the perceived intensity of flavour even on the tongue of a trained taster. In turn, tasters can be fooled into thinking they are drinking red wine by the simple use of colouring in white wine.
>
> Colour can also create perceived sweetness, which is especially important for those on low sugar diets. Food scientists may soon be able to increase the pleasure we get from food and drink by carefully selecting the colour that best complements and enhances the taste and smell of particular products. Multisensory enhancement has a key role to play in the arenas of science, medicine and commerce. It will provide hope for those with diminished senses and an exciting way forward for the products of the future.

Supplementation can remediate lack. Even the experts can be tricked in this new synthetic science. Senses are elemental, but they can be deceived too, it would seem. A science of fakery and manipulation was in train. The report commented:

> Major scientific advances are being made in the quest to improve flavour through multisensory enhancement effects, as well as using visual dominance techniques to make foods taste better by looking better.
>
> Critically, the increased use of flavour-enhanced foods can lead to an increase in the palatability and intake of food, as well as improving appetite, immune status and other aspects of health and wellbeing.
>
> These endeavours are by no means only restricted to food. Making environments more stimulating for the elderly by using enhanced colour schemes, the increasing use of textiles, textured surfaces and other tactually

> rich objects in the home can stimulate the sense of touch and make up for the effects of 'touch-hunger'.

There are other examples of how a focus on stimulation and enstagement within environments can affect outputs. Air freshener smells and lighting might be deployed to increase productivity. Perfumes can be used to increase our persuasiveness in crucial business discussions. Companies should turn attention to developing 'signature scents', in order to produce buying moods. In these final years of ICI, the company seems to have really drawn closer to that which apparently represented its nightmare version, the dark side that dogged it from its earliest days, the one described by Aldous Huxley, after his visit to ICI at Billingham in 1931, shortly before writing *Brave New World*. In Huxley's world vision, derived from the industrial organisation and production, which, in both the real world and Huxley's simulacrum, is lorded over by a man named Mond, everything revolves around consumerism, hedonism and moods enhanced by a drug called Soma. Huxley describes a scene when Lenina and Savage are sunk into their pneumatic stalls at the entertainment house. The opening act is musical-based but nasally received:

> The scent organ was playing a delightfully refreshing Herbal Capriccio – rippling arpeggios of thyme and lavender, of rosemary, basil, myrtle, tarragon; a series of daring modulations through the spice keys into ambergris; and a slow return through sandalwood, camphor, cedar and newmown hay (with occasional subtle touches of discord – a whiff of kidney pudding, the faintest suspicion of pig's dung) back to the simple aromatics with which the piece began. The final blast of thyme died away; there was a round of applause; the lights went up. In the synthetic music machine the sound-track roll began to unwind. It was a trio for hyper-violin, super-cello and oboe-surrogate that now filled the air with its agreeable languor. Thirty or forty bars, and then, against this instrumental background, a much more than human voice began to warble; now throaty, now from the head, now hollow as a flute, now charged with yearning harmonics, it effortlessly passed from Gaspard's Forster's low record on the very frontiers of musical tone to a trilled bat-note high above the highest C to which (in 1770, at the Ducal opera of Parma, and to the astonishment of Mozart) Lucrezia Ajugari, alone of all the singers in history, once piercingly gave utterance.[29]

Nasal delight passes to aural wonder, all synthetic, less than and more than human. The show takes off, haptics, stereoscopy, the feelies, and the scents continue. Another extract presents what happens at the end of life:

> It was a large room bright with sunshine and yellow paint, and containing twenty beds, all occupied. Linda was dying in company – in company and with all the modern conveniences. The air was continuously alive with gay synthetic melodies. At the foot of every bed, confronting its moribund occupant, was a television box. Television was left on, a running tap, from morning till night.

[29] Extracts from Aldous Huxley's dystopian science fiction novel, *Brave New World*, 1932.

> Every quarter of an hour the prevailing perfume of the room was automatically changed. 'We try', explained the nurse, who had taken charge of the Savage at the door, 'we try to create a thoroughly pleasant atmosphere here – something between a first-class hotel and a feely-palace, if you take my meaning'.

Synthetics allow a passage into death, and the senses will be stimulated until the end. Synthetics meets the end of life and comes to replace life itself. Synthetics, electronic impulses, a manipulated atmosphere in a communal room – an experience for everyone, issued by the factory from start to finish.

Aldous Huxley's sense of the coming chemical world was dystopian. Everything masks. Everything is masked. Everything saps the life and autonomy from individuals and from nature, in order to bestow on it a different nature, or a non-nature. Nature is remade from the nature that was there, in the rocks, in the air, in the sea. First nature becomes second nature. Nature has long been merged with second nature, which is a concept developed through the thought of Hegel, Marx and Lukács and indicates nature that has been augmented by historical and cultural intervention. Nature produces humans who in turn produce second nature. First nature, it might be argued is a yearning, rather than a palpable thing. It is the idea of a nature that exists without human intervention or spoilage, a pristine nature, a wilderness. To see nature in order to call it 'first nature' is already to have humanised it within human designs. Second nature outspreads. It is all nature that is transformed by human activity – agricultural areas, urban constructions, national parks, river regeneration schemes, aspects of nature as tradable goods and resources hauled up from the earth and shaped industrially to make more things. With the successful dominion over the planet by busy capitalist resource extraction and the overspills of pollution as its result, it might be said that no place is unscathed by the effects of human activity: witness the melting poles or the plastic-filled oceans. In the ancient conception of nature of philosopher Marcus Tullius Cicero, first nature is wilderness, second nature is the sowing of corn, it gives ways to something he calls third nature, which is aesthetic or strictly unnecessary from the point of view of survival: his example, the landscaping of gardens. Third nature is designed nature, and it proposes a magical or nightmarish world which comes into being only as a result of infrastructures that are highly capitalised.

Highly designed nature is an art of synthetics. Highly designed nature, a development of threads through the synthetic and through the chemical, is what comes into being out of the imagination of scientists, who sometimes turn to science fiction to dream up what could be. Academic Will Slocombe has explored how military visions draw inspiration – and not social analysis – from science fiction:

> The US military and the French army use science fiction writers to generate future threat scenarios. The Australian Defence College advocates for the reading of science fiction and, in Germany, Project Cassandra uses novels

> to predict the world's next conflict. The Sigma Forum, a science fiction think tank, has been offering forecasting services to US officials for years.[30]

He also notes that:

> Human augmentation – like enhanced sensory perception and personalised medicine – is a big thing in defence circles, which see the technologisation of the human body as a key arms race this century.

Increased sensory perception within – or on behalf of – the human, and also better sensory perception for the human. The developments forwarded by Sensism are already well in train, utilising nanotechnology and other advanced forms to augment and enhance sensory perception in modes already visage in science fiction narratives. In 2002, an article titled 'Clothes that love you – textiles to touch the inner you' appeared in the journal *Pigment & Resin Technology*. It opens:

> Living in a world where vision is the dominant sense, we often neglect our other senses, like touch and smell. But, imagine a sense-enriched world where your sportswear cools you on the move. Your shirt shrugs off the smell of tobacco or repels mosquitoes. You sink into fields-of-flowers on your sofa, catch the smell of success in a boardroom or hit a 'cool' note in a chic hotel lobby.
>
> This can all become reality due to innovative new technology, which incorporates fragrance into textiles. Sensory Perception Technologies (SPT™) is the way to weave well-being back into our clothes and lives. SPT™ is the joint creation of leading sensory designers Quest International, a member of the ICI Group, and one of the world's most recognised textile brands, The Woolmark Company. This new technology weaves benefit-laden particles such as moisturiser, deodorant, fragrance, fresheners, repellents or even anti-tobacco agents into any fabric. It heralds an extraordinary new era of 'smart' clothes which soothe, stimulate, protect and cosset you! SPT™ even withstands washing machines, so its impact can be enjoyed wear after wear.[31]

Well-being can be woven into clothes. Particles can carry benefits. Clothes can be smart – smarter than they were, smarter than us. This third nature is better nature. This patented technology incorporated miniscule waterproof droplets into fabric, in 'microencapsulation', and these are activated by movement or touch. As we walk, we release something from our clothing.

Shibani Mohindra, the New Business Development Director at Quest International in 2003, explained the reasoning:

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[30] See Will Slocombe, 'Militaries Plunder Sci-Fi for Tech Ideas, But Turn a Blind Eye to the Social Commentary', *The Conversation*, 2021, https://theconversation.com/militaries-plunder-science-fiction-for-technology-ideas-but-turn-a-blind-eye-to-the-genres-social-commentary-164978.
[31] See, 'Clothes that love you – textiles to touch the inner you', *Pigment & Resin Technology* vol.32, issue 4, 2003, p.266.

> Until now, textiles have only used the senses of vision and touch but a new way of looking at the impact of the senses on our lives – Sensism – will revolutionise the textile industry. This new philosophy is based on the idea that multi-sensory tools can empower us to become more productive, more successful and to enjoy relationships more. The first practical application is SPT™ which creates '3D fabrics'. The fabric, which will be the norm in the future, makes clothes that look good, feel good and do good.

There is so much goodness to be attained in this utopia that is brought to us through the clothes that caress our bodies and it extends into all manner of smartness around us, with air freshener and anti-bacterial substances emanating from carpets, as we walk, cosmetics exuding from cosmetotextiles, pesticides and flavours micro-sprayed or drugs delivered by nanoparticle transport systems. The world is monitored and augmented at the tiniest scales. We walk through our own little cloud environments, our own personal atmospheres tweaked and fine-tuned as we go. The best of all possible worlds is one for us alone. What of the bigger clouds – as ICI contracted, what happened to the clouds in Billingham? Did they contract too? Did the clouds disappear or did new clouds come, cloudy skies, no blue sky thinking, no blue horizons of the future?

ICI contracted. It sold off parts of itself. It broke into bits. But the corporation had not only altered the landscape. It was already suffused through the landscape. If there was an impact on the senses, it came not from the doctrine of Sensism and its ambitious desires to manipulate at the molecular level the world of consumption, it came from a molecular transformation in the bodies of those who had been with ICI through a certain period of time, and some of whom suffered more than they had bargained for. The landscape of industry takes root inside the body. The labour environment had suffused some lungs with asbestos, the fibres that lodge in the lungs and steal the breath. A slow violence caused by asbestos mesothelioma, a type of cancer derived from the atmosphere, came into visibility. The legacies emerge only very gradually into the world: Asbestos fibres can lie inactive on lungs for up to half a century. As the corporation shrunk, becoming absent, other presences, other remnants, other left behinds came more or less sluggishly into visibility. These join the other intangibles of memories and stories and past gestures made day after day in working lives and now no longer necessary. New entanglements in legal and bureaucratic, media and medical institutions become apparent. There was Jim who died four months after feeling unwell, after decades away from the paints and specialty polymers and the asbestos dust. Many Teesside messenger boys, cycling through the asbestos-lagged large sheds to deliver their notes, warmed up their daily lunch of tinned beans on steam pipes lagged with asbestos in the 1950s at the Billingham plant. Those fibres made their appearance in Jim's life palpable some 40 years after. Others had laid out asbestos blankets to catch the sparks for welders and then, after use, would fold and take them into storage. The dust and fibres of asbestos had to be swept off the bare hands daily. In the Stockton plant, young men monitored the pressure and flow of ethylene gas in pipes lagged with crumbing asbestos. What legal claims against a

company, now broken into parts, that allowed this substance to interfere in lives? Others had worked in the 1960s and 1970s with benzene as well at the ICI North Tees Oil Refinery and succumbed, as a result of exposure, to myelodysplasia and mesothelioma. One man with asbestosis recalled crawling through ducts and around pipework so swathed in asbestos he was virtually eating it at times.[32]

GRASPING AT THREADS

What threads? What stories? What horror stories, or something that was not perhaps known, or not known by all, and which could not be known in its fullness until the event of its manifestation. What threads trail from past to present? In the preface to her book *On Weaving*, from 1965, artist Anni Albers reflected on what it means to weave:

> Though I am dealing in this book with long established facts and processes, still in exploring them, I feel on new ground. And just as it is possible to go from any place to any other, so also, starting from a defined and specialised field, can one arrive at a realization of ever-extending relationships.[33]
>
> This tangential subjects come into view. The thoughts, however, can, I believe, be traced back to the event of a thread.

The event of a thread. The threads included in Albers's life and imagination were those of a weaver who learned to develop her weaving art at the Bauhaus in Germany, in the craft to which women tended to be restricted. She was an experimental weaver and incorporated horsehair, cellophane and silver thread in her work. Part of her baulked at her move towards automatic weaving, for it limited her ability to react to a material. To weave is to produce an event. The threads of plastic materials in the factory, the threads of asbestos – these are far from the weaver's craft, but there is a thread from one to the other, a story of development, if not one of progress, always. Connections exist. Threads tangle with other threads. Threads allow for the telling of stories, for the placement of event next to event and on and on. All the mythical weavers brought a chain of events into being as they told their stories. Some chains are fatal chains.

Some suffered a delayed death as a result of factory work. The factories died slowly too. Sensism did not save ICI. Profits had soared, but jobs were slashed in bulk chemicals and the CFC gases, more commonly known as 'greenhouse gases', that assaulted the ozone layer. ICI merged with the darkest parts of history – under Harvey-Jones the salt mines underneath the Billingham site were earmarked as a repository for nuclear waste. Another material with long-lasting agential capacity was to be tangled in the scene.

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[32] David Huntley, '"I was virtually eating asbestos at times" says retired vicar who worked at ICI', *Teesside News*, 20 June 2018.
[33] Anni Albers, *On Weaving*, Wesleyan University Press, 1965.

But the nuclear waste never came and the area lost its uses, its purposes. It became more or less a wilderness, or at least that was the name ascribed it when Margaret Thatcher traversed it in 1987. The prime minister dressed in a dark two-piece suit with matching handbag picked her way through a wasteland that was Head Wrightson's engineering works in Thornaby, closed since 1984. She asked us to imagine new futures that could take place here in what was to be dubbed 'The Venice of the North East', as the Teesside Development Corporation put it: those new futures were to be of business development parks, regenerated marinas, shopping centres and an expanded service sector. Might she have been able to dream as far ahead to free ports?

The future to come of business development parks was one thread to be followed, one lifeline out of all this. Sensism was a phase passed through and abandoned. Charles Spence passed on to other commissions and new research. In various articles, including in the journal *Flavour*, in 2015, he directs his energies towards the higher-end molecular gastronomy fad, writing of 'Olfactory dining: designing for the dominant sense' and he highlights the uses of atomisers, liquid nitrogen and dry ice – to make fragrant smoky mists and clouds – in cooking and cocktails and he considers the uses of nasal dilators as flavour enhancement devices and the technologies of 'inhalable food'. His thoughts turn futuristic:

> In the future, it would also seem likely that there may be a role for the hand-held technologies that one finds in most people's pockets in augmenting the dining experience too. Indeed, the last few years have seen something of an explosion of interest in digital plug-ins (e.g. the Scentee; https://scentee.com/). Certain of these can already release specific food aromas; just take the following: 'Available scents include rose, mint, curry, jasmine, cinnamon roll, lavender, apple, strawberry, ylang-ylang (a fragrant flower), coconut, and if you remember the fried corn soup fritters at KFC Japan from earlier this year, the corn soup scent should come as no surprise. There's also a limited-edition Korean BBQ collection with two meat scents and baked potato. Other scents are also in the works.' Currently the bubble-shaped Scentee retails at around $5 in The USA and can deliver around 100 bursts of a fragrance.[34]

This move towards something so intangible yet sensual, something so refined and complex, oriented towards indulgence, this Sensism, was not the thread that ICI followed to transfer out of the modern twentieth-century chemical age. Cut backs and the consumer-turn of ICI were other strands. But demergers and sell-offs were the main activity through the years of deindustrialisation. In 1991, agricultural and merchandising operations were sold off to Norsk Hydro. Its earliest business – soda ash production – was acquired by Brunner Mond, a descendant of the same firm who had in the very beginnings sold it to the company. In 1992, the nylon division went to DuPont. In 1993, the bioscience businesses, including pharmaceuticals, agrochemicals, specialities, seeds and biological products transferred to a new independent company called Zeneca which later merged with Astra AB to form

[34] See Charles Spence, 'Olfactory dining: designing for dominant sense', *Flavour*, issue 4, article 21, 2015, https://flavourjournal.biomedcentral.com/articles/10.1186/s13411-015-0042-0.

a company called AstraZeneca, now a household name since the global pandemic that began in 2020 and the vaccines it produced. Some Unilever businesses and an American paint company were bought in the mid 1990s, as the shift away from commodity chemicals took hold – other types of speciality chemicals – higher growth, higher margin businesses – were acquired, leading to £4 billion of debt and the decision to dump more of the old divisions. In 1997, ICI Australia went and polyester chemicals were sold to DuPont. More and more sales went ahead. The company was left largely with only Dulux paints, a rump of a firm which was taken over by AkzoNobel in 2008, its adhesives business transferred right away to Henkel.

STRANGE NATURE

What clouds could yet be made? How might the senses still be stimulated by the remnants and transformations of ICI's factories? In 2013, orange clouds appeared above homes, a bright smoke spreading from Billingham Manufacturing Plant, result of a pressure release of Nitrogen Dioxide from the fertiliser plant GrowHow. Strange plumes as signs of a presence still in the area of things made, of nature remade and reworked.

Critic and author Owen Hatherley visited ICI Wilton for his study of the state of things in the UK, titled *A New Kind of Bleak*, from 2012. He described the site as 'one of the great last projects of Building Design Partnership, an architectural firm that was then a Gropius-influenced technocratic-socialist institution'.[35] Though hit badly by recession, part of the site is still operating, as is obvious to his senses – 'the smell makes it clear that somewhere petroleum is being transformed here into something nature wouldn't want us to do, and that at least is mildly comforting, especially when fully familiar, as I am, with the safety procedures'. The building is modernist, with red brick wings and green plantings and a Bauhaus-style road, hauled up on pilotis, running beneath the building 'put there to create a feeling of motorcity modernity'. But it is dying its slow death. Or at least being forced, apparently, to grow up. The prime minster of the day, David Cameron, has talked about 'weaning' the people in the region 'from the teats of the state', as Hatherley puts it. The private sector should flourish here – should, but does not. Where is the knowledge economy? Where are the new cloud-based services? Where is the smart new world of digital clouds and fog and edge computing?

There was a future modelled in mould, a path followed until it was sold off. In Billingham, at the Belasis site, there is the factory that manufactures most of the Quorn that is used in the UK, synthetic meat, ultra-processed, industrially -generated mud fungus, which is now booming, due to the expansion of culinary vegetarianism and veganism – indeed from that plant comes the much-heralded Quorn for the vegan steak bake, sold at the bakery chain Greggs. Quorn was an ICI product. The Agricultural Division of ICI had once developed the world's largest bioreactor – the 1.5 million litre Pruteen reactor, which was used for the cultivation of animal feed. Pruteen was the trade name given by ICI to a microbial protein

[35] All quotes see: Owen Hatherley, *A New Kind of Bleak*: *Journeys Through Urban Britain*, Verso, 2012.

produced by bacteria grown on methanol produced from methane or natural gas, as a replacement for all the soya-bean meal and fish-meal in the diet of sows. High production costs and falling prices of competing products led to the abandonment of the project and the bioreactor was demolished in 1988.[36] Adaptation as Quorn was much more successful. The brand was approved for human consumption and launched in 1985 by Marlow Foods as a joint venture between the bakery giant Rank Hovis McDougall and ICI. It was the result of panics in the 1960s that there would be too many humans and not enough food in the near future and so artificial protein was needed. As petroleum and chemical companies explored food from yeasts, bacteria and moulds, J. Arthur Rank, too, who had been in the cinema industry but turned to flour manufacturing, was joined with ICI to find a way to make protein from his excess wheat. In 1968, near High Wycombe, he found a fungus that grew easily in fermenters and made a protein food that was given the name mycoprotein. While mushrooms are the fleshy fungi that grow above the ground, beneath the earth, mycelia, root-like threads develop and these are mushed together to make the foodstuff. The origin story, from Quorn's company lore, states that ICI found Quorn's Fusarium venenatum, from a soil sample in a Yorkshire field. It was a minority taste for a while but by 1998 was making profits. Massive fermenters jiggle the fungi in loops as they feed on a sugar solution made from wheat. After four days, the substance is ready to be frozen, shoving its long strands tightly together, then the flavour is added and the meat analogies – mince, ham and chicken slices, sausages, meatballs, nuggets – derived. Now, notes the company: 'The state-of-the-art production facility will produce 1.33M packs of Quorn® products per week, equivalent to the meat produced by 1,600 cows.'[37] Its owner now is Monde Nissin Corporation, a firm that is based in the Philippines.

NEW CLOUDS

Industry exists still in the old factories or on the old sites of ICI in Teesside. New ones such as hydrogen production are proposed. Old and new biologics companies develop. While ICI devolved down to AstraZeneca, other firms moved into the area to deliver biotechnologies. Fujifilm Diosynth Biotechnologies in mid 2021 expanded its production in Billingham of the Novavax coronavirus vaccine. But the billowing clouds, the fish smells, the pumping plumes of industry smog seems like another age. The wilderness becomes a nature reserve. New clouds appear.

Local newspapers in November 2015 reported on the appearance of thousands of starlings flocking to make an immense dark cloud over the wildlife park at Saltholme between Hartlepool and Billingham. The murmuration gathers and swoops, ringed by cooling towers and chimneys, power stations, oil refineries, incinerator plants, dockyards, where toxic – asbestos-filled – shipwrecks are broken up, and the towers of Quorn production loom. The birds arrive in small groups, gradually amassing, and slowly the group builds up to a swirling, pulsing whole that

[36] Pruteen reactor demolition, ICI Billingham plant, 1988, https://www.youtube.com/watch?v=td-eYH-MysW0.
[37] Lauren Wills, 'World's Largest Vegan Meat Factory Saves 1,600 Cows a Week', *Livekindly*, 29 March 2018.

shifts and coils fluidly. It is a cloud of birds swirling in unison, before dropping into the reed beds, as darkness falls. The site where the birds gather is a salt marsh that was once extracted industrially to produce caustic soda and so began the chemical industry in the area. It came to be one of ICI's sites. The area became contaminated over the years – clay caps the poisons, keeping them buried in the ground. The water, the salt and the wilderness here make sense of the place – for industrial excavators who will build an industry to change the world and for the birds who wish to roost here for the winter. The water, the salt, the wind, the air, the swirling birds, the old nature making lives amidst the new nature, the old industry and the new: all this, as a visitor comment on the RSPB Saltholme website puts it, is 'truly is a feast for the eyes and the senses'.[38]

The focus turns to the skies above the old industrial areas. Repeatedly the *Chronicle* and other regional newspapers report on strange cloud formations, seen to accompany the increasing number of odd weather events. In January 2017, the *Chronicle* asked readers to send in photographs of strange cloud formations. Laura from Gateshead saw Donald Trump in the clouds. Other faces could be seen. The British Isles appeared. And there were countless striated skies and jagged wispy clouds and thick foamy clouds, and clouds like footprints. In February 2017, a photographer caught repeated pink horseshoes in the sky. In 2020 a Marton woman saw strange blanket-like low clouds and a green object – not visible to the naked eye – in the sky.

The birds roost under these skies, with their new and ancient clouds. The clouds replace the clouds pumped from the chimneys and the cooling towers – some still do pump smoke, but less of it – into these skies, these water- and wind-filled skies. Middlesbrough was called an 'infant Hercules'. Half-man, half-god, he suffered in his mythic life, willingly, to show off – and to test – his extraordinary strength and resilience. His legendary nature meant that a constellation was named in his honour. Hercules was one of 48 constellations listed by Ptolemy, an astronomer from the second century. Hercules, in the third quadrant of the northern hemisphere and visible at latitudes between +90° and -50°, is one of nearly 1000 star patterns observed today. Its stars are arranged in a diamond pattern, and at each angled corner an articulated leg branches off. It could appear like a four-legged spider, or, at an imaginative stretch, as the Kneeling Giant, which it is also called. But it seems too like a model of chemical bonds, as they appear in school chemistry textbooks. In that guise, Hercules speaks to all the chemical bonding and rearranging that took place on the Earth below it.

Nothing is fixed but the stars. Or, this industrial episode, this passage through time of ICI and everything it brought into being and its aftermath, might tell us otherwise. Even the stars are not fixed. What we can see in them will change as we change. And if we can see them will change as we change. In 2019, newspapers reported on a starry constellation newly visible above Middlesbrough after industry of a certain type has gone and the pollution and smog shifts away – and this constellation of stars, of course, comes to be named not mythically, as is familiar

[38] See: https://www.rspb.org.uk/reserves-and-events/reserves-a-z/saltholme/.

from the ancient ones and might fit a city that was once called, by Gladstone, Hercules, but rather, instead, much more popularly, after the local high-calorie dish, Parmo and Chips.[39]

Here we end, when the future advertises itself as smart, smarter than we need be, and the cloud as digital. The ground is contaminated. A new age insists on clean technologies, on skies not earths, on renewables and sustainability not resource extraction, on locality not worlds away – that is the rhetoric. The new industry of the region focuses on biomass, biofuel, bioethanol and low-carbon energy derived from waste plants. Here the waste of the world will yield more power from itself. Here the atmosphere will be harnessed again, but this time for renewable energy assets, in particular offshore wind. The highest average wind speeds in Europe, battering the land from the northern North Sea, will be captured in the wind farms springing up around the port infrastructure.

But the idiom – the one spoken in the press and on the ground, the one that threads its way into lives, beyond the endless talk of employment opportunities and restructurings, reskilling and inward investment – is crowd-pleasing. As above so below: Parmo and Chips. Humour is necessary in these super-serious days. Everything may still be to play for. Everything is still being made or unmade. Some effects last beyond a lifetime. Some will have disappeared already. What was ICI? What will it have been? What is to be made of the remainders? What senses did it cultivate for those who lived amongst it and who live within its traces? What senses yet to harness? What sense can be made of it all?

[39] Shivali Best, 'Twelve new constellations spotted over UK – including "Parmo" above Middlesbrough', *The Mirror*, 19 November 2019, https://www.mirror.co.uk/science/twelve-new-constellations-spotted-over-20912862.