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English Summaries

Page 6 | Ursula Klein

Scientific and technical expertise in porcelain manufacture (around 1800)

The paper investigates the role of knowledge and science in modern industrial production processes, focusing particularly on porcelain manufacture in the decades around 1800. Newly discovered archival sources throw light on the knowledge and training of "arcanum" specialists and ceramists at the Royal Porcelain Manufactory in Berlin. Knowledge and training are viewed in the context of the discourse on "useful sciences". The useful sciences in the decades around 1800 are presented as an early form of technological sciences, something new that is neither academic science as practiced in the universities nor commercial applied science.

Page 14 | Susan Mossman

Early plastics: perspectives 1850–1950

Plastics had their origins in the mid-nineteenth century and underwent extraordinary growth and proliferation over the next 150 years. The reliance on natural and then semi-synthetic "plastics" gave way to the development of the first truly synthetic plastic, Bakelite, in 1907. From then on the range and uses of plastics developed in a multiplicity of ways. Over time, plastics have proved to be the eminently transmutable and almost magical material envisaged in the dreams of the early plastic pioneers. The next fifty years heralded a range of exciting new plastics and what has been referred to as the "Plastics Age".

Page 26 | Günter Lattermann

Who discovered it?

Adolf Spitteler and the history of galalith

The discovery of galalith – the most important plastic after celluloid and predating the development of fully synthetic phenolic resins – is invariably connected with the names of Adolf Spitteler in Prien am Chiemsee and Wilhelm Kirsche in Hanover, who were granted the first patent in 1897. Almost nothing was known about Adolf Spitteler before now. In the sparse information available he is always referred to as a German or a Bavarian or an Austrian "chemist". None of this is right. The paper outlines the previously unknown, circuitous career of Adolf Spitteler, a brother of the Swiss Nobel Prize winner for literature, Carl Spitteler, up until the discovery of the casein synthetic plastic galalith.

Page 35 | Frederic Steinfeld

Managing chance discovery

The decision to develop research at the chemical company Bayer

The development of industrial research laboratories in Germany is closely intertwined with the history of Germany's dyestuffs industry in the second half of the 19th century. Between 1870 and 1890, the industry's practical procedure, often based on chance discovery, gave way to a scientific approach to innovation. Though the conditions were very similar throughout the chemical industry, not all companies adopted the new ways at the same time – firms such as Hoechst or BASF, where chemists were part of management, recognized the importance of basic research far earlier than others. The chemical company Bayer, in contrast, was very late in identifying the strategic importance of research – a failure that almost drove the company into bankruptcy.

Page 44 | Elisabeth Vaupel

Substitute for natural vanilla

Acceptance and legal treatment of the synthetic flavorings vanillin and ethyl vanillin in Germany (1874–2011)

As the main flavoring of natural vanilla, vanillin is both a "natural" flavoring and an artificial product that was first chemically synthesized in 1874. The article describes the initial consumer acceptance of chemically synthesized vanillin and how it became a widely accepted substitute for expensive natural vanilla in Germany in periods of economic crisis. Today vanillin is the world's most widely used synthetic flavoring, produced on a multi-ton scale every year.

Page 56 | Alexander Wagner

The fiction of non-fiction

Hybrid forms between the novel and non-fiction

Using selected examples, the paper describes how the genre of what will tentatively be called 'non-fiction novels' was integrated into the National Socialists' economic policy

and especially the 1936 four-year plan. The study focuses on both the description and the presentation of scientific and technological knowledge and the specific literary techniques of the selected texts, taking into account the concept of synthetic modernism. The aim is to show how literature is involved in scientific-historical arbitration processes and in the creation of a material and object culture and how it acts within a multimedia system for the popularization of scientific knowledge by integrating both non-literary techniques and the means of literary depiction. In addition to studying Hans Dominik's book on the synthetic fiber Vistra and Rudolf Brunngraber's *Karl und das 20. Jahrhundert*, the article concentrates mainly on Karl Aloys Schenzinger's novel *Anilin*.

Page 66 | Manfred Rasch

Karl Ziegler and low-density polyethylene

The conditions for an unusual success story

The article describes the discovery and early marketing history of low-density polyethylene. There are two questions here. Firstly, why was low-density polyethylene discovered at the Max Planck Institute for Coal Research and not, say, at a polymer research institute? And secondly, why was marketing so successful that it earned the Institute and its discoverers about one billion D-marks in license revenues? In financial terms, the discovery of the process for producing low-density polyethylene was the invention of the century. It enabled Karl Ziegler to develop the Coal Research Institute into one of the larger institutes in the Max Planck Society and the only one that financed itself entirely from its own patent and license revenues over several decades. This is a unique story in the history of science.

Page 80 | Andreas Haka

Visionaries spur on polymers: unrecognized potential?

Hybrid materials in the first half of the 20th century

Hardly any group of materials has more potential in the eyes of engineers and scientists than fiber-reinforced plastics; these are plastics that in most cases amalgamate two different materials whose combined properties achieve the required specifications more efficiently. The principle of fiber reinforcement has been known since antiquity. It was not until early in the 20th century, however, that engineers began to study these hybrid materials, in the framework of the new discipline of macromolecular chemistry, and to define them as structural materials. The development, production, and use of these materials marked a new chapter in materials technology design and was instrumental in characterizing new load parameters for engineering products. This process is ongoing.

Page 90 | Viola Hofmann

"This is Perlon calling"

The teething problems of a new textile fiber in the 1950s and 1960s

In the 1950s and 1960s, West Germany's synthetic fiber industry geared up to establish the polyamides 6 and 6.6 on the consumer market. The aim was to position the new synthetic fibers as an alternative to the well-known cellulose fibers in textile and clothing manufacturing and also as a competitor to natural fibers. However, the hoped-for demand that would send the revolutionary material "into orbit" never materialized. Consumer response was muted. In the 1950s the new textile fiber was still unknown to consumers and had not yet proven itself. The manufacturers banded together to promote polyamides through joint advertising. They had to invent an entirely new material discourse in order to persuade consumers. The invention of the Perlon brand was one of many measures taken to furnish the new synthetic fiber with its own narrative.

Page 98 | Silke Haps

Plastic on steel = PLATAL

Hoesch AG diversifies in the 1960s: House 'L 141' in Dortmund

Starting in the 1950s, Hoesch, the German steel company, invested in the development of anti-corrosive plastic coatings to steel surfaces. The product is known as PLATAL and was used for consumer goods (e.g. powder compacts or cigarette cases), for hoppers or bins in the chemical industry or for outdoor and indoor cladding on buildings. These plastic-coated steel sheets opened the way for developments such as TEKTAL, a roofing system made of PLATAL, and wall elements with double-sided PLATAL insulation. As this diversification raised acceptance of prefabricated components and housing, the steel company was able to participate in the building boom of the late 1950s/early 1960s in the Federal Republic of Germany, a government-sponsored phase of materials experimentation that was driven by construction and manufacturing considerations.

Page 108 | Joachim Breuninger

Plastic bodywork in the GDR – revolutionary or simply a lack of alternatives?

In 1955, the Sachsenring P70 from Zwickau – the first passenger vehicle with thermoset bodywork – was launched. Its successor was the Trabant, of which three million were built, making it the most widely manufactured plastic car in automotive history. Nevertheless, the use of plastic in the bodywork was anything but innovative – both the idea

of using plastic rather than steel and the Trabant's entire technology were a product of the 1930s, and no fundamental modernization took place until shortly before production was wound down.

Page 116 | Stefan Erzinger

Evaluating the environmental impacts of plastics

This paper presents the environmental impacts of plastic products and describes life cycle assessment as a comprehensive method of ecological evaluation. By making allowance for environmentally relevant factors at the product development stage, potential environmental impacts can be detected, channeled and limited. It is important to consider the entire life cycle when evaluating a product's sustainability and environmental friendliness. Important aspects to be considered at the ecological product design stage are the choice of a material with a low ecological footprint, as low a weight as possible, and optimized flow properties in the piping system.

Page 122 | Julia Lütolf

Synthetic materials in art production

A small selection of samples from the material archive collection at the Sitterwerk demonstrated at the Iron Library's 39th History of Technology Conference the forms in which synthetic materials are used in art production. The material collection belongs to the Sitterwerk Foundation in St. Gallen, which also has a library on art, an exhibition room with works by the artist Hans Josephsohn, and an atelier studio for guest artists. The Kunstgiesserei St. Gallen, a foundry dedicated to art, is located in the immediate vicinity and engages in close cooperation with this public and not-for-profit organization.

Page 128 | Florian Ruhland

Premodern water 'know-how' in the Iron Library (IV)

Knowledge about water quality in 18th century encyclopedias

The first part of this series focused on the work of Jacob Leupold, the second part on the work of Leonhard Thurneysser and Torbern Berman, and the third part on the work of Pierre-Joseph Macquer and William Thomas Brande. This fourth and last part completes the picture of premodern water 'know-how'. A German, a French and three English encyclopedias from the 18th century are presented and their value as sources is examined. Of particular interest is the question of the form in which chemical knowledge was incorporated into the lexicon articles. It is a matter of speculation whether the encyclopedias contributed to popularizing knowledge about water.