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Poisons in the Twentieth Century: Unpunished Crimes, Slow Violence and the Role of History

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Abstract

This article will provide a review of recent historical scholarship on toxic products. It will start by discussing studies on the history of nineteenth-century criminal poisoning and continue with recent literature on twentieth-century toxic hazards in workplaces, agriculture, foodstuffs and the environment. The aim is to highlight continuities and changes in historical studies on poisons and toxic risks over the last two decades. The author will review the main studies which have guided his own research while describing the main trends in crime history studies, environmental history and the history of public and occupational health. He contends that the area will benefit from more multidisciplinary exchanges in order to consolidate its position in current public debates.

Keywords: toxic substances, slow violence, risk society, environmental history, agnotology, toxic regulation.

Résumé

Cet article passe en revue les recherches historiques récentes sur les produits toxiques. Dans un premier temps, je discuterai des études sur l'histoire des empoisonnements criminels du dix-neuvième siècle et poursuivrai avec les travaux sur les risques toxiques du vingtième siècle, dans les industries, l'agriculture, l'alimentation et l'environnement. L'objectif principal est de mettre en évidence les continuités et les changements dans la recherche historique sur les poisons et risques toxiques, au cours des deux dernières décennies. Je passerai en revue les principales études qui ont guidé mes propres recherches, tout en décrivant les grandes tendances de l'histoire criminelle, de l'histoire environnementale, de l'histoire de la santé publique et de la santé au travail. Cet article tente de montrer que ce domaine de recherche des produits toxiques requiert davantage d'échanges multidisciplinaires, afin de renforcer sa position et son influence dans les débats publics actuels.

Mots-clés : substances toxiques, violence lente, société de risque, histoire environnementale, agnotology, gouvernance toxique.

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OVER the last two decades, toxic products have taken centre stage in historical research. Historians of poisons have enlarged the range of protagonists to include experts, decision-makers, activists, judges, industry managers and victims. They have explored the disputed and blurred boundaries of science, medicine, economic interests and politics in their portrayals of the spectrum of epistemological and agnotological practices connecting (or disconnecting) toxic exposures and health hazards. Using a wide range of sources including sometimes hard-to-access documents, they have shown the different connections between corporate strategies, academic research and state policies. While most of the studies have been confined to particular contexts, collaborative projects have flourished in recent years and have encouraged comparative perspectives. Historians have also made sophisticated analyses of the interactions between discursive constructions, sociotechnological objects, expert knowledge, vested interests, activism and decision-making. They have shown that poisons are embedded in social conflicts marked by great asymmetries in epistemic tools, political power, economic resources and access to mass media. Recent scholarship has followed the circulation of poisons at local, regional and global scales. It has also confirmed that episodes of poisoning, contamination or pollution are complex socio-material phenomena which must be explained by mobilizing a broad array of social, cultural, material, medical and environmental issues. This complexity poses both challenges and opportunities.

This paper provides a brief overview of recent historical studies on toxic products. Since this broad-ranging literature has been reviewed in other recent publications (Guillem-Llobat & Bertomeu Sánchez, 2016; Kirchhelle, 2018; Rothschild, 2016), the author will offer a more personal view, one that follows his own research path as a historian of science: two decades ago when he started to examine nineteenth-century poisoning crimes and more recently with a shift in interest towards twentieth-century toxic hazards in workplaces, foodstuffs and the environment. The objective is to shed light on the continuities and changes in recent decades in historical studies on poisons and toxic risks by using examples from criminal history, environmental history and the history of public and occupational health. A comparison will be made of the different legal and scientific approaches to nineteenth-century criminal poisoning with the new industrial hazard regimes generated by the development of industry in the twentieth century. "Contact zones" between the different lines of historical research related to poisons and toxic risks will be pointed out. The assertion is that the area could be substantially enhanced by increased multidisciplinary collaboration (in order to overcome the harmful effects of fragmentation) and

more exchanges between academics and activists, thus encouraging the production of socially-robust knowledge in contrast to the trends promoted by the academic neoliberalism of the last two decades. Examples of recent toxic product studies from different academic fields will be provided, from the history of crime and medical history to agricultural, food, or environmental history. Toxic products are also discussed in other areas such as STS studies, political ecology and legal studies. The author claims, as have others, that new narratives written in the contact zones can help history to play a substantial role in current public debates on toxic risks (Bertomeu Sánchez, 2019a; Bertomeu Sánchez & Guillem Llobat, 2017).[1]

Poisoning as a Fine Art

Unlike many other areas of academic writing, books on poisons are very popular, so much so that they can be found today in airports or supermarkets alongside detective novels and true-crime books. In the past, poisons were protagonists in mythological narratives, folk tales, theatre plays, and other forms of popular culture. They have also been used both as symbolic and material resources, either as metaphors or as mortal substances in famous fictional writings (Caudill, 2011; Klippel, Wahrig & Zechner, 2017). At the same time, poisons have been the research subject for physicians interested in their deleterious and pharmaceutical properties. They have served as experimental models in order to understand key concepts in pathology and pharmacology, and from a legal perspective, have been included as part of the corpus delicti in poisoning crimes or silent murders that were often difficult to prove in court. Since the testimony of ordinary witnesses was rendered useless by the secret nature of the crime of poisoning, judges regarded toxicology experts as a valuable resource. This is how poisons played their part in the emergence of expert-based forms of justice. In fact, toxicology and forensic psychiatry were the two flourishing areas of legal medicine during the nineteenth century. At the same time, high-profile poisoning trials sparked the interest of the general public, who crowded the courtrooms and read the journalists' accounts and literary narratives on expert reports and legal debates (Burney, 2006; Watson, 2004).

Toxic products can act as mediators between the different groups in a particular "forensic culture". A forensic culture is characterized by constellations of detection technologies, authorized voices and expert witnesses, rules

[1] The research has mainly been carried out in collaboration with Ximo Guillem and other associated colleagues: HAR2015-66364-C2-2-P and PID2019-106743GB-C21.

of judgment and overarching social anxieties. With the help of expert knowledge, detection technologies (such as chemical tests, clinical symptoms, autopsies, epidemiology, animal experiments, etc.) provide an access to information on poisoning crimes which is beyond the possibilities of ordinary witnesses. Legal systems constrain the role of lawyers, experts and judges in different ways. During the nineteenth century, many European states codified the procedures of legal inquiry, the matters that needed to be proven, and the required standards of proof in each case (Burney & Hamlin, 2019; Hamlin, 2013).

Expert controversies were frequent during famous poisoning trials: the questions of which tests were the most reliable and who should interpret them (chemists, doctors, apothecaries) became contentious matters in courts. As a result, toxicological research intermixed with legal procedures, advisory tales, moral qualifications and idle gossip in its movements from laboratory and courtrooms to salons, newspapers, classrooms and medical academies. In academic contexts, experts attempted to take the popular images on poisons and constrain them to the range of issues covered by the emerging discipline of toxicology. Their main concerns were about detection technologies and the effects of toxic products. Many toxic products have ambiguous and misleading physical, chemical and medical properties: they can be easily confused with everyday materials and poisoners relied on these properties to be able to execute their plans. Unintended poisoning accidents and suicides are also frequent (Bertomeu Sánchez, 2017; Chauvaud, 2000).

Apart from deciding who was qualified on the subject of poisons, other epistemological issues were at stake during poisoning trials: the general value of scientific proof, the role of jurors in criminal trials, the free evaluation of scientific evidence, and the tensions between the open-ended nature of scientific research and the limited time available for legal inquiries, along with the irreparable consequences of guilty verdicts, particularly since poisoning crimes carried the death penalty. In salons, newspapers and other forms of popular culture, the uncertainty surrounding the evidence of poisoning even touched on other social aspects such as the situation of women and political debates. Crossovers between these cultural spaces were common: medical reports were quoted in legal journals and in articles published in the general press (Bertomeu Sánchez, 2014). Toxicological reports provided creative ingredients for novels (for example, Flaubert's description of the suicide of his heroine Madame Bovary) and theatrical plots. Many other works of fiction and legal and medical books were devoted to famous poisoning trials such as those of Marie Lafarge and Madeleine Smith. Poisoning became a topic for educated conver-

sation and was a common feature in literature, fine arts and cinema (Klaver & Puntarello, 2016; Klippel, Wahrig & Zechner, 2017).

In many cases, the controversies surrounding poisoning trials were stirred by the public imagination, especially when the defendant was a woman. Since ancient times, women have been thought to have privileged access to poisons and have been accused of using them in family and political crimes. Regardless of the available historical sources, some of these women have become historical icons as poisoners, recreated in fictional literature over the centuries (Crosby, 2018; Dowling, 2013; Klippel, Wahrig & Zechner, 2017). Criminal poisoning has also been connected with political issues, particularly in specific historical eras and places: from the early decades of the Roman Empire to the Italian Renaissance and the modern-day Russian state (Collard, 2007; Pastore, 2010).

Studies on the history of crime confirm that poisons can move across different legal, scientific and popular cultures, thus encouraging tensions and interactions. In this world of exchanges, the ambiguities go far beyond the differences or similarities between poisons and medicines, which can be found in old terms such as the Greek expression "pharmakon" and in equivalent terms in other languages. In fact, a review of the literature unveils many more layers of meaning associated with toxic products in different social and cultural contexts. Poisons can simultaneously be familiar materials, scientific objects, criminal tools and political weapons. They can also become sources of gendered images, legal concerns and social anxieties. Their historically-located and locally-embedded ontological nature is sufficiently malleable to adapt to a broad range of contexts and expectations. For instance, arsenic, the "king of poisons" in the nineteenth century, was used as a rat poison, pesticide, drug ingredient and dye for making wallpaper. It was not just a hazardous product frequently used by poisoners, but was also a dangerous source for food and water contamination, occupational illnesses, industrial pollution, and environmental problems. However, public concerns and legal action focused on criminal poisoning, even though poison was used in only 3-4% of murders in the nineteenth century. This was a period when criminal poisoning stirred up social anxieties among the upper classes in many countries throughout the world, but it was a minor issue in comparison to the other hazards posed by toxic products (Watson, 2011; Whorton, 2010).

Crime and Unpunishment

Toxicology was a science created in the nineteenth century for the prosecution of criminal poisoning cases, thus making it a science designed

for and mostly developed in the courtroom. The main purpose of toxicologists was to detect small quantities of poisons in corpses so as to provide unquestionable evidence of foul play. Their approach was based on qualitative chemical analyses and high sensitivity tests and proved to be very useful for criminal cases, even though its feasibility was questioned around 1840 with the emergence of studies on "normal poisons", i.e., small quantities of poisons found in healthy human bodies and whose physiological role was unknown (Bertomeu Sánchez, 2013). This particular approach to toxicology mobilized laboratory and work force resources because it reflected the anxieties of the main political and economic powers. As chemical tests were intended to detect rather than prevent poisoning crimes, they could do little to control toxic products in workplaces, foodstuffs and the environment, in which prevention regulation was key (Bertomeu Sánchez, 2019b).

While large quantities of material and human resources were invested in criminal poisoning, the dangers that the chemical industry posed to public health and the environment were largely neglected during the nineteenth century. New forms of risk governance, involving a growing role for experts in decision-making, and the requirement of higher standards of proof, were among the causes of the invisibilization of industrial hazards. For instance, for big cities such as Paris or London, harmful industries were broadly accepted in populated areas and were only removed when there was conclusive cumulative evidence of their danger. The solution was not the removal of the polluting activities, but the introduction of occupational hygiene guidelines for workers or technological changes (new furnaces, filters, combustion methods) for industries. Many conflicts were solved by economic compensation and for those who were unsatisfied with this solution, the possibility of trials but only through the civil courts (Le Roux, 2011, 2016).

By the beginning of the twentieth century, public attention and state concerns were moving increasingly from criminal poisoning to forms of poisoning associated with the adulteration of foodstuffs and the impact of industry, agriculture and mining on the quality of air, water and soil. As the century unfolded, new forms of toxic violence caught the imagination of the public in the form of food scares, nuclear fears, public health crises, endangered species, polluted landscapes, and so on. Nevertheless, there are some material continuities as many of the substances used in nineteenth-century crimes "resurfaced in a new era of human poisoning and environmental pollution in which individual culpability and criminal intent were less easily established" (Arnold, 2016, p. 171).

Industrial accidents, like those at Minamata, Three Mile Island, Seveso, Bhopal, and Chernobyl, etc., played a major role in changing public perceptions and triggered social debates on national and international regulations. The causes of the catastrophes were contested and varied: chemical spills, radioactive exposures, oil slicks, contamination of aquifers, and the transportation of hazardous materials. Catastrophes triggered riots against political or colonial powers, but also led to attacks on marginal groups who had been scapegoated, resulting in religious discrimination, xenophobia or environmental injustice. These events would remain in the collective memory of resilient populations for many years, some events becoming landmarks in environmental activism (Silei, 2014; Bertomeu Sánchez & Guillem Llobat, 2017b).

Along with the new forms of exposure, popular and academic ideas on poisons underwent substantial change. The age-old trope of female poisoner was no longer the prominent image when greedy merchants and industrial polluters took the lead. At the same time, toxicology, once one of the most important areas of legal medicine, became less relevant in the context of the new forensic sciences at the beginning of the twentieth century (Burney & Pemberton 2016). The problems of toxic substances (rather than "poisons") and their regulation (rather than their "detection") resonated in new social and cultural contexts; groups interested in these issues included physicians, environmental activists, trade unionists and company managers. Certain continuities can be identified between nineteenth-century criminal poisonings and more recent public health and environmental issues related to toxic exposure. These connections (and discontinuities) have rarely been studied, inhabiting the no-man's land between different historical traditions. Although a new language of toxicity, adulteration, contamination and pollution was emerging, there were many products, instruments and methods that remained in place, sometimes moving from one context to another and limiting the production of evidence required in new toxic exposures (Bertomeu Sánchez, 2019a)

Fragmented Governance

Another reason for the lack of control of toxic products was the fragmented and disparate legislation governing their use. This had not been the case in criminal poisonings: specific criminal laws were conceived to prosecute poisoners for murder and those convicted generally received the death sentence. Poisoning was either an aggravating circumstance or even a special type of crime in many nineteenth-century legislative codes (Watson, 2011). However, these criminal laws were difficult to apply to other crimes

related to toxic products, and the new regulations proved to be largely inefficient for dealing with these problems. It has been noted by historians that governments and international agencies had a limited capacity for regulating hazardous chemicals throughout the twentieth century (Bohme, 2015; Boudia & Jas, 2014; Henry, 2017).

Reviewing national and international regulations on toxic products over the last two centuries, Soraya Boudia and Nathalie Jas have organized them around different "modes of governance of risks", that is, ways in which "scientists, experts, public authorities, industry and activists think, conceive and manage the hazards of poisons". They claim that three modes of governance have appeared during the twentieth century: regulation, risk assessment and adaptation. By the 1950s, threshold limit values (TLVs) were used in the regulation and confinement of toxic products. These thresholds were values below which it was supposed that the substance was unlikely to affect human physiology (Nash, 2008). The increasing number of products introduced during the 1970s, along with the difficulties of calculating the limit values, encouraged the introduction of new risk-assessment based regulations. New experts, agencies and regulatory knowledge were mobilized but reliable data were lacking for most of the products (both new and old), and the toxic risks remained largely uncontrolled. Governments, activists and victims were obliged to accept adaptation and resilience as the regular mode of action in a toxic world. Instead of a system in which one mode of governance of toxic products was replaced by another, the coexistence of modes has produced hybrid situations that harbour very different conceptions and norms, situations that frequently provide opportunities for polluters to escape regulation, but also new chances for victims and activists looking for new forms of contestation and struggle (Boudia & Jass, 2019).

The fragmentary nature of toxic product regulation is a major constraint to effective directives in occupational health, food quality or the environment. The molecule-by-molecule approach is another source of ineffectiveness. This involves testing chemicals individually through studies dealing with the persistence, bioaccumulation, environmental transport and adverse effects of each product. There is a "molecular bureaucracy" involved covering a disparate array of legal structures, administrative procedures, treaties, information systems, conventions and standards (Hepler-Smith, 2019).

The one-by-one approach, along with the ever-increasing number of toxic substances, poses problems for both regulators and historians. Many studies analyse just one substance over a short period of time in a particular geographical setting. Global scales, transnational studies and comparative

analyses between countries or chemicals are far less common, even if these approaches are being increasingly found in recent literature (Sellers & Melling, 2012; Sellers, 2014; Bohme, 2015; Rosental, 2017; Rothschild, 2019). When narrowing the focus to the most famous toxic products, historians risk creating a misleading picture of the general problem. For instance, in the case of pesticides, the emphasis has been on DDT and on the environmental movement which led to it being banned in the US. As such, historians have tended to neglect other products, such as organophosphate pesticides, the risks they entail (occupational hazards) and their victims (farmworkers), thus weakening the power of historical perspectives to address current problems. In order to avoid "the problems of synecdoque", the historian Frederic R. Davis has advocated a "synthetic approach", incorporating elements of the history of science and environmental history (Davis, 2019). Other areas such as the history of public health, economics, and agriculture can also offer complementary perspectives on these topics (Bertomeu Sánchez, 2019a).

While bearing in mind the risks of synecdoche, historians can deal with the harmful effects of academic fragmentation by following the circulation of poisons across different societies and cultures, thus connecting domains that are often studied separately in the academic literature (Bertomeu Sánchez & Guillem Llobat, 2017). Like narratives on human lives, a "biographical approach" to the history of toxic products can serve to integrate the scientific, legal, political, economic and medical realms related to their production and use. When adopting such a narrative, biographers of poisons are in a way obliged to deal with all the aspects of the "life cycle" of a compound in a harmonious, pondered fashion. This is the approach adopted in a recently published book whose editors aim to "shed more light on the interaction between those — legally and institutionally — separated domains and to trace how borders and interactions between them shifted over time and across national borders" (Homburg & Vaupel, 2019, p. 3-4).

Another group of historians have also recently called for an alternative approach based on the idea of "residues" as both material and political entities. They ask for a shift in focus from new chemicals and their unknown effects to the accumulated hazards produced in the past. Residues are marked by their irreversibility, invisibility, persistence, unruly effects and unpredictable behaviour; they transform in capricious ways, defy regular forms of control, frequently escape regulation, and are extremely difficult and costly to eliminate. When talking about these externalities of residues, historians need to pay attention to the unequal distribution of costs and benefits. While their production and commercialization bring huge profits for the polluters, their human and environmental costs are usually left to

state welfare systems, or turned into a toxic burden for marginalized groups (Boudia, Henry & Jass, 2018).

Proof and Uncertainty

Proof and uncertainty have always been key features in the debate on poisons. Since Antiquity, criminal poisoners have used products which were difficult to distinguish from the foods and drinks in which they were mixed, thus making these crimes difficult to prove in a court of law, at least without the support of expert knowledge. Relying on toxicological research, experts mobilized different forms of evidence, from chemical tests to clinical symptoms and animal experimentation. No general agreement existed concerning their probationary value but judges and experts managed to accept reasonable standards of proof for murder by poisoning, and defendants were often found guilty on the strength of these tests (Bertomeu Sánchez, 2013).

Because toxicological tests were designed for poisoning crimes, guilty verdicts were much more difficult to obtain when other kinds of toxic crimes were involved, for instance, those occurring in factories, mines or the food industry (Rainhorn & Bluma, 2015). In these cases, legal action was only possible after proving the causal connections between chemicals and diseases. The production of reliable evidence is frequently a laborious process in terms of the time, human capital and laboratory resources required, so there were many debates on displacing the burden of proof from one protagonist to another. Let us consider the controversies in the application of the precautionary principle in toxic regulation in Europe and the US: while activists and victims support this principle for the sake of public health and environmental protection, industry lobbyists argue that it might deter scientific development and economic investment due to the economic costs of the toxicological research required (Langston, 2014; Steel, 2011).

While usually placing the burden of proof on the victims, legal systems frequently require expensive scientific expertise to demonstrate the connections between chemicals and illnesses. Many legal proceedings on toxic products have involved discussion on the nature of admissible proof and reliable expert knowledge. In many cases, judges have had to act as gatekeepers for the admissibility of medical and scientific evidence in the courtroom. One of the most important US court decisions on this issue (the so-called "Daubert standard") came about following litigation on the health hazards caused by the drug Bendectin, distributed by Merrell Dow Pharmaceuticals. In this case, as in many others, requiring high standards of evidence in an area marked by uncertainties and "undone science" could

put citizens at risk of being "legally poisoned" (Cranor, 2011; Rainhorn, 2019).

The role of expert and advisory boards is one of hottest topics in toxic product studies. As in other studies on experts, historians have noted the problems of selection, authority, trustworthiness, capture, and even corruption. In this situation, victims usually rely on alternative ways of evidence-making and data-gathering (Brown, 1997). But even when affected communities can offer robust factual data, polluters can hire "merchants of doubt" (Oreskes & Conway, 2010) who use their authoritative voices to produce counterfeit controversies and fake uncertainties, which can be repeated in the mass media. And in doing so, they can easily transform the claims of communities into "contested illnesses" (Brown, 2007).

Moreover, industry experts can help to naturalize corporative interests in the form of national and international standards. Corporations can also use less honorable tactics: preventing the circulation of sensitive knowledge, capturing regulators by means of the "revolving door", supporting research designed to weaken regulation, or funding prestigious publications/papers that share their views. They can also rely on more invisible practices related to the production of ignorance, or "agnotology" (Proctor & Schiebinger, 2008). Since R&D departments in leading industries produce a substantial part of the research on toxicants, company managers can easily avoid "sensitive topics", preventing or delaying the circulation of existing "problematic" knowledge, or concealing evidence on the human and environmental costs (Kirsch & Stuart, 2014; Markovitz & Rosen, 2003). Moreover, public inaction creates scarcities in equipment and supplies, training resources, and human capital, thus promoting "unprotective toxicologies" that are unable to cope with risks posed by the flood of "lucrative molecules" in workplaces, homes, and the environment (Tousignant, 2018). Lacking funding, studies on the effects of toxic exposure can stagnate and atrophy, becoming examples of "undone science". These less visible forms of ignorance can help to deter public action on the control of toxic products under the banner of uncertainty (Frickel, 2014; Frickel & al., 2010; Gross, 2015).

Slow violence and Inequality

Because of its insidious, invisible and long-term nature, toxic exposure can be regarded as a form of "slow violence". It is a threat that evolves gradually and without dramatic and immediate damage. Its delayed effects are dispersed across time and space, so it is difficult to establish who are the poisoners and who are the victims. It affects mostly marginalized commu-

nities who lack the necessary resources to make this damage visible, particularly in the aforementioned contexts (Nixon, 2011).

The slow violence of toxic exposure can be combined with other more visible forms of political violence and technologies for social control. In 2018 alone, non-governmental organizations documented the killings of 164 environmental activists who were murdered for defending their homes, forests and rivers against destructive industries and corporate powers with connections to corrupt governments and political elites. Many of these crimes have been silenced in the mass media and governments and legal systems have proved unable to prevent murders or to obtain reparation. This context makes it very difficult for activists to acquire reliable data on these crimes (Global Witness, 2019). Historians also face problems in accessing the relevant sources to make balanced analyses; the voices of victims and activists are less likely to be heard in the historical record than those of governments, experts and industry. In this situation, oral history could provide alternative sources to the voices of subaltern groups with fresh perspectives on toxic disasters (Green & Cooper, 2015; Lee & Newfont, 2017).

In this unequal and frequently ruthless context, transforming data on toxic exposure into political action is a complex process, both in large environmental movements and in polluted workplaces (Henry, 2017; Ottinger & al., 2011). Lacking legal support, other affected communities have put into action alternative practices of resilience to restore degraded human bodies and landscapes. Several studies have described how communities can create effective reparative actions based on particular forms of evidence and alternative forms of justice, even in the midst of extreme violence and toxic hazards. Again, historians face difficulties in their attempts to reconstruct these social and epistemological resilience practices (Lyons, 2018).

In addition to reconstructing these stories, historians can also be active participants in the campaigns against toxic risks (Kirsch & Stuart, 2014). In recent times, litigation on toxic hazards has mobilized historians as expert witnesses in trials. Examples include the testimony by Allan Brandt and Robert Proctor on tobacco, and Gerald Markowitz and David Rosen on silicosis and lead pollution (Brandt, 2007; Markowitz & Rosner, 2013; Proctor, 2011). They were all able to benefit from access to new sources of information, and many books on toxic substances have since been written using the wide range of sources produced as a result of these trials.[2] In these and other cases, historical studies on toxic products have

[2] Many secret documents have been released and are now available to the public on websites such as https://www.toxicdocs.org/

been widely circulated outside the academic world and have informed debate in courtrooms and in the campaigns of social activists to achieve environmental justice.

A Role for History

To conclude, current scholarship on toxic products highlights the inefficiency of regulations, due either to their disconnected norms and unapplied rules, or to the one-by-one approach to toxic assessment. This legal deficit in toxic control is reinforced by more invisible practices related to "agnotology" and "undone science" along with the role of sequestered experts, "merchants of doubt" and the revolving door between regulators and polluters. These ingredients constitute a fertile terrain for the growth of different forms of corporative crime, which, in contrast with nineteenth-century poisoning murders, remained largely unpunished in the twentieth century. This bleak picture reinforces the idea that the main purpose behind twentieth-century regulations was to safeguard global trading rather than to prevent crimes against workers, consumers or the environment. Inspired by economic agencies or think tanks committed to capitalist dogmas, the regulations (or the lack thereof) have sometimes reinforced the inequalities between victims and polluters. These inequalities are not limited to economic and political powers, they are also related to decision-making, the regulating agencies and the mass media. They also involve an unbalanced production of proof and uncertainty related to toxic hazards.

Remarkably, the issues above are largely absent from current debates on toxic products. Many discussions are framed around the narrative of science and its discontents, in which "scientific data" provided by "impartial experts" is opposed to the "irrational panic" of chemophobic activists. This review confirms that history has a role to play in reframing these public debates. By adopting different temporal and spatial scales, historical research can shift the focus away from scientific data and look for more complex social and cultural issues. It can also help to deconstruct technocratic discourses and empower victims, while questioning the institutional framings and received cultural constructs. It can bring to the fore crucial issues, such as the uneven distribution of power and risks, that shape decision-making processes in toxic product matters. Thus, studies on toxic products offer new opportunities for cross-fertilization between academic research and social activism, while fostering and expanding the uses of history in public affairs and policy-making.

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