LEAD Action NEWS

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The newsletter of The LEAD (Lead Education and Abatement Design) Group Inc.
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Volcano Art Prize 2018 Deadline Extended

2017 Volcano Art Prize (VAP) Entry. Title: Uluru, Lead-safety Message: Visit the heart of Australia but with-out poisoning it with lead. Artists: Sophea Wang https://volcanoartprize.com/portfolio-item/uluru/

Volcano Art Prize (VAP) is an art competition held by The LEAD Group (charity organisation) annually for people of all ages. Two types of awards will be awarded - best entry chosen by the judge and best entry chosen by the people. Entering VAP might not just help you win attractive prizes but could also make you a Good Samaritan in spreading awareness about solutions to Lead problems in your day-to-day life. The entry could be of many forms. The image just has to be rectangular and in landscape-orientation (not portrait-orientation). It's preferable if your entry has a lead safety message with it. Children can take help from their parents for the message. Submit your entries on http://volcanoartprize.com/

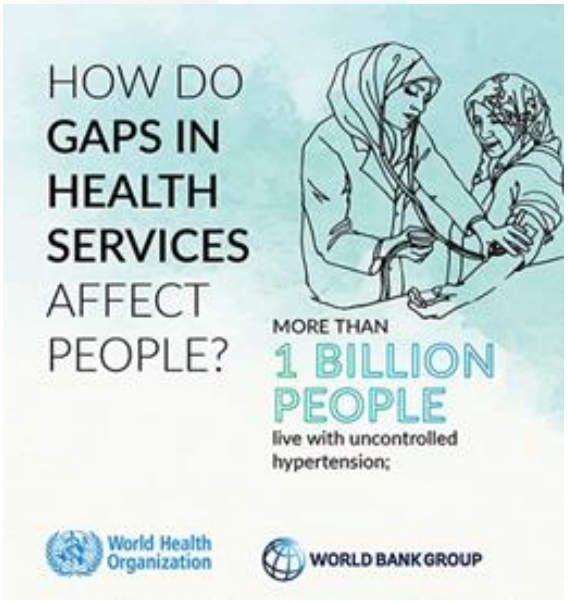
- Photograph
- Video
- Short film
- Poems
- Plays
- Short stories
- Case Studies
- Posters
- Paintings
- A photo of any form of creative item

The Volcano Art Prize 2018 entry deadline has been **extended to Monday 1st October, 2018** and the Facebook voting deadline is now **Monday 15th October, 2018.** The Award Ceremony can be attended via Skype or in person in Sydney, Australia, and will be held during International Lead Poisoning Prevention Week of Action (ILPPWA) – **Sunday 21st – Saturday 27th October 2018**.

Contents

Deaths from lead exposure approach the levels attributable to smoking

A 1st August 2018 fact sheet by LEAD Group volunteer Emily Choong, using extracts of media articles about the landmark Lancet lead article by Lanphear et al, March 2018.



"Lead is most widely recognized as a hazard to children, who can suffer intellectual damage from even minimal exposure. However, because lead can contribute to conditions such as high blood pressure and hardening of arteries, it is also believed to contribute to cardiovascular and heart disease." [Glenza, 2018]

"The population attributable fraction of the concentration of lead in blood **for all-cause mortality** was **18·0%** (95% CI 10·9–26·1), which is equivalent to 412,000 deaths annually [in the US alone]. Respective fractions were **28·7%** (15·5–39·5) **for cardiovascular disease mortality** and **37·4%** (23·4–48·6) **for ischaemic heart disease mortality**, which correspond to 256,000 deaths a year from cardiovascular disease and 185,000 deaths a year from ischaemic heart disease." [Lanphear et al, 2018]

Lanphear and his team reviewed two decades of health data for more than 14,000 adults in the US, covering the period 1990-2011. The participants all had blood tests at the outset to measure past and current exposure to lead, as well as a urine test for the metal cadmium. [Hood, 2018]

"There's no safe threshold," Lanphear said. "Once we found that there was a risk across the entire range of exposures, we could estimate the number of attributable deaths. And instead of it being 40,000 deaths, which is what had previously been estimated, we found that it was about 10 times that." [Lieber, 2018]

'Overall, people who had high lead levels (6.7 µg/dL) were at 37% greater risk of premature death from any cause, 70% greater risk of cardiovascular death, and double the risk of death from ischemic heart disease, compared with people with lower levels (1 µg/dL)... These results were adjusted for age, sex, household income, ethnic origin, diabetes, BMI, smoking status, alcohol consumption, diet, physical activity, and amount of cadmium in urine. [The Lancet, 2018]

They also concluded the estimated number of deaths attributable to lead were comparable to the number of deaths from tobacco smoke exposure. [Lardieri, 2018]

The new Lancet study estimates that deaths from lead exposure approach the levels attributable to smoking, which kills 483,000 Americans each year. People are still far more likely to suffer complications from smoking. **But only 20% of Americans now smoke, while lead exposure is more common, affecting 90% of people in the study.** [Glenza, 2018]

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www.leadsafeworld.com – test the environment. www.lead.org.au – info on blood lead levels

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Low-level lead exposure and mortality in US adults: a population-based cohort study – A Review

By LEAD Action News Contributor

24th July 2018

Reference:

Bruce P Lanphear, Stephen Rauch, Peggy Auinger, Ryan W Allen, Richard W Hornung

www.thelancet.com/public-health Published online March 12, 2018

http://dx.doi.org/10.1016/S2468-2667(18)30025-2

https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(18)30025-2/fulltext?code=lancet-site

Introduction

The paper in The Lancet, Public Health journal by Professor Bruce Lanphear et al attracted a lot of attention. Titled "Low-level lead exposure and mortality in US adults: a population-based cohort study" it was published in March 2018 and was soon reported by over 70 news media.

The aim of this LEAD Action News article is to bridge the gap between the news media summaries and the Lanphear paper itself in an attempt to give a lay summary of the contents. Inevitably this means skimming over some of the background and details. It should be noted that the author is not an expert in statistics. Corrections or clarifications from readers would be welcomed.

For a proper understanding readers should study the full paper – and take a degree in statistics.

Summary

Basically, what this study did was to link two data sets to see if there was any correlation between elevated lead levels and some later fatal health problems. The study looked at all-cause mortality (death) together with cardiovascular disease (CVD) and ischaemic heart disease (IHD).

The most important output from the study was to report the hazard ratio for an increase in blood lead level (BLL). The hazard ratio was calculated for an increase from the level below which 10% of participants were found, to the level above which 10% of participants were found - from below 1·0 µg/dL to above 6·7 µg/dL. That is micrograms (1,000,000th of a gram) per decilitre (one tenth of a litre) – by any measure, very small amounts.

To put it another way, it answers the question "What is the risk of moving from the best 10% to the worst 10%?"

In summary, ignoring confidence intervals, the results presented were:

Outcome	Hazard Ratio	Population Attributable Fraction	Population Equivalent (USA)
All-cause mortality	1·37	18·0%	412 000
CVD	1·70	28·7%	256 000
IHD	2·08	37·4%	185 000

The meaning of these measures seems to be:

Hazard Ratio

This is the difference in the chance of an outcome occurring between one level of a measure and another.

In this case, an increase in BLL from below 1.0 to over 6.7 µg/dL would increase the risk of death by 37%, dying from CVD by 70% and dying from IHD by over 100%. That is over a period, on average, of 19.3 years. This is the time between the patient appearing on the first and second data sets. However, see the note below about confidence levels.

It should be added that µg/dL is the commonest measurement of BLL. The mean in this study was 2.71 µg/dL. In the USA 5 µg/dL is considered elevated (NIOSH, 2018 [1]), but in the UK the level would have to be 60 µg/dL for an adult to be suspended from work (UK Legislation, 2002 [2]).

Population Attributable Fraction (PAF)

The British Medical Journal (Mansournia and Altman, 2018 [3]) has a good description of what this is: "PAF is the estimated fraction of all cases that would not have occurred if there had been no exposure". In this case, the Lanphear et al study concludes that 18% of deaths would not have occurred had all subject's BLLs have been below 1.0 µg/dL. We know that death must occur at some time, so this would seem to mean the deaths that would be avoided over the mean period of follow-up, i.e. 19.3 years from the average age of subjects at the start which was 44.1 years. The same can be applied to CVD and IHD.

Population Equivalent

Having established the PAF in the sample of 14,289 subjects, this is then extrapolated to the whole population of the USA based on the number of all-cause deaths, and those caused by CVD and IHD.

This is how the headline figure of 412,000 deaths per year due to lead poisoning is derived.

Data Sets

The data analysis in the study uses two sources:

The Third National Health and Nutrition Examination Survey (NHANES III)

National Death Index (NDI)

The essential process was to match NHANES records with NDI records for each person in the study. NHANES provides the BLLs and NDI provides the cause of death, if deceased. This study does not therefore look at the lifelong impact of lead poisoning.

NHANES

NHANES III was conducted in the USA from 1988 to 1994 and included a total of 39,695 persons. There was a bias in the data collected with higher sample rates for unders 5s, over 60s, Mexican-American persons, and non-Hispanic black persons. However, this should not impact the results because the same individuals should be found in the NDI data.

The Lanphear et al study used data for those aged 20 or over in NHANES.

The NHANES data set includes wide variety of measures. Those chosen as the baseline in the Lanphear study are:

- Gender
- Ethnic origin
- Education
- Income
- Residence location
- Smoking
- Alcohol consumption
- Physical activity
- Hypertension
- Diabetes
- Healthy eating
- Body mass index

- Age
- HbA_{1c} – measures glucose concentration
- Serum cotinine – indicates smokers
- Urinary cadmium – measures kidney accumulation

NDI

The NDI data is a centralised database of death records from 1979. For this study individuals in NHANES are matched to the appropriate death record in NDI. It would appear that the cause of death is used to identify deaths from CVD or IHD.

Diseases

CVD

Cardiovascular disease is a general term for conditions affecting the heart or blood vessels. Around 1 in 4 deaths in the USA are caused by heart disease (CDC, [4]) and it is estimated that this costs $200billion per year (CDC Wonder [5]). If elevated lead levels are causing 28.7% of these deaths then this is costing over $57billion per year. This is not including the costs resulting from other non-fatal lead related conditions.

Included in CVD are:

- Coronary heart disease – when blood flow to the heart is blocked, or reduced, causing angina, heart attacks and heart failure
- Strokes and transient ischaemic attack – when blood supply to the brain is cut off permanently or temporarily.
- Peripheral arterial disease – when there is blockage in the arteries to the limbs
- Aortic disease – such as aortic aneurysm, bulging of the main artery carrying blood from the heart

IHD

This is another name for coronary heart disease. It is probably selected for this study because it accounts for around 370,000 deaths in the USA of which about 146,000 occurred before age 75. These are data from the National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December, 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program (CDC, [6]).

Statistical Methods

The paper lists several statistical methods used in the data analysis. Most of these are highly complex and sophisticated. They include:

Cox proportional hazards models

> This appears to be a way to calculate the impact of different values of a variable on survival rates. In this case, differing values of blood lead (SDAHT, [7])

Schoenfeld residuals

> The Cox proportional hazard model assumes that the hazard ratio is constant over time. This is validated using the Schoenfeld residuals method. In the case of the Lanphear study none of the models violated this assumption using this test.
>
> (StataCorp, [8])

SUDAAN (version 10.0.1)

> SUDAAN is a software package for analysing correlated data. The software includes features to correctly account for complex design features, as found in the NHANES data, including weighting (RTI, [9]).

Taylor linearisation

> One of the features of SUDAAN is support for Taylor linearization. This appears to be used to find an approximate linear relationship at a point in the complex NHANES data (RTI, [9]).

Five-knot restricted cubic splines

> Because the relationship between blood lead levels and survivability may not be linear, i.e. not a straight line on a chart, splines are used to investigate what shape the line might be (Wikipedia, [10]).

Confidence Intervals

The findings in the paper are expressed with 95% confidence intervals. What this means is that we can be 95% confident that, based on an extrapolation of the sample data, that the true population value lies between the lower and upper confidence intervals.

For example, the all-cause mortality hazard ratio was found, in the sample, to be 1·37. For this result, the 95% confidence intervals are given as 1·17–1·60. Therefore, the true hazard ration is probably somewhere between 1.17 and 1.60.

Another example is the population attributable fraction for all-cause mortality. This was found to be 18% with confidence intervals of 10·9–26·1. So it is probable that the actual percentage of deaths attributable to lead is between just below 11%, to over 26%. Converting this into numbers of deaths we can say that between 249,000 and 597,000 deaths each year are caused by death.

Another type of interval is used for the follow-up time. That is the time from the subject being included in the NHANES data to their appearance in the NDI data. This is stated as 19·3 years with an interquartile range of 17·6–21·0. This is the range of values where the middle 50% of the follow-up times lie. This helps describe the range of values or the shape of the histogram. For this we have actual, not extrapolated, data, so can say for sure that 50% of the follow-up times lie within about 2 years below and 2 years above the average follow-up time.

Limitations

The paper describes some limitations. Interpretation of these could include:

> Baseline measurements of lead exposure may not reflect lifelong cumulative lead loading. Some might be the result of incidental rather than environmental exposure or continued environmental exposure could result in greater cumulative lead loading.
>
> Cause of death can be misreported and impact the analysis. Data quality is always a factor.
>
> Other risk factors are adjusted for where possible. However, some, e.g. air pollutants and arsenic, were not adjusted for and could have an impact.
>
> Although the NHANES data contains many parameters there may be some not included that impact the results. These are called confounders and may include additional socioeconomic and occupational factors.

Conclusion

> It could be said that death is unavoidable so can we say that this study really measures avoidable deaths? What we can say is that we die from the first thing that kills us. This study suggests that, it is probable, that, currently, between 249,000 and 597,000 Americans are dying sooner than they would have because they had elevated blood lead levels around 20 years previously.

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Lead poisoning and intelligence: a search for cause and effect in the Scottish Mental Surveys

In 1932 and again in 1947, the Scottish Council for Research in Education (SCRE), at the urging of the Population Investigation Committee and the Eugenics Society, undertook the Scottish Mental Surveys (SCRE, 1953, p. 1). Testing two cohorts, one of 87,498 children in 1932 and another of 70,805 children in 1947 (SCRE, 1949, p. 5), researchers set out to measure - using the same validated test each time - the intelligence of every Scottish child 11 years of age (see notes 1 & 5). The stated impetus for the Surveys was a fear that average Scottish intelligence was declining, perhaps due to a tendency for the more intelligent members of society to produce fewer progeny then those who were less intelligent (Maxwell, 1961, p.10). But when investigators compared the results of the 1947 Survey with those from 1932 their predictions were completely upended. Instead of average intelligence declining, as was feared, it had risen, substantially (SCRE, 1949, p viii).

The Surveys were unparalleled - two surveys of entire populations, not just samples. Nothing like them has occurred before or since. And the contexts in which they took place are of interest. Scotland's resources were severely stretched in both 1932 and 1947. In 1932 the country was feeling the effects of the Great Depression, and in 1947 it was both grieving and rebuilding following the devastation of World War II. Despite those obstacles, the country's leading educators felt compelled to conduct two massive research studies in an era before modern computers. Each test was scored and tabulated by hand. It is hard to imagine the concern and worry over Scotland's future that must have existed to justify such undertakings.

With the 1947 results in hand, investigators began to look at cause and effect. There was a belief that genetic evolution had not played a role, the 15 years between Surveys being too short a period for such change to have taken place (Maxwell, 1961, p. 10). Beyond that, however, there has been no agreement to date on cause. Although researchers felt that environmental influences had undoubtedly played a role (SCRE, 1953, p. 50), in a retrospective, Ian Deary and co-authors labeled the 1947 results as an early example of the "secular rise in intelligence test scores" due to the "Flynn effect" (Deary, et al., 2009, p. 24). The Effect describes what happens when the same intelligence test is administered repeatedly to successive generations of test takers. Regardless of test design the current generation invariably scores better on the test than did previous generations (Flynn, 1999). Flynn's explanation for the Effect is that intelligence increases in response to an increasingly complex world (Flynn, 2013) .

If children in 1947 were more intelligent than those in 1932 because of the Flynn effect, then the story ends and the Scottish Surveys return to obscurity. But there is another explanation, one that addresses the rise in test scores without invoking Flynn's theory. That explanation holds that in 1932 a large number of surveyed children suffered from chronic lead poisoning and that this caused test scores to be abnormally low. As environmental lead levels fell, and children absorbed less of the metal, intelligence rose to the level recorded in the 1947 results. Was chronic lead poisoning widely prevalent in Scotland in the first half of the last century, and were the Surveys bellwethers of the human cost of that event? The evidence will show that, at home and at work, lead had laid siege to Scotland, and only gradually beginning in the 1920s did the threat diminish. Of all the perils from lead, the most pervasive was the presence of the metal in drinking water, not at its origin but as a byproduct of its delivery to the consumer.

"*Roughly 150 years ago, cities all over the world installed lead pipes to distribute water.*" wrote Dr. Werner Troesken in his book *The Great Lead Water Pipe Disaster* (Troesken, 2006, p. 9). Municipally owned lead service pipes for the delivery of drinking water existed in Scotland until well into the early part of this century (Government of Scotland, 2002). In the mid-1970s, in response to growing concerns about lead in the environment, authorities conducted the most comprehensive survey of lead in water ever undertaken in Great Britain (Central Unit on Environmental Pollution, 1977, p. iii). What they found was that the amount of lead in drinking water correlated directly with the lead content of the pipes and fixtures supplying the water (Central Unit, p. 10). As part of the survey, authorities drew water samples from 2,317 randomly selected households in England, 574 in Scotland, and 290 in Wales (Central Unit, p. 6). After confirming that the survey's demographics matched those of the countries under study, investigators extrapolated their findings. Based on "first draw" samples (see note 6) they estimated that 44.6% of homes in England, 58% in Scotland, and 37.8% in Wales had lead levels above a detectable minimum (Central Unit, p. 7). For the highest detected levels of lead (0.3mg/L and greater), there was an even greater difference; 0.6% of homes in England, 11% in Scotland, and 0.8% in Wales were estimated to have such levels. For "daytime" samples (see note 7) the differences trended in the same direction albeit with different numbers (Central Unit, p. 8). Lead-solvency, here defined as any process able to release lead into drinking water whether corrosion is present or not, explained much of the difference.

In the presence of lead plumbing the amount of lead in drinking water may be increased by: a) increase in water acidity, b) increase in water temperature, c) age of the plumbing, d) the use of lead-lined residential storage tanks, e) the use of pipes made of different metals (usually copper and lead), f) contact time between lead and water, g) water pressure and turbulence of flow and, h) thermal expansion of the pipe (Britton, 1981, p. 350). It can also be increased through the disruption of pipe deposits from public water flow cycling on and off (White, p. 461) and, as described above, the total lead content of the pipes and fixtures that connect the water main - which was usually made of steel or iron, not lead -

with the household taps (Herring-Shaw, 1909, p. 90). In Scotland acidic water was the major reason for lead-solvency.

Published studies on lead contamination of municipal water supplies have singled out Glasgow over Edinburgh despite the fact that the water systems of both cities drew from surface sources in areas with decidedly acid soil chemistries. However, given that Glasgow was more than twice the size of Edinburgh in the early part of the Twentieth Century, and drew water from an area where the soil chemistry was slightly more acidic (The Scottish Water Advisory Committee, 1963, pp. 6,7), the emphasis on Glasgow is understandable. Reports have focused on the consequences of ingesting lead-solvent water. But in truth the water contaminated everything it touched. In the short term such contamination was trivial, but over months and years objects on which water was allowed to dry - clothing, floors, table tops, pots and pans, kitchen counters, dishes, etc. - ran the risk of accumulating lead. Together with other sources of lead in the environment it all added up.

Reliable "always flowing" public water systems were uncommon in Great Britain until well into the Twentieth Century. For a variety of reasons, water service was routinely interrupted for several hours each day forcing the householder to look for other ways to keep water available at the tap (Hellyer, 1898, p. 251) (Raynes, 1920, p. 254). The usual solution was the household "cistern", a large tank integrated into the plumbing that held as much as several hundred gallons or more. Frequently this was a large box made either of wood lined with lead or wholly of lead (Hellyer, p. 251ff). Cisterns were also common in rural areas where household water needs were met solely through the collection and storage of rain (Raynes, p. 255). When persistent published reports appeared alerting readers to the risk of poisoning from lead cisterns, scattered efforts to eliminate the cistern as a source of drinking water began. Shortly after the turn of the century, for example, one municipal plumbing code mandated that water from the "drinking" tap (usually the kitchen) had to be plumbed directly from the public water main bypassing the cistern completely (Herring-Shaw, p. 138). Sometime before 1940 this would become standard recommended practice (Building Research Board, 1944, p. 10) (Frazer, 1940, p. 108). As another example, a second cistern constructed of lead-free material was sometimes installed as a source of potable water in areas where the public water supply was routinely interrupted (Society for the Sanitary Inspection and Construction of Houses, 1881, p. 932). Finally, where public water systems were charged and under pressure at all times, providing an uninterrupted supply, the cistern risked becoming superfluous. But improvements to plumbing infrastructure were not quickly or widely adopted. When they began to be implemented as part of new housing construction, it was too little and too late for the 1932 cohort, all of whom had been born in 1921; 87,438 children whose most vulnerable growing-up years would occur during the 1920s.

Although there had long been a recommendation to construct cisterns and pipes of lead-free materials in lead-solvent areas (Hart, 1904, p. 187), there was a countervailing belief

that given the right water chemistry further dissolution and corrosion of plumbing would be prevented once the action of water on lead had laid down a protective and impermeable barrier of metallic salts, which combined with organic matter in the water would shield the soft bare metal from further damage (Hart, p. 188; Raynes, p. 253; White, p. 461). The problem would correct itself in effect. However the barrier itself could become damaged for any number of reasons, exposing the consumer to lead once again. A second obstacle to the adoption of plumbing improvements was that lead plumbing, particularly lead cisterns, were practically indestructible, as one observer noted, leading to extraordinary long replacement cycles. In an investigation of a spontaneous outbreak of lead poisoning in the Scottish Highlands in 1974, the source of the lead was found to be the plumbing and in particular the lead cistern, which in one case was almost 200 years old (Goldberg, 1974). Finally, in the first half of the Twentieth Century the vast majority of Scotlanders did not own the homes they lived in. They rented. It is estimated that in 1914 this circumstance applied to 90% or more of the population of Scotland (Abrams & Brown, 2010, p. 48; Niven, 1979, p. 25). That astounding statistic meant that the average householder did not have the legal right to remove lead from the plumbing even if he or she wanted to, and in the absence of government mandates or financial penalties, the landlord had no incentive. Improvements would have to wait for government action on housing as well as official recognition that lead poisoning from drinking water was a problem.

Although Glasgow, Scotland's largest city in the early Twentieth Century, had some of the worst slums in Europe, housing blight had not spared the rest of the country. In an official report published in 1917 on the housing problem attendant to the working classes, investigators concluded that 236,000 new houses needed to be constructed throughout the country both to replace houses unfit for habitation and to raise overall living standards to an acceptable level (Royal Commission on Housing in Scotland, 1917, p. 347). As a result of the Commission's findings, two government initiatives were launched, one in 1919 and one in 1924 (Niven, pp. 26-27). From published statistics it can be estimated that 10% of the 236,000 had been constructed by the end of 1923, 17% by 1925, 32% by 1927, and 41% by 1928. Although the initiatives languished and finally ended with the economic collapse of 1929, new government programs in 1930 and 1935, as well as the return of speculative building following a 24 year hiatus, resulted in a building boom in Scotland from 1930 to 1939 (Niven, pp. 29-30). As a result, 64% of the 236,000 houses were completed by the end of 1931 and 108% by the end of 1935 (Ministry of Labour, 1927 (v. 35), 1928 (v.36); Department of Health for Scotland, 1927-1936). The new houses, fitted with plumbing that offered lower levels of lead contamination of water, would fully benefit children in the 1947 cohort but only a small number of those in the 1932 cohort.

As households were moved out of old quarters and into new, trading old lead plumbing for new in the process, the risk of lead poisoning from drinking water dropped fractionally. Although this was particularly true where drinking water was not supplied from a lead cistern in the new house, simply trading old lead pipes for new lessened the risk of lead-

solvency at least for a time. A review of published sources suggests that over the life span of a lead water pipe, which was said to average 50+ years (Britton, p. 354), lead-solvency progressed through three stages: 1) the "conditioning" stage - in this stage lead-solvency began high and then gradually diminished as a protective barrier was laid down on the interior surface of the pipe. This stage was present whenever new or repaired lead pipe was placed into service. 2) the "conditioned pipe" stage - in this stage lead-solvency and corrosion were at their lowest. The length of this stage was determined by the adherence and permeability of the protective barrier. 3) the "aged lead plumbing" stage - in this stage both corrosion and lead-solvency increased as a result of failure of the protective barrier. "Aged lead plumbing" was found to be a reliable predictor of lead-solvency (Britton, p. 354; Richards, 1980, p. 323). The importance of the stages within the context of the Surveys is that, during the children's most formative years, a greater number in the earlier cohort grew up with plumbing in stage 3, whereas in the 1947 cohort a greater number grew up with plumbing in stages 1 and 2.

How often builders failed to include a lead cistern in new construction is not known. But plumbing trade books of the period advised against supplying water for drinking and cooking from lead cisterns particularly in areas where the water was lead-solvent, a condition that applied to most of Scotland (Raynes, p. 286; Herring-Shaw, p. 113; Hart, p. 187). In addition, British medical publications, some from before the turn of the century, roundly condemned the practice of using lead cisterns as a source of drinking water (White, 1889; Goldberg, 1974; Swann, 1892). More recent information on the use of lead cisterns in Scotland was published as part of a follow-up investigation of the Edinburgh Lead Study, a survey of 500 children living in central Edinburgh in the 1980s (Raab, et al., 1993). At the time it was estimated that there were between 30,000 and 60,000 lead-lined water storage tanks still in use "for all domestic purposes" mainly in the Edinburgh and Glasgow areas (Britton, p. 358). In the follow-up study investigators examined the cold water supply in 480 of the children's homes. Non-public housing that was rented as opposed to owner occupied was more than twice as likely to have cold water supplied from a lead storage tank. The difference between public housing and privately rented homes was even more stark, the latter being 10 times more likely than the former to have cold water supplied from a lead tank. The study also found that more recently built homes were far less likely to include such tanks then were houses built during the late Victorian period or early Twentieth Century (Raab, et al., p. 197). In 1931, in an obscure reference, came a hint that municipal authorities were ready to acknowledge that lead-solvency was a problem (British Waterworks Association, 1931, p. 17). And in 1938, 2 years after the birth of the 1947 cohort, lead-solvency made an appearance before the law. As reported In a lecture on water and public health before the Royal Institute of Chemistry of Great Britain and Ireland, the speaker stated that a judge had ruled that water companies had a duty to either warn customers of the danger of lead-solvency or take steps to mitigate it (Carey, 1946, p. 21).

But for children participating in the Scottish Surveys drinking poisoned water wasn't the only lead peril they faced. Lead from occupational exposure was another. Spanning the width of Scotland from the Firth of Forth on the east coast to the Firth of Clyde on the west lay the heart of the country's industrial might for much of the Nineteenth and early Twentieth Centuries. And at the center of that lay the largest shipbuilding industry the world had ever known. Along the banks of the river Clyde and its estuary, where most of the ships were built, as well as at Leith, Rosyth, and Burntisland on the Firth of Forth, lay a score or more of shipbuilding, shipbreaking, and ship repair facilities (Moss & Hume, 1977, p. end plates). Shipbuilding was dirty, dangerous work (McKinlay & Hampton, 1991, p. 21). And often hidden in the dirt was dust and residue from lead. Lead was widely used in shipbuilding. It could be found in paint and plumbing (as pipe, conduit, and solder), as a lubricant, in engine parts, as corrosion control coatings on plate steel, and as sheet lead for floors and bulkheads in areas subject to condensation such as galleys and room-sized refrigerators, (Consolidated Mining and Smelting Co. of Canada (C.M.& S.Co.), 1944, p. 255). After peaking in 1920 shipbuilding in Scotland went into decline and never fully recovered. Although the industry rebounded somewhat in the late '30s, gains in worker productivity as well as a migration of skilled labor away from the industry during its lean years reduced the insured work force from 97,000 in 1921 to 41,000 in 1936 (Ministry of Labour, 1921, 1936; Jones, p. 112; see note 3). That meant that far fewer wage earners were potentially bringing home lead contaminated clothing to families that could count as members children in the 1947 cohort, roughly 80% of whom had working class parents (SCRE, 1953, p. 215; see note 2).

By 1920 what promised to be difficult years ahead for the Industry became even more so with the withdrawal of the British Admiralty from the business of building ships, a move required by international treaty (Peebles, p. 5; Campbell, p. 134). Since many commercial contracts ended up generating losses for the shipyards - the result of competition, technical challenges, overcapacity, labor unrest, supply chain problems, and the vicissitudes of world trade - the withdrawal removed the only reliable funding source the industry had known (Slaven, 1977, p. 202; Peebles, 1987, p. 141). It also removed a role model for lead safety at a critical time.

"*The Admiralty have for some time recognized the dangers attaching to the use of lead paints, and have taken precautions accordingly*". That statement, given in testimony before a committee investigating the dangers of lead paint, revealed how seriously the British Navy took the threat of lead poisoning among ship's painters. The point was driven home by the fact that the Navy had become a leader in the use of lead-free paints on the interior surfaces of ships (Committee on Lead Paint, 1915, p. 59). A man painting ships for the Navy could expect to benefit from the following, all provided at Admiralty expense: plenty of soap, nail brushes, hot water and towels and the time to use them before lunch and at shift's end; enforcement of the preceding by an overseer stationed at the door of the washroom ("no wash-up" meant "no wages"); work overalls and their regular washing at a

commercial laundry (a benefit usually denied those working on civilian ships (Committee, p. 38; Reid, 2010, p. 102) and, regular examinations for signs of poisoning (Committee, p. 75). Although the speaker was referring to activity at Government owned dockyards, it is illogical to believe that the Admiralty would abandon this or any regulation simply because a naval vessel was being built, refitted, or repaired at a commercial rather than at a navy yard. And while it may be comforting to believe that the Admiralty instituted the work rule out of a sense of humanity, the truth is probably more prosaic. Painters getting sick on the job and having to be replaced could delay the launch of a badly needed ship.

When a commercial yard enjoyed business from the Admiralty, yard workers built merchant ships and navy vessels side by side (Peebles, p. 3). Admiralty contracts contributed more than five times that of merchant contracts to yard overhead and profit at two of the leading Clyde shipyards in the years leading up to both Wars (Peebles, pp. 145, 147). That kind of financial security would have made the Admiralty the most important customer for any yard lucky enough to have the Navy's business. So it is difficult to imagine a scene where ship's painters are up to their elbows in soapy water before mealtime at a berth where a navy vessel is being built, while at an adjacent berth in the same yard workers painting a merchant ship are sitting down to eat with paint encrusted hands. Although that may have occurred, a more optimistic view is that the Admiralty's position on lead safety would have been embraced by yard management. Coincidental with the departure of the Admiralty from shipbuilding, spray painting began in shipyards. The hazards associated with spraying lead paint in confined spaces were well known, and for that reason spray painting in a ship's interior was strongly resisted by labor unions (Reid, p. 101). In better times, in a crowded yard, with berths occupied cheek by jowl and workers swarming over every ship, even exterior spraying could be a hazard as a mist of lead paint would drift from ship to ship. But as the shipbuilding industry fell into disarray from 1920 onward prompting yard management to cut costs, the painters, never well organized to begin with, lost ground. An example was the demise of an agreement reached at the end of the War between the union and yard management for the latter to provide clean overalls on a regular basis. That benefit would disappear sometime before 1930 (Reid, p. 102). As World War II approached and commercial shipyards revived, painters regained much if not all of their lost ground, in step with the return of the Admiralty to shipbuilding.

The blow to safety that followed the Navy's exit from shipbuilding was compounded by a simultaneous surge in shipbreaking at the end of the War, a result of obsolete naval vessels being scrapped (Jones, p. 95). Carried on at 70 different locations throughout Great Britain (Hoffman, 1933, p. 29), shipbreaking was the dirtiest most hazardous work that a shipyard could engage in. Acetylene torches cutting through plate steel covered with lead, cadmium, zinc, or nickel chromium either as paint or corrosion coating, sending up great plumes of toxic gases laced with heavy metals. In 1924 the number of cases of lead poisoning reported among workers in the shipbreaking industry was higher than 15 other lead-related occupations and industries, and 30% higher than the next highest number

(Hoffman, 1927, p. 11). Old photos of the era show shipyard workers laboring in what appears to be street clothes, a conclusion supported by oral histories (McKinlay & Hampton, pp. 22,23). Pictures show vests, jackets, coats, trousers, and cloth caps being worn, occasionally supplemented by overalls especially if painting, welding, or lead burning was part of the job. But unless the work was for the Admiralty, all the clothing including the overalls came home to be washed (see note 8).

Apart from crowded tenements built with the working classes in mind, much of the housing for industrial workers in the urban centers of Scotland in the first quarter of the Twentieth Century began life as middle and upper class homes, many built during the late Victorian era, or as failed real estate developments for the middle class (Niven, p. 20). As the affluent moved away from the city's center with its crowding and pollution, or emigrated, their now empty houses were transformed into rented quarters for working class families, "made-down housing" in the local vernacular (Allan, 1965, p. 599; Cairncross,1954, p. 194; Fraser & Maver, 1996, p. 369). A single house, remodeled and subdivided into flats, would become home to several families, some living in a single room that functioned as kitchen, sleeping quarters, and living area with one privy for the entire building. Many of these quarters consisted of no more than two rooms regardless of the number of occupants (Begg, 1987, p. 7). Although the "made-down" properties would rapidly deteriorate In the 1920s from lack of maintenance (Horsey, p. 13), an epidemic of lead poisoning from children eating old lead paint would not materialize (BMJ, 1955) as it had in Baltimore in the 1940s and '50s. Lead paint was not widely used in Scotland for domestic purposes (Committee on Lead Paint, p. 31) perhaps because of the expense.

The other source of occupational lead during this period was the munitions industry which in Great Britain as elsewhere employed large numbers of women during the War. By one estimate tens of thousands of women in the West of Scotland alone were employed at the height of production, and by all estimates at least that number and probably many thousands more were engaged throughout Scotland (Baillie, 2002, p. 34; Scott & Cunnison, 1924, p. 98; see note 4). In addition to the ever present risk of fire, explosion, and occupational illness, munitions manufacturing was hazardous due to the large number of people working in close proximity to dangerous machinery. The hazards were made worse by the fact that many workers and managers, inexperienced and hired in a frenzy after munitions production was found to have fallen far short of need (Baillie, p. 1), were unfamiliar not only with munitions manufacturing but with heavy industry of any kind. Women who up until then had seldom set foot outside the home could find themselves after a short training course working long hours including nights and Sundays, man-handling 80 pound artillery shells across a crowded, noisy, factory floor close to fellow workers each intent on coaxing the machine in front of them into milling a piece of smoking hot metal to exact specifications. In the major urban centers of Scotland, munitions manufacturing focused mainly on heavy shell and bombs rather than small arms ammunition (Baillie, p. 28). In view of the urgency of the situation at the Front every

available resource was pressed into service. Local garages, bicycle repair shops, even a golf equipment manufacturer became entrepreneurial centers of munitions production (Baillie, p. 29; Scott & Cunnison, p. 94). There was an acknowledged lead hazard in such work. Lead paint was used to protect finished munitions from corrosion, alloyed with steel to make the latter easier to machine (C.M.&S.Co.; p. 237) as an essential component of artillery Shrapnel shells, in soldering and tinning processes, and to harden and temper steel used in making bombs and shells. As part of the hardening process, the steel was immersed in a bath of molten lead to bring the former to a uniform temperature (Hamilton, 1915, p. 64; Ministry of Munitions, 1917, p. 100). Evidence has shown that any time an object is immersed in a lead bath, the thin layer of lead oxide floating on the surface of the molten lead breaks into pieces, some microscopic in size. The smallest of the pieces may become airborne floating as invisible particles (APHA, 1942, p. 7). What precautions were taken to prevent these particles from being inhaled, or whether authorities were even aware of the problem, is unknown. However by War's end 12,000,000 artillery shells had been produced in Scotland alone (Baillie, p. 22). Every one of these shells was heat treated either by immersing it in molten lead or by other means (Hamilton, p. 59).

Although the Ministry of Munitions' Committee on the Health of Munition Workers issued comprehensive safety guidelines intended for the protection of workers (Ministry of Munitions, 1917), serious questions have been raised as to how closely these guidelines were followed in light of the relaxation of labor laws governing the conditions of industrial employment for the duration of the War (Baillie, p. 186). Given lax enforcement it would be difficult to believe that there were not more than a few women who emerged from the experience having absorbed lead at their place of work, a claim for which there is some evidence. Sometime after the signing of the Armistice in 1918, the Ministry of Munitions' Committee on the Health of the Munition Workers issued its final report. Included in the report was a section written by a senior medical officer who had examined 1,156 women at eight munitions factories throughout Great Britain (although none in Scotland). The examiner observed that in addition to other findings, up to 26% of women complained of constipation; up to 32% had several carious teeth; as many as 37% had complained of indigestion, abdominal pain, or loss of appetite; up to 30% of nervousness, irritability, depression, or difficulty sleeping; as many as 59% of recurrent headaches; and as many as 28% of muscular aches and pains. Each complaint was noted at all eight factories although the frequency of each varied considerably from factory to factory (Health of Munition Workers Committee, 1918, p. 141). This suggests that the complaints were work related and not something that the women brought from home. All of the findings have been associated with proven cases of chronic lead poisoning. And while no single finding is specific for lead poisoning (each can be seen in other conditions), the fact that all of the findings were observed over a single time period, in a group of women all doing related work and all with known occupational exposure to lead, makes it highly likely that lead was

causative. A number of these very same women would go on to give birth two or three years later to children who would participate in the 1932 cohort. That mothers can unknowingly poison their unborn child with lead even years after maternal lead exposure has ended is well documented (Rastogi & et.al., 2007; Silbergeld, 1991).

In 1927 came the opening that would allow information on the dangers of lead to reach a wider audience. Issued in December of 1926 to go into effect January 1 of the following year, the Lead Paint (Protection Against Poisoning) Act made mandatory a host of new requirements for firms that used lead paint to paint buildings (MacKenzie, 1926). In addition, all painting contractors whether they used lead paint to paint buildings or not, had new reporting requirements that would allow health officials to track the whereabouts and work activities of all employed commercial painters. (Ministry of Labour, 1927, p. 13). The practical effect of the Act was to reduce the use of lead paint. "*The best that can be hoped",* wrote Dr. E.L. Collis of the Act," *is that employers, rather than be bothered with complying with the code, will adopt the use of paints which do not contain lead. There is already a considerable tendency in this direction"* (Collis, circa 1927). Because the Act would have added to the cost of painting, official language on the dangers of lead paint would likely have appeared in every painting contract, every deal negotiated with a customer, and would have been conveyed to every employee retained, hired, or released by a firm. In this manner public awareness of the dangers of lead had an opportunity to advance.

Results from the 1947 Survey raised several questions. Two of the more interesting dealt with the participation of girls in the study, and the distribution of test scores by educational regional authority respectively. Of the former James Maxwell wrote that "*The question must remain open, one major difficulty, the fact that most of* the *increased score in 1947 was due to the girls, has to be accounted for in any explanation*." (Maxwell, 1961, p. 10) A proposal now put forward is that girls absorbed more lead than boys because the former's household chores resulted in more lead exposure. In a working class home the wife and daughters did the heaviest housework; washing clothes, scrubbing floors (including, as a paying part-time job, scrubbing community staircases of which apparently there were many, in tenement buildings and in "made-down" housing), and cooking. Boys had some domestic responsibilities as well but more of their time was spent outside the house working at part-time jobs the most common of which was delivering milk (Lewis, p. 57; see note 9). Lead contaminated clothing piled in the corner of a crowded flat waiting to be washed was the responsibility of the mother and her daughters. In houses that were home to more than one industrial worker, a not uncommon occurrence, as many households sublet space in order to make ends meet (Royal Housing Commission, p. 100), the quantity of contaminated clothing could be doubled or even tripled. Since laundry facilities for working class families were always communal (Abrams & Brown, p. 61), this made lead-contaminated clothing a hazard for others as well. Lead poisoning in families from lead brought home from work as dust and residue had become such a problem in

Great Britain that sometime around 1911 premiums for workman's compensation insurance for painters were increased because of it (International Labour Office, 1927, p. 84). But as events conspired to reduce occupational lead exposure - an unexpected benefit of the pullback of the shipbuilding industry, the return of the Admiralty to commercial shipyards, and the Lead Paint Act of 1927 - the quantity of lead dust and residue in the home diminished, a clear benefit to children in the 1947 cohort. "*It is interesting to note*", wrote the authors of the 1947 results, "*that the superiority of the girls* [over the boys] *is most marked in the lower* [end of the range] *of score* [that is, the lowest 10% of scores] (SCRE, 1949, p. 91)..." Approximately 90% of these scores were claimed by children from working class families (SCRE, 1953, p. 113). If any improvement in test scores were to occur due to a reduction in occupational lead contamination of the home, it is in these scores that change would have been expected and was in fact seen.

The second question concerns the distribution of test scores by regional groups of educational authorities. A similar analysis was not completed for the 1932 Survey."*The general trend*", wrote James Maxwell "*is a decrease in average score from the South-East to the West and North* [of Scotland] *with Orkney and Zetland being exceptions"*. Orkney and Zetland (islands in the far north of the country) together contributed about 0.6% of children participating in the Survey. Maxwell continued, "*It is rather hazardous to attempt an explanation of these differences...*" (Maxwell, 1961, p. 54). An examination of topographical maps of Scotland reveal two phenomena that track the distribution of test scores remarkably well; the distributions of peatlands and soil acidity. Peatlands become more numerous as one moves from the South-East (where average scores were higher) to the North and West (where average scores were lower) (James Hutton Institute, 2017). Where there is more peat the soil is (on average) more acidic, the result of organic acids having been leached from the peat. For the same reason water drained from peatlands (a major source of drinking water in Scotland) is acidic. Since acidic water is lead-solvent and lead water pipes were present throughout Scotland at the time of the Surveys, it can be argued that lower intelligence test scores in the West and North of Scotland were the result of greater ingestion of lead from lead-solvent water in these regions.

Occupational lead poisoning, a reportable disease in Great Britain for most of the Twentieth Century (although not until 1927 for building and carriage painters), fell in uneven fashion from a peak of more than 400 cases in 1923 (including almost 50 deaths) to 168 cases (including 17 deaths) in 1935 (Hoffman, 1927, p. 10; Ministry of Labour, Sept 1936, p. 319). The decline occurred despite the fact that between 1931 and 1936 lead consumption increased by over 30% in Great Britain (C.M. & S. Co.; p. 71). From the late '30s into the early '40s the annual number of cases of occupational lead poisoning in Great Britain from all sources averaged around 115 with few if any deaths (Ministry of Labour Gazette, 1937-1941; vols. 45-50).

It is interesting to speculate on what might have happened had events occurred otherwise. If, for example, childhood lead exposure had stayed the same or perhaps even increased between the first and second Surveys. Would a higher level of lead exposure have reversed the outcome, with the 1947 cohort showing a lower intelligence than the 1932 cohort, confirming everyone's worst fears? Would such an outcome have strengthened the hand of the eugenicists, or perhaps that of the social reformers? A number of children (less than 1% of either cohort) continued to be studied for several years (Maxwell, 1969). Although differences in educational attainment and rates of marriage and fertility were recorded, none of these have shed light on the difference in intelligence between the cohorts. There is the feeling too, wrote Ian Deary, "*that the* [Scottish Mental Surveys] *were born of the concerns of a passing age*." (Deary, et al., p. 27), a veiled reference perhaps to the fact that intelligence did not decline as had been expected. It is obvious too from reading published reports that educated people of the period were not naïve about the dangers of lead. They feared it as much as people fear it today. And if their families had sufficient resources, they likely used them to build lead-free cisterns, install lead-free water pipes (if they were available) and avoid lead-related occupations. But lead also had economic importance. Early in the era water pipes might have to have been custom built, from scratch, on site, if there was to be an alternative to toting water from a well in a bucket. Lead was the only material that would allow a plumber to fashion a water pipe from a flat piece of metal. To question the use of lead in munitions, in shipbuilding or other heavy industry, or in plumbing, could have been viewed as unpatriotic in a country whose economy (and defense) critically depended on the metal. So even for the most wary and the best informed there was sometimes no alternative to lead. The SCRE investigators believed that the key to understanding the results of the 1947 Survey lay in understanding the family: its size, the child's position in the family, the intelligence of other family members, and the occupation of the father or guardian (Maxwell, 1961, pp. 9-11). With more than 50 years of perspective to work with, that understanding can perhaps be stated as follows. Families from the more affluent classes, living in better housing, exposed to no lead at work and little or none at home, and enjoying good nutrition, fared better. Families quartered in substandard housing, exposed to lead at home and at work, and living a subsistence existence, fared worse. Experience has taught that evidence of chronic lead poisoning in urban slums as well as in rural poverty can easily escape detection. In hindsight that certainly seems to be the message here.

Notes

1. Only children at school and in class the day of the Survey were counted. Children absent from school the day of the Survey (@ 4,500 children) are not included in the figures. No attempt was made to locate and test these children after the fact. It is not clear if the Surveys were announced in advance. If so then some families may have elected not to allow their children to participate

2. From a random sample of 10% of the children investigators in the 1947 Survey obtained information on family living conditions, father's occupation, the height and weight of the child, certain physical disabilities of the child, and other information. None of this information was obtained from children participating in the 1932 Survey.

3. In Great Britain unemployment insurance was required of all workers in shipbuilding and allied industries. The total number of insured workers (employed and unemployed) was provided monthly in the Ministry of Labour Gazette. Casual employment was common in the shipbuilding industry. In any given month a worker could work every day or only part of the month and often for different shipyards. In such a system separating employed from unemployed becomes difficult. For that reason the numbers 97,000 and 41,000 represent the total insured workforce which counts both employed and unemployed. From 1921 to 1936 the total insured workforce steadily declined.

4. Although Scott and Cunnison in their book *The Industries of the Clyde Valley During the War* (Clarendon Press, Edinburgh, 1924) cite a figure of 28,000 women employed in munitions in Scotland in October 1918 (p. 98), a footnote acknowledges that the number does not include women from every munitions factory and workshop, only the principal ones. Myra Baillie has identified an additional 15,000 working in other munitions firms plus an additional 4 firms for which no figures are available (Baillie, pp. 33-34). Based on these and other sources Baillie estimates that as many as 100,000 women were employed in all phases of munitions manufacturing and supporting industries throughout Scotland (Baillie, p. 34).

5. The intelligence test administered to children in either cohort was not an IQ test (SCRE, 1949, p. 119). In order to measure the IQs of all children in the cohorts, samples of children were randomly selected from both cohorts for formal IQ testing. After confirming that the demographics of the samples faithfully reflected the demographics of the cohorts, intelligence test performance was then equated to a specific IQ for each child in both cohorts.

6. A "first-draw" sample was water taken from the kitchen tap first thing in the morning before any other water in the house had been run. This is water that had sat in contact with lead all night.

7. A "day-time" sample was water taken from the kitchen tap at random times during the day before any water had been run off.

8. The topic of overalls was much discussed during the Committee on Lead Paint hearings of 1915. It was clear from testimony that some painters painted only in their street clothes and wore no overalls at all. Some employers testified that they would be willing to provide clean overalls for painters in their employ. Others would do so only under duress. In the end, the Committee recommended to the Home Secretary that painters be required to provide for the washing of their own overalls on a weekly basis (Committee on Lead Paint, p 181). When the law governing the use of lead paint in buildings was enacted in December of 1926, that recommendation was followed (MacKenzie, p. 21).

9. No relevant health information was collected from children in either Survey other than height and weight in the 1947 cohort. These data showed that children with working class parents were generally shorter and lighter than children whose parents were professional, administrative, managerial, etc (SCRE, 1953, p. 79). While the data are not diagnostic of chronic lead poisoning neither are they inconsistent. Failure to thrive, a term used to describe children who fail to achieve their expected rate of growth and development, has been associated with chronic lead poisoning among other conditions (Grant & et.al, 1980) (Schwartz, et al., 1986).

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Plumbing the depths: lead in soil leads to increased crime

[URL: http://www.crccare.com/news/plumbing-the-depths-lead-in-soil-leads-to-increased-crime?campaign=33AD46F0-E514-11E7-88D24201C0A8012D&subscriber=FDA52C90-AFEC-11E3-8E48005056B60026 CRC Care Press release, 13 September 2017]

Children exposed to lead in soil are more likely to commit crime as young adults, an international conference in Melbourne will hear today.

Dr Mark Cave, from the British Geological Survey, will present results at the CleanUp 2017 global forum showing lead contamination in an urban area results in increased crime.

'There is no dispute that if lead gets into the body of a young person it causes neurological effects,' said Dr Cave. 'If children are exposed to lead in air and soil at a young age then the impairment of their neurological development can lead to them being more likely than the rest of the population to commit crime about 20 years later.'

Dr Cave compared lead levels in soil with socio-economic information about health, wealth, employment, housing and crime in the English towns of Derby, Leicester and Nottingham. He found soil lead is associated with criminal behaviour in Derby's urban environment, but not Leicester and Nottingham.

'This was because the lead concentration in Derby is higher, as the river carries lots of naturally occurring lead from mineralised sources in the Peak District into the centre of town. Lead in Leicester and Nottingham seems to come from human sources and is in lower concentrations.'

Dr Cave said the levels of lead influenced crime in upper and lower socio-economic classes differently. 'In people with not much wealth, socio-economic conditions have more effect on crime than the lead. But for people in a higher class, the lead has more effect because socio-economic factors don't have as much effect.'

Researchers at Macquarie University found similar results in Australian populations, showing a strong relationship between childhood lead exposure and subsequent rates of aggressive crime.

Dr Cave said lead exposure can be reduced by identifying its pathway into the body. 'Although we don't realise it, people, especially young children, involuntarily eat 60 to 100 milligrams of soil a day. So we need to seal areas of soil with high lead content by adding topsoil or building pavement or tarmac, and then monitor how much lead is being inhaled.'

CleanUp 2017 – the 7th International Contaminated Site Remediation Conference – is organised by CRC CARE and is being held in Melbourne from 11 to 13 September. The conference program is available at ***www.cleanupconference.com/program***.
Download a PDF of this media release.

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CRC CARE

The surprising link between postwar suburban development and today's inner-city lead poisoning

SOURCE: the conversation

http://theconversation.com/the-surprising-link-between-postwar-suburban-development-and-todays-inner-city-lead-poisoning-54453

February 25, 2016 10.07pm AEDT

Author

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Flaking lead paint in a home in Muncie, Indiana. Shelly/Flickr, CC BY-NC-ND

The Flint water crisis and the sad story of Freddie Gray's lead poisoning catalyzed a broader discussion about lead poisoning in the United States in recent years. What are the risks? Who is most vulnerable? Who is responsible?

Lead is an enormous and pervasive threat to public health. Almost any level of exposure causes permanent cognitive problems in children. And there are many sources. Ten million water service lines nationwide contain lead. Some 37 million U.S. homes contain lead-based paint somewhere in the building. Soils in many areas are contaminated with lead that was added to gasoline and emitted from car exhaust.

But the risk is not evenly distributed. Some Americans face a "triple whammy" of increased risk based on poverty, race, and place. Evidence dating back to the 1970s has shown that lead poisoning rates are higher in inner cities and low-income and minority neighborhoods than in white, affluent, and suburban neighborhoods.

And although children's blood lead levels have fallen significantly in recent decades, these disparities still exist. My dissertation research shows that government-supported suburban development and racial segregation after World War II contributed to lead poisoning by concentrating minority families in substandard urban housing.

An urban epidemic

Humans have used lead for thousands of years in products ranging from ceramic glazes to cosmetics. Exposure increased in the industrial era. Lead piping and paint came into wide use in the 19th century, followed by lead batteries and leaded gasoline in the 1920s.

Health experts knew that lead was toxic, but childhood lead poisoning did not become a sustained public health concern until the second half of the twentieth century, due in part to obstruction from the lead industry. After World War II, child lead poisoning cases spiked in many cities, especially among low-income African-Americans. In Baltimore child lead poisoning cases rose from an average of 12 per year between 1936 and 1945 to 77 cases in 1951 and 133 cases in 1958.

Lead poisoning cases also increased in Cincinnati and other cities in the 1950s and '60's. Experts identified a key source: peeling and flaking lead-based paint. The victims were mainly from poor, minority families in deteriorating inner-city neighborhoods.

Lead-based paint was available in the United States until 1978, and was widely used in public housing because of its durability. Theseter11/Wikipedia, CC BY

One obvious solution would have been to find better housing – and indeed, during this period millions of Americans were moving from cities to suburbs. But discriminatory government policies effectively excluded minority families from buying homes in suburban neighborhoods, leaving them trapped in cities, where a vicious cycle of deterioration and disinvestment exacerbated lead hazards.

The role of mortgages and highways

Suburbanization and home ownership in America exploded after World War II. Many urban scholars identify federal housing and highway policies as the most important drivers of 20th-century suburbanization.

One key agency, the Federal Housing Administration (FHA), was created during the Great Depression to make homeownership more feasible by offering federal insurance for home mortgages. FHA loans favored new suburban housing, especially from the 1930s to the 1960s. Agency guidelines, such as those for minimum lot size, excluded many inner-city homes, such as Baltimore's classic row houses. Other FHA guidelines and suggestions for neighborhoods – such as minimum setbacks and street widths – favored new suburban developments.

FHA appraisal standards warned against "older properties" and "adverse influences" on home value, including smoke, odor and traffic congestion. Until the late 1940s the agency considered "inharmonious" racial groups a housing finance risk.

After the Supreme Court declared racial covenants legally unenforceable in 1948, the FHA moderated its policies. But for the next decade it made little effort to curb housing discrimination, with some of its major administrators continuing to defend racial segregation.

Not surprisingly, the vast majority of FHA loans went to single-family, new homes in the suburbs. According to the U.S. Commission on Civil Rights, less than two percent of FHA loans issued from 1947 through 1959 went to African-Americans.

Buyers line up to purchase homes in Levittown, NY, the archetypal postwar suburb, built between 1947 and 1951. Until 1948, contracts for Levittown houses stated that the homes could not be owned or used by non-Caucasians. Mark Mathosian/Flickr, CC BY-NC-SA

Federal transportation policy also spurred and shaped post-war suburbanization. In 1956 Congress enacted the Interstate Highway Act, which was designed to ease traffic congestion. The act authorized billions of dollars to complete about 42,000 miles of highways, half of which were to go through cities.

The proliferation of interstates and automobiles made downtowns increasingly obsolete and furthered movement to the suburbs. According to one estimate, each highway built through a city reduced the city's population by eighteen percent.

And suburban automobile commuting contributed directly to urban lead poisoning. Inner city residents absorbed the bulk of lead gas pollution from commuters who converged on cities daily. Lead gas exhaust contaminated soil in city neighborhoods.

White flight and urban blight

As black populations in cities increased, African Americans began moving into formerly all-white neighborhoods. "White flight" followed: panicked white homeowners moved away. Often the cycle was inflamed by "blockbusters," people who used the threat of integration to get white homeowners to sell for low prices.

Real estate speculators who acquired these cheap properties sold some of them (at inflated prices) to minority buyers. Many used highly exploitative contracts. Black homeowners had to make high interest payments, leaving them with little money for maintenance.

Conditions were even worse for black renters. Slumlords often neglected maintenance and tax payments on their properties. Even when city health codes targeted lead paint, as in New York and Baltimore, landlords milking properties for profit often failed to comply.

Disinvestment in inner city housing became a self-perpetuating cycle. A 1975 study for the U.S. Department of Housing and Urban Development concluded that landlords who had low-income renters and few financing options scrimped on maintenance, furthering housing decline. Eventually landlords abandoned their rentals, which led to further neighborhood disinvestment.

Reinvesting in cities

Cleaning up lead contamination is expensive. One recent study estimates that it would cost US$1.2 billion to $11 billion to eliminate lead risks in one million high-risk homes (old buildings occupied by low-income families with children). But it also calculated that every dollar spent on lead paint clean-up would generate from $17 to $221 in benefits from earnings, tax revenue and reduced health and education costs.

Government agencies and nonprofits have poured money into lead research, screening, and hazard reduction programs, but more is needed. The largest source, HUD's Lead Hazards Control Program, has received $110 million annually from 2014 to 2016, only enough to fund lead abatement in about 8,800 homes yearly. Moreover, in the past few years, the Congress has sought to cut HUD's budget even further, by a half in 2013 and by a third just in the past year. Fortunately, those proposals were not successful, but even without them, lead hazard reduction funding is woefully inadequate.

Can we find other sources? Since government housing policies have contributed to lead poisoning, perhaps we should tap them to fund cleanup. For example, the home mortgage

interest tax deduction subsidizes new homes in the suburbs, and is particularly beneficial to more affluent homeowners.

Reforming the mortgage interest deduction, which costs the federal government $70 billion annually, could generate funding to remediate older rental houses. Some of this money could also be used to expand programs run by federal agencies, local governments and nonprofits that fund multiple improvements in low-income housing, including mold abatement and energy efficiency upgrades.

Another strategy would be to create a mechanism modeled on Property Assessed Clean Energy programs for lead paint removal. PACE programs allows state and local governments or other authorities to fund the upfront costs of energy efficiency upgrades, then attach the costs to the property. Owners pay the costs back over time through assessments which are added to their property tax bills.

The United States has heavily subsidized suburban home ownership for more than 80 years. This policy helped many Americans, but hurt others, including families still trapped in homes where they are at risk of lead poisoning. Today, as many observers hail a U.S. urban renaissance, the persistence of lead poisoning highlights a continuing need for more investment in housing and health in our inner cities.

UN Environment and WHO agree to major collaboration on environmental health risks

News release [URL: http://www.who.int/mediacentre/news/releases/2018/environmental-health-collaboration/en/]

10 January 2018 | *Nairobi* - UN Environment and WHO have agreed a new, wide-ranging collaboration to accelerate action to curb environmental health risks that cause an estimated 12.6 million deaths a year.

Today in Nairobi, Mr Erik Solheim, head of UN Environment, and Dr Tedros Adhanom Ghebreyesus, Director-General of WHO, signed an agreement to step up joint actions to combat air pollution, climate change and antimicrobial resistance, as well as improve coordination on waste and chemicals management, water quality, and food and nutrition issues. The collaboration also includes joint management of the BreatheLife advocacy campaign to reduce air pollution for multiple climate, environment and health benefits.

This represents the most significant formal agreement on joint action across the spectrum of environment and health issues in over 15 years.

"There is an urgent need for our two agencies to work more closely together to address the critical threats to environmental sustainability and climate – which are the foundations for life on this planet. This new agreement recognizes that sober reality," said UN Environment's Solheim.

"Our health is directly related to the health of the environment we live in. Together, air, water and chemical hazards kill more than 12.6 million people a year. This must not continue," said WHO's Tedros.

He added: "Most of these deaths occur in developing countries in Asia, Africa and Latin America where environmental pollution takes its biggest health toll."

The new collaboration creates a more systematic framework for joint research, development of tools and guidance, capacity building, monitoring of Sustainable Development Goals, global and regional partnerships, and support to regional health and environment fora.

The two agencies will develop a joint work programme and hold an annual high-level meeting to evaluate progress and make recommendations for continued collaboration.

The WHO-UN Environment collaboration follows a *Ministerial Declaration on Health, Environment and Climate Change* calling for the creation of a global "Health, Environment and Climate Change" Coalition, at the United Nations Framework Convention on Climate Change (UNFCCC) COP 22 in Marrakesh, Morocco in 2016.

Just last month, under the overarching topic "Towards a Pollution-Free Planet", the United Nations Environment Assembly (UNEA), which convenes environment ministers worldwide, adopted a resolution on Environment and Health, called for expanded partnerships with relevant UN agencies and partners, and for an implementation plan to tackle pollution.

Note to editors

Priority areas of cooperation between WHO and UN Environment include:

Air Quality - More effective air quality monitoring including guidance to countries on standard operating procedures; more accurate environment and health assessments, including economic assessment; and advocacy, including the BreatheLife campaign promoting air pollution reductions for climate and health benefits.

Climate - Tackling vector-borne disease and other climate-related health risks, including through improved assessment of health benefits from climate mitigation and adaptation strategies.

Water – Ensuring effective monitoring of data on water quality, including through data sharing and collaborative analysis of pollution risks to health.

Waste and chemicals – Promotion of more sustainable waste and chemicals management, particularly in the area of pesticides, fertilizers, use of antimicrobials . The collaboration aims to advance the goal of sound lifecycle chemicals management by 2020, a target set out at the 2012 United Nations Conference on Sustainable Development.

Ongoing WHO/UN Environment collaboration includes:

Ministerial Declaration on Health, Environment and Climate Change –WHO/UN Environment announcement at COP22

BreatheLife campaign has engaged countries, regions and cities in commitments to reduce air pollution for climate and health benefits, covering more than 120 million people across the planet, including Santiago, Chile; London, England; Washington DC, USA, and Oslo, Norway, with major cities in Asia and Africa set to join.

Strategic Approach to International Chemicals Management (SAICM) - which has included effective past actions to phase out lead paint, mercury emissions and persistent organic pollutants.

Related links

Environmental health - http://www.who.int/phe/en/

BreatheLife

BREATHE LIFE
Clean Air. Healthy Future.

Campaign site - http://breathelife2030.org/

Volunteer at The LEAD Group: Fergus Thomson

During my time at the LEAD office I gained experience in data entry and website maintenance. It wasn't until I volunteered with The LEAD Group that I realised how widespread the dangers of lead actually were and its effects on health and the environment.

It was a pleasure to work with Elizabeth and everyone who volunteered their time there.' - Fergus T

Worse Than Lead?

Special Investigation: The chemical industry strikes again, shifting from lead to flame retardants that also sicken and kill.

By Jamie Lincoln Kitman, August 15, 2018

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The Secret History of Lead

Jamie Lincoln Kitman

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[The media release for *The Secret History of Lead* was published in LEAD Action News vol 8 no 1, on 5th September 2000 at http://www.lead.org.au/lanv8n1/l8v1-3.html]

Fire alarm: US government tests found that flame retardants "did not…provide any significant protection." (Consumer Product Safety Commission)

Today, thanks in part to the efforts of a single Virginia family, as many as 97 percent of Americans have toxic flame retardants in their blood. Deeply poisonous, and linked to cancer, genetic damage, and behavioral and learning difficulties, the prevalence of flame retardants, here and around the world, owes to the fact that these chemicals have been placed in many of the objects of daily life—in our homes, automobiles, and workplaces, even in our beds.

This article was reported in partnership with the Investigative Fund at the Nation Institute, with support from the Puffin Foundation. Emily Biuso and Darren Ankrom provided research assistance.

While the flame-retardant business has grown explosively and with tragic consequences, the world has yet to reckon with this morally challenged industry, which started taking off more than 40 years ago. Nor has the US government held manufacturers accountable for the original evil that spawned the proliferation of flame retardants: the monumentally unsafe business of adding lead to gasoline. Now, new research undertaken by The Nation reveals the startling connection between these two scourges to public health and the environment.

Meet the Gottwalds of Virginia, one of the 100 richest families in America and the most powerful shareholders in the Albemarle chemical company, based in Charlotte, North Carolina. In September 2016, Floyd Gottwald Jr. gave $50,000 to Trump Victory, a joint fund-raising committee for Donald Trump's presidential campaign, continuing a family tradition of Republican funding that goes back decades. Yet you've probably never heard of them. The Gottwalds keep a low profile—perhaps understandably, given that they've built their wealth by blanketing the planet in lead and flame retardants.

A deadly neurotoxin that never biodegrades, lead assaulted the public health throughout the 20th century, largely through its role as an additive to gasoline. When the United States began phasing out leaded gas in the 1970s, the Gottwalds pivoted to flame retardants. Often manufactured with the chemical element bromine, flame retardants are also extremely toxic products. But they have never been effectively regulated, much less banned, as lead eventually was—even though the banning of lead was scandalously delayed, as its manufacturers fought off regulation for decades with a mixture of outright lying, deceptive advertising, and the financial lubrication of elected officials (as I documented in an investigation for The Nation back in 2000).

Flame retardants have been identified not only as carcinogens, but as mutagens (i.e., agents that mutate genetic material). Many are now understood as first-class endocrine disrupters, implicated in a growing variety of learning difficulties, IQ deficits, and behavioral disorders, especially among the young, including hyperactivity and behaviors consistent with autism and, among the older set, diminished fertility, miscarriages, premature births, obesity, advanced puberty, thyroid hormonal problems in postmenopausal women, and an increased risk of ALS.

Traces of flame retardants are now found virtually everywhere on earth, including in the water and dust inside our homes. According to the Chicago Tribune, the level of certain flame retardants doubled in the blood of adults every two to five years between 1970 and 2004. In a 2014 study of California day-care centers, researchers found flame retardants in 100 percent of the dust samples. A recent Chinese study revealed their presence in e-

cigarettes. Remote locations aren't safe either; the chemicals have been consistently found in the blubber of Arctic sea mammals.

It's no wonder. The global consumption of flame-retardant chemicals is projected to top 7 billion pounds by 2022—a staggering amount, especially when you consider the most incredible fact of all: In the quantities in which they're typically employed, flame retardants don't retard flame very much.

These compounds became ubiquitous starting in the 1970s, as governments around the world were persuaded by corporate campaigns that flame retardants were essential fire-safety tools. Much of this campaigning was hysterical and dishonest; almost all of it was underwritten by the products' manufacturers, including the Gottwalds' Albemarle Corporation and the chemical industry of which it was a part. Working in concert with the tobacco industry, these manufacturers mounted aggressive scare campaigns to create a perceived need for their products: They crafted regulations and lobbied legislatures to adopt them; attacked scientific findings they didn't like; ridiculed public-health advocates; spun journalists; and bought political access with millions of dollars in campaign contributions. This anti-public-health offensive explains why flame retardants are now embedded in an astonishing array of consumer products, including furniture, bedding, electrical equipment, and—most despicable of all—children's clothing and car seats.

Although they were launched more than 50 years apart, flame retardants and leaded gasoline share a common corporate pedigree. The story begins with the addition of lead to the gasoline supply, an act of breathtaking greed and deceit on the part of four blue-chip companies: General Motors, DuPont, Standard Oil of New Jersey (these days known as ExxonMobil), and, later, Dow Chemical. The story continues for nearly a century, as the mass production of leaded gas gave way to the mass production of flame retardants.

While certain flame retardants have been phased out over time, others have been phased in; the Gottwalds and other manufacturers are not going quietly into the night. Notwithstanding the proven health and environmental harms that their products inflict, the suppliers of flame retardants intend to sell increasing amounts of this toxic product for years to come. The Gottwalds have made that clear enough, as their Albemarle Corporation has expanded its bromine-production capacity and its partnerships around the world, recently with a 2014 linkup with Israel Chemicals, Ltd.

Like other makers of dangerous chemicals, Albemarle has stayed one step ahead of the law and public outrage by perfecting a cynical version of the classic bait-and-switch scam. When regulators ban one flame retardant because of its undeniable health impacts, the manufacturers simply tweak a molecule here and there to produce a similar but legally distinct product. Then they give that product a new name and hustle it back onto the market.

Albemarle declined interview requests for this article and did not respond to a detailed list of questions about its activities.

The roots of today's scandal extend back to 1923, when three of the world's biggest companies combined to introduce leaded gasoline in the United States, the fastest-growing market for automobiles. General Motors came up with the idea; Standard Oil of New Jersey had the technical smarts to move it into mass production, along with the market share and distribution muscle to reach huge numbers of customers around the world; and the chemical giant DuPont contributed factories, additional capital, and scientific expertise.

The business opportunity for these three companies arose from the fact that the automotive fuel of the day was lousy and getting lousier. But GM researchers had discovered that adding lead increased the fuel's octane level and reduced engine "knock," an unpleasant metallic sound heard when the engine accelerated. With Standard Oil of New Jersey, GM created a joint venture, the Ethyl Gasoline Corporation (later shortened to the Ethyl Corporation), to organize the mass manufacture, distribution, sales, and marketing of this new gasoline additive.

Over the next 50 years, leaded gasoline would erode public health so grievously—in the form of hundreds of millions of cases of heart attacks, strokes, cancer, renal failure, learning disabilities, behavioral difficulties, and more—that the removal of lead from most modern gasoline, which started in the 1980s, has been hailed as one of the greatest public-health triumphs of the last century.

The health impacts of leaded gas could have been avoided if corporate greed hadn't trumped human decency. Many of lead's hazards were already known, and some had been suspected for thousands of years. (The ancient Greek physician Pedanius Dioscorides warned that "Lead makes the mind give way.") Safer methods of increasing octane, such as adding ethanol, were also known in the 1920s, and they were cost-competitive. But ethanol, known at the time as "farm alcohol," could not be patented—a fatal flaw in the eyes of the Ethyl Corporation's owners, who preferred their proprietary, if deadly, product.

GM, DuPont, and Standard Oil of New Jersey soon confronted a new problem: It turned out that lead wrecked car engines. Senior GM executives Alfred Sloan and Charles Kettering were informed by associates inside and outside the company that lead deposits dramatically shortened the lives of engines, spark plugs, and other vital components. "[I]n the course of a few thousand miles [of driving with leaded gasoline] it becomes necessary to replace spark plugs," Thomas Midgley Jr., GM's top scientist, told Kettering, the company's director of research, in a November 1922 memo. Midgley's report, now housed in the Richard P. Scharchburg Archives at Kettering University (the former General Motors Institute) in Flint, Michigan, added: "The exhaust valve stems and seats suffer in a slightly different way when they become hot enough to melt the litharge [lead]." Other internal

documents suggest that engineers in GM's Buick division were seeing engines fail within 1,500 miles of driving.

Far from retreating, however, Sloan and Kettering turned this unanticipated lemon of a business problem into the lemonade of bigger profits by making leaded gas part of GM's new push for "planned obsolescence." For some years, GM and the rest of the US auto industry had confronted a structural problem: Their productive capacity was outstripping consumer demand for their products. Americans didn't need, or didn't think they needed, as many cars as the industry could build. Sloan, GM's future president and CEO, who championed the concept of planned obsolescence, set out to change their minds.

To entice people to buy more cars, GM began changing its cars' designs, colors, and capabilities year in and year out. Provocative advertising was introduced, and customers were allowed to pay in installments. Cars became status symbols as much as transportation machines.

Though unintended, the propensity of leaded gasoline to wear out engines and their components amounted to a supercharged form of planned obsolescence. The business logic was as simple as it was cold and calculating: GM profited directly from every vehicle it sold. Then it earned an additional royalty, through its joint stake in the Ethyl Corporation, on every gallon of leaded gas sold—whose damage to engines and components in turn generated additional earnings when GM supplied the replacement parts or, better yet, a whole new car. For GM's leadership, it was what you might call a win-win-win.

But what was good for GM wasn't so good for its customers, some of whom were powerful enough to make their displeasure felt. Before long, representatives of the US Army and Navy and the British and Canadian air forces were informing GM and Ethyl executives that leaded gasoline was wreaking havoc on their airplane engines. "I am bringing this matter to your attention as some action must be taken on the part of the Ethyl Gas Corporation or they will lose the foot-hold which they are just now getting with the [US] Navy," a high-level executive of the airplane-engine maker Pratt & Whitney wrote to Kettering on November 11, 1927.

The commercial risks posed by leaded gas were so worrying that they triggered dissension within GM's ranks, the company's internal files reveal. The heads of Buick and Cadillac, GM's luxury-car divisions, were initially reluctant to recommend leaded gas to their customers because of its destructive properties. Letters of concern from the two division heads led CEO Sloan to fire a terse missive back to Buick's general manager, H.H. Bassett, on May 2, 1924: "[I]f it continues as it looks now, [leaded gasoline will] be a very big earning power [for the corporation] competing with our Car Divisions, all without the employment of hardly any capital at all." Translation: You don't understand. We're going

to make more money selling this stuff than we do selling cars. Before long, the Buick and Cadillac divisions fell in line.

Still, a new engine failing after just 1,500 miles proved to be a bit much, even for cutthroat businessmen like Sloan and Kettering. They needed to find a way to expel more of the lead from engines. A quick fix was found with the discovery of ethylene dibromide. Often known by the acronym EDB, it's produced by the reaction of the hydrocarbon ethylene with bromine. Manufactured by Dow Chemical engineers, EDB worked as a chemical "scavenger": It turned lead into lead bromide, making it less prone to build up in engines and more likely to be expelled with the exhaust into the air.

Problem solved—except for the people breathing that air, because elemental bromine is no day at the beach. With a name derived from the ancient Greek word bromos, for "stench," bromine is the only nonmetal element that is a liquid. It's most readily found in mineral halide salts or dissolved in salt lakes and brine pools. And, as will be detailed below, it is definitely not good for you.

If leaded gasoline was to come into widespread use, huge additional quantities of bromine had to be found. After a few false starts, the Ethyl Corporation's scientists hit upon the answer: the ocean. Seawater contains about 67 parts of bromine per 1 million parts of seawater. In 1934, a huge plant opened at Kure Beach, North Carolina. The plant sucked in millions of gallons of seawater each day, removed the bromine from the water, and then expelled the wastewater back into the sea.

After additional extraction plants were built, the worldwide production of bromine reached 40,000 tons in 1941, 90 percent of which found its way into leaded gasoline. By 1970, global production had increased by a factor of eight to reach 320,000 tons. A reckoning, however, was fast approaching.

In the 1960s, airborne lead was increasingly seen as an urgent public-health issue, as scientific certainty overturned decades of specious corporate-funded research. In 1974, the US government required that unleaded gasoline be put on the market to permit the use of catalytic converters. These were essential to meeting the terms of the Clean Air Act of 1970; placed in a car's exhaust system, the catalytic converter dramatically reduced air pollution, slashing nitrogen-oxide emissions by 98 percent, according to the US Environmental Protection Agency. But there was a catch: Catalytic converters were incompatible with the use of leaded gasoline, because the lead contaminated the component's catalyst. As a result, leaded gas had to go.

Lead was gradually phased out of the gasoline sold in the United States and finally banned outright in 1986. The European Union did the same, albeit more slowly; its ban became official in 2000, the same year that bans also took effect in India and China. Other nations followed suit, but even more slowly; as of March 2017, the UN Environment Programme

reports that only three countries (Algeria, Yemen, and Iraq) still permit the sale of leaded gasoline.

The phaseout created an obvious problem for the makers of leaded gas: How could they keep the profits rolling in? GM, however, had seen that problem coming years earlier and had taken steps to protect its interests. Along with its partners, GM arranged to dump the Ethyl joint venture. Which is how the Gottwalds enter this tale.

In one of the strangest transactions in US corporate history, the Ethyl Corporation was unloaded in 1962 by its creators—GM and Standard Oil of New Jersey—onto the Albemarle Corporation. At the time, the Ethyl Corporation was 13 times larger than Albemarle; its purchase price of $200 million was 100 times greater than Albemarle's annual profits. "It was like a Mom and Pop grocery buying the A&P [supermarket chain]!" Monroe Jackson Rathbone, the president of Standard Oil of New Jersey, exclaimed at the time. The deal was so unlikely that it made the front page of The New York Times, and was covered by The Wall Street Journal in an article headlined Jonah Swallows the Whale.

The inside story of this deal wasn't revealed until Ethyl's official history was published decades later—and even that history left out a key detail that the Gottwalds might not have known. At the time, Ethyl's purchase ranked as the largest leveraged buyout that Wall Street had ever seen. And it took place only because of extraordinary backroom muscling on the part of Ethyl's corporate founders. The company's official history recounted that GM and Standard Oil of New Jersey applied intense pressure on Chase Bank and a handful of leading insurance companies to lend the Gottwalds the $200 million they needed to buy Ethyl. Rathbone acknowledged that his company and GM "really guaranteed the banks that they would not lose anything if loans were made to Albemarle for the purchase of Ethyl," according to the official history.

Why did GM and its partners want to unload Ethyl so urgently, selling the joint venture for a fire-sale price? The answer may lie in something that the public didn't know: GM was quietly working on a solution to curb automotive air pollution. But that discovery wasn't announced until 1970—eight years after the sale of Ethyl—when GM president Ed Cole stunned the automotive world by announcing that the industry could meet the standards of the Clean Air Act by introducing catalytic converters. In short, GM had vociferously opposed tighter pollution standards throughout the 1960s—from the original Clean Air Act of 1963 through its 1970 amendment—even though it and others were actively working toward a new technology that would meet those standards. The question that GM has never been forced to answer is: Why did you fight emissions regulations—and during those years of secrecy, how many people were sickened or killed as a result of the delayed pollution standards? Contacted by The Nation, representatives of GM, DuPont, ExxonMobil, Dow Chemical and the Albemarle Corporation all declined to comment.

In any case, the subsequent phaseout of leaded gas became the Gottwalds' problem—a risk they then blamed GM and the other sellers of Ethyl for failing to disclose. Yet the new owners of the Ethyl Corporation were a resourceful bunch with no apparent moral compass, and so they managed to turn this situation to their advantage. First, Ethyl tried to sell EDB as a fumigant, a quick-acting pesticide to spray on soil and post-harvest crops. EDB killed fungi, rodents, insects, and other vermin with aplomb, but shortly after its arrival on the market, its residues started turning up in breakfast cereals and cake mixes. By 1981, the EPA had concluded that EDB was a "potent mutagen, which should be removed from the food chain." The EPA also linked EDB to damage to the liver, stomach, adrenal glands, and reproductive systems, especially the testes. And when burned, EDB creates methyl bromide, a major contributor to the hole in the earth's ozone layer, which increases skin cancers and respiratory problems.

It took time and a few dead ends, but the Gottwalds eventually found a profitable solution: brominated fire retardants. Although these fire retardants had been in use since the 1950s, they didn't become huge sellers until the 1970s. What changed?

As the 1970s unfolded, a purported epidemic of house fires began attracting attention in the United States. Fingers were pointed at the tobacco industry, which had been adding chemicals to cigarettes that caused them to stay lit for 10 minutes or more. People smoking in bed would nod off, and before they knew it the bedroom was in flames. Government regulators and legislators began calling on manufacturers to develop cigarettes less likely to start fires.

The tobacco industry wasted no time in deflecting suggestions that it come up with a safer cigarette. Instead, as the Chicago Tribune revealed in an award-winning investigation in 2012, Big Tobacco worked to shift the public focus from its product to the risk of household objects that might burn, including foam-filled, upholstered furniture.

Remarkably, the State of California seemed to agree. In 1975, a state agency enacted a regulation that proved to be a godsend for the manufacturers of flame retardants. Known as the California Furniture Flammability Standard Technical Bulletin 117, the rule mandated that all furniture offered for sale in the state pass an open-flame test: The foam inside upholstered products was required to withstand 12 seconds of exposure to an open candle flame.

The Ethyl Corporation rushed to satisfy the demand for flame retardants created by California's regulation. The potential market was enormous, because other states and even foreign countries would go on to adopt California's approach, much as they had a decade earlier with automobile seat belts and air-pollution standards. Flame retardants soon found their way into a dizzying array of household items: not just furniture but carpeting and flooring materials, bedding, baby products, computers, televisions, and other electronic equipment, as well as cars, boats, and aircraft. Like lead in gasoline, flame

retardants became pervasive, spreading on a sea of clever marketing, strategic half-truths, and lies.

However well-intentioned, the far-reaching California regulation proved to be scientifically unfounded. When scientists with the US Consumer Product Safety Commission applied flame to two upholstered chairs—one with flame retardant in its foam, the other untreated—both chairs were consumed by fire in less than four minutes. “We did not find flame retardants in foam to provide any significant protection,” said Dale Ray, a commission official who oversaw the tests, in 2009.

But such studies only emerged decades after the California regulation took effect. Meanwhile, Albemarle and its fellow manufacturers joined with the tobacco industry to convince the public, the press, and government officials that flame retardants were the necessary cure for all things fire-related. This propaganda campaign was assisted by Burson-Marsteller, a public-relations giant that boasted a Hall of Shame client list: not only the tobacco barons, but also Union Carbide (after the Bhopal gas leak in India that killed 15,000 people); the company responsible for the Three Mile Island nuclear-power-plant disaster; and the military junta that prosecuted Argentina’s “dirty war” in the late 1970s. As Burson-Marsteller founder Harold Burson said in 2008, “We are in the business of helping companies through difficult situations.”

Retained by the flame-retardant makers in 1997, Burson-Marsteller urged the creation of the Bromine Science and Environmental Forum, a group less interested in science and the environment than in weakening the US ban on methyl bromide. Along with industry associations like the Methyl Bromide Working Group and the Methyl Bromide Global Coalition, the forum lobbied state and federal legislatures and fought the Montreal Protocol, the international community’s effort to repair the ozone layer.

“Burson-Marsteller has helped the bromine industry advocate on how flame retardants enable manufacturers to increase the ignition resistance of materials used in a wide range of applications including in the automotive sector,” a Burson-Marsteller representative told The Nation.

Peter Sparber, a former tobacco-industry executive, recruited the National Association of State Fire Marshals, the organization representing the top fire officials in all 50 states, to propose federal rules mandating flame retardants in furniture. Sparber attended meetings with the US Consumer Product Safety Commission on behalf of the marshals for years, sometimes offering the scientifically bogus claim that the foam inside furniture was “solid gasoline” that needed to be treated. Marshals claimed not to have known that Sparber was billing the industry-funded Tobacco Institute $200 an hour for his work with them.

Burson-Marsteller helped run the Alliance for Consumer Fire Safety in Europe, which is similarly bankrolled by flame-retardant manufacturers. The alliance’s front man was a

British firefighter named Robert Graham, a high-strung individual whose tactics included setting furniture alight outside the European Parliament to make his point. An Alliance for Consumer Fire Safety website, now removed, solicited memberships with horror stories of combustible consumer products, including allowing viewers to watch sofas from a selection of countries being burned.

As with leaded gasoline, the manufacturers of flame retardants knew early on that their product wasn't safe. In 1977, Arlene Blum and Bruce Ames, two chemists at the University of California, Berkeley, published a report in Science magazine whose damning subtitle plainly stated: "The main flame retardant in children's pajamas is a mutagen and should not be used." The authors explained that tris(2,3-dibromopropyl) phosphate, or Tris-BP, a frontline flame retardant of the day, was a likely carcinogen that caused sterility in animal tests. With a chemical composition alarmingly similar to EDB, the lead scavenger, Tris-BP was certain to pose disturbing health impacts.

Blum and Ames further observed that Tris-BP inevitably entered the ecosystem through wastewater from laundry. Six bedsheets treated with Tris-BP and washed in 30 gallons of water resulted in six parts per million of the poison in the wash water, when only 1 ppm was needed to kill goldfish. Like all flame retardants before and after, Tris-BP was seen to leach readily into the bodies of people wearing treated fabrics. "We found a child who'd never worn Tris-treated pajamas," Blum recalled in an interview. "We had the child wear Tris-treated pajamas for one night, and we found Tris breakdown products in her urine" soon after. It was easily picked up, Blum added, and "screamingly mutagenic."

Three months after the Blum and Ames paper was published, the Consumer Product Safety Commission banned brominated Tris in children's clothing. But in a response that set the stage for the next 40 years, flame-retardant manufacturers simply rolled out a related product: chlorinated Tris. No matter that chlorinated Tris was also a known carcinogen.

In another round of chemical whack-a-mole, when EDB was banned in 1984, the world's bromine makers rallied around a substitute known as tetrabromobisphenol-A. TBBPA's most widespread application has been as a fire retardant in electronic equipment, a market that expanded dramatically thanks to the growth of the Asian economies and the rapid obsolescence of electronic goods.

Today, TBBPA is the world's most-produced brominated flame retardant, with millions of pounds sold each year. Like all flame retardants, TBBPA will escape in time from wherever it's placed and enter the homes, offices, and bodies of people, as well as pets, livestock, wildlife, plants, streams, and rivers. Once in the human body, it can cause cancers, mutations, learning disabilities, behavioral issues, fertility issues, and reduced IQs. A 2014 study by the National Toxicology Program found that TBBPA caused cancers of the uterus in female rats and cancers of the liver in male mice.

None of this unsavory health news seemed to bother the Gottwalds; a resolute willingness to pollute has been central to Albemarle's strategy from the beginning. So has the company's management by family members—indeed, family control appears to be key to the Gottwalds' financial success, shielding them from the opprobrium of outsiders who might recoil from the nasty end of the chemical business in which Albemarle has dwelled.

Forbes recently estimated the Gottwald family's net worth at $3.1 billion, but their rise to fortune began humbly enough. In 1918, young Floyd D. Gottwald found work as a clerk at the Albemarle Paper Manufacturing Company, a small paper concern located in Richmond, Virginia. Floyd rose through the ranks, becoming president in 1941, before purchasing the business after the Second World War.

Gottwald served as the Ethyl Corporation's CEO until 1968 and remained an active board member until his death in 1982. His son, Floyd Jr., ran Ethyl after 1968, frequently swapping titles—CEO, chairman, president—with relatives as Ethyl's holdings grew and were reorganized. Floyd Jr.'s brother, Bruce, has also served as CEO. Today, Bruce's personal wealth is estimated at $580 million. Floyd Jr. isn't far off.

The Gottwalds are regular donors to the state and national Republican Party. The Gottwalds have collectively gifted more than $1 million to GOP causes over the last 10 years, including to a fund-raising committee for Donald Trump's presidential campaign. All of this may help explain why, in March 2017, Trump's EPA declined to conduct further testing on TBBPA.

Questions for the Gottwalds went unanswered by the Albemarle Corporation's press office.

Over time, as one scientific study after another found that flame-retardant chemicals were carcinogenic and mutagenic, California came to see the error of its ways, and state officials sought to limit their use. Between 2007 and 2012, four bills were introduced in the California Legislature to update TB 117, the regulation that had given rise to the proliferation of flame retardants.

All four bills failed, thanks in part to the muscle of the chemical industry, which spent at least $23 million on lobbying and campaign donations aimed at resisting tighter regulation. Joining the industry were deceptive front groups like Citizens for Fire Safety, which was exposed in the 2012 investigation by the Chicago Tribune. Founded by Albermarle and other flame-retardant manufacturers, the group described itself as "a coalition of fire professionals, educators, community activists, burn centers, doctors, fire departments and industry leaders, united to ensure that our country is protected by the highest standards of fire safety." But the group's only funding came from three different chemical companies.

To defeat the California bills, Citizens for Fire Safety spent tens of millions of dollars on a variety of underhanded tactics. For example, the group paid a retired burn surgeon who falsely testified about burn victims and misled lawmakers about the effectiveness of flame retardants. (He later surrendered his license to practice medicine.) The group also falsely claimed to work with a federal agency, an international firefighters' association, and the American Burn Association, all of which denied any connection with Citizens for Fire Safety when contacted. And seeking that last refuge of contemporary scoundrels, the group rolled out a phony social-justice argument, maintaining that poor children would experience the most harm if flame retardants were removed from household items. The group summoned witnesses to repeat this bogus assertion at hearings, including a 10-year-old boy who told California legislators, "I just want you to imagine a child crying for help in a burning building, dying, when there was a person who only had to vote to save their life."

The Chicago Tribune's exposé of the industry's skullduggery had an impact, however. Shortly after its publication, Albermarle and other flame-retardant manufacturers announced that they would defund Citizens for Fire Safety. The lobbying on the industry's behalf would be now undertaken by the American Chemistry Council's newly formed North American Flame Retardant Alliance. Just as it had retooled banned products with new names and slightly different chemical profiles, the flame-retardant industry slapped a fresh coat of paint on its lobbying efforts and got back to work resisting regulation.

Nevertheless, California lawmakers voted in 2013 to amend TB 117 in a subtle but important way: Now the materials covering the furniture, rather than the underlying foam, needed to deter fire. To the industry's chagrin, this new standard could be met with smolder-resistant materials—leather, wool, or synthetic weaves—rather than with flame retardants. And in 2015, a new labeling law took effect in California, requiring that furniture that contained flame retardants be identified as such.

Alas, none of these changes spelled an end to their use. As other states began taking note of the hazards posed by flame retardants, the American Chemistry Council stepped in again, taking the fight to state legislatures. In its 2010 tax returns, the council told the IRS that it had "helped defeat, amend or postpone the passage of more than 300 flawed bills dealing with chemicals and plastics in 44 states," many of which concerned flame retardants.

Despite the industry's best efforts, 16 states were actively considering legislation to ban certain flame retardants as of March of this year, according to the Pew Charitable Trust. Often, the states have been motivated by a lack of regulation at the federal level. A shocking fact: The EPA maintains a database of some 85,000 chemicals that have been manufactured or processed in the United States, but it has subjected less than 300 of these to rigorous testing under the Toxic Substances Control Act and has banned only five (including PCBs.) Crucially, some of the pending state legislation would prohibit manufacturers from substituting other hazardous chemicals in place of the flame

retardants that the legislation restricts. Provisions like this, which strike at the heart of the industry's modus operandi—"You don't like that flame retardant? Try this one!"—are particularly reviled by these companies.

Indeed, it may have been the fear of aggressive state regulation that led the chemical industry to endorse a major overhaul in the federal regulation of chemicals that was passed by Congress in 2016. The Frank R. Lautenberg Chemical Safety in the 21st Century Act is generally considered a compromise between the industry and the environmental and public-health communities. The latter liked the fact that, for the first time, the law gave the EPA the right to regulate chemicals based on their health effects alone, without reference to economic costs and benefits. (A previous EPA ban on asbestos had been thrown out by a court and watered down on the grounds that it failed to weigh the ban's cost to industry.) Health and environmental advocates also liked that the act mandated a safety review of many previously untested chemicals and expanded the EPA's ability to require testing of new and existing ones.

Despite this, the American Chemistry Council lobbied strenuously on behalf of the bill, presumably because it limits the ability of states to pass their own laws regulating chemicals. If the EPA rules that a chemical is safe, that decision preempts a state's ability to say otherwise. Even if a state compiled clear evidence that a given chemical was poisoning its residents or waterways, it would have to wait for the EPA or Congress to take action. History teaches that the odds of such a federal interruption of the chemical industry's business practices are slim. The moral: In a post–***Citizens United*** environment, where corporations and the wealthy can flood electoral campaigns with unlimited amounts of untraceable money, it is easier to buy Congress than to buy 50 statehouses.

Flame retardants are more prevalent in 2018 than they've ever been, as the industry continues to promote the venerable falsehood that all of its products are safe and effective. On its website, the American Chemistry Council boasts that the EPA has identified more than four dozen safe flame retardants, but it fails to note that many of those now in widespread use are not featured on that EPA list. Old fear tactics continue to proliferate as well. "Every 23 seconds, a fire department responds to a fire in the U.S.," the council has warned ominously. This fact cynically elides the actual effectiveness of flame retardants. Indeed, most of the fires that a department responds to are, by definition, ones in which a flame retardant has failed to prevent the fire.

In "The Facts Behind Misconceptions of Brominated Flame Retardants," the industry revs up its fog machine one more time. This slippery document, featured on the website of the Bromine Science and Environmental Forum, decorously concedes that not all flame retardants have been good for people, but then assures readers that "one flame retardant

does not represent the entire family…. It is very difficult to attribute properties or findings from one small group or sub-group of substances to an entire family of chemical substances."

As the industry supposedly continues its search for new and safer materials, it has refined its bait-and-switch scam, even pretending to embrace environmental consciousness by recasting out-of-favor products with green-sounding names. Thus, in 2016, Albemarle retired its HBCD flame retardant in favor of an allegedly more sustainable product with the moniker GreenCrest, while Afton Chemical, another Gottwald-headed/controlled company, calls one of its gasoline additives "Greenburn."

Albemarle is also stepping up its export efforts. As the company enthused in a quarterly report last year, "[W]e continue to believe that improving global standards of living, widespread digitization, increasing demand for data management capacity and the potential for increasingly stringent fire safety regulations in developing markets are likely to drive continued demand for fire safety products." The global demand for flame retardants has skyrocketed—from 526 million pounds in 1983 to 3.4 billion pounds in 2009—with the demand projected to top 7 billion pounds by 2022. Market analysts have predicted that global sales, around $6 billion in 2015, could reach $10 billion per year by 2020.

With products like the appealingly named GreenCrest and Saytex coming to market, the manufacturers of flame retardants continue to march ahead, spreading disease and death with every step. Consider it a gift from the Gottwald family to you. All of you.

Jamie Lincoln Kitman, New York bureau chief for *Automobile Magazine*, won an investigative reporting award from Investigative Reporters and Editors for his *Nation* article on leaded gasoline. A member of the Society of Automotive Historians, Jamie Lincoln Kitman drives a 1966 Lancia Fulvia and a 1969 Ford Lotus-Cortina, both of which run fine on unleaded.

Obituary: Evan Whitton 5 March 1928 - 16 July 2018

My father Evan Whitton died at the age of 90 last month and this is my first chance to say goodbye to him and honour his memory. *LEAD Action News* was privileged to have had Evan as a Guest Editor and Editorial / Defamation / Legal / Media / Advocacy Advisor for nearly three decades so this publication is a fitting place for one more obituary.

Many of his journalist colleagues have written obituaries (see below) and thanked Evan for mentoring them, and because Evan was a history and English literature teacher before becoming a journalist and author, his ex-students have also published a whole newsletter full of accolades for Evan as a teacher and a good man.

My experience of Evan as my father began when I was 9 years old, 53 years ago without notice, well, none that I can recall. A year before, my mother Noela had taken on the role of both mother and father, but late in 1965, Evan moved in with us (I have three older siblings) and I can recall thinking "my home has become a classroom – this guy is a born teacher but nothing like a father".

Picture this, early-on in the new living arrangements: four children seated around a map of Vietnam on the wall, being instructed on troop movements and famous battle locations – Evan standing, used a long ruler to point to the map to describe Australia's involvement in the war - in chronological order, as was his wont. We each had to put up our hand to ask a question!

By the time I was 10, I realized Evan was a walking dictionary so I always asked him for word definitions while reading or listening to the radio or TV current affairs - this was on for approximately three hours a day! He referred me to the actual dictionary over-and-over before I took up the habit and stopped asking him.

Evan worked two or three jobs in order to earn enough to cover the cost of living for his own three children and the four of us so the most memorable times I spent with him in the early years were doing the shopping, at the laundromat, watching rugby matches he reported on and, because I seemed to have inherited my parents' musical abilities, going to Gilbert and Sullivan musicals together.

As a teenager, when my friends were listening to the Rolling Stones and heavy rock, I was learning the German lyrics of Beethoven's 9th Symphony choral movement – Beethoven was Evan's favourite composer. It was certainly my favourite piece of music – played at high volume – thousands of times. When I joined the Beethoven Society Choir and sang it in the Sydney Opera House years later, Evan and Noela dutifully attended.

This millennium, I felt privileged to have spent practically every Saturday with Evan and Noela (pictured at left), enjoying Evan's cooking and their recollections of childhood and of having fallen in love as teenagers, married other people, but reunited in their thirties, and then lived a happy life together, with Evan being the full-time carer for my mother, following a stroke three years ago. Evan took a few decades, but he had transformed from a teacher to become my loving father, all the while creating a model of a loving partnership.

On his deathbed, Evan said he had loved my mother for 75 years and I thanked him for being my loving father for 53 years. He told me he was glad to have loved me for 53 years and that my best feature was that I am "interested in everything."

My wish now is that I can carry on with my vision of creating a lead-safe world by 2041 – in loving memory of my father.

Elizabeth O'Brien, Co-Founder, The LEAD Group Inc, and Author of *Didgeridoo – a children's Dictionary of Aboriginal Words in English,* [book web-published at www.netk.net.au/whittonhome.asp]

Here's a sample of *Downlands Newsletter #75 Tribute to Evan Whitton*, put together by Evan's former student Jack Duggan (JD):

If you would like to read some of the many "Obituaries" written in Evan's honor, *highlight and copy* the 'https……'etc shown below from the newspaper listed, then '*paste*' the details into the search bar of your internet. The details should then be easy to locate from there.

Sydney Morning Herald: (by Rachel Clun)

https://www.smh.com.au/national/walkley-award-winning-journalist-evan-whitton-dies-aged-90-20180717-p4zrvz.html

Australian Financial Review: (by Andrew Clark)

https://www.afr.com/business/media-and-marketing/publishing/evan-whitton-the-outstanding-reporter-of-his-time-20180718-h12udg

The Herald [Newcastle, NSW]: (by Tony Stephens)

https://www.theherald.com.au/comment/your-say/5536643/obituary-evan-whitton-1928-2018/

The Toowoomba Chronicle : (by Kerry White)

https://www.thechronicle.com.au/news/rugby-pioneers-leave-lasting-mark/3484060/

The Muswellbrook Chronicle: (by Tony Stephens as above)

https://www.muswellbrookchronicle.com.au/story/5545183/obituary-evan-whitton-1928-2018/

The Sydney Morning Herald: (by Tony Stephens – above)

https://www.smh.com.au/national/journalist-won-five-walkley-awards-for-ground-breaking-journalism-20180717-p4zryn.htm

The Courier Mail: (by Kerry White)

https://www.pressreader.com/australia/the-courier-mail/20180728/282252371327786

I couldn't get the link for Kerry's contribution to work. So here is a copy of what he wrote:

OBITUARY: Evan Whitton 5 March 1928 – 16 July 2018 – A GREAT OBSERVER OF LIFE AND POLITICS

[As it appeared in The Courier Mail on 28/7/18]

IN the early 1960s Evan Whitton was teaching English at a private school in country Queensland; before the end of the decade he had won a national journalism award for a report on living as a pensioner in Melbourne.

The award was a Walkley, representing esteemed recognition in the media profession, and he went on to win four more as well as a being named Journalist of the Year and inducted into the Media Hall of Fame. He died on 16 July 2018, aged 90.

Whitton was born in Muswellbrook, NSW, on 5 March 1928, but raised in Murgon in south-east Queensland before going away to the Catholic boarding school, Downlands College, Toowoomba. He went on to teaching college and later returned to his alma mater to teach English....

He had been writing rugby on a casual basis for the local *The Chronicle* newspaper where he began journalism full-time, soon moving on to a much lauded career writing (and editing at times) for *Truth* in Melbourne, the *Sunday Australian*, *The National Times* and *Sydney Morning Herald*. He later became a Reader in Journalism at University of Queensland and a columnist for an online legal journal, *Justinian*.

Early on he attracted attention, even a rebuke from Ronald Ryan's executioner in 1967. "... in 38 years I have never been told my work has been jerky," he responded to Whitton's first-hand report on the hanging (Ryan was the last person hanged in Australia).

His journalist of the year award was for "courage and innovation" in reporting the NSW Wran Royal Commission. Later he covered the Queensland Fitzgerald inquiry, "the biggest and most important story I ever worked on; the experience of a career."

He has written eight books ranging from *The Hillbilly Dictator: Australia's Police State* (ABC, 1989), which came out of the Fitzgerald Inquiry, to a work as a 'legal historian', *Our Corrupt Legal System: Why Everyone Is a Victim (Except Rich Criminals)* (Bookpal 2010).

His substantial writings are available online at http://netk.net.au/WhittonHome.asp including a story about his ANZAC father who it seems left horse-tending duties at Alexandria to stow away to get to Gallipoli. He was wounded and had his legs amputated, but lived for 50 more years.

Evan Whitton is survived by his second wife, Noela, their seven children from previous marriages, seven grandchildren and four great grandchildren.

By Kerry White (a student of Evan Whitton in 1961)

Pressreader: (by Chilla Johnson)

https://www.pressreader.com/australia/the-chronicle8992/20180803/283583811202301

Toowoomba Chronicle: (by Kerry White)

https://www.thechronicle.com.au/news/rugby-pioneers-leave-lasting-mark/3484060/

The Saturday Paper: (by Richard Ackland – The Gadfly)

In his regular "Diary" section on the 21st July 2018, Richard wrote: 'The death of Journalist Evan Whitton has been widely reported along with his investigatory work on justice and injustice. He was a big presence in the field of reporting and an inspiration to many cubs, including Gadfly. One of the aspects of his career less noted in the encomiums was his campaign to replace the entire adversarial system of litigation with the inquisitorial (Napoleonic – Germanic) system of justice. In other words courts would turn into miniroyal commissions of inquiry, pressing for the truth with minimal interference from the rules of evidence. Judges would be specifically schooled and not necessarily drawn from the ranks of long-winded barristers. They would sit on the bench alongside lay jurors. No doubt these ideas started percolating during the long, dry days he sat as areporter in the Toowoomba courthouse. He tirelessly peddled his inquisitorial approach in the law journal *Justinian* and elsewhere. It was so shocking that the rank and file of the legal profession became incandescent with his attack on the perfection of the 'Rolls Royce' justice system. He also gave some of the human rights lawyers a swipe when he wrote: "The adversary system is solid for human rights; its firm position is that criminals have a human right not to be convicted, and their victims have a human right to like it or to lump it." It's not often that the death of a journalist leaves an empty spacein human affairs. Whitton's death creates such a void.

EDITORIALS Evan Whitton chased the truth - *The Australian July 18, 2018*

https://www.theaustralian.com.au/opinion/editorials

Evan Whitton represented the essence of newspaper reporting. He wore out his shoe leather going to the scene, knocking on doors, meeting players, asking questions and uncovering facts others wanted concealed. Whitton's work was honoured with five Walkley awards, the Graham Perkin Journalist of the Year and an inaugural induction into the Media Hall of Fame. His work exposed police, business and political corruption as well as the folly of war. A truth-teller who broke through barriers erected by bureaucrats and the justice system, Whitton dragged facts into the sunlight. This is a style and quality of reporting under threat in our digital age. He died on Monday, aged 90, and is survived by his wife, Noela.

Whitton's life was quite a story.

++

I don't think Sir Robert Menzies or Gough Whitlam had more 'Obituaries' published in as many newspapers as Arg ! **JD**

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Here are some more obituaries I found, published in New Zealand newspapers:

Journalist exposed Australia's involvement in Vietnam War

Manawatu Standard, 23rd July 2018

https://www.pressreader.com/similar/281977493409412

Waikato Times, 23rd July 2018

https://www.pressreader.com/similar/281977493409412

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