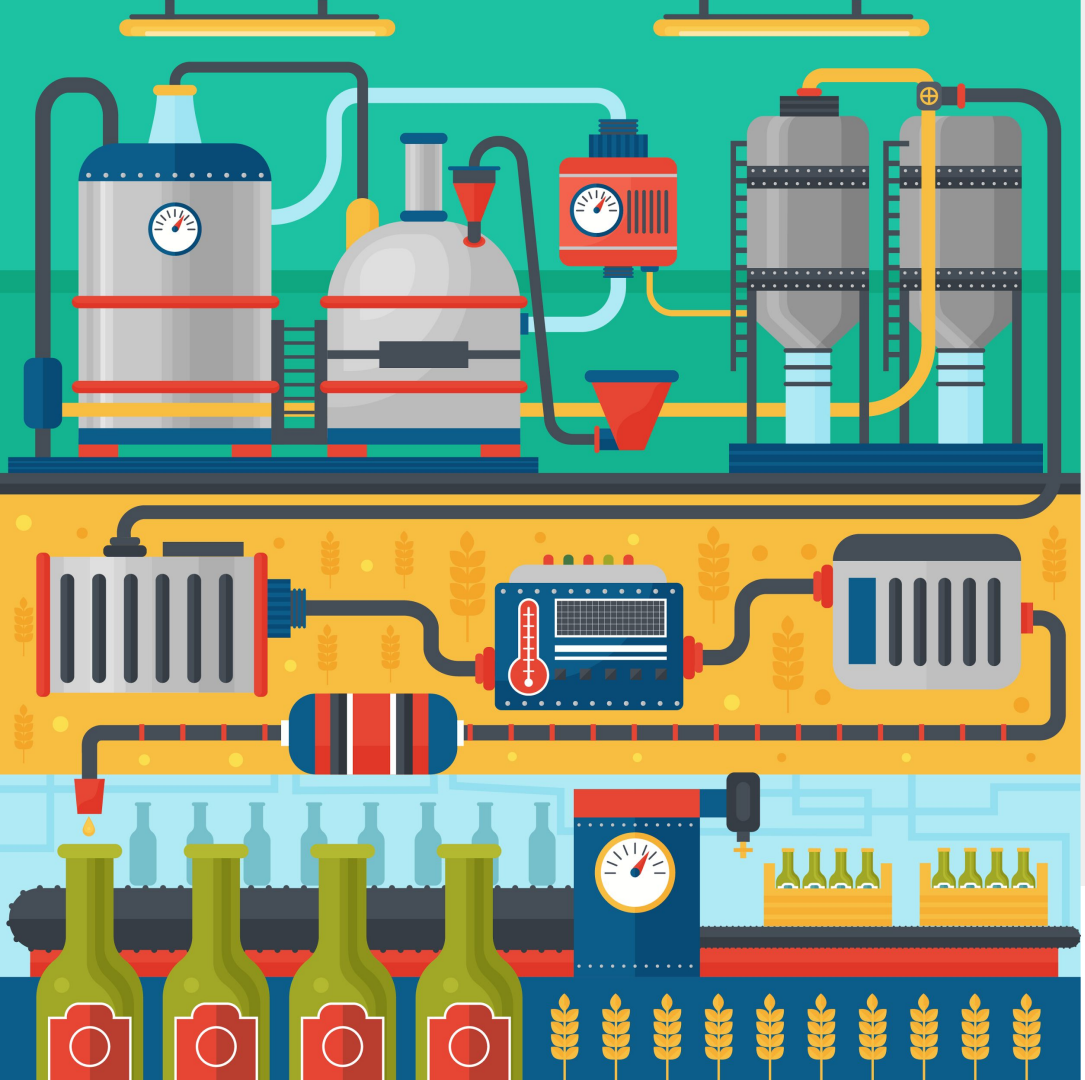


BREWERS
CONGRESS 2017

# Dr Bill Simpson

## Cara Technology

LALLEMAND
SimplyHops BARTH-HAAS GROUP
QCL
Muntons Passionate about malt

# When Disaster Strikes


## Dr Bill Simpson, Cara Technology, UK


**One Great George Street, London**
**27 November 2017**

BREWERS CONGRESS 2017

cara TECHNOLOGY

# 1. YEAST
## The Belgian Incident

# 2. MALT
## The carbaryl incident

# 3. ADJUNCTS
## The arsenic incident

# 4. ADDITIVES
## The cobalt incident

# LESSONS LEARNED

# YEAST

# The Belgian incident

## 2016

# Belgian incident

**Year: 2016 | Location: USA**

**Problem: Flavour, product integrity**

- Contamination of house ale yeast with wild yeast (*Saccharomyces cerevisiae* var *diastaticus*)
- Yeast produced phenolic off-flavours (styrene, 4-vinyl guaiacol) and esters (ethyl acetate) in beer – issues with appearance (nitro product)
- Over-attenuation due to glucoamylase production – explosion risk
- Problem not promptly detected by brewery, despite big flavour changes in their beers ("Belgian" flavour in US craft-style beers)
- Action: Product recall

# Belgian incident


**>10% annual production**

## Revolution Brewing Recalls 10,000 Barrels of Beer

Chris Furnari | Oct. 18, 2016 at 4:13 PM

Share

Revolution Brewing yesterday issued a recall of more than 10,000 barrels of beer packaged between Aug. 3 and Oct. 11 due to off-flavors that developed in six of the company's more popular products.

Belgian incident

# Belgian incident


According to Revolution, the affected beer “exhibit ester or phenolic flavors, which are more characteristic of Belgian-style ales, and which should not be present in our standard American ales.”

“We believe these off-flavors were produced by a wild yeast that has gotten worse over time and was not identified in time by our quality control methods,” Deth and Cibak wrote.

Deth told the Chicago Tribune he estimates more than 10,000 barrels of beer were affected by the recall, and though much of it was already consumed, up to 2,000 barrels of beer is still out there.

Belgian incident

# Belgian incident

Chicago Tribune

## Revolution Brewing founder on huge beer recall: 'It's like a death in the family'

"It's like a death in the family. No one likes to deal with it, but you deal with it the best you can. And it brings people together and refocuses you on what really matters, which for us is the quality of our beer," Deth said Tuesday.

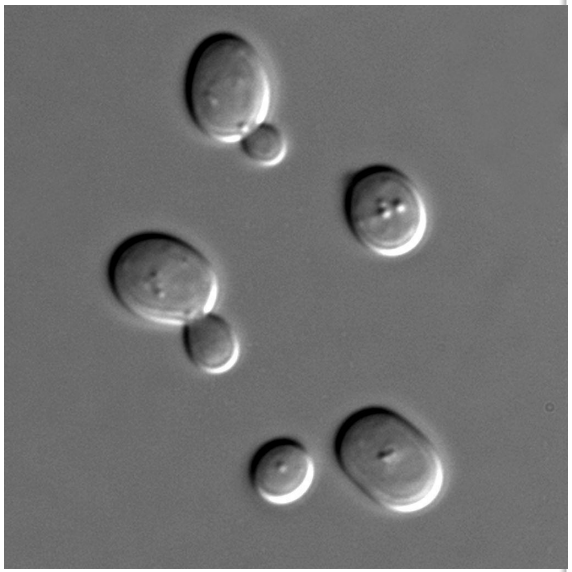
# Belgian incident

- Revolution Brewing are one among many breweries that have suffered similar problems
- Most breweries have not gone public
- All have become very good at testing for wild yeast!



# Belgian incident

- And now the lawyers are involved ….



**DISTRICT COURT, BOULDER COUNTY, COLORADO**
Boulder County Combined Court
1777 6th Street
Boulder, CO 80302

DATE FILED: November 14, 2017 11:54 AM
FILING ID: E6EA3B68AEBFC
CASE NUMBER: 2017CV31132

**Plaintiff:** INDIAN PEAKS BREWING COMPANY D/B/A LEFT HAND BREWING COMPANY, a Colorado Corporation,

v.

**Defendant:** WHITE LABS, INC., a Colorado Corporation.

Maureen R. Witt, #10665
J. Lee Gray, #27306
Holland & Hart LLP
6380 South Fiddlers Green Circle, Suite 500
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bbbump@hollandhart.com
***Attorneys for Plaintiff***

▲ COURT USE ONLY ▲

Case Number:

Div.:

**COMPLAINT AND JURY DEMAND**

# Lessons learned

- Quality tests are not just a “nice to have” in a brewery
- Microbiological testing, chemical testing and sensory testing are an essential cost of doing business
- Suppliers get things wrong sometimes – you need a way of knowing when that happens

# MALT

# The carbaryl incident

**1985**

# Carbaryl incident

**Year: 1985 | Location: Australia**

**Problem: Flavour**

- Flavour issue detected by only 1 in 8 tasters in the brewery
- Taster's results disregarded and beer sent to market
- Largest product recall in history of the brewing industry up until that time
- Source identified as a barley storage pesticide present in the malted barley used to make the beer
- Action: Use of carbaryl on malting barley banned

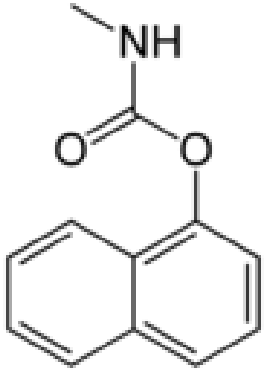
# Carbaryl incident

Grain storage pesticide which protects against insect damage

Approved for use on malting barley in 1984 on the basis of pilot brewing trials

Australian brewers were first to use malt protected with carbaryl

Image: USDA Cooperative Extension



# Carbaryl incident

Traces of carbaryl survive the malting process

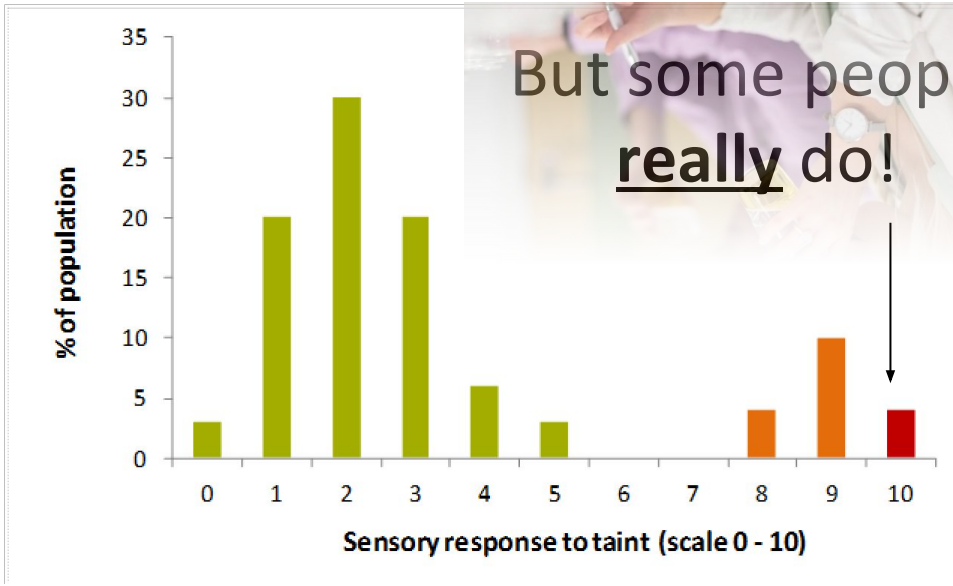
Converted by brewer's yeast into 1-napthol

Only some strains of yeast carry out the reaction

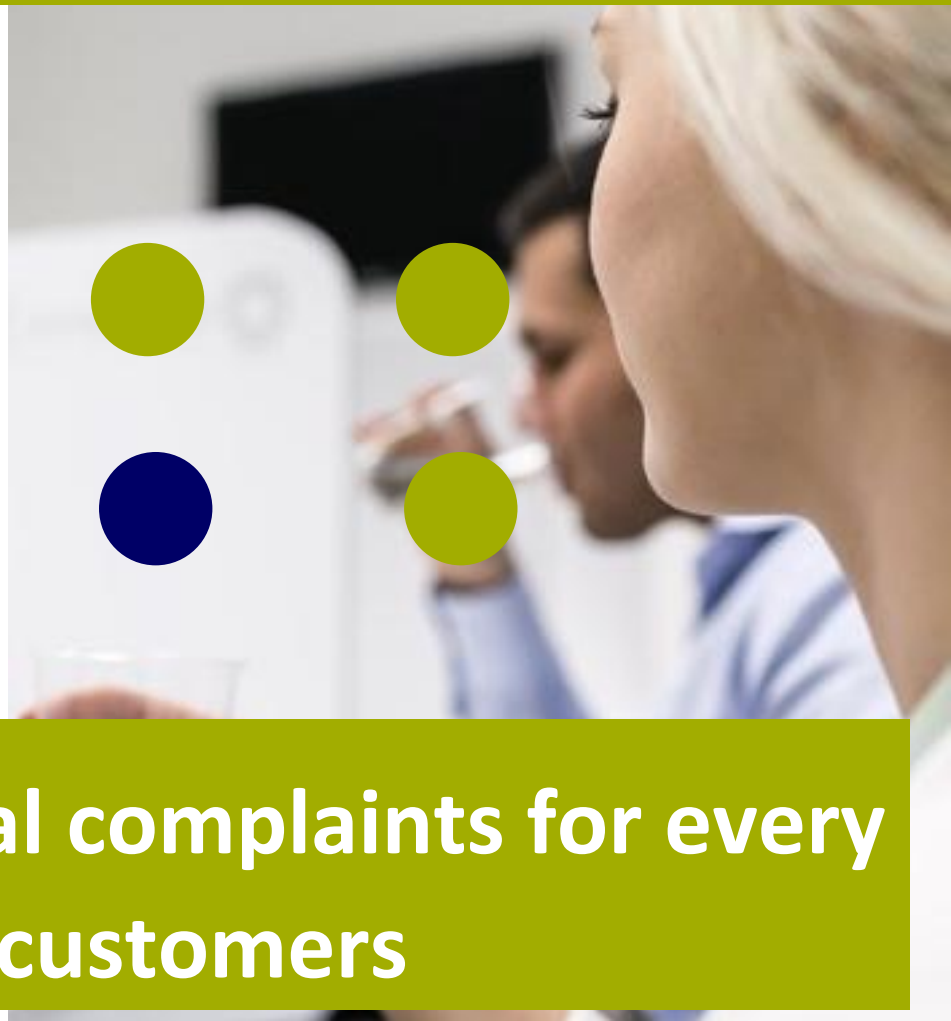
# Carbaryl incident

## Not everyone finds the flavour of 1-napthol in beer offensive …

But some people **really** do!



# Carbaryl incident



**125,000 potential complaints for every million customers**

# Lessons learned

- Just because something has been approved by an “authority” doesn’t mean that nothing can go wrong
- Buyer beware!
- Law of unintended consequences
- Disregarding a minority of results, assessors or customers is always a bad idea

# ADJUNCTS

# The arsenic incident

**1900**

# Arsenic incident

**Year: 1900 | Location: England**

**Problem: Consumer death and injury**

- Arsenic contamination of glucose and invert sugar syrup used as adjunct and as priming sugar
- Caused by change in type of sulphuric acid used in manufacture of syrup
- Involved more than 200 breweries in England, causing at least 70 deaths and injuring thousands – alcoholic polyneuropathy
- Action: Royal Commission – first legal limit for a poisonous substance in a food or beverage

# Newspaper headline

**Poisoning in Manchester**

**Remarkable Revelations**

**Arsenic in Beer**

*Manchester Evening Chronicle, 1901*

# The beer market in 1900

Dominated by cask and bottled beer

Almost all products primed with glucose or invert sugar and given a secondary fermentation in package

Sugars also widespread as brewhouse adjuncts

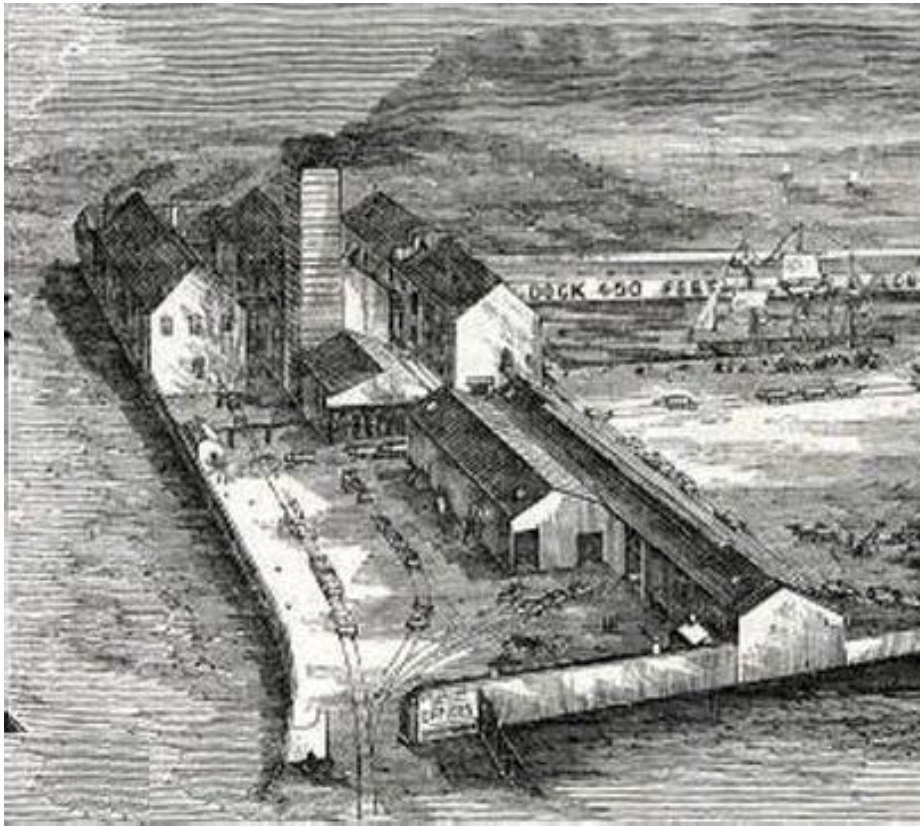
# A tale of process improvement

**Bostock Sugar Works, Garston, Liverpool**

**Manufactured glucose and invert syrups**

**Sulphuric acid used in processing**

**Supplier to more than 200 breweries**



# A tale of process improvement

**Bostock's supplier reduced costs by switching sulphur used to manufacture sulphuric acid for iron pyrites (Fool's gold)**

**Result was acid which contained arsenic**

Image: Rob Lavinsky, iRocks.com

# ARSENIC IN BEER.

## HEAVY CLAIM FOR DAMAGES.

London, January 11.

Messrs. Bostock and Company, Limited, sugar refiners, of Liverpool, are taking proceedings to recover heavy damages from Messrs. John Nicholson & Sons, the proprietors of large chemical works at Hunslet, Leeds, for having supplied them with sulphuric acid adulterated with arsenic. It has been proved that the beers which caused the poisoning of many hundreds of persons in the midland counties were brewed with sugar which had been purchased from Bostock & Co.'s refinery, and the arsenic in the sugar is now said to have been traced to the sulphuric acid used in the refinery.

The Government have appointed a Royal Commission to report upon measures that should be taken as safeguards against arsenic in food and drink.

## Lawyers involved ....

ROYAL COMMISSION ON ARSENICAL POISONING.

FIRST REPORT

OF THE

ROYAL COMMISSION

APPOINTED TO INQUIRE INTO

ARSENICAL POISONING

FROM THE CONSUMPTION OF BEER AND OTHER ARTICLES OF FOOD OR DRINK.

Part I.

REPORT.

Presented to both Houses of Parliament by Command of His Majesty.

## ... Government involved

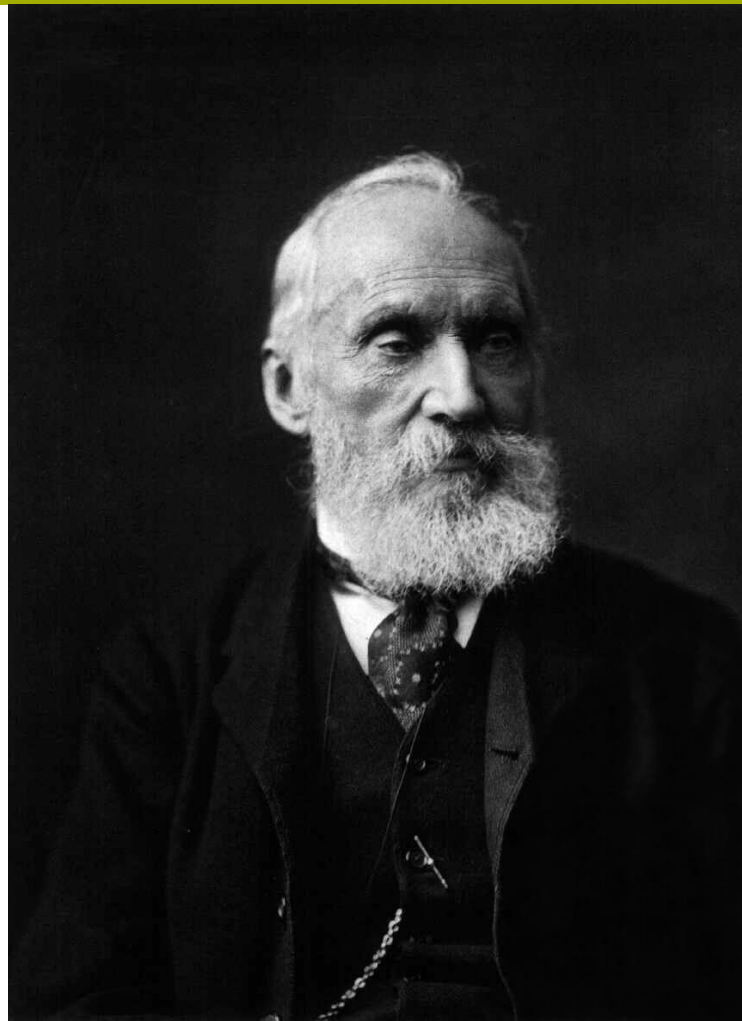
# The arsenic incident

**Royal Commission Chaired by Lord Kelvin concluded:**

**At least 70 dead**

**At least six thousand injured**

***Bostocks sued their supplier – Nicholson & Son – they lost***



# Lessons learned

- Responsibility for the safety of beer sold to the public lies with retailers, distributors and brewers
- Suppliers are not accountable for consequences of how their products are used by others
- Ignorance of the potential consequences of supplier changes can have dire consequences

# ADDITIVES

# The cobalt incident

**1965**

# Cobalt incident


**Year: 1965 | Location: Canada, and elsewhere**

**Problem: Consumer death and injury**

- Cobalt chloride was in widespread use globally as a beer foam stabilizer and to protect beer against gushing
- The material was FDA-approved and considered safe
- Some brewers routinely added 10x too much to their beer
- Excessive consumption of such beer led to death and injury
- Action: Immediate stop in use of cobalt in beer production; FDA approval for cobalt withdrawn; big losses in market share for breweries affected; brewery closure

# United States Patent Office

2,865,755
Patented Dec. 23, 1958



2,865,755

## REDUCING THE TENDENCY OF BEER TOWARDS GUSHING AND INCREASING ITS FOAM STABILITY

Richard Stanley Wrey Thorne, Holte, Denmark, assignor to Alfred Jorgensen's gaeringsfysiologiske Laboratorium, Copenhagen, Denmark, a firm

No Drawing. Application March 25, 1957
Serial No. 647,967

Claims priority, application Denmark May 16, 1956

8 Claims. (Cl. 99—48)

The occurrence of that defect in bottled beer known as gushing or overfoaming has something of the character of an epidemic, being limited usually to particular geographical regions. Gushing is manifested by an abnormally rapid evolution of carbon dioxide as soon as the bottle is opened, the foam so formed overflowing from the bottle and carrying with it a more or less considerable volume of beer. The periodic and more or less localised occurrence of overfoaming seems to be caused by defects, whose nature is not understood, in the barley used for brewing the defective



beer, which expression, for the purposes of the present invention is to be understood to comprise also canned beer and beer placed in other sealed containers intended to be opened immediately before the consumption of the beer, and in which containers the beer is transported and sold to consumers.

Accordingly a still further object of my invention is (in connection with the manufacture of bottled beer, which manufacture includes the bottling or corresponding operation by which the beer is placed into the containers in which transportation and sale is to take place, and the sealing of such containers) the incorporation with any material used at any stage in the manufacture of the finished beer after the main fermentation, of a non-toxic amount of cobalt exceeding 0.1 mg. per litre of the beer.

A still further object of my invention is the provision of convenient means by which the cobalt can be so added during the manufacture of bottled beer.

One mode of carrying my invention into effect is therefore, to add to beer subsequent to pasteurization an adequate proportion of an inorganic cobaltous salt. This embodiment of the invention has been used in the following Experiments 1–3, typical of a great number of experiments carried out to illustrate the effect obtained

cobalt incident


BRASSERIE
DOW
BREWERY
DOW PLANETARIUM


une
Dow?
Dow
ALE
D'accord!
Emportez-en
à la maison
SEULE LA BIÈRE Dow EST "CLIMATISÉE"
207

# QUÉBEC BEER-DRINKERS' CARDIOMYOPATHY: CLINICAL AND HEMODYNAMIC ASPECTS*

Yves Morin, André Têtu, and Gaston Mercier
*Department of Medicine, Laval University, Québec, Canada*

On August 24, 1965, a 39-year-old stevedore was admitted to the Department of Surgery of the Hôtel-Dieu de Québec. The clinical picture was unusual. The patient complained of severe epigastric pain, with tenderness localized to the upper part of the abdomen. He was deeply cyanotic, this grayish hue was found especially in the face, neck, and abdomen. He was short of breath but lay flat in bed; above all, he was very anxious and agitated but did not present any evidence of incoherence or gross tremor. The patient admitted to drinking regularly an average of 25 pints of beer (Brand XXX) daily. His dietary habits were poor and irregular; he rarely ate on weekends (or whenever he was off from work) and ate sandwiches at other times. On physical examination of the cardiovascular system, his heart rate was regular at 115 beats per minute, and blood pressure was 80/60. Arterial pulses were

All of these patients were unusually heavy beer drinkers, and 36 had been drinking heavily for at least 20 years. The average alcoholic intake was 24 pints daily, but one patient, a truck driver, drank an average of 20 quarts of beer daily. Most patients drank beer exclusively, but six occasionally consumed other types of alcoholic beverages. Although the average patient preferred draught beer sold exclusively in taverns, bottled beer was also consumed, since taverns are closed on Sunday in Québec City.

**Announcement of the cessation of activities at Dow's Brewery March 31, 1966**

The Dow Brewery is making public its decision to withdraw its beer from the market and put an end to the operations of its Quebec City plant. In a statement issued to the press, the management announces that "the destruction of beer in the brewery and beer withdrawn from the market will be under government supervision." This news follows the death of 16 people with myocardial disease, a phenomenon that remains unexplained. A rumor that Dow beer is behind these deaths, however, led us to make a radical gesture: remove beer from the market and stop the operations of the plant in Quebec. Aware of the damage done to the image of their company, the leaders of Dow make this decision even before knowing the results of an investigation conducted by the Quebec Ministry of Health to determine the exact causes of death. Yet, according to Minister Eric Kierans, nothing at that time confirmed the responsibility of the Dow in this series of deaths and in the other 24 cases of myocardosis identified. According to company spokespersons, there are currently 390,000 crates of beer in the company's warehouse in Quebec City. At $ 4 a box, this destruction is a colossal financial loss.

# Lessons learned

- RTFM!
- “FDA-approved” doesn’t mean “guaranteed safe”
- “Edge-case” consumers and synergistic effects have to be considered when evaluating new products and processes
- Creative, educated, knowledgeable, informed multi-disciplinary teams are needed to evaluate risk

# WHEN DISASTER STRIKES

# Conclusions

2017

## 1. THINK CREATIVELY

What's the worst that could happen?

## 2. ASSUME NOTHING

Check things for yourself

## 3. ANALYSE RISK

Search the internet!

## 4. TAKE RESPONSIBILITY

Experts can be wrong too

# LEARN THE LESSONS OF BREWERS PAST

**“Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know.**

**….., it is the latter category that tend to be the difficult ones.”**

**Donald H Rumsfeld, 2002**