Environment and Urinary Bladder Cancer: a Historical Perspective

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107TH ANNUAL MEETING
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Until the twentieth century, in the wild and windy moorlands of Devonshire, fields of bracken were set ablaze aiming to encourage rainfall

Perhaps not even a drop was generated, but due to this popular belief, a potential carcinogen-promoting agent for urinary bladder carcinoma was inadvertently incinerated

- **Tobacco**. Tobacco use, particularly cigarette smoking, has been linked to almost every type of cancer, especially lung cancer. "Tobacco is by far the greatest cause of cancer cases and death," Dr. Wascher says. According to Shelly Smekens, ND, naturopathic resident at CTCA® in Zion, Illinois, the risk is high for both smokers and nonsmokers exposed to secondhand smoke.
- **Radon**. Radon is a colorless, odorless gas that develops as a result of uranium decay. It is present in some level almost everywhere in the world, but some places have higher levels of radon, particularly areas with cold winters and in buildings with basements where the gas can accumulate. "After cigarette smoking, radon is the second-highest modifiable risk factor for lung cancer, which is still the number one cause of cancer death in the United States," explains Smekens. Dr. Wascher notes, "Radon gas exposure probably accounts for five to eight percent of all lung cancer cases."
- **Air pollution.** "Particulate air pollution, especially exhaust from diesel engines, has been linked to lung cancer," Dr. Wascher says. "Individuals who live in heavily polluted areas therefore appear to have higher rates of lung cancer."
- **Charred food.** Heterocyclic amines, or HCAs, are carcinogenic chemical compounds created by cooking meat at a high temperature. Grilled and heavily charred meats have been linked to colorectal, pancreatic, stomach, and breast cancers.
- **Dietary choices.** "Diets rich in red meat and other animal products are also associated with an increased cancer risk," says Dr. Wascher, "and particularly cancer of the esophagus, stomach, pancreas, colon, and rectum. Diets that are low in whole grains and fresh fruits and vegetables also increase the risk of these same cancers."
- **Radiation**. Exposure to radiation can increase the risk of cancer. "For most of us, that is probably not a huge deal because we didn't live downwind of Chernobyl," explains Dr. Wascher. "But an area of increasing concern is medical Xray exposure. In fact, recent conservative estimates suggest that one to two percent of all new cancer cases may be linked to medical X-rays and to CT [computed tomography] scans in particular." Many of these scans are important and necessary to medical treatment, but sometimes Xrays and scans are overused. "When properly used, CT scans are very important in the management of cancer, but many of these scans are being done for less-thansolid critical reasons," Dr. Wascher says. He recommends prudent use of these scans—and the use of ultrasound or magnetic resonance imaging when possible and appropriate, instead of CT scans.
- **Power lines**. Smekens explains that electromagnetic fields (EMFs) have been associated with leukemia, brain tumors, and breast cancer. "There have been some occupational studies on people who worked on power lines that showed small but real increases in leukemia and brain cancer," she says. An association has also been found between housing proximity to power lines and increased incidence of childhood leukemia.

Indeed, many important carcinogens of bladder cancer aetiology occur in nature and may have been present on this planet as long as man

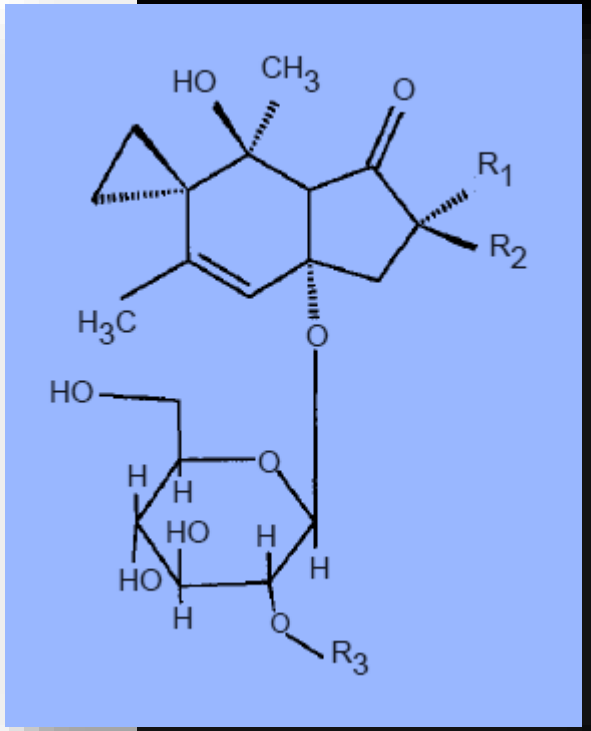
Bracken (*Pteridium aquilinum*) was used by several Pacific Northwestern Indians tribes as a dietary staple as long ago as 14,000 BC, and in more modern times as food for both humans and animals in many parts of the world

Environ Health Perspect 1983;49:201-207

Table 1 Distribution of the ptaquilosides in ferns (Saito et al, 1989; Niwa et al, 1983)

Species	Ptaquiloside or ptaquiloside analogue
Cheilanthes myriophylla	+
Cibotium harometz	+
Coniogramme gracilis	–
C. intermedia	–
C. japonica	–
Dennstaedtia distenta	–
D. hirsta	+
D. scabra	+
Histiopteris incisa	+
Hyplepis bamleriana	+
H. tenuifolia	+
H. punctata	+
Microlepia marginata var. hipinnata	–
M. strigosa	+
Monachosorum arakii	–
Monachosorum flagellare	–
Onychium japonicum	+
Pityrogramma calomelanos	+
P. sulphurea	+
Pteridium aquilinum	+
Pteris cretica	+
P. dispar	+
P. excelsa	+
P. fauriei	–
P. nipponica	+
P. oshimensis	+
P. purpureorachis	–
P. ryukyuensis	–
P. semipinnata	–
P. tremula	+
P. wallichiana	+
Sphenomeris chusana	–

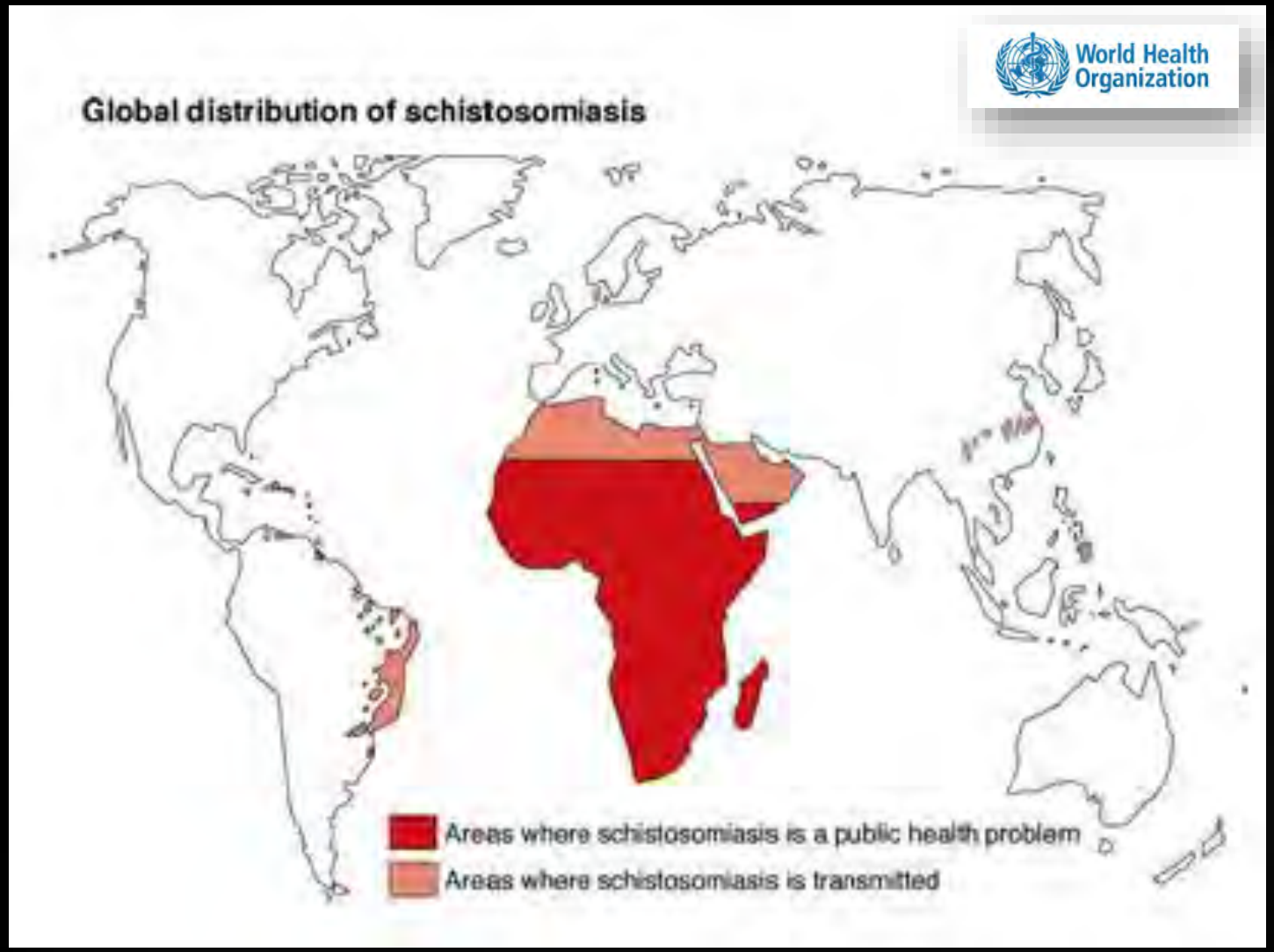
(+ corresponds to present, – to not detected)



This fern is now recognised as a potent experimental plant to induce urinary bladder cancer

Chemical carcinogenic compounds (e.g. ptaquilosides or ptaquilosides analogues) have been isolated in several kinds of ferns, including bracken fern

Br J Cancer 2000;83:914-920



Infectious agents are believed to cause over 20% of malignancies worldwide

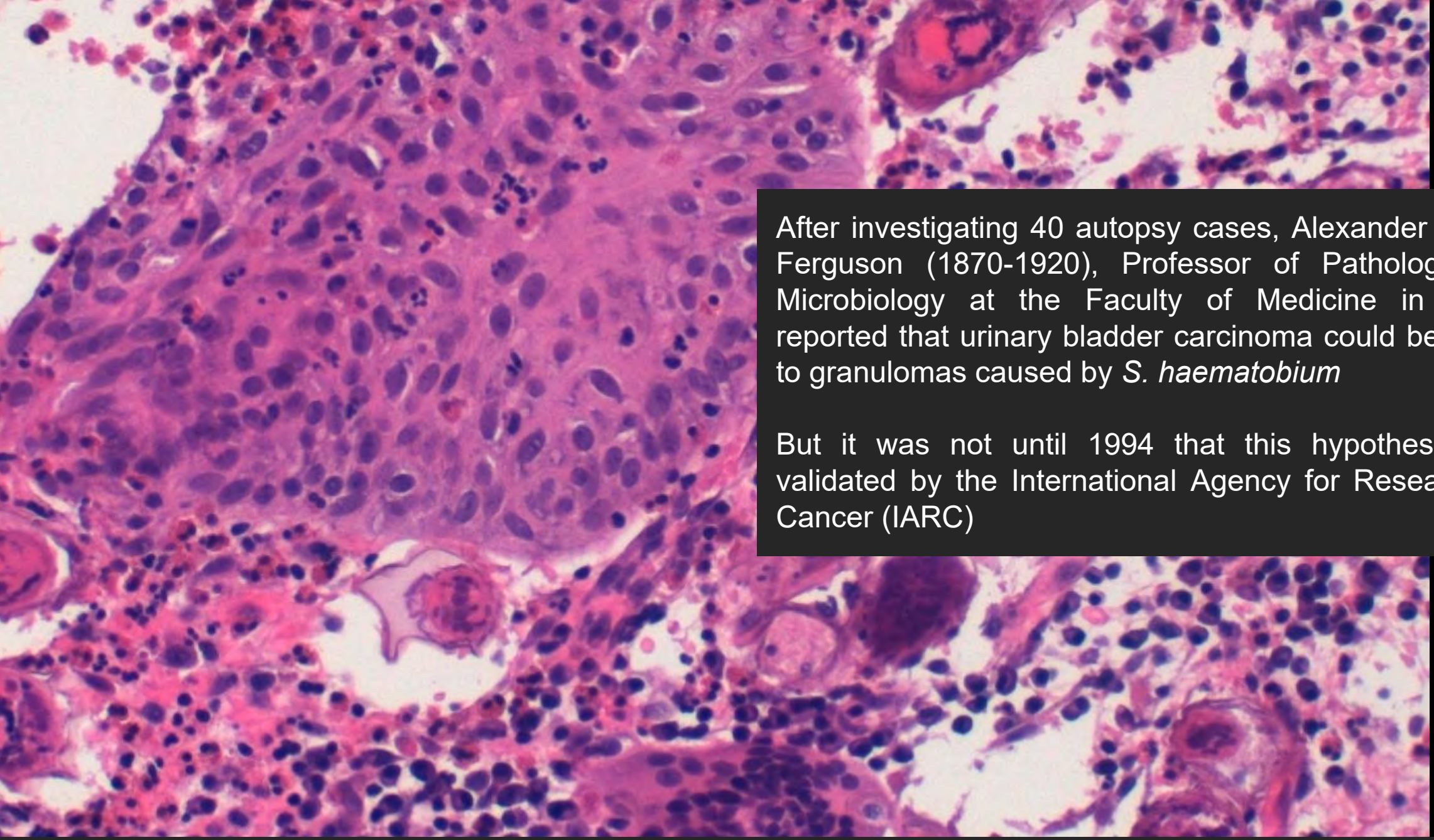
Schistosoma haematobium, a trematode parasite endemic in Africa and the Middle East, invades small vessels of the human urinary bladder and other pelvic organs

Increased travel for business, education and tourism between countries has led to unusual schistosomiasis cases in non-endemic countries

J Adv Res 2013;4:461-466

It was Theodor Bilharz (1825-1862) who first identified this blood fluke during an autopsy at the Kasr El Ainy Hospital (Cairo) in 1851

The existence of an association between schistosomiasis and urinary bladder cancer was first theorised by the German surgeon Carl Goebel in 1905



After investigating 40 autopsy cases, Alexander Robert Ferguson (1870-1920), Professor of Pathology and Microbiology at the Faculty of Medicine in Cairo, reported that urinary bladder carcinoma could be linked to granulomas caused by *S. haematobium*

But it was not until 1994 that this hypothesis was validated by the International Agency for Research on Cancer (IARC)

J Bull Soc Pathol Expt 2017;110:68-75

Sir Marc Armand Ruffer (1859-1917) discovered calcified schistosome eggs in two Egyptian mummies of the 20th dynasty

BMJ 1992;304:555-6

The first contact of Europeans with *Schistosoma* occurred in 1779 during the 3-year French invasion of Egypt. Many soldiers are believed to have been infected as well as Napoleon himself

Following the expeditions by Christopher Columbus (1451-1506), shipments of gold, silver and precious stones arrived in Europe from the “New World”. Just as important from the economic point of view, plants of the *Solanaceae* family, i.e. potatoes, tomatoes, eggplants and peppers, also reached Europe. Another plant of the same family was introduced: tobacco

The tobacco smoking culture was introduced into Europe in 1519 by Spanish explorers, and its use spread rapidly to Asia and Africa

John Hill (1716-1775), the English physician and botanist, reported a link between tobacco use and cancer in 1761

Cancer 1982;49:1056-1066

Association between smoking and risk of bladder cancer among men and women

Neal D Freedman, PhD, MPH[1], Debra T Silverman, ScD, ScM[1], Albert R Hollenbeck, PhD[2], Arthur Schatzkin, MD, DrPH[1], and Christian C Abnet, PhD, MPH[1]

Conclusions

Tobacco smoking was a strong risk factor for bladder cancer, with PARs of approximately 50% in both men and women. We found higher risk estimates for current cigarette smoking relative to never smoking in the NIH-AARP cohort, initiated in 1995, than were reported in previous publications from cohorts initiated between 1963 and 1987. These results support the hypothesis that the risk of bladder cancer associated with cigarette smoking has increased with time in the United States, perhaps a reflection of changing cigarette composition. Prevention efforts should continue to focus on reducing the prevalence of cigarette smoking.

Cancer 1982;49:1056-1066

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TREATISE

OF THE

DISEASES

OF

Tradesmen,

Shewing the various Influence of particular Trades upon the State of Health; With the best Methods to avoid or correct it, and useful Hints proper to be minded in regulating the Cure of all Diseases incident to Tradesmen.

Written in Latin by

BERN. RAMAZZINI,

Professor of Physick at *Padua*.

And now done in English.

LONDON,
Printed for *Andrew Bell*, *Ralph Smith*, *Daniel Midwinter*, *Will. Hawes*, *Will. Davis*, *Geo. Straughan*, *Bern. Lintot*, *Ja. Round*, and *Jeff. Wale*. 1705.

In his famous "*De morbis artificium*", Bernardino Ramazzini (1633-1714) recommended physicians to ask the question *"et quam artem exerceat"* in order to accurately evaluate their patients

Several neoplastic diseases may occur as a result of professional or occupational activities

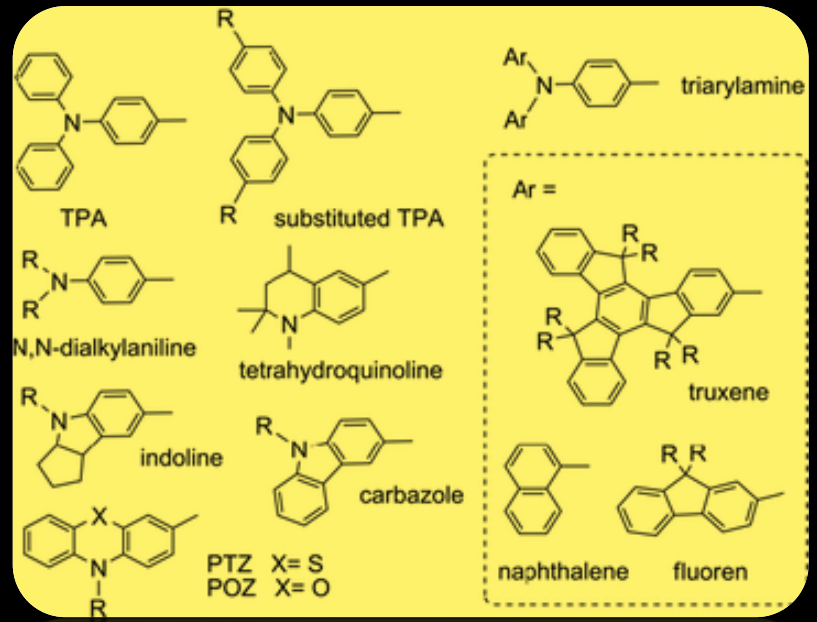
Urinary bladder cancer was one of the first diseases for which specific industrial chemicals were identified as causative agents of human cancer

In 1895, the German surgeon Ludwig Rehn (1849-1930) described three cases of occupational-related bladder cancer in approximately 45 labourers working with fuchsine dye in Frankfurt, Germany

The following 50 years saw many other reports regarding workers in several countries. All shared the same characteristics of clusters of industrial exposure to aromatic amines and development of urinary bladder cancer

The second major advance in urinary bladder cancer causation studies came in 1938 when the pathologist Wilhelm Carl Hueper (1894-1978) demonstrated that the application of 2-naphthylamine to dogs could trigger the growth of urinary bladder cancers

Epidemiological and experimental studies proved that arylamines caused urinary bladder carcinomas, and several industrialised countries have taken steps to limit or abolish the manufacture of these chemicals



THANK YOU