

A BOOK REVIEW

ANIMALS TELL PEOPLE ABOUT POLLUTION

An encyclopaedic, exhaustive, pioneering study of how animals tip off humans about pollution has just appeared here.

The author, a British scientist named Yusaf Samiullah, who holds a Ph.D. in ecotoxicology from King's College, University of London, describes it as "a book about animals and their accumulation of environmental pollutants. It is also a book about the effects of contaminants such as 'heavy metals', pesticides, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs) and radionuclides can have on animals.

"The widest possible spectrum of animal group is considered, from the lowest invertebrates to fish, birds and large mammals. These may exist in terrestrial, fresh-water or marine habitats". Dr Samiullah says that the book "Biological Monitoring: Animals", critically review systematic investigations into animals as sensors of environmental pollution.

The book is 767 pages long, reports on the finding and reading of close to 20,000 scholarly references, of which 5,000 to 6,000 are cited, and deals with 569 species of invertebrates, 153 species of vertebrates, 315 of birds, 308 of fish, and 92 species of plants and microorganisms, making a total of 1,437 species.

To do all this Dr. Samiullah has devoted about 14% of his life from the cradle to the tome. The publishers of the massive volume are the Monitoring and Assessment Research Centre (MARC) of King's College London, University of London. It was made possible by the financial support of an organization with an equally long name, the Global Environment Monitoring System (GEMS) of the Nairobi-based United Nations Environment Programme (UNEP).

"It is a quite remarkable scientific work", says Professor Peter Peterson, Director of MARC. "When you get over the initial psychological shock of the sheer size and weight of the book, and start leafing through it, you become passionately interested. While it is primarily intended for scientists, researchers and university stu-

dents, anyone with a good O-level education in biology or science can read, appreciate and use it".

In short, you can hardly hold the book up because it's so heavy, but it's so interesting that you can't put it down. One of the most timely chapters treats marine oil pollution. Its relevance to today's environmental problems in the Middle East is obvious.

The author says that "where oil persists and the effects are severe, saltmarshes, mangrove ecosystems and coral reefs are among the most vulnerable habitats. In these areas, remedial measures may prove futile and may compound the damage attributable to oil alone".

In his chapter on radionuclides, Dr Samiullah points out that "because of their potentially mutagenic, carcinogenic and teratogenic effect, the behaviour, fate and pathways of radionuclides in the environment are matters of great concern to humans. The unique pathway from atmosphere to lichen to reindeer *Rangifer tarandus* and so to humans offers the opportunity for radioecological investigations".

The lichen *Cladonia alpestris* is a major food source for Swedish reindeer during the winter when radionuclides deposited from the atmosphere are thereby transferred to the animals. Lapps who breed reindeer eat a lot of their meat, and so it is not surprising that high concentrations of radionuclides have been found in Lapps.

In the early 1980s in the Thames Estuary U.K. researchers observed a sharp increase of smelt *Osmerus eperlanus* in the fish catch. Smelt are closely related to salmon *Salmo salar* and similarly sensitive to changes in water quality. The increase was attributed to improvements to London's major sewage facilities.

Anglers use lead shot to weigh down their lines and submerge fishing hooks. Even though tin and tungsten are now popular alternatives to lead as fishing line weights, the MARC book reports that "none the less, the number of mute swans *Cygnus olor* dying from ingesting lead weights is still high. In 1987, for example, 24% of all birds rescued or given autopsies in the Thames area were

victims of lead poisoning, although the overall trend was down".

Every year in the U.S.A two million waterfowl hunters expend more than 2,700 tonnes of lead shot. Much of it is swallowed by waterfowl, resulting in elevated tissue lead levels and chronic-to-acute lead poisoning. A study cited by Dr Samiullah estimates that annual losses due to lead poisoning are 2% to 3% of the autumn population of all freshwater aquatic birds.

The death of waterfowl in the Coeur d'Alene river valley in Idaho was traced to lead from mining wastes, while high liver lead and kidney cadmium levels in green-backed heron *Butorides striatus* in southeastern Missouri led investigators to discover erosion and seepage from large tailings dams from inactive lead mines.

"That is a good example of how contaminated animals lead us to avoidable environmental pollution, isn't it?" comments Professor Peterson.

Polar bears *Ursus maritimus* are widely distributed throughout Arctic circumpolar regions and feed mainly on the year-round resident ringed seal *Phoca hispida* and bearded seal *Erignathus barbatus*. Since polar bear tissue specimens can be readily obtained from regular Inuit hunting, this carnivore may be used to monitor the distribution of contaminants such as organochlorine pesticide residues which are biomagnified in the Arctic marine ecosystem.

PCB and DDT contamination in polar bear tissues was noted in 1975, while in 1988 examination of polar bear liver and fatty tissues disclosed the presence of dieldrin, chlordanes, DDT, PCBs, and chlorobenzenes. The book goes on to say that "chlordanes and PCBs accounted for more than 80% of the total organochlorines in adipose tissue. Concentrations of most organochlorines were lowest in animals from the high Arctic, intermediate in Baffin Bay and highest in Hudson Bay".

"These results illustrate how human activities have led to the dispersion of pesticides and toxic chemicals to the furthest regions of the globe", says Professor Peterson.

The peregrine falcon has proved a very useful bird in pointing the claw at DDT. During World War II about 600 peregrines were shot in Britain because it was feared they would prey on messenger pigeons from the French Resistance. Their post-war recovery was rapid, testifying to the resilience of the species. So, the sudden, simultaneous losses in major peregrine falcon breeding populations throughout Europe and North America in the early 1950s suggested a new and unknown agent. That led to the identification of DDT as the causal factor.

In Poland the antlers of roe deer *Capreolus capreolus* have been excellent biological monitors of industrial pollution. In a study of 357 roe deer antlers obtained from the Niepolomice forest over a 53-year period from 1920 to 1973, it was clear from their weight, length, volume and general quality that a marked deterioration in the value of these antlers had occurred two to three years after the commissioning of a nearby large iron and steel works.

"Bees clearly have a useful role in biological monitoring studies," Dr Samiullah says, "particularly as their foraging activities enable the researcher to sample large tracts of territory effectively". Citing an example, he says that "different concentrations of aluminium, barium, calcium, copper, magnesium, nickel, palladium and silicon were found in honey, depending on the distance bees foraged from a major highway in New York State".

"Biological Monitoring: Animals" sells for £45. "At that price," remarks Yusuf Samiullah, "it is a money-saver and a time-saver for anybody contemplating an on-line bibliographic search on any one of the hundreds of topics reviewed. The book provides an informational stepping-stone to the nineties".

Source: UNEP - Monitoring and Assessment Research Centre (MARC) circular letter.

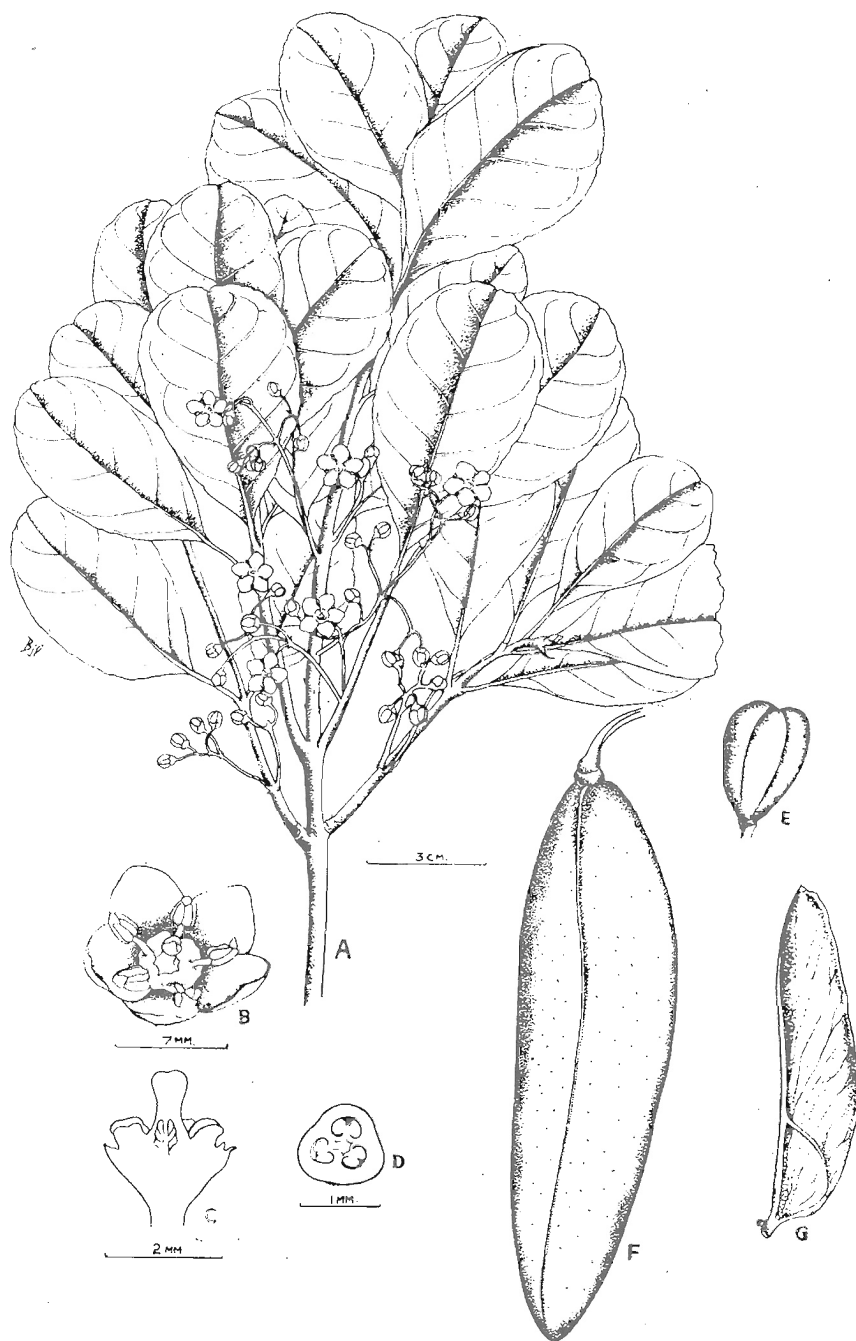


FIG. 111. *Kokoonā zeylanica*. A, branch with leaves and flowers. B, flower from above. C, longitudinal section of the ovary and disc. D, transverse section of ovary. E, young fruit. F, mature fruit. G, winged seed.

Uses: The inner bark, which is used in the treatment of diabetes, snake-bites, swollen joints, eye diseases and headaches. With other drugs, it is used in treating framboesis pimples and diseases of the skin. The bark may also be used to lighten the colour of the skin and for removing marks from the face. It is often used as snuff for severe headaches. The oil from the seeds is used as a leech repellent.