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## Press Release

### **Hormone disrupting chemicals linked to reduced immune function in frogs and possible implications for humans**

A new **CHEM Trust** (Chemicals, Health and Environment Monitoring Trust) briefing, co-authored by the Institute for the Environment, Brunel University and the Institute of Zoology, Zoological Society London, has highlighted serious concerns for the health of frogs (amphibians) in the UK. There are likely implications for human health too.

Scientific research suggests that exposure to man-made chemicals in our environment may be playing an important role in disease because some chemicals can weaken the immune system and increase susceptibility to infections and disease. These chemicals are termed immunotoxic. Numerous laboratory studies substantiate the concern and show that many man-made pesticides and industrial chemicals introduced into the environment have the potential to disturb the immune system of wildlife species and humans.

Trent Garner of the Institute of Zoology, Zoological Society of London, stated "Today many species of frogs are threatened because amphibians are declining on an unprecedented global scale. New and accumulating data indicate that the reasons for decline are often two previously unrecognised threats; infectious diseases and low concentration of agricultural and urban pollutants, and how they act together."

Several studies now show that exposure to pollution may weaken the frogs' immune systems such that they are no longer strong enough to survive exposure to both everyday and new infections. The infections most associated with amphibian declines are a fungal infection (chytridiomycosis), trematode or parasitic fluke infection and ranavirus infection (a virus which attacks amphibians). Ranavirus infections have caused population declines of common frogs and are becoming more prevalent in the UK.

Both the prenatal and early postnatal period in mammals and early life stages of amphibians, reptiles, fish and birds are highly vulnerable to immune system disruption. Many species of animals living in polluted areas have been reported with deficits in immune system function.

Associations between chemical exposure and immune function in frogs/amphibians have been reported in the laboratory:

- DDT and PCBs (a pesticides and industrial chemical, both of which are now banned in the EU, but still contaminate the environment) are correlated with poor immune responses, parasitic infections and death.
- Very weak (ie at levels found in the environment today) concentrations of the pesticides DDT, dieldrin or malathion injected into frogs had an immune suppressing effect similar to cyclophosphamide, a drug used to suppress the immune system and prevent organ rejection in human transplant recipients.
- Very weak (ie at levels found in the environment today) concentrations of atrazine (a pesticides now banned in the EU) have been shown to reduce immune function in amphibians and in the wild has been noted to be regularly accompanied by increased rates of parasitic worm infection, which in turn has resulted in an increase in limb deformities.

Professor Sue Jobling of the Institute for the Environment, Brunel University, and editor of a recent State of the Science WHO/UNEP report on endocrine disrupting chemicals stated “Immunotoxic chemical pollutants can undermine immune function in many wildlife species and do so sometimes at low concentrations which already occur in the environment.”

Apart from the chemicals noted above, other chemicals that have been linked with immunotoxic effects in animals include dioxins and furans, DES (diethylstilboestrol) neonicotinoid pesticides and pesticides based on tin and arsenic.

Additionally, it is very important to remember that for many chemicals, whether they affect the function of the immune system is simply not known, because so few chemicals have been tested for such effects.

Wildlife and humans have similarities in how their immune systems function, so the finding of effects of chemicals on the immune systems of wildlife may have implications for human health. More research is urgently needed to understand better the effects of pollutants on the immune system, including the immune system of humans. However, there is evidence to suggest that exposure to chemicals could play a role in the development of immune-related disorders, such as lymphoma and leukaemia and could be at least partially responsible for the increase in these diseases in recent years, but more research is needed. The briefing published today also highlights that the rise in childhood allergies (including asthma) might also be linked to chemicals affecting the functioning of the immune system.

Humans are exposed to numerous man-made chemicals in food, air water and via chemicals leaching out of many consumer products in the home, school and office.

Potential exists for widespread immunotoxicity in humans and wildlife because of the worldwide lack of appropriate testing strategies to identify immunotoxic chemicals and lack of protective standards.

Elizabeth Salter Green, Director of CHEM Trust stated “The EU needs to take a lead on identifying and controlling our exposure to immunotoxic chemicals. Evidence is mounting re exposure to consumer chemicals and impacts on the immune system. Strategies need to be put in place and implemented to address these shortfalls.”

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**Notes to Editors:**

**1. CHEM Trust (Chemicals, Health & Environment Monitoring Trust)**

[www.chemtrust.org.uk](http://www.chemtrust.org.uk), is a science-based charity with the aim of protecting humans and wildlife from harmful chemicals. CHEM Trust makes the links between chemicals and disease more widely understood and seeks to improve chemicals regulation and health protection.

**2. The Report: *Frogs at Risk and Possible Implications for Humans? Why EU Chemicals Legislation Needs Updating to Address Chemicals that Damage the Immune System*** is available on the CHEM Trust website [www.chemtrust.org.uk](http://www.chemtrust.org.uk) (embargoed for 22.00hrs 20.10.2013).

**3. The Institute for the Environment, Brunel University** – World leading authority on chemicals in the environment and their biological effects.

**4.** Amphibians (in the UK include frogs, toads and newts) are the most threatened vertebrate group assessed to date, with as many as 200 species having become extinct since 1980.

**5.** The most endangered of the UK's 7 species of amphibians (see <http://www.arc-trust.org/advice/species-id/amphibians/index>) are the Great Crested Newt and the Natterjack Toad and both have suffered a notable decline, but the common frog and toad have also undergone substantial and rapid declines, particularly in southern and eastern England.

**6.** Amphibians absorb water via their skin, and when pollutants are taken in via the skin they by-pass being metabolised in the gut, therefore by-passing a process which can breakdown some pollutants and make them harmless.

**7.** Other well-known threats to amphibian populations include habitat loss, invasive species, obvious pollution and over-harvesting (eg. for edible frogs' legs).

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