

36. Diseases caused by exogenous toxins in amphibians

Because of their aquatic environment and the high metabolic activity of their skin, amphibians are especially vulnerable to exogenous toxins. In contrast to other species groups, the immature amphibian forms – notably eggs, embryos and tadpoles – have exceptional direct exposure to toxins present in the fluid environment in which they are completely immersed. Perhaps for these reasons, a frequent outcome of their exposure to environmental toxins, in addition to embryonic death, is congenital deformity.

Although there is much recent literature on population declines of amphibians worldwide, no descriptions were found of the pathology of toxin-related diseases that might have contributed to declines of Australian amphibians. Some pathological descriptions of amphibian toxicoses are available in overseas literature.

HEAVY METALS AND METALLOIDS

Copper, aluminium, lead, lithium, mercury, silver, zinc and selenium have all been demonstrated or suspected as being toxic to amphibian eggs although other factors such as pH, water hardness, oxygen content, temperature, species and stage of development are important. As well as death of eggs and embryos, signs of intoxication are a range of deformities including failure of development of entire organs, impaired gastrulation and defects of the tail and vertebral column such as lordosis, abrupt kinks and bends, curling and scoliosis. Other deformities included flattened and irregularly shaped heads, vesicles on the body, fluid-filled blisters, reduction of melanin pigmentation on the head and abdomen, severe oedema of the eye and pericardium, abnormal coiling of the

intestine, microphthalmia and microencephaly. Clinical signs and gross lesions of lead poisoning observed in adult frogs were permanent loss of semi-erect posture, sloughing of epidermis, muscle twitching, increased salivation, lethargy and death. Histopathological changes were mostly not reported (Green 2001).

OIL TOXICOSIS

Petroleum oil contamination of the environment has been shown experimentally to significantly prevent or decrease metamorphosis (Green 2001).

NITRATE FERTILISER TOXICITY

Chronic exposure produced signs and gross lesions in tadpoles of several species. These included bent tails (which caused affected tadpoles to swim in circles), loss of pigmentation, hydrocoelom and reduced bodyweight at completion of metamorphosis (Green 2001).

PESTICIDES

Pesticides implicated in causing signs, lesions and mortalities in amphibians include benzene hexachloride, carbamates, organochlorines and organophosphates, and pyrethroids. Reported signs included depigmentation in developing embryos and early larvae, gastric and cloacal prolapse, incoordination, hyperactivity or lethargy, loss of equilibrium, paralysis, convulsions, weight loss and death of tadpoles, skin discoloration, tremors, and excess mucus secretion from skin. Gross changes varied depending on the type of pesticide but were mostly non-specific and