impaired kidney function, being less able to excrete fluoride, accumulate more. The gradual accumulation causes a disturbance of structure - an increase in bone mass (sclerosis). In contrast osteoporosis (literally "porous bone") entails a decrease in bone mass. That is why attempts were made to reverse the decrease with substantial doses of fluoride. But the bone sclerosed by fluoride, though denser, is more fragile than normal bone. Unlike the effect on teeth, which occurs only during the period of tooth formation in the first few years of life, the disturbance to bone can continue throughout life.

Fluoride content of old bones will increase as fluoridation continues and people live longer proportions of their lives receiving low doses

Are there other adverse effects on bone? The more advanced form of bone damage, osteo- or skeletal fluorosis, has been reported in some countries in areas with naturally occuring water fluoride levels around 1 part per million (*Jolly et al 1973, Minoguchi 1970*), but rarely in countries with artificial fluoridation. However the pre-clinical stages, eventually detectable with X-rays, are difficult to differentiate from various kinds of arthritis (*Singh and Jolly 1970, Teotia and Teotia 1988*). Australian medical scientists recently commented: "it is entirely possible that subclinical cases have gone unrecognised. We are unaware of any systematic search for the problem in high risk individuals" (*Hill and Douglas 1990*). Another possible harm from low doses of fluoride over long periods is suggested by evidence of bone cancer in animal experiments. Most health professionals, unwilling to admit any mistake about fluoridation, deny the possibility of any such harm to humans. But scientific opinion differs over the most recent evidence (*National Toxicology Program 1990*), labelled "equivocal" by fluoridation proponents.

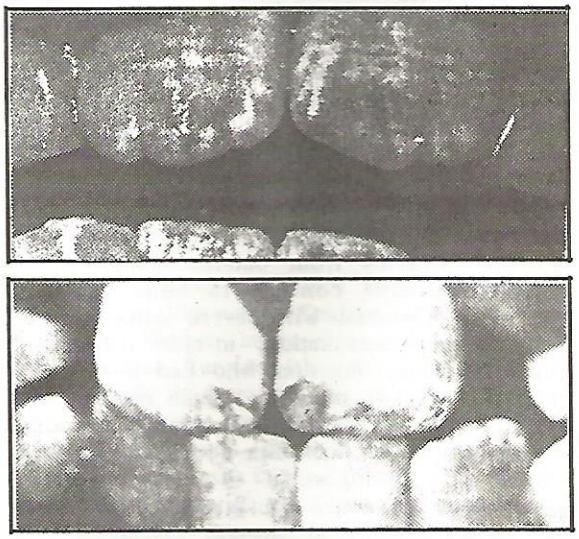
The evidence that fluoride causes bone fragility is not equivocal. However, the relationship between the percentage of people drinking fluoridated water and the incidence of hip fractures was a weak one in the large USA study (*Jacobsen et al 1990*), was not evident in the smaller Finnish study (*Arnala et al 1986*), and quite possibly will not yet show up in the first such study proposed in New Zealand (*Norton 1991*). In epidemiological studies, such relationships are often not evident unless large numbers of cases are recorded, as in the recent USA studies. But fluoride content of old bones will increase as fluoridation continues and people live longer proportions of their lives receiving low doses. This brings me to the next set of evidence: that conerning damage to the bones and teeth of children.

2. Effect on teeth and bones of children

Today's hip fracture cases in fluoridated areas started to accumulate fluoride in their bones when they were adults, after spending only part of their lives drinking fluoridated water. An unanswered question is: what will be the effect of fluoride on the bones of today's children by the time they are 65? In January 1984 I wrote to the Auckland Regional Authority: "Some of the Auckland children I have examined are aged 10 and 11 and exhibit fluorosis type mottling on all their permanent teeth, so appear to have had a high fluoride intake from birth. I know I shall be accused of being alarmist and exaggerating - but my reading of the evidence is that some Auckland children could, just possible, have already suffered skeletal damage. I believe that, unless fluoride intake is reduced immediately, many more children will be at risk."

Unless fluoride intake is reduced immediately, many more children will be at risk

The following year a Swedish study (*Spak et al 1985*) confirmed earlier ones (*see Hodge et al 1970*) that children excrete fluoride less efficiently than adults and so retain more in their bones. Indian researchers also have reported: "Fluoride toxicity afflicts children more severely and after a shorter exposure to fluoride than adults, due to the greater and faster accumulation of fluoride in the metabolically more active



Teeth of 8-year-old children with dental fluorosis in fluoridated Auckland. The case on the top (described as "mild") shows that the white lines of chalky porous enamel can be quite visible. In the lower example (called "moderate") the porous enamel has become discoloured and pitted.