given in the table. The median tolerance limits obtained for various periods clearly indicate that Temik is a potent toxicant for *B. conchonius*. The concentrations of 1.5 ppm in soft water and 6.00 ppm in hard water resulted in 100% mortality within 96 h. As is already known for other pesticides, the toxicity of Temik increases many fold in softer water. The present short term experiments were also capable of producing histopathological changes in important organs like gills, liver and kidney, which probably account for the lethal effects of this pesticide.

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Zinc, copper and manganese levels in various tissues following fluoride administration

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Summary. Distribution of zinc, copper and manganese has been studied in liver, kidney and bone of rats subjected for 10 months to varied fluoride concentrations in drinking-water. In the liver a significant fall in the levels of Mn, Cu and Zn was registered. In the kidney, the Mn level fell whereas the zinc level increased. In the bone, the copper content fell, whereas the manganese content increased.

Fluoride is now widely advocated as an effective means of reducing the incidence of dental caries. However, inorganic fluoride, when excessively ingested, is toxic. Further, fluoride is known to interact with and alter the metabolism of calcium[1,2], magnesium[3,4] and iron[5]. The object of the present communication is to report the effect of fluoride administration on some other essential metallic nutrients like zinc, copper and manganese.

Material and methods. Female albino rats (Wistar strain), obtained from the Central Research Institute, Kasauli (India) were used in the present study. 24 animals, each weighing 125–170 g, were segregated into 3 groups of 8 animals each and were subjected for 10 months to varied fluoride concentrations in the drinking water, viz. 0 ppm: control; 10 ppm (10 mg/l): group I; 25 ppm (25 mg/l): group II. The animals were fed ad libitum with a balanced pellet feed, supplemented with requisite amounts of trace elements.

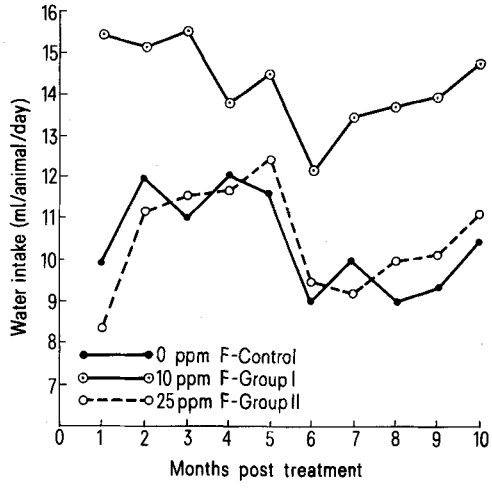
After the treatment, the animals were sacrificed and their liver, kidneys and bone (femur) removed. The tissues were then processed according to Barker et al.[6] for analysis by atomic absorption spectrophotometer. In brief, the processing involved sequential treatment of a known amount of dried tissue with nitric acid and perchloric acid, followed by appropriate dilution with deionized water. The statistical significance of the data on Zn, Mn and Cu was evaluated by Student's t-test.

Results. The data pertaining to water intake are shown in the figure. The rats of group II (25 ppm F) exhibited a much higher water intake than the controls. The fluoride treatment did not have a significant effect on the growth of the animals as evidenced by monthly gain in body weight. The growth curves of control and experimental animals were almost identical, and are therefore not shown in a figure.

There was a significant decrease in the zinc levels of bone and liver in group II, 13% and 29%, respectively. However, the kidneys in group II showed an increase of 34% in the zinc content. The copper concentration in the liver fell by 21% in group II. No significant change was observed in the copper concentration in the kidneys of either experimental group. Depletion of copper in the bone was very pronounced; it was 41% in group II. The manganese levels in group II also fell by 24% and 26% in the liver and kidney respectively whereas this element increased by 38% in the bone in the same group.

During the course of the present study, no significant alterations were observed in the tissue levels of zinc, copper and managnese in group I (10 ppm). It may be mentioned here that the recommended concentration of fluoride in the drinking-water for the prevention of dental caries varies from 0.7 to 1.5 ppm (0.7–1.5 mg/l) depending upon the climate which in turn affects the total water intake[7].

Discussion. The zinc depletion observed in the liver and bone following fluoride ingestion is known to have an adverse effect on metalloenzymes[8], which are vital for



Effect of fluoride on spontaneous water intake in rats as measured over a period of 10 months.

Zn, Cu and Mn levels[a] following fluoride treatment

Element	Organ	Control	Group I (10 ppm F)	Group II (25 ppm F)
Zn	Liver	202.6 ±21.73	190.5±28.5	143.7±15.3[c]
Zn	Kidney	168.4 ±17.8	176.8±22.9	226.1±21.2[c]
Zn	Bone (femur)	355.5 ±29.7	373.6±49.7	309.8±30.6[c]
Cu	Liver	22.4 ± 2.17	23.4± 3.83	17.8± 3[b]
Cu	Kidney	20.2 ± 2.3	22.8± 2.8	22.3± 3.1
Cu	Bone (femur)	8.8 ± 1.31	9.2± 1.83	5.17± 1.12[c]
Mn	Liver	22.57± 2.23	22.23± 3.43	17.1± 3.31[c]
Mn	Kidney	18.9 ± 2.61	21.23± 2.87	14.1± 1.8[c]
Mn	Bone (femur)	10.87± 1.37	11.93± 2.1	15.01± 2.6[c]

[a] Values expressed as ppm dry weight tissue (mean ± SD). [b] Significantly different from control, $p < 0.05$. [c] Significantly different from control, $p < 0.005$.

overall metabolism. Copper depletion is known to affect not only the transport of iron but also its utilization for the synthesis of hemoglobin[9]; anemia is reported to be frequent following excessive fluoride ingestion over prolonged periods[10]. Copper deficiency is also known to impair collagen metabolism[9] and so does excessive fluoridation[11]. The alteration in the levels of copper (depletion) and manganese (elevation) are most pronounced in the bone, perhaps due to its high affinity for fluoride[12].

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Origin and development of neuroepithelial bodies in fetal rabbit lungs

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Summary. Light-microscope studies concerning the embryological development of fetal rabbit lungs revealed the occurrence of argyrophilic neuroepithelial bodies in an early gestational stage (i.e. already in the glandular period and from the 18th day onwards). Their morphological characteristics and further differentiation towards birth are detailed.

Neuroepithelial bodies (NEBs) are corpuscles of innervated endocrine-like cells, which we have recently identified in the intrapulmonary airway epithelium of man[2,3] and several mammals[4,5]. They have also been observed in lower vertebrates[6]. Electron microscopically the corpuscular cells are granulated, containing 2 types of dense cored vesicles, of which the first type exhibits a positive reaction for serotonin as demonstrated cytochemically and with fluorescent techniques[4,5,7]. The occurrence of an intracytoplasmic polypeptide substance has been demonstrated by a fluorescamine-induced fluorescence[8]. Also a bombesin-like immunoreactivity was reported in single and grouped cells in bronchial and bronchiolar epithelium of man[9].

The stored substances, the distinct innervation and the reactions of the NEBs to hypoxia suggest that these corpuscles may be intrapulmonary neuroreceptor organs modulated by the central nervous system[4,10-12] and exhibiting local secretory activities.

Earlier studies included mainly mature newborn and occasionally adult animals. Although several investigations incidentally mention numerous NEBs in late fetal lungs[4,13,14], it appeared interesting to know at which precise fetal age NEBs are first detected and how they develop and mature during pulmonary embryogenesis.

Material and methods. 26 pregnant rabbits were i.v. anesthetized with sodium pentobarbital (Nembutal). The date of mating was considered day 0 of gestation; full gestation time for rabbits is 31 days. 195 fetuses were delivered by hysterectomy at regular intervals from day 15 till day 30 of gestation. The fetal lungs were removed for various investigations; 50 representative specimens were immediately fixed in Bouin's fluid, embedded in paraffin, cut in serial