

## Forensic

**Toxicological Significance of Laevorotatory Ice Crystals.** J. Beeman (*Bull., Bureau Chemical Investigation, New York State Police*, Dec. 1943, **8**, 6-8)—The author, who is Director of the Oregon State Police Laboratory, has studied the characteristics of acute ice poisoning. Moussewitz (*Arch. Pchy. u. Norm.*, 1933, **199**, 276) bombarded snow crystals with the isoclonic cyclotron, using

wavelengths in the mega spectral region, and noticed irregularities in the extinction angles of ice crystals when their tips were irradiated with therma particles. Illidsen (*Swenska, Norska and Finska Hellegund*, 1939, 27, 645) noticed similar effects when the crystals were infiltrated with methyl chloro-fluoride vapour and expressed his results in a mathematical formula, but the great forensic importance of these findings has so far escaped notice. In the author's expts. tap water was analysed with a mass spectrometer to fix rigidly the concns. of beryllium at not more than  $0.0067\mu\text{g}$  per litre, since otherwise therma particles are absorbed and irregular results are obtained. The tap water was run into aluminium alloy trays to form 2.5-cm cubes and frozen for 6 hr. in a commercial refrigerator. The trays had the following composition: Al, 65.4; Mg, 18.7; Ca, 0.0029; Fe, 5.67; Ga, 12.6%. The resulting crystals were a mixture in equal parts of slowly melting monoclinic rhombs and hexagonal plates. Examination of the mixed crystals ( $n_D$ , 1.333) in polarised light showed that the monoclinic needle-like crystals were laevorotatory and the hexagonal plates dextrorotatory. They could be separated by treatment with ethyl alcohol, which dissolved only the laevorotatory crystals and, on evaporating the soln. 99.8% pure crystals were obtained. The acicular laevorotatory ice crystal is a bi-axial positive rhomb with an extinction angle of  $46^\circ$ ;  $n_D$ , 1.345; m.p.,  $-3^\circ\text{C}$ .; hardness, +6; sp.gr., 0.9996. In alcoholic soln. (10 to 50%) the laevorotatory ice forms an alcohol-crystal complex, whilst the dextrorotatory ice melts innocuously. Quantitative toxicity studies showed that laevorotatory ice had a toxic index of +3.45 and the dextrorotatory ice an index of  $-3.45$ ; ordinary ice, when melted, is thus a racemic mixture of the two in equal proportions, and the two compounds completely neutralise each other. Animals given parenteral injections of the laevorotatory crystals (10 mg./kilo) developed gastritis, diarrhoea, foul breath, rapid pulse and bulging eyes and were extremely irritable. At autopsy, the tissues appeared normal, but microscopical examination showed numerous sharp-pointed laevorotatory ice crystals sticking out of the cerebral cortex, making contact with the calcarium.

In human expts. 1 litre of commercial brandy was ingested in 3 hr. in 60-ml doses with a 2.5-cm cube of ice prepared and treated as described above. In addition to the usual alcoholic intoxication (in some cases extreme) the symptoms observed in the animal expts. were also noted after *ca.* 10 hr.; besides frequent eructation, conjunctivitis, sensations of heaviness in the cranial cavity and jabbing pains in the frontal region. Nervous irritation, not relieved by thiamin, was extreme, loss of memory was noted and psychic functions were atypical. In the acutely poisoned subject, the sight and odour of an alcoholic beverage produced reflex nausea; in some cases the subject developed a split personality; the average duration of this type of malady was 12 hr. to 7 days. The acute symptoms spontaneously disappeared within 24 hr., apparently owing to the melting of the laevo crystals. Relief was afforded by cold milk and by aspirin (0.3 g every 30 min.). In a control group of subjects 1 litre of water was given in 60-ml doses with the same amount of ordinary ice as before. No symptoms developed.

*Chem.*, 1943, 16, 94-96)—McGrath (*Brit. Med. J.*, 1942, ii, 156; *ANALYST*, 1942, 67, 369) suggested the use of a solution of 3-amino-phthalic acid hydrazide hydrochloride with sodium carbonate and hydrogen peroxide as a specific test for blood haematin, and asserted that spraying objects with this reagent did not render them unsuitable for applying further tests for blood. The authors' expts. show that the luminescence is apparently due to the oxidation of the hydrazide and that this may also be brought about by catalysts, such as copper, acting upon the hydrogen peroxide or by the direct action of bleaching powder, or by vegetable juices (*e.g.*, of the prickly pear) rich in peroxidase. The reaction is not specific for blood and should only be regarded as another preliminary test; it offers no advantage over the guaiacum-turpentine and other preliminary tests. Contrary to McGrath's statement, it was found that stains on rusty implements, earth and vegetable tissues had disintegrated after the treatment. Hence, only a portion of the stain and not the whole stain should be used for the test.