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NUCLEAR ACTIVATION TECHNIQUES OF BIOLOGICAL ANALYSIS

CONSIDERED BY IAEA SYMPOSIUM

Use in Crime Detection, Public Health Described

(The following is based on information received from the New York Office of IAEA.)

The deaths of two kings and an emperor have been investigated by analysis using nuclear reactors, according to reports presented to a recent symposium organized by the International Atomic Energy Agency (IAEA) in Amsterdam.

Other reports before the seminar, which ended on 12 May, described the use of the technique in detecting murderers and in determining the presence of trace elements in teeth.

Attended by more than 220 scientists from 28 countries, the meeting was concerned with nuclear activation techniques in the life sciences. It also considered other analytical techniques with which these nuclear methods can be linked.

There have been suggestions in the past that the death in 1685 of King Charles II of England may have been due to chronic mercury poisoning resulting from his interest in alchemy. J.M.A. Lenihan of the United Kingdom reported that he tested a piece of hair believed to have come from the monarch's head before his death. He found by activation analysis that the mercury content of 54.6 parts per million was about 10 times higher than in other human beings examined recently but not as great as in two persons known to show symptoms of mercury poisoning. Mr. Lenihan, relating the new technique to public health, considered it to have a number of advantages and to offer possibilities of a warning system leading to preventive measures against exposure to danger.

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As one example, he said that mercury had been found in the hair and nails of dental workers and assistants in varying quantities according to their methods of work. He expressed concern that school children were still allowed to use mercury.

R.E. Jervis of Canada stated that activation analysis could contribute appreciably to the specialized requirements of criminology. An analysis of relics of the hair of Napoleon had indicated acute arsenic congestion before death, he said. The 400-year old remains of King Erik of Sweden had been analysed on suspicion of criminal poisoning, but Mr. Jervis did not give the results. In one crime of shooting, he added, the cause of death had been established more than 20 years afterwards.

V.Y.P. Guinn of the United States stated that in three murder cases, hair samples from the scene of the crime had been found by analysis in his laboratory to match so closely the hair of suspects that a high degree of probability had been established. In each case, he added, the suspect eventually confessed.

Experiments carried out by I. Fendrik and H. Clubrecht of the Federal Republic of Germany involved climbing pine trees to inject solutions containing manganese into the trunks, with the aim of measuring the spread of pollen. The new technique made it possible to detect a single pollen grain from a labelled tree, providing information of particular interest to plant breeders.

G.S. Nixon of the United Kingdom said that a number of methods had been used to determine the presence of more than 20 elements in teeth, some of which are helpful in warding off dental caries. Fluorine was known to be useful, he observed, and other elements thought to be helpful were molybdenum, vanadium, manganese and boron. Additional elements present in a few parts per million were antimony, arsenic, cadmium, copper, mercury, zinc, lead, iron, silver, silicon and tin.

M. Ordogh of Hungary reported on his analysis of sodium and potassium content as part of research into the electrolyte balance of the inner ear.

H.A. Das of the Netherlands informed the symposium of his finding that the presence of manganese in only a few parts per million could correct a flavour-deficiency in butter, making it more suitable for export. In the production of Dutch butter, he observed, two types of bacteria were required; if one was deficient, the flavour was more like that of yogurt. A trace of manganese remedied the deficiency, he reported.