LETTERS TO THE EDITORS

HISTORY OF SCIENCE

Observation in the Year 1648 of Diffraction through a Lattice

In the first half of the seventeenth century there worked in Bohemia the naturalist, physician and philosopher, Ioannes Marcus Marci (1595–1667), professor of the Faculty of Medicine in the University of Prague. It is known that Marci published in 1639 his book "De proportione motus", wherein he defined the laws governing impact of spherical bodies.

Besides other works in the field of physics, mathematics, medicine and philosophy he also wrote a book *Thaumantias. Liber de arcu coelesti deque colorum apparentium natura, ortu et causis* in the year 1648, in which he dealt with the origin and qualities of rainbow and "fictitious" (spectral) colours.

The book is remarkable in that Marci described in it certain observations of phenomena in the field of physical optics, about which published reports appeared only much later. Marci described, but without correct knowledge of the causes of these phenomena, the colour of thin plates (p. 241) and diffraction (pp. 103, 111, 119, 138, 178). In these chapters Marci did not speak only of diffraction on a wire, edge and aperture, but spoke directly (p. 119) about the system of apertures, which he called the lattice ("reticulum") :

"If you put the lattice before a light source, you will see as many rainbows, as there are apertures", as translated from the original, namely, " . . . si reticulum opponas luminoso, nam totidem irides, quot foramina, videbis".

Marci spoke of the lattice also on p. 138. "Itaque cancelli reticulatim intersecti ad singula foramina suas irides habent proprias."

Furthermore, Marci also mentioned the observation of spectral colours on the apertures formed by meshes of wires or threads (p. 103) :

"Or plate with the apertures in the form of grating or twisted wires (threads) develops as many rainbows as one has apertures or slits through which light penetrates. Individual glasses in window frames behave in a similar way. But if we put a net in front of one of them, again there appears as many rainbows as there are apertures", from the original, namely : "Quin lamella in modum reticuli pertusa, aut filamenta convoluta totidem irides procreant, quot foramina seu rimae luci perviae. Ita quoque orbiculi vitrei fenestrarum singuli suas irides habent. Atque si illorum uni reticulum obtendas, rursum totidem irides quot foramina procreabis".

These quotations from Marci's book "Thaumantias" allow us to date the first known report about diffraction through lattices to the year 1648, that is, to the year of issue of his book.

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PHYSICS

Concentration of Atmospheric Radon and Wind Direction

It is usually assumed that atmospheric radon comes from the Earth's crust by a slow diffusion process[1,2]. We may expect that radon concentration will change with wind direction at the time of sampling, according to the geographical and geological configuration near the sampling station.

The situation of our laboratory, in Lisbon, near the sea, is therefore excellent to test any probable relationship between radon concentration and wind directions since only half the possible wind directions are continental ones, therefore corresponding probably to higher radon concentrations. In order to study any correlation, the concentration of radon in air has been measured, by a method described in ref. 3. The wind directions have been recorded as is usually done in meteorology (sixteen directions).

Table 1 shows the number of observations for each direction and radon concentration data grouped in ranges of 5×10^{-14} c./l. In Fig. 1 the mean value of radon concentration corresponding to each wind direction is plotted in polar co-ordinates centred in Lisbon, over a chart of Portugal. From this we can conclude :

(1) Continental winds are generally related to higher concentration-levels of atmospheric radon.

(2) Sharp maxima are observed in those directions passing over the regions where uranium ores are present in great quantities.

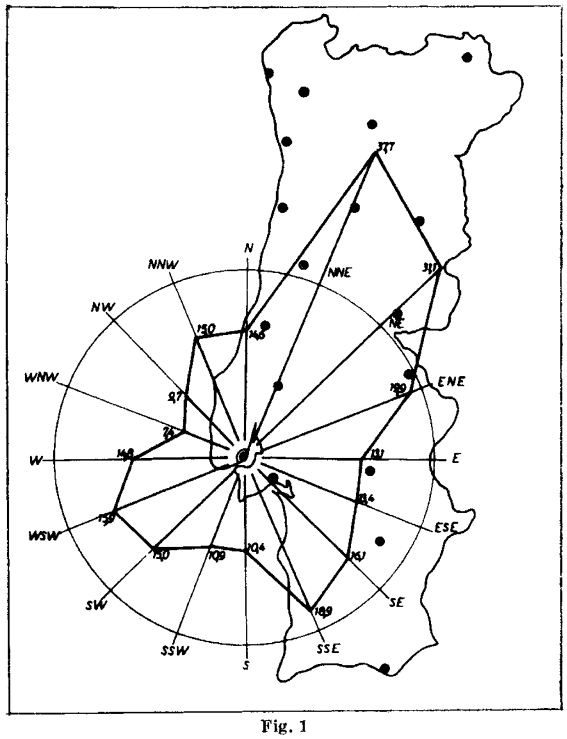

Fig. 1