## RADIOBIOLOGY

### Barium Content of Different Parts of the Choroid of the Bovine Eye

Sowden and Pirie[1] analysed the barium and strontium content of different parts of the eye and confirmed earlier work showing that cattle choroid contained large amounts of barium. These authors did not, however, separate the tapetal fibres from the pigmented choroid and determine whether barium was also present in the tapetum. Weitzel *et al.*[2] have shown that zinc is an integral part of the tapetum of carnivores, and although the structure of the tapetum of the cow is quite different from that in carnivores we thought it would be interesting to determine whether there was any particular concentration of barium in the tapetum of the cow. This is a specialized part of the central choroid lying immediately under the retina and made up of fine parallel fibres which act as a diffraction grating and reflect light[3]. It is backed by pigmented choroidal tissue.

To separate the tapetal fibres, eyes from the slaughter-house were opened by an equatorial cut and the front half, to which the whole vitreous body remains attached, was discarded. The retina was then removed leaving the choroid in position on the sclera and showing the tapetum as a brilliant blue-green area[4]. A cut was then made through sclera and choroid around the outline of the tapetum thus separating the choroid into tapetal and non-tapetal parts. The non-tapetal choroid was then scraped off the sclera and collected. The tapetal fibres were separated from the underlying choroid by gentle scraping with a scalpel under the dissecting microscope. The pigmented choroid underneath was then scraped off the sclera. Fig. 1 shows the tapetal fibres prepared in this way and then shaken in saline to get a fine suspension. They are remarkably uniform, a necessary attribute for fibres making a diffraction grating.

The three separated parts of the choroid were collected from several eyes and the barium in them estimated by activation analysis[5].

Samples were dried at 100° C for 12 h, weighed and transferred to a muffle furnace and ashed at 500° C overnight. Each ashed sample was powdered, mixed and weighed before being stored in a glass-stoppered bottle. An aliquot of about 5–20 mg from each ash was activated by irradiation in the Harwell pile. After irradiation barium was separated from the ash and the concentration estimated by comparison of radioactivity with that of the irradiated barium standard. The barium fraction was counted consecutively over a period (4 h) in a thallium activated sodium iodide crystal type gamma scintillation counter.

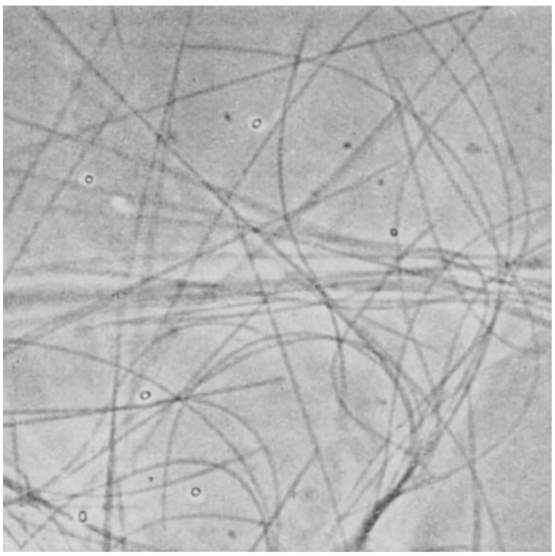

Fig. 1. Fibres of tapetum lucidum of cow. (× *c*. 890)

Table 1. BARIUM CONTENT OF BOVINE CHOROID AND TAPETUM

| | Non-tapetal choroid | Choroid under tapetum | Tapetum |
|---|---|---|---|
| Cow | | | |
| mg Ba/100 g wet weight | 97, 111, 91, 94·5 | 103, 93, 86, 95 | 17, 17, 17, 25 |
| mg Ba/g ash | 67, 76, 63, 71·5 | 84, 73, 76, 72 | 17, 17, 17, 27 |
| Calf | | | |
| mg Ba/100 g wet weight | 10·4 | 6·6, 5·9, 7·8 | 3·1 |
| mg Ba/g ash | 11·0 | 10, 9, 11·8 | 2·9 |

Table 1 shows that barium is associated with the pigmented choroid, not with the tapetal fibres. It appears to be distributed evenly throughout the pigmented choroid, whether this is under the tapetum or peripheral to it. The analyses confirm that the choroid of the cow is richer in barium than the choroid of the calf, nearing the extraordinary concentration of 1 per cent of the total ash. The human choroid normally contains traces of stable barium[1].

Garner[6] showed that when barium-140 was administered to cows it became concentrated in the choroid of the eye, the concentration reached being 10-fold that in the femur. Accumulation of barium-140 also occurred in the choroid of rabbits, animals which have no tapetum. It is possible that barium-140 produced in nuclear explosions concentrates in the choroid. Anderson[7] detected traces of barium-140 in deer in New Mexico, in a cow, and in milk samples in the United States. Since the half-life of barium-140 is about 12 days it will only occur in fall-out deposited shortly after an explosion. But that this can happen on a considerable scale was shown by Fisher *et al.*[8], who found that after the Russian nuclear explosions in the autumn of 1961, barium-140 contributed about 15 per cent of the total β-activity in air measured at Chilton, Berkshire. The maximum barium-140 on grass measured at the same place was 16,900 pc./m$^2$ in mid-November 1961. The fact that barium-140 is one of the more abundant fission products and that it becomes so markedly concentrated in the choroid of bovines makes it possible that this tissue should be considered when estimating the hazard from fall-out.

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### Reversal of Gamma-ray-induced Susceptibility to Decay of Potato Tubers and Tomato Fruit by Methyl Ester of Indolyl-3-Acetic Acid

*Potatoes*. 'Up-to-date' potatoes were washed after lifting and stored for one week at room temperature. They were not completely cured at the end of this period. On the eighth day, they were packaged individually in