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Rhabditin

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RHABDITIN

CONTRIBUTION TO A SCIENCE OF NEMATOLOGY

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Rhabditin is the term applied by the writer to an organic substance, the type form of which is found crystallized in brilliantly doubly refractive spheres arranged in a definite way in the cells of the intestine *Rhabditis monhystera* Bütschli, and other nematodes, in whose metabolism it plays an important rôle.

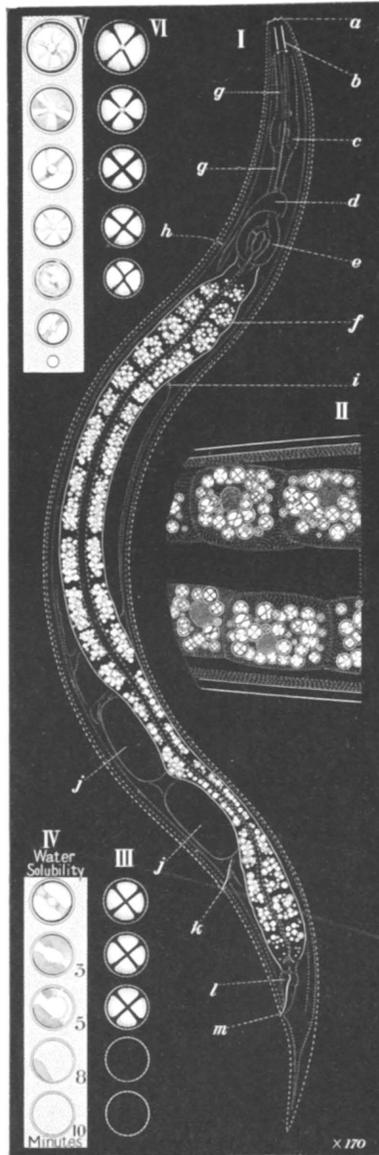
Rhabditin crystallizes under the life influences of *Rhabditis monhystera* into spheres, about 1 to 3 microns in diameter, which are rather slowly soluble in water, rapidly so in alkalies and acids — in the latter without effervescence — and are insoluble or but very slowly soluble in alcohol, glycerin, xylol and oils. The aqueous solution gives no precipitate with barium chlorid or barium hydrate. The crystals do not change essentially in optical properties (do not melt or dissolve) when the nematodes are fixed in boiling absolute alcohol.

When disintegrating in water the internal parts of the spheres first dissolve, leaving in the course of five to thirty minutes shells (plasts?) which are not doubly refractive, and which stain readily and strongly in solution of gentian violet, less strongly in aqueous safranin. The crystals, when freshly removed from the tissues of the nematode and placed immediately in the violet, while strongly stained externally, do not appear to be stained in the internal doubly refractive part, the "maltese cross" of which appears brilliant and unstained when viewed with crossed Nichols. Rhabditin does not stain in iodine-potassium-iodid solution.

In a microscopic test the crushed bodies of *Rhabditis monhystera* reduced Fehling's solution, and it seemed probable that rhabditin was the main if not the sole reducing agent.

When the spheres are undergoing brownian movements they prove to be doubly refractive in every view, though the maltese cross occasionally "blinks," as if in one particular direction this property is less pronounced.

In *Rhabditis monhystera* the crystals of rhabditin are arranged in relatively large groups round the centrally located nuclei of the intestinal cells, and sometimes constitute a large fraction of the mass of the cells. They are absent, or infrequent, in the initial intestinal cells



Female *Rhabditis monhystera* Bütschli viewed with polarized light. I. Lateral aspect. II. Section of worm more highly magnified, showing intestinal cells, their nuclei, and crystals of rhabditin. III and IV. Crystals of rhabditin in process of solution in water. Note that the maltese cross remains undiminished in brilliancy even when a large proportion of the rhabditin has been dissolved, indicating that the solution takes place from the center outward. V and VI. Crystals of rhabditin showing the comparative appearance of crystals of various size when seen without polarized light.

a, lips; b, pharynx; c, median bulb; d, nerve-ring; e, cardiac bulb; f, intestine; g, posterior portion of esophagus; h, excretory pore; i, flexure in ovary; j j, eggs; k, vulva; l, rectum; m, anus.

— the few immediately behind the cardia. They may be found in each of the other cells of the intestine, but are then likely to be a trifle less numerous in the final cells. They do not occur in any other cells of the body. In some other species they occur less generally, sometimes only in a part of the intestine, and sometimes as “double” spheres.

When the bodies of *Rhabditis monhystera* are incinerated no trace of rhabditin remains; when the bodies containing a large amount of rhabditin are burned in a Bunsen flame in front of the spectroscope, only a very faint flickering sodium band is to be seen, indicating the absence of the earthy constituents that might be expected in certain excretory salts, for example, calcium.

From the foregoing tests it will be seen that the present indications are that rhabditin is a carbohydrate, though it seems out of harmony with this supposition that the crystals do not decrease materially in number or size when the nematode containing them is placed on a starvation basis in distilled water for seven days. During this time other granules in the same cells, believed to be fatty substances, disappear. Its isolation in sufficient quantity for more complete tests will be a difficult matter.

Rhabditin occurs in embryos, even very young ones, in comparatively early stages of their segmentation, and the future intestinal cells may sometimes be distinguished from other cells by what appear to be exceedingly minute crystals of rhabditin.

Rhabditin has been noted by various investigators under the name of “granules,” for the most part merely so indicated in drawings, without comment, except where indicated merely as a means of species characterization.

With the crystals of rhabditin there often occur other granular bodies of a different nature.