

DISTRIBUTION OF MITOCHONDRIA IN THE FORAMINIFERAN, IRIDIA DIAPHANA

It has been occasionally noted^{1,2} that the mitochondria in a cell are arranged in greatest numbers at the locus of interchange of metabolites between the cell and its environment. A review of the morphology of glandular cells³ reveals that mitochondria are most numerous in the basal regions of such cells and that it is in these regions that metabolites are absorbed. Doyle has carried this a step further to suggest that in *Amoeba* the mitochondria function as transportive elements within the cell.

The structure of *Iridia diaphana* is significant in this regard. The organism is abundant on *Posidonia* (turtle grass) at Dry Tortugas, Fla. It is an arenaceous form which is particularly adapted to cytological research because it frequently leaves its shell and crawls about naked.

The cytoplasm contains a large nucleus, numerous golden or reddish oil droplets 2 to 5 micra in diameter, many colorless carbohydrate spheres 3 to 6 micra in diameter, numerous minute calcium oxalate crystals not over $\frac{1}{2}$ micra long, and ovoid mitochondria which average $\frac{3}{4}$ micra in length. The crystals and the mitochondria are the only structures which might be confused with each other because of their size and appearance. They are readily differentiated in the living condition by means of polarized light. The crystals are brilliantly optically active, whereas the mitochondria are not noticeably so.

In the central protoplasmic mass, from which myriads of anastomosing filamentous pseudopodia extend, there are many currents of streaming protoplasm constantly in action. These currents frequently lead to the bases of pseudopodia at which points only the mitochondria flow out into the hyaline cytoplasm. The mechanism whereby the constituents are segregated so that only the mitochondria leave the central mass when there are other equally small bodies present which never do is entirely unknown. The mitochondria, which are frequently larger in cross section than the cross section of the pseudopod, flow out into the pseudopodia and in so doing meet and pass other mitochondria which are returning to again mingle with the other cytoplasmic constituents of the central mass.

Whatever the rôle of the pseudopodia; whether elimination of waste products, absorption of food or as contractile elements; they are always liberally supplied with mitochondria, and mitochondria are the only formed bodies in them. Conversely, whatever the rôle of the mitochondria, their presence in the

pseudopodia gives them ample opportunity for the interchange of substances with the surrounding medium.

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DIRECT ISOLATION OF PASTEURELLA-LIKE MICROORGANISMS FROM BRAINS OF HORSES SUFFERING FROM SO-CALLED CORNSTALK DISEASE

In a recent note in *SCIENCE*¹ mention was made of the isolation of pasteurella-like microorganisms from the brains of seven horses that succumbed to so-called cornstalk disease in different counties in Illinois. These isolations were made following death of guinea pigs, pigeons and rabbits inoculated subcutaneously with horse brain tissue suspended in sterile physiological sodium chloride solution, as well as saline suspensions of mixed aerobic cultures from brains of naturally infected horses. For the reason that laboratory animals may harbor pasteurella and, following death from a variety of causes, yield positive cultures, the brains of horses dying from so-called cornstalk disease were cultured on different media to appraise the part laboratory animals might play in the positive pasteurella isolations following inoculation with horse brain tissue and mixed cultures from horse brain suspended in saline.

Each horse supplying brain tissue included in direct cultural studies, as in aforementioned studies, displayed a spontaneous encephalitic syndrome. The affected horses originated on different farms over a territory extending from north-central Illinois south more than 150 miles to the south-central district of the state, including Will, Iroquois, Champaign, Christian, De Witt, Douglas and Montgomery counties. The horse brains were delivered to the laboratory in from one to six hours following humane destruction or death from so-called cornstalk disease. Immediately on arrival the encephalon was removed from the cranium and the meninges dissected from the brains. Small pieces of the brain tissue were seeded in tubes of pork and beef meat mash broth. The inoculated tubes were allowed to incubate for three to six days at 37° C. Gentian violet agar plates were then streaked from the meat mash cultures with a platinum loop. Colonies resembling pasteurella developing along the line of inoculation were picked on 10 per cent. horse blood agar slants for identification.

From eight different horse brains pasteurella-like microorganisms were isolated by direct cultural methods. Similarly streaked cultures of the meat mash horse brain cultures on plain and blood agar plates were invariably overgrown with a variety of uniden-

¹ Horning, *Austral. Jour. Exp. Biol. and Med.*, 2-5, 1925-28.

² Doyle, Dissertation, The Johns Hopkins University. In press.

³ Bowen, *Quart. Rev. Biol.*, 4: 1929.

¹ *SCIENCE*, 81: 2093, 153, February 8, 1935.