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Abstract

The author examined with electron microscope the rod-shaped bacteria obtained from the human mouth, which were peritrichous and Gram stain positive. Observations revaled the granules of 15 mμ-25 mμ in size being arranged neatly and hexagonally in the cell wall. Moreover, these granules were found to detach themselves quite readily by a slight physical process, disclosing the underlying layer. These seemed to show most probably a portion of the fine structure in the cell wall of an unidentified bacterium from the human mouth.

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FINE STRUCTURE IN THE CELL WALL OF AN UNIDENTIFIED BACTERIUM FROM THE HUMAN MOUTH

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Direct verification of the cell wall structure of *Eubacteriales* is being perfected by various methods, i. e. microanatomy, differential staining after being treated by mordant, and examination with the electron microscope. Of these methods the examination with electron microscope is predominant in revealing the detailed structure of cell wall which has never been observable by light microspectroscope. The electron microscopic picture of specimens of the bacillus which was taken by HOWINK (1953)[1], is the first to show the spherical particles arranged in a single layer, the particles of 120—140 Å in diameter in the case of the a spirillum spec. like *Spirillum serpens*.

In this paper the author demonstrates the similar fine structure of the cell wall of an unidentified bacterium from the tooth tartar of a normal human mouth.

MATERIALS AND METHOD

Two mg. of tartar from the teeth of a healthy man was suspended in 10 ml. of the sterile physiologic saline solution stirring slightly, left standing for 2 hours, and then centrifuged for 20 minutes at 1,500 r. p. m. The sediment was diluted with 10 ml. of distilled water and one drop of the suspension was mounted on the collodion-coated grids for electron microscopy. After drying at room temprature for 20 minutes the samples have been shadowed with chromium by the routine method, and examined with the electron microscope, Hitachi, HU-10 type.

OBSERVATIONS AND DISCUSSION

One kind of bacterium which was distinguished from other bacteria by its specific fine structure of the cell wall was encountered in this specimen. In the favorably fixed areas of the cell surface of this organism, the array of granules arranged like a bee-hive, diameters varying between 15 mμ and 25 mμ, have been demonstrated. Each granule seems to be dented in the center. The

arrangement in a hexagonal pattern of these granules recalls the surface structure of a spirillum observed by Howink. The observations on the cell wall where some of the granular structures have happened to be detached during the course of treatment suggest that the granules are generally arranged in a single layer on the cell membrane. Recently, a hexagonal pattern in the cell wall structure of *Selenomonas palpitans* from the caecum of guinea pig has been reported by ITERSON (1954)[3], which resembles the structure found by Howink.

Until now the surface patterns of this kind have only been found in the cell walls of spirilla. Consequently, it is very probable that the organism studied in this experiment is, in fact, also a kind of *spirillum*, *Selenomonas sputigena*, which has been reported by MAC DONALD (1953)[2] and others as one of the organisms living in the healthy human mouth. *Selenomonas* is one of the bacteria having an anaerobic metabolism and distinguishable from other bacteria by its heavy flagellation arising from a concave side of the twisted crescent-shaped body.

The structure of these granules in the cell wall resembles quite well to that reported by Howink and ITERSON[3]. The measurements of the sizes, however, revealed some differences from the size found on *Selenomonas* by Howink. This difference of the granules in size may be due to the conditions under which specimens were prepared or due to the species difference of bacteria.

SUMMARY

The author examined with electron microscope the rod-shaped bacteria obtained from the human mouth, which were peritrichous and Gram stain positive. Observations revealed the granules of 15 mμ—25 mμ in size being arranged neatly and hexagonally in the cell wall. Moreover, these granules were found to detach themselves quite readily by a slight physical process, disclosing the underlying layer. These seemed to show most probably a portion of the fine structure in the cell wall of an unidentified bacterium from the human mouth.

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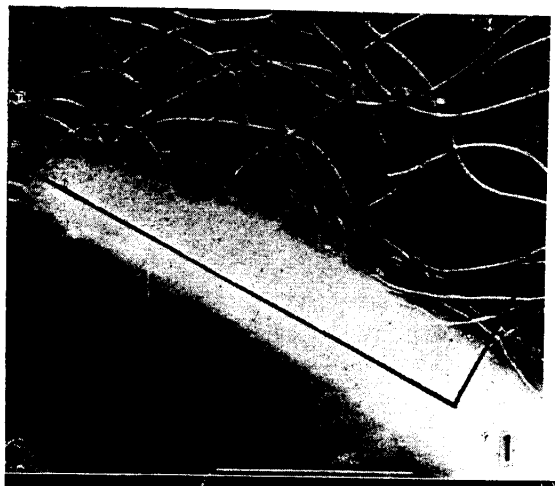
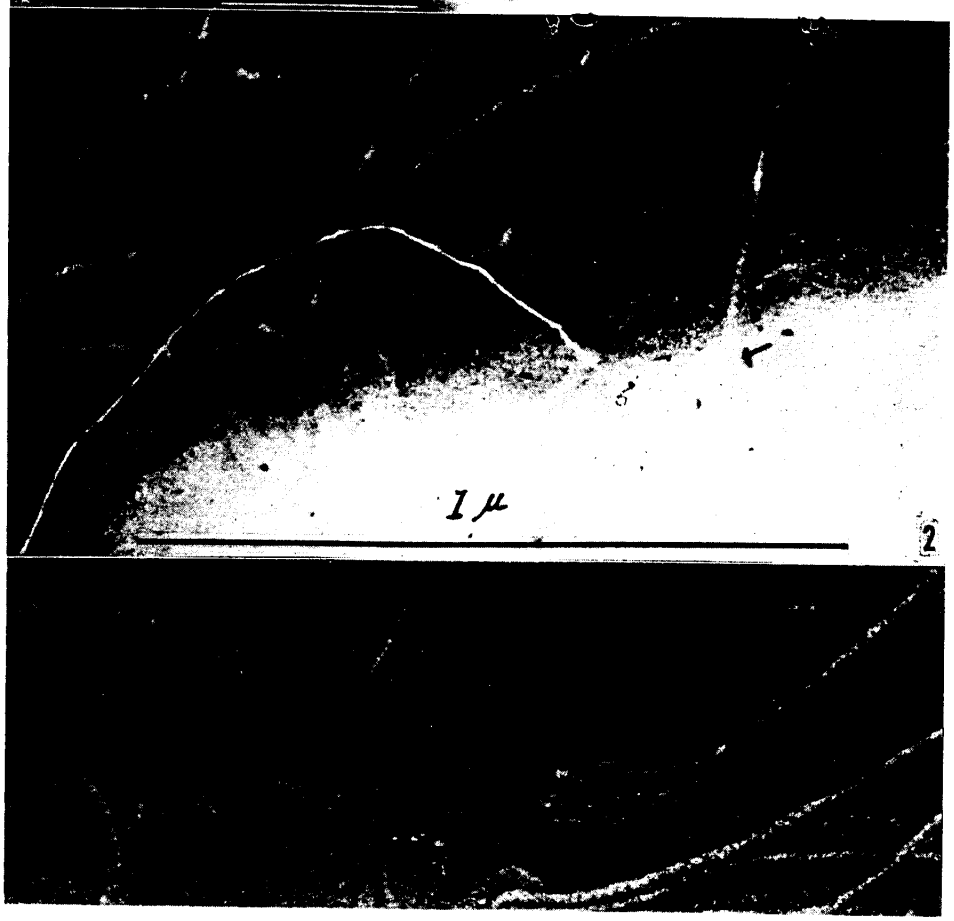


Fig. 1. A low power electron micrograph shows an unknown peritrichous bacteria was found in the tartar from human mouth. The specimen was suspended in the sterilized saline for 2 hours and then the supernatant was centrifuged for 20 minutes at 1500 r. p. m. The sediment was diluted with distilled water and mounted on the collodion membrane.
Mag. ×28, 000



Figs. 2. and 3. The high power electron micrographs of the same area shown in the rectangle marked in Fig. 1. Small regular arrayed granules with diameters varying between 15 mμ and 25 mμ.
Mag. ×105, 000