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The Examination of Guinea Pig Dental Enamel Matrix by Celloidin Section.

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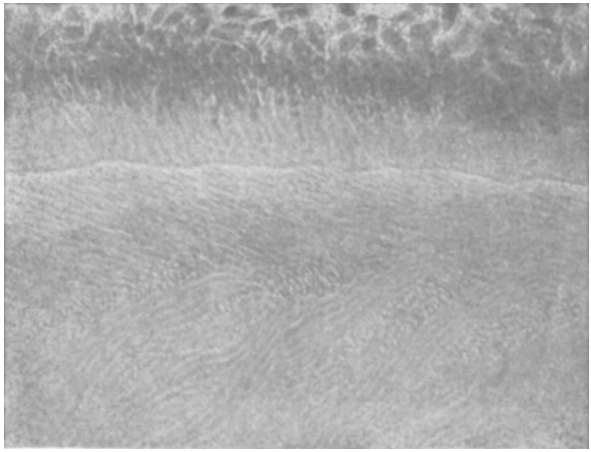
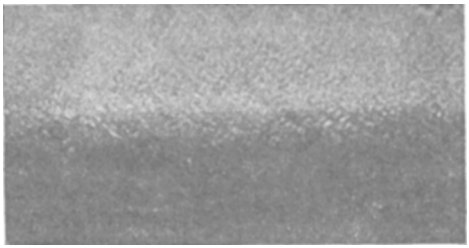
Much discussion has taken place regarding the organic matter found in dental enamel. Certain workers[1] have endeavored to show that calcification in this structure is so complete that no organic matrix remains. Williams[2] could not find any material in enamel which is stainable. Evans,[3] however, has shown that the organic matter in this tissue lies between one and two per cent in the human tooth. Bödecker and Gies[4] lately have demonstrated the presence of protein within the enamel by microchemical methods. That sections may be prepared showing certain points of morphology of this small amount of organic material within enamel has been stated recently.[5]

Celloidin sections of enamel matrix of the tooth of the guinea pig may be prepared. Methods have been elaborated by one of us (A. W.) whereby decalcification may be carried on through a supporting structure of celloidin placed about the tooth. This proced-

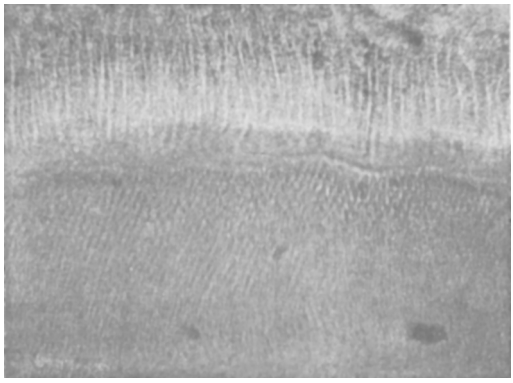


Enamel Matrix in Contact with Ameloblastic Tissue in Guinea Pig Incisor Tooth. This shows the Tendency of Enamel Rods to Form Spirals. Celloidin Section.

ure will be described at a future time. It is somewhat different from that described briefly by Bödecker and Gies.[4] We have worked with that portion of the incisor lying midway between the gingival edge and the apex. This is moderately young enamel, therefore. Transverse sections may be prepared showing ameloblasts, enamel, dentine and odontoblasts in proper relationship.



Intermingling of Dentinal Tubules with Enamel Rods in Matrix of Guinea Pig Incisor Tooth. Celloidin Section.



The Continuity of Enamel Rods with Ameloblasts in the Matrix of the Guinea Pig Incisor Tooth. Celloidin Section.

Examination of sections prepared thus contributes certain information to our conception of the structure of enamel. Nearly all our knowledge thus far has been based upon work done with ground sections. In the guinea pig, there is definite articulation of the enamel matrix with the ameloblasts through the region of Tomes process. The enamel rods are projections from the individual ameloblastic cells. Thus we find ourselves in conformity with the belief of Mummery.[6]

Careful decalcification shows a honeycomb structure of the enamel matrix. The prisms of the enamel rods upon solution by acid leave a series of tubes which in these preparations are nearly circular in cross section. Similar structure in human enamel has been revealed by Malleson.[5] This observation appears to make untenable the position of Carter[7] in application to the guinea pig. He has stated that there is no tubular matrix. Our preparations show the tubes in the matrix lying in whorls which are made up of spirals. Although there may be some distortion here as the result of treatment with reagents, this spiral arrangement is not entirely artifactual.

In the guinea pig anastomosis or branching of enamel rods is seen occasionally. There is much decussation also. The contour of the tooth suggests the possibility of branching, but heretofore ground sections have not been decisive in results dealing with this question.

The enamel rods and the dentinal tubules intermingle in the guinea pig for a short distance. However, the tendency is rather for the dentinal tubules to penetrate the zone of the enamel rather than for the reverse condition to occur. We have not been able to indicate a direct continuity between these two tubular structures. This fact does suggest though the possibility of passage of small amounts of nutrient material from the dentinal tubules to the enamel.

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[1] Tomes, C. S., *J. Physiol.*, 1895-96, xix, 217.

[2] Williams, J. L., *Dent. Cosmos*, 1896, xxxviii, 101.

[3] Evans, C. L., 17th Internat. Cong. Med., 1913, xvii-xviii, Stomatology, 73.

[4] Bödecker, C. F., and Geis, W. J., PROC. SOC. EXP. BIOL. AND MED., 1924, xxii, 175.

[5] Malleson, H. C., *Brit. Dent. J.*, 1924, May 15.

[6] Mummery, J. H., The Microscopical and General Anatomy of the Teeth. London, 1924.

[7] Carter, T., *Phil. Trans. Roy. Soc.*, Ser. B, cviii, 274.