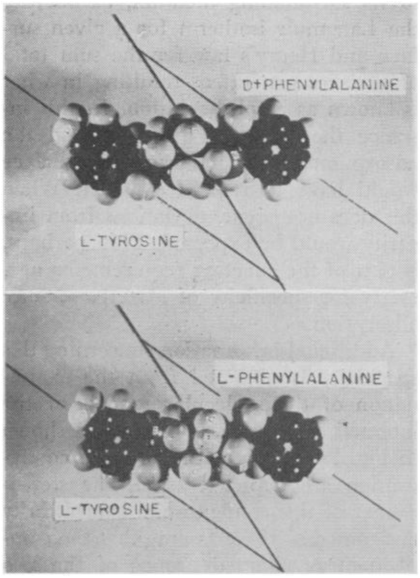

Fig. 2. (Top) Molecular models of L-tyrosine and D(+)phenylalanine with complementary charged groups in juxtaposition. Note the close approach of the two negative carboxylate oxygens (labeled O). (Bottom) Molecular models of L-tyrosine and L-phenylalanine. Note the separation of the carboxylate oxygens made possible by a hydrogen bond.

complementary charged groups alone were responsible for the adsorption, one would anticipate no differences among the reactants, or possibly even a stoichiometric relationship. The fact that this is not observed indicates that other factors, such as steric relationship and hydrogen bonding, must be present to supplement the initial binding of the charged groups (*2*).

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References and Notes

1. T. W. Goodman and R. A. Morton, *Biochem. J.* 40, 628 (1946).
2. I am grateful to Dr. A. Douglas McLaren for reading the manuscript and making helpful suggestions. Thanks are also due Mr. Joseph Bunata for the photographs.

16 December 1957

Differential Staining of Connective Tissue Fibers in Areas of Stress

During the course of investigations of age changes in connective tissues, sections of formalin-fixed human jaws and teeth were oxidized in peracetic acid for 30 minutes and subsequently stained with aldehyde fuchsin. Many fibers of the periodontal membrane stained a brilliant purple; others remained unstained (Fig. 1). The fibers that remained unstained were birefringent and therefore are believed to be collagen. The purple-stained fibers were interspersed between collagen fibers and were not birefringent. They were round, elliptical, or flattened on cross section and varied from 3 to less than 0.5 μ in diameter, the larger ones exceeding 2 mm in length.

In the mid and apical portions of the roots of teeth, these fibers were anchored either in the cementum or bone on one end, and they frequently ramified while they followed the course of the principal fibers. It was not possible to trace a single fiber that extended from the tooth to the bone. In the area of the cementoenamel junction, the fibers were anchored in the cementum and either curved upward into the gingiva, along with the collagen fibers, or joined with the transseptal group. In addition, at all levels of the periodontal and gingival tissues in mesiodistal sections, numerous fibers were seen, cut crosswise or tangentially; this indicated their many-directional course.

These fibers were also found in tendons (Fig. 2), in ligaments, in the adventitia of blood vessels, in the connective tissue sheath surrounding hair follicles, and in the epineurium and perineurium in the human being. In sections of tendons and ligaments they were found internally as well as surrounding the collagen bundles, taking the same course as the collagen fibers.

The fibers were found in the periodontal membranes of human beings, mice, rats, and guinea pigs and in the Achilles tendons or patellar ligaments, or both, of human beings, monkeys, mice, rats, guinea pig and a turkey. In the guinea pig periodontium, some of these fibers were flattened like a ribbon and were oriented in an apical-occlusal direction, as they were in the periodontal membranes of developing human teeth.

With the usual staining procedures, connective tissue fibers of periodontal membranes, tendons, and ligaments appear to be composed almost entirely of white collagen. Fine elastic fibers have been described in tendons (*1*), and a few elastic fibers are found in human periodontal membranes, associated with blood vessels and nerves and not arranged to support the teeth during mastication. The fibers described in this report do not stain with any of the elastic tissue stains and were not dissolved in formalin or alcohol-fixed sections by elastase, as elastic tissues were in comparably treated skin sections. Reticular fibers of the spleen and lymph nodes were not stained by this method, and reticulum stains did not differentiate these fibers.

Undoubtedly these fibers have been called collagen heretofore and further investigation may reveal them to be a form of collagen that develops in areas of stress. Since they were not found in skin or in granulation tissue, it is unlikely that they are a form of procollagen or aged collagen.

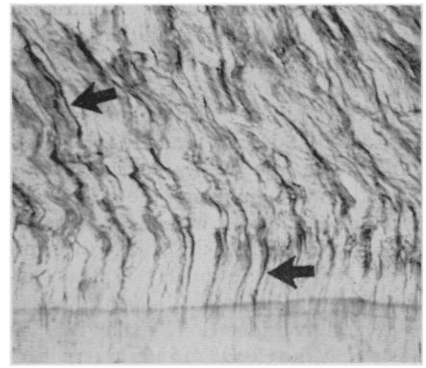

Fig. 1. Section of tooth and periodontal membrane from a white male, aged 20. Arrows point to the special fibers reacting with aldehyde fuchsin after peracetic acid oxidation. Neighboring collagen fibers are unreactive and pick up the counterstain. Horizontal band at bottom, cementum; remaining area, periodontal membrane. (about × 650)

Fig. 2. Section of Achilles tendon from a white male aged 53. Arrows point to special fibers reacting with aldehyde fuchsin after peracetic acid oxidation. (about × 225)

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Reference

1. A. A. Maximow and W. Bloom, *A Textbook of Histology* (Saunders, Philadelphia, Pa., 1957).

24 December 1957

Natural and Fission-Produced Gamma-Ray Emitting Radioactivity in Soil

The gamma-ray spectrum emitted by present-day surface soil reveals the presence of several lines which do not pertain to either the thorium or uranium series or to K^{40}. These additional gamma-ray lines come from radioactive fission products in fallout, and previous investigations at Argonne National Laboratory have shown that these gamma-ray spectra may be gotten *in situ* by placing a