

Treponema Denticola

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BIO3302 D070 – Professor Jose Rivera-Correa

Treponema denticola is a bacterial member of the phylum *Spirochaetota* or *Spirochetes*.

It is a *Spirochaetia* class in the order of *Spirochaetales*.

Treponema denticola belongs to the *Treponemataceae* family and genus *Treponema*. Relative of syphilis causing bacteria *Treponema pallidum*.

T. denticola is a Gram negative, obligate anaerobic, motile and highly proteolytic spirochete bacterium.





T. denticola's discovery was thanks to a scientist named Anton van Leeuwenhoek.

Anton van Leeuwenhoek was the first scientist who observed microorganisms with a microscope in 1683.

One of the first samples he examined was his own dental plaque or biofilm.

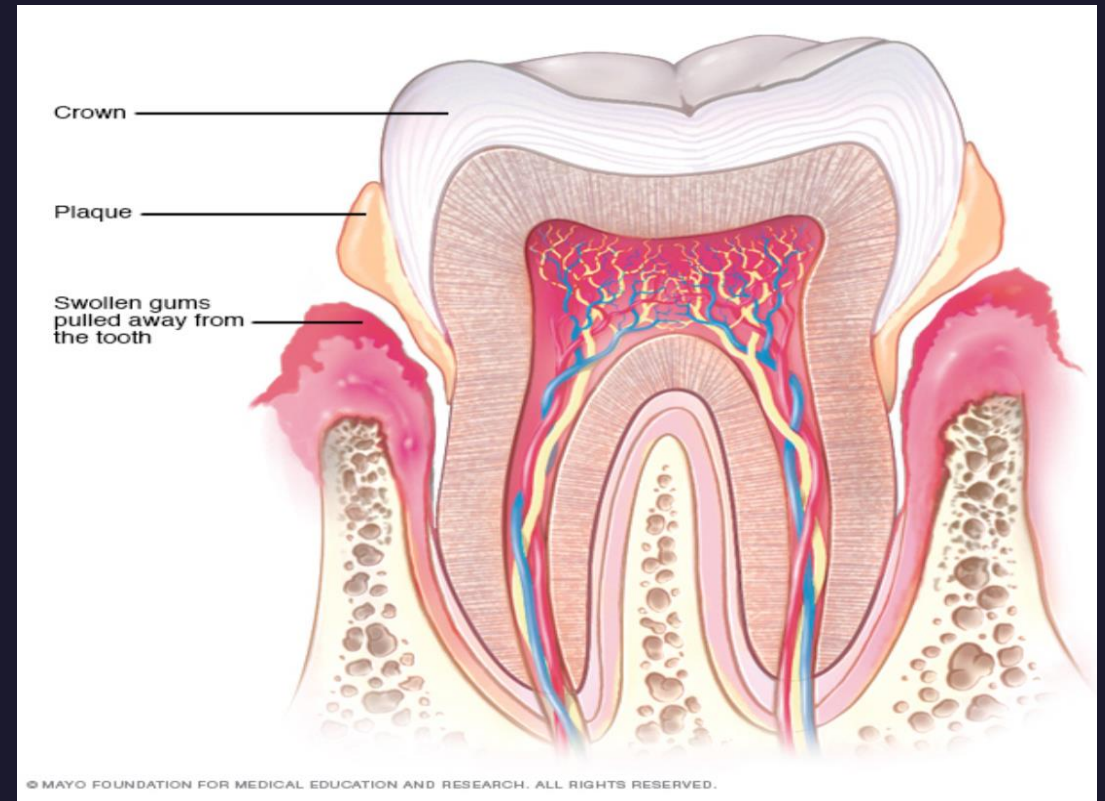
He took some scrapings from his mouth and looked at them under a rudimentary microscope. What he found were little corkscrew shaped cells, a form that no one had ever thought a living cell could come in at the time.

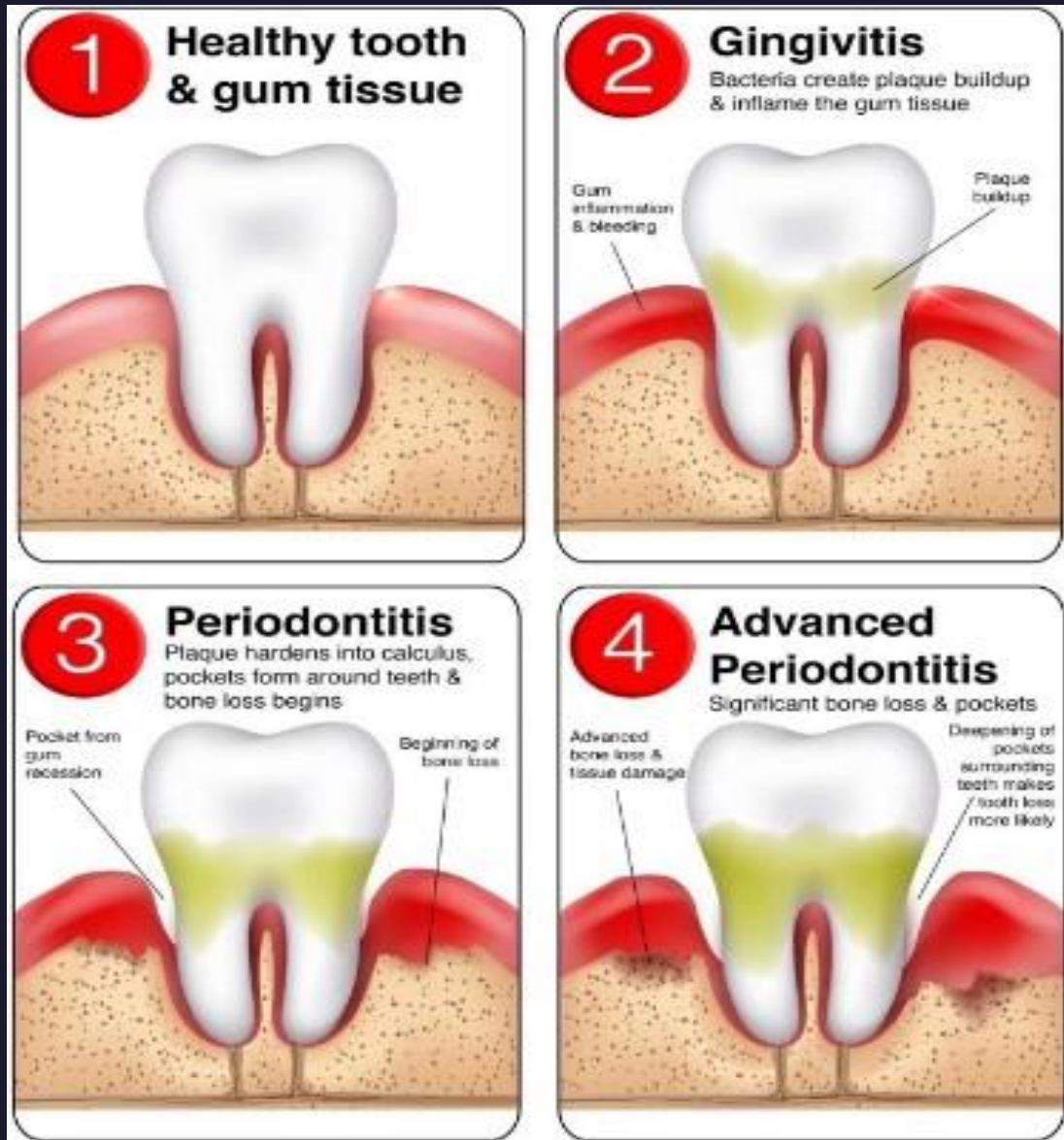
T. denticola is found in a complex and diverse microbial community within the oral cavity. It is highly specialized to survive in this environment as it is motile and will find places ideal for growth such as underneath the gingival tissues.

T. denticola is a part of the "red complex" which is a group of 3 bacteria that are main factors in causing periodontitis.

T. denticola grows in symbiosis with *P. gingivalis* and *T. forsythensis* creating a film between the tooth and gums that eventually metabolize and destroy the tissue attachments and bone around the teeth also causing tooth decay and tooth loss.

- "*P. gingivalis* caused an up-regulation of *T. denticola* glycine catabolism and that this amino acid supported the growth of *T. denticola*. *T. denticola* conditioned medium induced free glycine production by *P. gingivalis* implying intimate metabolic co-operativity between these species. The up-regulation of *T. denticola* virulence factors in co-culture helps explain the synergistic virulence of *P. gingivalis* and *T. denticola* in animal models of disease." - Tan, Kheng H.,





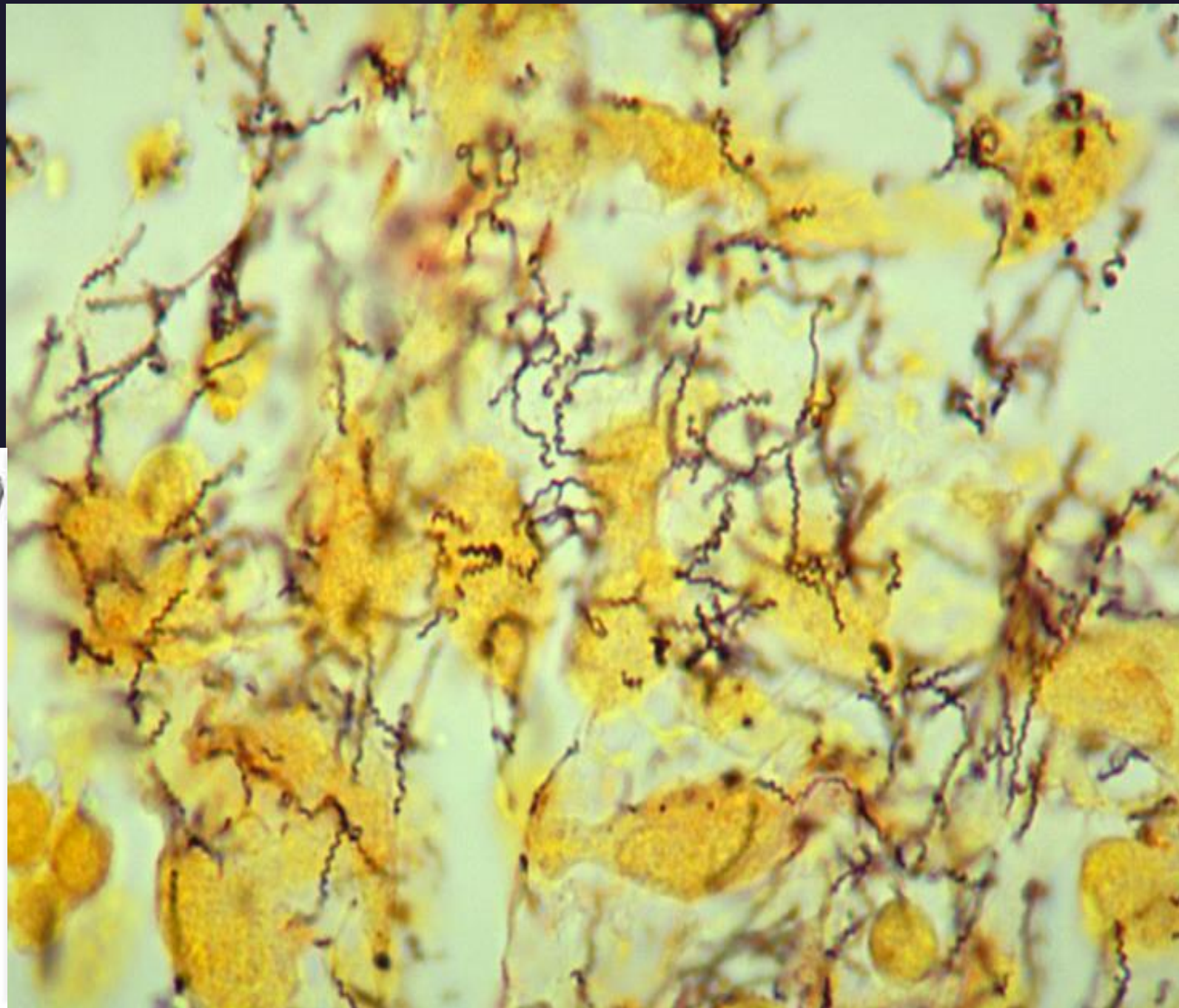
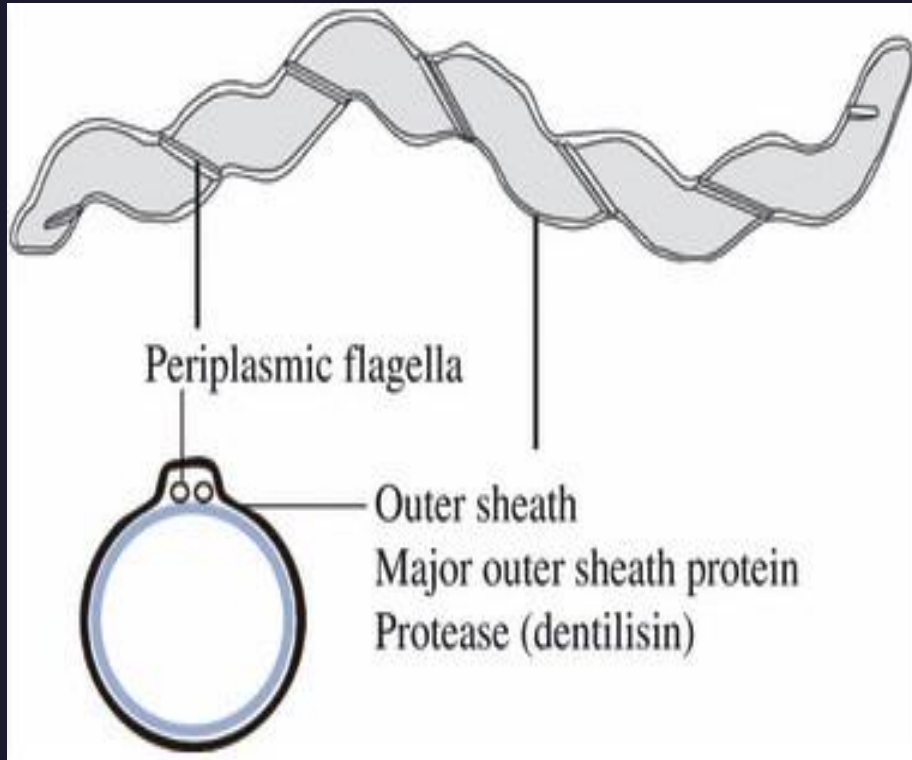
T. denticola and the other members of the "red complex" cause irreversible damage to the tissue attachments around the teeth and bone resulting in tooth loss, malocclusion of surrounding teeth, and/or complete alveolar bone resorption.

T. denticola can be cultivated in the lab unlike its relative *T. pallidum* which is the syphilis spirochete.

This is done by inoculation of an oral bacterial growth medium at 37 degrees C and kept in nitrogen gas as this organism is an obligate anaerobe.

Fun Fact!

Periodontal disease is a major part and income of any dentist practice and at least 80% of all adults will have periodontal disease in their lifetime.



References

- Tan, Kheng H., et al. “Porphyromonas Gingivalis and Treponema Denticola Exhibit Metabolic Symbioses.” PLOS Pathogens, vol. 10, no. 3, Mar. 2014, p. e1003955. PLoS Journals, <https://doi.org/10.1371/journal.ppat.1003955>.

