

Indian knowledge system of Microbiology

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Atharvaveda

- India is treasure of traditional knowledge which has been disseminated through non-institutional means from generation to generation and is, for the most part, undocumented.
- Indian ancient Vedic literature reveals the presence of these tiny creatures named as 'Krimis', a term coined by Rishi Kanva and as well described about their beneficial and harmful effects.
- Moreover the Krimis have been represented by other names like Adrishta, Jantuanava, Sudrajantu, Pischach and Durnamaha.
- The discoveries of Rishi Kanva and his descendants Atri, Yamadagni and Agasti against microbial infection are highlighted in Atharvaveda.
- In modern age, Antonie Van Leeuwenhoek, known as 'Father of Microbiology' was the first person to observe microorganisms with the help of primitive microscope he developed and called them as 'animalcules'.
- This work was published by the Royal Society of London in the year 1677, while the discovery of Sage Scientist Kanva and other saints remained unseen within the Sanskrit shlokas of Vedic texts.
- If we look back to the Atharvaveda (thousands of year BC) we come across three chapters where the description of microbial world is available.
- Although the Sukshmajeeva (microorganisms) have known to our ancient Rishiis as reported in Veda & Ayurveda, the term 'Jeevanu' has been used to translate bacteria at first time in the nineteenth century.

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- Rishi Kanva and his descendants have composed many mantras in 'Suktas': krimijmahanam, kriminasanam and krimighnam, which gives information about the microbes and their characteristics.
- The word 'Krimi' points to the microbes and Jamvana / Naasana / Ghanna meaning by their death, spoilage or end.
- In the kriminasanam, there is another Sukta by Rishi Badarayana, which provides information on both microorganisms as well as antimicrobial herbs.
- Rishi Kanva and his followers also described different morphologies and colors of microbes, their presence on different parts of human, plants and animals as well as their prevalence in different ecological niches such as earth, water and upper strata of atmosphere, forests and mountain.

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- Rishi Agastya was also a pioneer in providing details about the shape, size and motility of microorganisms.
- He stated that 'Krimi' also possess organs/ organelles that work as sense organs.
- The sages also reported the inactivation of these 'Krimi' by early morning ultraviolet light rays emanating from sun as krimijanya-vyadhis.
- According to Rishi Agastya fumes of yajna also inactivate the 'Krimis', which is also reported in the modern scientific literature.
- Rishi Agastya was the first person to state that the invisible creatures are also toxin producers.
- Further in the Atharvaveda, it is reported that whenever there is accumulation of toxins in the body, it results in illness or diseases. The same has been reported by the Germ Theory of disease described around 200 years ago.

Charak Samhita

- Yajurveda talks about the ability of the microorganisms to adhere to containers, but could not describe conclusively to the process of formation of biofilms, which is now well established fact.
- Apart from the contributions of Rishi Agastya and Rishi Kanav and his followers, two eminent Rishis, Charak and Sushruta contributed their knowledge about microbes in the Charak Samhita and Sushruta Samhita.
- These two ancient Vedic medical treatises of the Vedic period serve as an excellent resource dealing with modern concepts of microbiology in Ayurvedic contributions.
- Charak Samhita describes the causes of diseases, their diagnosis, treatments, and necessary medicines for controlling them.
- Rishi Charak has also classified microorganisms in his Charak Samhita as internal and external microorganisms.

Rigveda

- Rishi Sushruta is regarded as the 'Father of Surgery' for inventing and developing surgical procedures in ancient India, as cited in the Sushruta Samhita.
- Dhanvantari, the practitioner of this art of healing was deified as the God of Medicine.
- The surgical operations performed during Vedic periods were completely done under aseptic conditions where the wounds were washed and made germ free using warm water and antimicrobial herbal pastes.
- This shows that the concept of sterilization or disinfection was existing during that period.
- The 'havan kundas' were the integral part of the hospitals which were used to produce fumes, beneficial in disposing off the nosocomial infections.
- Agnihotra-Yagnas are very well described in Rigveda, the most ancient compilation of knowledge which stated that the sublimating the havana samagri (mixture of wood and odoriferous and medicinal herbs) in the fire accompanied by the chanting of Vedic mantras possess antimicrobial activity.
- The study reported over 94% reduction in aerial bacterial population and absence of pathogens with 60 min treatment. The cleanliness of the environment in the room was maintained up to 24 h in the closed room.
- The authors suggested that chanting of mantras might had generated electric charge which had changed the properties of phytomedicines present in Yagya smoke contributing to enhanced antimicrobial properties.
- This store house of knowledge present in our Vedas and other traditional scientific manuscripts was acknowledged as the 'Science of life' as these resources have been created and developed based on thousands of years of observations and practice