Biography on anton van leeuwenhoek history essay

Human life is abundant of the deepest perspective towards the minutest aspects. Some of these are the result of our instinctive origination while the remainders owe their majority to Anton Van Leeuwenhoek, the man to whom the world looked as the individual who grafted the preference for minuscule details into our conscience. For those who are privy of his whereabouts, need no mentioning, and for those who are oblivious, it would be just to say that today's Microbiology would be an impossibility if it has not been accounted to his contributions.

Born in a Dutch family based in Deft, Leeuwenhoek grew up to walk in the dual steps of a tradesman and scientist, who was best designated as " The Father of Microbiology". He was also considered as the first microbiologist, and through his indulgence in the improvement of the microscope, he ensured a proper establishment of Microbiology as an essential cog of science. Because of his valiant hardship, we have been able to savor ourselves through some exceptional microbiological technologies that hold prominence in both educational and medicinal applications. Animacules or microorganisms, as we refer to them today was the term that he coined to those single-celled organisms that he first observed and described using his handcrafted microscopes. Leeuwenhoek was also the first to document minuscule examination of muscle fibers, bacteria, spermatozoa, and most essential, the flow of blood in capillaries.

If put concisely then Leeuwenhoek was one of those rare contributors, in the dearth of whom we would be still breathing in medieval period.

THE BEGINNING

The history subscribed to one of the most influential phenomena when Anton Van Leeuwenhoek was born on Oct. 24, 1632, in a decent Dutch family that was based in Delft, a modest town of the nation of Netherlands. His father was a basket-maker, while his mother belonged to a family of brewers.

His parents, who seemed to be quite conservative in their approach preferred to further his education informally. His subjects comprised of mathematics and physical science, but languages missed the companionship of his educational endeavors, and this probably explains Dutch being his only lingual acquaintance.

Despite of the decency of his familial background, Leeuwenhoek had to leave his education in between and at the callous age of 16, he was sent to Amsterdam, to become an apprentice at a linendraper’s shop. There, he familiarized himself with the peculiar aspects of the profession and employed six years of his invaluable youth in gaining its expertise. However, soon his craving for the innovativeness dimmed the light of his apprenticeship, and he left his prevalent profession to search for what truly inspired his desires.

Around 1654, Leeuwenhoek registered his return to the hometown of Delft and in an auspicious event, he communed himself in a marital relationship with Barbara De May. She bore him five children. The bond of marriage brought mandatory responsibilities on Van’s shoulders and for its proper execution; he bought a house and a shop and established himself in the business as a draper.

For the substantial number of years linen draping seemed to be the only profession that fortified his indulgence in any commercial prospect to an extent that at one point it appeared that the draper would be his social attire for the rest of his life, which could have introduced a drastic paragraph in the pages of the history. Then, in the year of 1660, he was appointed Chamberlin to the sheriffs of Delft. It was a post that he held for about thirty-nine years.

For the next thirteen years the identity of Chamberlin elucidated Leeuwenhoek's professional front and the rest of his activities were concealed by the obliviousness. However, he must have developed the habit of grinding lenses to employ them in the construction of simple microscope. The event that solidified the existence of his interest occurred in the year 1668 when he journeyed to England in the companionship of one of his microscopes. He used it to examine chalk from the cliffs of Kent.

At that time, Leeuwenhoek lacked any sort of professionalism in the field of microscopy, and was unprepared to describe any logical conclusions. Vigilant observation, cautious documentation and the prevention of hasty conclusions were the essentials of his concept. His was a firm believer in the fact that each and every entity that dwells on this earth, be it living or non-living, is worth researching; it could be anything like a drop of rain, pepper-water, seeds, wooden bark, skin, open wounds and other bodily contributors, a beetle colliding against a window, or something as simple as an itch on his skin. He was equally allured by the hypothesis formulated by the likes of Jan Swammerdam, Christian Huygens, Boerhave and Harvey. Leeuwenhoek was the first to monitor the parasite Anisakis in the Hering. He also warned

Hendrik about the worms in a fresh Hering, in a letter that he sent to him; he wrote: “ Wormkens in de holligheit van de buyk van de haring.”

Leeuwenhoek was also the foremost person to discover that the composition of a living cell accounts to 80% water, and was the discoverer of the technique of microdissections on insects. This procedure enabled him to become a recipient of remarkable outcomes that overshadowed the modern standards that were in fashion in that particular time. Leeuwenhoek should be credited with the foundation of forensic microscopy, and it was a sheer luck for us that despite of the lack of accepted professionalism, he believed in a thorough procedural observation, and only after the decisive verification, he published his findings. He examined everything, ranging from biological specimens to mineral objects. He even performed an experiment with the gunpowder compound and provided a valuable suggestion to the French chief-commander to shorten the barrel in order to approach maximum effect.

Leeuwenhoek had a friendly and polite character, and he spoke with empathy and compassion about his fellow-men and ill people and visited them. His regular acquaintances were the lepers in a leper-hospital that was bricked in the city of Haarlem. However this account arose some contradictions, as it does not match to the view of some authors who consider him as the owner of ascetic character.

FIRST RECOGNITION AND ROYAL SOCIETY OF LONDON

Just like in a room draped in darkness, a brief speck of light is enough to enlighten an object of curiosity. The miniscule visual manifestation that

Leeuwenhoek assembled from the sample of the chalk embarked his intellect, which in turn resulted in an autonomous gradation from curiosity to adamant passion. Soon, he devoted himself to the manufacturing of the microscopes and savored their aid in registering the detailed structure of the minute organisms, and it is a belief that the origination of his curiosity dated back to 1665 when he read Micrographia*, a brilliant work published by Robert Hooke. It is believed that it was this work that had probably stimulated his adamant interest in the world of minuscule.

[*Note: It is a historical account documented by Robert Hooke that comprised of thirty-years long observation that he performed through various lenses. The book was published in the auspicious month of September 1665, which was the Royal Society’s first key publication, and was the first scientific best-seller that inspired a wide public interest in the field of microscopy. It is also noteworthy for coining the biological jargon, cell.]

Nurturing his interest like a gardener nurtures his plants, Leeuwenhoek dwelled deeper into the construction of microscopes, and it was during this period that he found the use of single lenses of very short focal length preferable than the compound microscopes that were processed back then; and the brilliance of the discoveries that he made using these back their reliabilities. Nonetheless, his resilience and austerity enhanced his observational skills and when the autumn applauded the arrival of the year 1673 through a progressive intensity, Van’s attempts paid off via Regnier De Graff.

Graaf, was a brilliant young physician of Delft, who accidentally acquainted himself with the discoveries made by Leeuwenhoek and in a favourable swirl of fate, his discoveries generated an immaculate impression on the former one to an extent that he wrote a letter about the latter’s works to Henry Oldenburg, Secretary of the Royal Society in London. This letter was published in Philosophical Transactions, and Oldenburg wrote to the author requesting further communications.

Graaf’s initiative brought the microbiologist under Oldenburg’s merger attention that in turn resulted in the former writing a letter to the Royal Society*. His first letter contained some observations on the stings of bees. However, he never wrote an authentic scientific paper. The explanation of his discoveries was a scramble of letters written in Low Dutch that sometimes were objectionable by some society members.

[*Note: The Royal Society was an organization formed in 1662 under a royal charter granted by Charles II. Devoted to register fresh technological developments in the field of science, the society’s aim was to facilitate the scientists in achieving their goals.]

The initiators and perhaps the earliest members of the Royal Society who were also the designers of modern English Speculative Freemasonry, included prominent intellectuals from the “ invisible college” as William Viscount Brouncker, Robert Moray, Robert Boyle, William Petty, John Wilkins, Christopher Wren, Robert Hooke, Elias, Ashmole and Isaac Newton. Although a direct evidence regarding to his early indulgence in the society is missing, the accumulation of the substantial number of clues indicate towards his lineage with a Vrijmetselaar or with the inspiration originating from Masonic attitudes.

As it is believed that the superficiality certifies the outcome of one's intellectuality. Such occurred with Leeuwenhoek in the initial period of his relationship with the Royal Society. It was a probability that the organizational constitution of his papers would have biased the members' minds who preferred a more mannered approach to the detailing. In a probable consequence, they challenged the existence of such minute organisms as his animalcules and waived the possibility of the authenticity of such idea.

Leeuwenhoek, who attired generosity in the beginning, soon became wearied of it and he presented the society with the thorough account of his methodical approach in estimating their sizes through their diametrical comparison to the objects that fell under the direct measurable dimensions. Through the implication of rational computations, he predicted their volumes from their perceptible diameters. Through the illustrational cohesion of his subjects and the spherical and objects he simplified his explanation for the members to understand. He depicted the possibility of the existence of literally a million microbes in the volume that equals a grain of sand. By progressively comparing objects of decreasing size with one another, he proved for example that protozoan cilia are thousands-fold smaller than a human hair.

Even though the successful exhibition of the protozoan cell, the society still attired doubt around itself, so it wrote a letter and wished its interest in renting his microscope for a span of few days. However, Leeuwenhoek, who until now had developed a inseparable adoration towards his instrument denied its handover, even if it was transitory in nature. The members were privy that until and unless a proper inspection would continue to facilitate its share of obliviousness, substantiation would not be possible. Therefore, in order to arrive to a judgement, they appointed two scientists- Nehemiah Grew and Robert Hooke to validate the credibility of his experiments.

Credited with the new responsibility by the society, both the men initiated a serious attempt to corroborate Leeuwenhoek's observations. Their initial effort acquainted them to failure, which put his report under doubtful perspective. However, Hooke, who was adamant in his attitude, despite of the ambiguity, found a faint credibility in the microbiologist's study. He again tried using a microscope with 330 X (power of magnification). The results that second trial generated, brought a smile on his face, and confirmed Leeuwenhoek's success. Both the scientists reported the resultant similarity in their observations and to those that Leeuwenhoek explained in his letters.

The society, despite of its scepticism, accepted Leeuwenhoek's claims, and in the same year Graaf sent them a letter, they conveyed a delegation to Delft. Their words relayed reluctance and showed an inclination towards a forceful methodical acceptance, but their rave report confirmed Van's declaration.

Just like in the morning, a drop of dew enhances the beauty of the leaf it perches; in the same way the remarkable authentication of the microbiologist's claims generated immaculate allurement over substantial number of prominent figures around Europe, which included even the Future Queen Anne of England and Tsar Pytor I of Russia. They failed in keeping themselves away from witnessing the demonstration of his marvels. His fame soon ensured his undeviating place in the history of science and a few years later he was elected to full membership in the society. However, his attendance to the organization's meeting registered absence, and did his signature on the society's membership catalogue.

Leeuwenhoek's correspondence with the Royal Society was initiated through a series of letters that he wrote in Dutch, which then were translated into English or Latin and included in the Philosophical Transactions of the Royal Society. They were often reprinted separately. His entire observations were explained in letters that numbered to at least two hundred. They were addressed either to the society or to his friends.

Leeuwenhoek's letters comprised of random observations with little coherence that were written in an informal style. However, despite of the casualness that the description of his observations attired, he avoided the fusion of the facts with his speculations that could otherwise lead to confusion. His vigilance resulted in the effortless identification of numerous organisms that he described in his catalogue.

To give some of the flavor of his discoveries, we present extracts from his observations, together with modern pictures of the organisms that Leeuwenhoek saw.

An amusing facet to add in Anton's life is that he considered his own artistic skills capable enough to execute the vital task of illustrating his findings.

Therefore, for almost all the instances, he hired limners* to commence that short of work.

[Note*: Originated illuminators, i. e. artists and engravers that we now know as illustrators or commercial artists.]

LEEUWENHOEK'S MICROSCOPES

Just like a musician without his instruments or a painter without his brushes are mere statistical puppets in the pages of history, in the same way an introduction to Leeuwenhoek without mentioning the medium of his genius would be just like a pizza served without any toppings.

The number and quality of Leeuwenhoek's mikroskoops (as they were known back then) and the ones that survived share ambiguous certainty. However, through a mutual agreement it can be said that he constructed at least several hundred of them, out of which about two hundred and fifty were complete. Amongst those most of them included a mounted specimen and also about two hundred mounted lenses.

STRUCTURAL MAGNIFICANCE

Leeuwenhoek's microscopes were simple magnifying glasses comprised of single spherical or biconvex lens that were mounted amidst two copper, brass or silver plates. The size of the plates matched the modern microscopic slides, i. e. about 1/3 inches. The object that was subjected to the examination was raised, lowered, or rotated by threaded screws attached to the plate. His device also included one of the first mechanical micromanipulation systems. However, Hooke had already accomplished this with a touch of differentiation. It was a possibility that Leeuwenhoek must have understood early that the shallow depth of field of strong microscopic lenses had ruled out focusing on microorganisms by hand. Like modern objective lenses, his lenses were extremely small with short focal lengths of 1-2 millimeters. There was requirement with the lenses; it was a need to consign them close to the eyes, and adequate practice and good eyesight were mandatory factors for their usage. The plates were carved up to provide adequate grasp between the eyebrow and cheek like a jeweller's monocle loupe. Following a standard scientific procedure, the plates were held in a horizontal position with the threaded stem used as a handle peeping away from the nose.

Estimates of microscopes' magnifying power vary from about 200 to 500 diameters, and if the higher number is true then he had achieved about a third or even a half of the highest magnification possible with visible light! The sizes of the objects that he mentioned in his reports and the finesse that attired the detailing of his drawings do bear out their astonishing optical precision and to Anton's own skills as one of the very first microscopists in history.

LENSES

According to the numerous references in many accounts of Leeuwenhoek's work consider him as an inventor of microscopes. However, he did not invent his single-lens microscope. It is Robert Hooke's " Micrographia", which illustrates the conjectural benefit of using minimal possible number of lenses. Hooke also provided a detailed description of the process of the creation of small round lenses that involved the drawing and fusion of fine glass whiskers into tiny spheres. His technique included the fixing of multiple spheres to a sheet of wax for simultaneous pulverization and polishing of the attachment sites of the whiskers. His methodical approach reveals his practical experience in the construction of such lenses. He even explained the process of mounting a tiny single-lens on a needle-hole perforated through a thin metal plate, which was in exact resemblance with Van Leeuwenhoek microscope.

Hooke presumed them to be the superior microscopes, but the annoying twirl of fate introduced him to a mordant outcome when the difficulty of their usage surfaced due to the need of holding them close to the eye. But as it is said that it is the life's excruciating experiences that account to the learning of survival, such occurrence encouraged him to add an extra lens near the eye. This modification gave birth to the compound microscope and the lens is known as the eyepiece lens. Hooke's indulgement with the microscope shows the possibility of Van Leeuwenhoek picking up his design from Hooke, and therefore an speculation can be drawn that the later one is better viewed as a discoverer rather than as an inventor.

Even though we are to be believed, that Leeuwenhoek was the one who used to ground his lenses, but the fact is that its authenticity will always lurk behind ambiguity. His unvarying dissembling that an exceptional requirement of time, skill and effort were coherent ingredients of his construction method, is consistent with his common unwillingness to teach or encourage competitors. In the dearth of direct evidence, it can at least be speculated that he actually copied Hooke's procedure and fabricated lenses by pulling and fusing spherical globules with smoother planes than he could ever have accomplished by grinding.

Once, a German sojourner Zacharias Konrad Zetloch Von Uffenbach gave a long visit to Van Leeuwenhoek who chivalrously entertained him with countless wonders. However, instead of expressing his gratitude, the former one ungraciously wrote in memoir:

“ When we further inquired of Herr Leeuwenhoek whether he ground all his lenses, and did not blow any? He denied this, but displayed great contempt for the blown glasses. He pointed out to us how thin his microscopia were, compared with others (This phrase seems to indicate that one man or the other had seen instruments of like construction that may have predated Antonj’s own. – ed.), and how close together the laminae were between which the lens lay, so that no spherical glass could be thus mounted; all his lenses being ground, contrariwise, convex on both sides. As regards the blown glasses, Herr Leeuwenhoek assured us that he had succeeded, after ten years’ speculation, in learning how to blow a serviceable kind of glasses which were not round. My brother was unwilling to believe this, but took it for a Dutch joke (a snide German euphemism for a lie – ed.); since it is impossible, by blowing, to form anything but a sphere, or rounded end.”
– von Uffenbach, 1710.

Despite of the nature of Uffenbach’s excerpt, the inducement of too much effort of the individual grinding of each lens is undeniable in comparison to the ones that are fabricated in a span of one of two minutes via a spirit lamp and a blowpipe. In a sharp contrast to the modern method, which governs the usage of a single microscope and numerous disposable slides fixed placed on a fixed or moveable stage, Leeuwenhoek was in a habit of building a new microscope for separate captivating specimen. He considered the complete instruments as permanent settings for his choicest specimens, which is why it can be speculated that he might have built hundreds of them.

Due the secrecy that Leeuwenhoek maintains in his methods, the predictability of his works always share ambiguity; for an example, it is still unclear that how he obtained the necessary illumination to achieve his remarkable results. Clifford Dobell suggested that he might have discovered some simple method of dark-ground illumination, whereas Barnett Cohen contradictorily stated that Van Leeuwenhoek might have exploited the optical properties of spherical drops of fluid containing the objects under observation.

THE ARCHWAY OF A DISCOVERER

Leeuwenhoek through his resilient genius gave the field of Microbiology numerous discoveries that provided the foothold of which it boasts today. His researches in the life history of the lower forms of animal life directly counteracted the accepted principle that they are a result of spontaneous regeneration or bred from corruption. He also showed that the weevils of granaries that in his times were commonly assumed to be bred from wheat, are grubs hatched from eggs deposited by winged insects. In his chapter on the flea, he not only provided a detailed description on his structure, but also traced out the whole history of its metamorphoses from its first emergence from the egg to the adulthood. Even today, if we perform a thorough observation of its growth process, we will find it extremely captivating.

It is owed not so much for the precision of his observation, as for its incidental disclosure of the extraordinary unawareness that was in existence back then in regard to the origin and propagation of this minuscule and despised creature, which some affirmed to be generated from sand, others from dust, others from the dung of pigeon and others from urine, but which he demonstrated to be " gifted with as great excellence in its kind as any large animal", and proved to breed in the regular way of winged insects. He even made the note of the fact that the pupa of the flea is sometimes attacked and fed upon by a mite. This very particular observation suggested the well-known lines of Jonathan Swift.

Being drawn to the blighting of the young shoots of fruit trees that was generally attributed the ants found upon them, Leeuwenhoek was the first to find the Aphides, the ones responsible for the ailment. He then made a thorough investigation in the history of their generation and observed the young existing in the bodies of their parents. He also did a vigilant study of the history of the ant and was the first to reveal that the commonly supposed ant eggs are really their pupae, holding the perfect insect nearly ready for emersion, at the same time the true eggs are far smaller, and give origin to maggots or larvae.

He also provided a detailed explanation of another fact that sea mussel and other shellfish are not generated out of the mud or sand found on the seashore or the beds of rivers at low water, but from spawn through the regular course of generation. This way he successfully counteracted to the defense of Aristotle's doctrine put forward by F. Buonanni, a learned Jesuit of Rome. He maintained the same in proving the authenticity of the freshwater mussel’s origination. The observation that he did on their ova was so precise that he witnessed the rotation of the embryo, a phenomenon that is believed to share its part of revelation long afterwards. With an equal enthusiasm, he investigated the generation of eels, which at that time were commonly supposed to be produced from dew without the ordinary process of generation.

It is a surprise that the individuals who were a believer in it did not only comprise of ignorant, but respectable and learned men too. He not only entertained himself as the first discoverer of the rotifers, but he depicted “ hoe wonderfully nature has provided for the preservation of their species”, by their tolerance of the drying-up of the water they inhabit, and the resistance that they generated to the evaporation of the bodily fluids via the construction of an impermeable casing in which they then become enclosed. “ We can now easily conceive”, he says, “ that in all rainwater which is collected from gutters in cisterns, and in all waters exposed to the air, animalcules may be found; for they may be carried thither by the particles of dust blown about by the winds.”

A REVELATION SO PROMINENT

When the summer steeped on the first step of the seasonal staircase and the year registered itself under 1974, Leeuwenhoek, through the induction of his brilliance, made an important discovery that was going to prove one of the major beneficiaries to the medical field. He provided a description of red blood cells, which was done with so much precision that he outshined his contemporaries Marcello Malpighi and Jan Swammerdam. In a fair estimation he catalogued their size, in modern terminology, 8. 5 microns in diameter, the correct value is 7. 7 microns.

Leeuwenhoek sent a folio of sic pages to the Royal Society, in which he wrote about the microscopy of blood, and the structure of bone, teeth, liver, and brain; and the growth of epidermis. He also delivered finely cut sections of his specimens enwrapped in four envelopes pasted to the last sheet of the letter. He prepared them by his own hands for the interest of the society. These samples present great insight into Leeuwenhoek's manual dexterity as a microtomist.

However, his talent for sample preparation got erased from the historical leaflets, partially because his later discoveries were so much dazzling that they outshone everything else. The dependency of the precision of his observation was in a direct proportion to his meticulousness that was involved in the preparation of the slice of the sample. This reflects his infinitesimal patience. Many samples were successful in surviving for three-and-a-half centuries and are still viewable under the modern microscopes, but the others were ruined by fungal growth, due to moisture, and it is impossible to study them now.

In the same year of 1674, he gave an immaculate description of the beautiful alga Spirogyra and various ciliated and flagellated protozoa that he discovered in a single vial of pond scum, which he had taken from the Berkelse Mere, a small lake near Delft. This occasion could be considered the simultaneous births of the fields of Microbiology, protozoology (now called protistology) and phycology. He also found that yeast consists of individual plant-like organisms.

Eight years later in 1682, Leeuwenhoek gave a clarified description of the nucleus within the red blood cells of fish, and in the year that followed, he perceived the sedimentation of erythrocytes from a suspension and their lysis on the addition of water. In the same year, he discovered the lymphatic capillaries and mentioned them in the description of blood capillaries in the intestine. He explained them as different capillaries containing " a white fluid, like milk".

THE INGREDIENT OF PROSPERITY

For the next couple of years Leeuwenhoek depicted negligible accomplishment in explaining anything that could lead to the extraordinary advancement of the science of his time. His observations concerning the circulatory system of transparent tadpoles were obsolete, which only strengthened the popular notion of him following Swammerdam, Hooke and other anatomists. A time came when it seemed the Van would become only a little better than an average anatomist. Then, fate took a favourable turn of the situation when in 1676 he shifted his focus on the objects that existed in the blind corner of the anatomists. They included; cheese-rind fungi, animal sperm, bile liquid from different species of animals, crystals formed in urine, exploding gun powder, plaque that he extracted from his teeth, melted snow and a few others.

However, the turning point of his career and the one that can be related to the origination of biology occurred when he attempted to interpret black pepper, the spice that was the reason for numerous European merchants' prosperity, and an invaluable ingredient to the Dutch painters' still-life masterpieces. The cause of his curiosity was his want to understand the reason behind the sweltering hot sensation that it caused in the mouth. Thorny protrusions resembling the ones found in thistle or a nettle were the ones that touched his expectations. He presumed them as the entities that stung the tongue. However the revelation that the dry peppercorn provided when observed under his microscope, hardly matched his satisfaction. This led him to think that it is the combination with the saliva that initiates these thorns into action. Therefore, he drenched the peppercorns in sterile water, but when he looked at the soaked peppercorns, instead of burry edges, he saw miniscule entities swimming in the water.

However, that thought of those things to be some animalcules didn't appear in his mind. The examination of many types of water has grafted in him a very good understanding of water's purity, depending on the source. He had used sterile water from melted snow and covered the dish tightly so that nothing could fly from the air in the room. A couple of days later when he observed the pepper-water under his lens, he mentioned the observation something like this, "…the water is so thick with them, that you might almost imagine you were looking at the spawn of fish, when the fish discharges its roe." His comprehensive notes reveal that he witnessed the existence of bacilli in that water. His experimentation continued from the month of April to the August with pepper-water. He made a note of everything he did and saw.

Once Leeuwenhoek was done with pepper, he shifted his attention on ginger, cloves and nutmeg. He soaked them and observed under his microscope, but not to unearth the reason of their taste, he wanted to compare their animalcules with those of pepper-water. From his meticulous description of his observation of the spice waters and other diverse natural waters, it becomes apparent that he saw flagellates, ciliates, bacteria and rotifers.

Leeuwenhoek's 18th letter to the Royal Society is regarded as is most striking and immaculate account of description. It is also known as the " letter on protozoa," it consists of seventeen pages of closely written text in a neat, small handwriting. A copy of the letter was also delivered to Constantijn Huygens, Christian's father. It