THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Knots of Ebola: Intelligence of Composite Mathematical Product 'DNA'

Dr. Rojukurthi Sudhakar Rao
Ex-Junior Research Scholar, Department of Applied Mathematics, Andhra University, Waltair , India

Abstract:
The Virus Ebola from forest monkeys entered human cells on mere object to object mingling with surface tension enabled instantaneous dispersal of the lightest viruses from river surfaces .
Ebola's genetic DNA tip to molecular biologists and consulting mathematicians led to composite mathematical product -- Knot Theory when the unwary biologists shocked by the whys & hows of naughty and naked dancing of the knotted DNA on spotted topologies .
Provoked by the global proportions of mathematical roots of globalization -- no matter Ebola or terrorism or resurrection of cold war between America and Russia who are not even neighbors with registered enmities but heading global competition commissions , this piece of self-directed "quotient -research –latent" unpacks the Ebola terminator reincarnated as global virus moving far beyond the confines of physical evolution in the river Ebola in order to unforget the human race alert of the UNO Headquarters notifying all sovereign state powers – nuclear or unclear of ebola--danger –level across the global societies .
Chartering extrasensory abilities , this Paper aims at lighting the universal research bodies busy with the e-compounded governance of e-times playing back the forgotten and forgiven Ebola dancing knots and the differential viral hyperspheres detrimentally ajar in our spaceage .

Keywords : *Mathematical Product , DNA , Knot Theory , Ebola , UNO , Topology , Human Race , Mathematical Roots of Globalization .*

1. Introduction

The scare of Ebola is spread globally. Scientific studies and preventive measures are on large-scale because prevention is better than cure in other parts of the Globe where ebola has not spread. The five elements of Nature, namely, Water, Fire , Air , Earth & Sky are said to have been the Ebola sustainers . No wonder , Ebola has acquired the ability to weaken the human beings from within after its entry into the human body system till the death of the human . Basically, it is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola survives on the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforests .

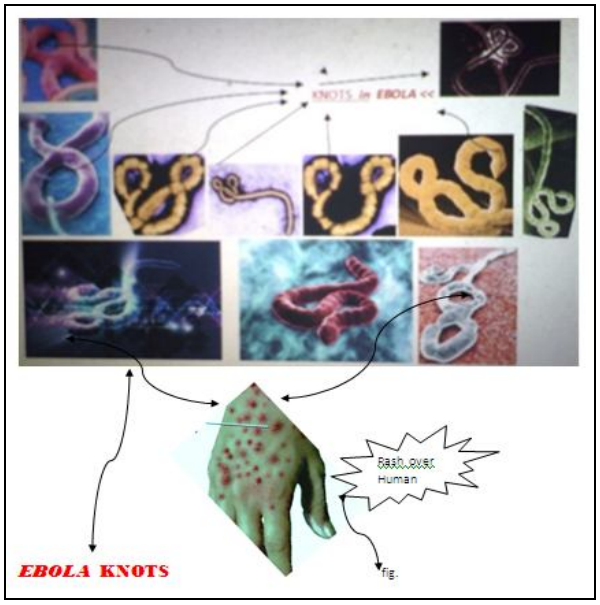


Figure 1

2. Research Phase One

BOLA vs E-BOLA vs 'EBOLA'

Under the ground as well as above the ground, the Ebola has become enigmatic. The very name , EBOLA is an enjambment since rewriting it as 'e-bola ' is representative of the latest flourishing trends in the world of e-commerce (electronic commerce) with the 'e ' standing for everything having to do with the interaction with computers, world-wide-web & internet dealings in electronic-usage of e- information , e-data , e-business , e-marketing , e-retail , e-auctions, e-stocks, e-banking and a host of other day-to-day e-effects like e-books, e-library, e-utilities , e-transfers and e-adjustments with the speciality of e-mail posts by secure- private- intranets & extranets of virtual companies .

However , this paper restricts itself to the ebola virus variety but not intended for the e-bola of the electronic – commerce-variety and indeed also unconcerned with the plain ' bola ' without e-connectivity at all [i.e., neither electronic(e-bola) nor viral (ebola)] which then described as being the 'BOLA MISSILE' of the South American weapon with potential of a modern day missile customarily used by the South American Cowboys consisting of stone balls attached and secured to the ends of a strong cord or braids of rope-material hurled to entangle the limbs , legs and feet of cattle and other animals as depicted in the pictures below .

Figure 2: BOLA MISSILE

3. Research Phase Two

EBOLA IS NOT BACTERIA

Looking in the reverse direction , from the plain bola to an electronic e-bola to the virus called ebola, our mind is tuned now to know much more about the virus , EBOLA , and why it is called a virus in the first place .

Ebola is a virus but not a bacterium. Bacteria are unicellular organisms meaning that a bacterium is made up of a single cell only. A virus is neither a cell nor an organism because it does not possess any of the fundamental parts of a cell like nucleus, cytoplasm, and cell membrane. But it does have a genetic material abbreviated as the DNA or the RNA(deoxyribonucleic or ribonucleic acid , respectively) which is vital in increasing their number. The viral DNA is capable of synthesizing new viruses inside its host cell , say , plant cell or animal cell or even a bacterial cell for that matter . In other words, virus is not capable of reproduction. They only multiply once they invade cell and exhibit lysis or lytic activity.

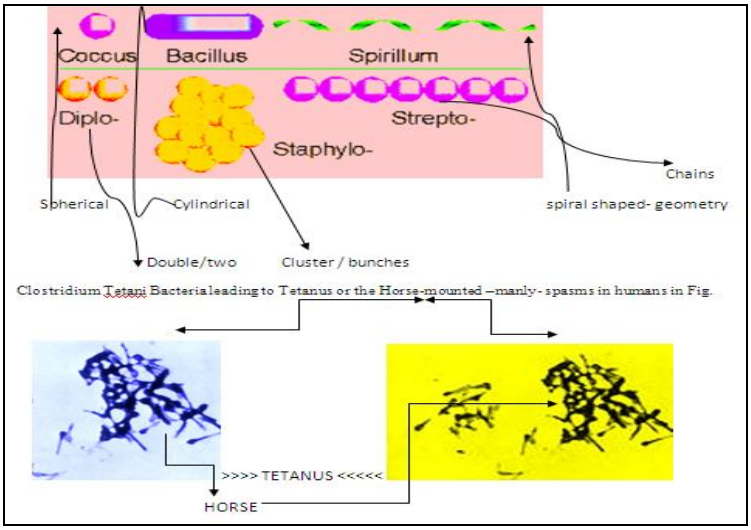


Figure 3: Bacteria Models of Singles, Doubles & Clusters In Fig.

Dr.Robert Koch , a German physician is famous for several discoveries related to bacteria including the raising and cultivating the bacteria for experimental research purposes whose work is known as the Koch's Postulates .

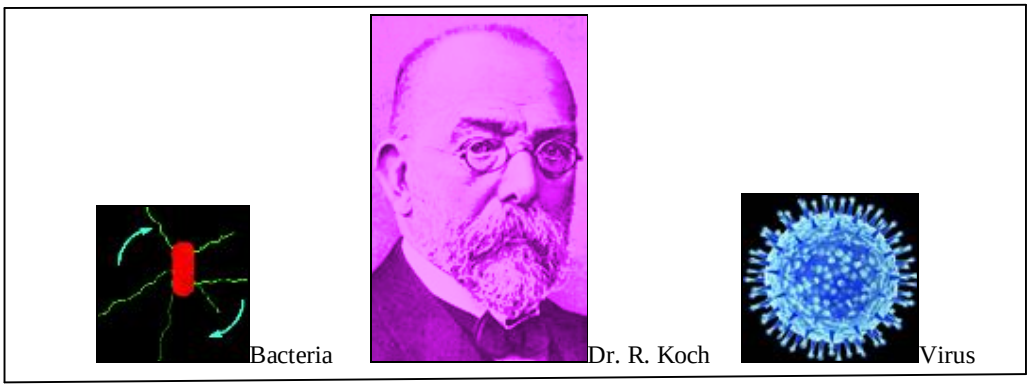


Figure 4

Figure 4 : An embedded Video explaining Virus opposite Bacteria to be self-clear with an audio-support below.
The internet locater is available@ http://www.youtube.com/watch?v=DIX6tjglCk4#action=share

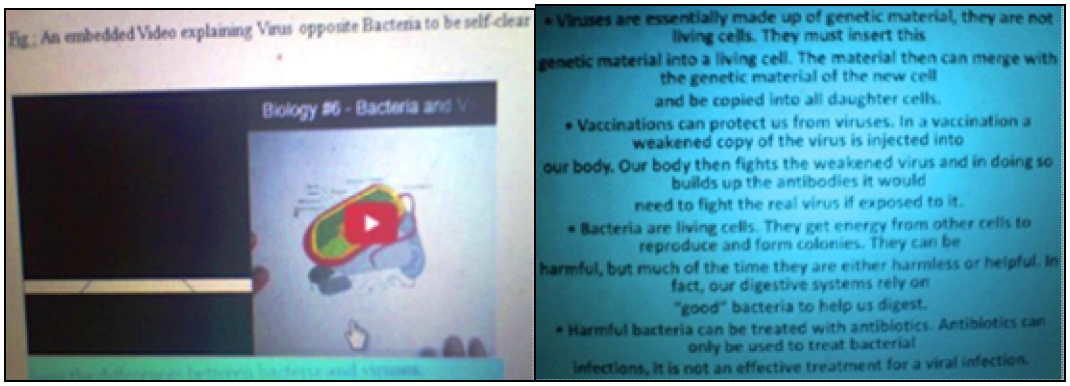


Figure 5

The study of Viruses revealed elementary smallest structure as under because virus has no life-form .

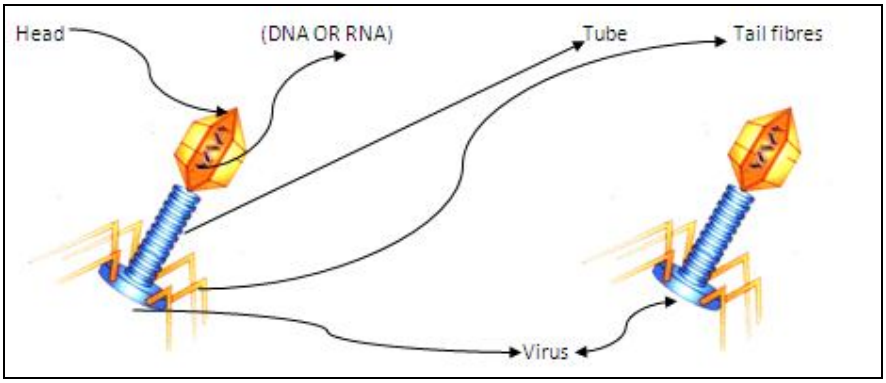


Figure 6 : Virus structure .

Ebola virus is one of at least 30 known viruses capable of causing viral hemorrhagic fever syndrome. The genus *Ebolavirus* is currently classified into 5 separate species: *Sudan ebolavirus, Zaire ebolavirus, Tai Forest (Ivory Coast) ebolavirus,Reston ebolavirus,* and *Bundibugyo ebolavirus.* The 2014 outbreak of Ebola virus disease in West Africa, involving *Zaire ebolavirus,* is the largest outbreak of Ebola virus disease in history of mankind . Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever, is a severe, often fatal illness in humans. This virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission. The first EVD outbreaks occurred in remote villages in Central Africa, near tropical rainforests, but the most recent outbreak in West Africa has involved major urban as well as rural areas.

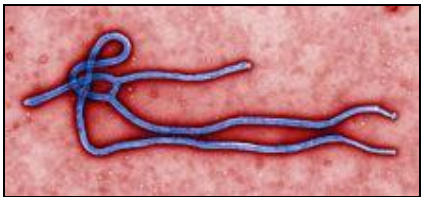


Figure 7: Ebola virus which is named after the River Ebola

4. Research Phase Three

Deadly Virus Ebola from African Region

The Ebola virus causes an acute, serious illness which is often fatal if untreated. Ebola virus disease (EVD) first appeared in 1976 in 2 simultaneous outbreaks, one in Nzara, Sudan, and the other in Yambuku, Democratic Republic of Congo. The latter occurred in a village near the Ebola River, from which the disease takes its name.

The current outbreak in West Africa, (first cases notified in March 2014), is the largest and most complex Ebola outbreak since the Ebola virus was first discovered in 1976.

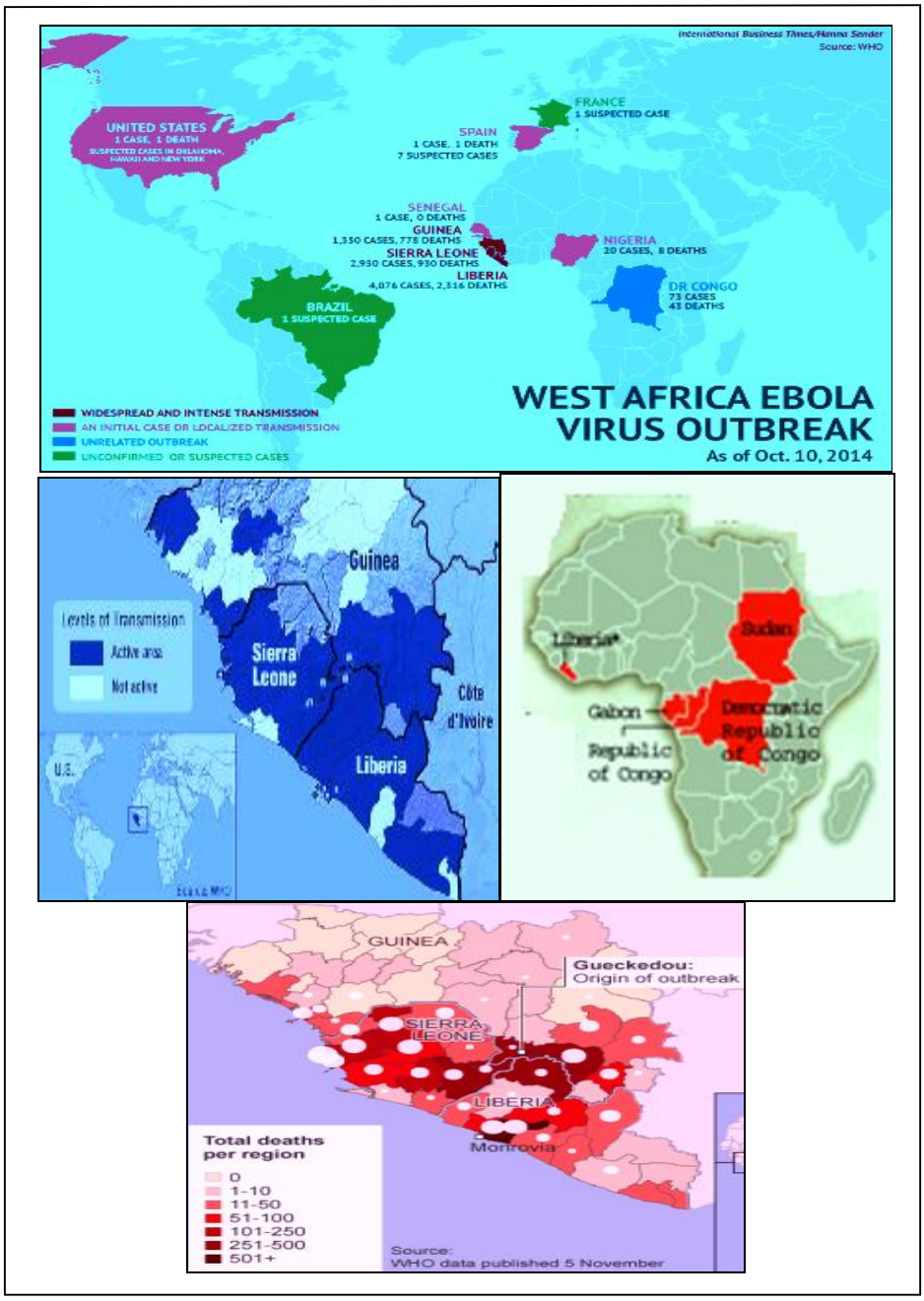


Figure 8:West Africa origin

There have been more cases and deaths in this outbreak than all others combined. It has also spread between countries starting in Guinea then spreading across land borders to Sierra Leone and Liberia, by air (1 traveller only) to Nigeria, and by land (1 traveller) to Senegal.
The most severely affected countries, Guinea, Sierra Leone and Liberia have very weak health systems, lacking human and infrastructural resources, having only recently emerged from long periods of conflict and instability
A separate, unrelated Ebola outbreak began in Boende, Equateur, an isolated part of the Democratic Republic of Congo. The virus family Filoviridae includes 3 genera: Cuevavirus, Marburgvirus, and Ebolavirus. There are 5 species that have been identified: Zaire, Bundibugyo, Sudan, Reston and Taï Forest. The first 3, Bundibugyo ebolavirus, Zaire ebolavirus, and Sudan ebolavirus have been associated with large outbreaks in Africa. The virus causing the 2014 West African outbreak belongs to the Zaire species.

5. Research Phase Four

Ebola Knots - A Coexpression of Human Terminator Epidemical DNA Product Value

Ebola spreads through human-to-human transmission via direct contact (through broken skin or mucous membranes) with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials (e.g. bedding ,clothing) contaminated with these fluids . Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola.

Figure 9: ebola human cells

Ebola virus is an obligate cellular parasite . Study of ebola's DNA requires isolation of viral material from the host cell contaminants and DNA . So, viral DNA in substantial amounts facilitates obtainment of total genetic information on the ebola virus .

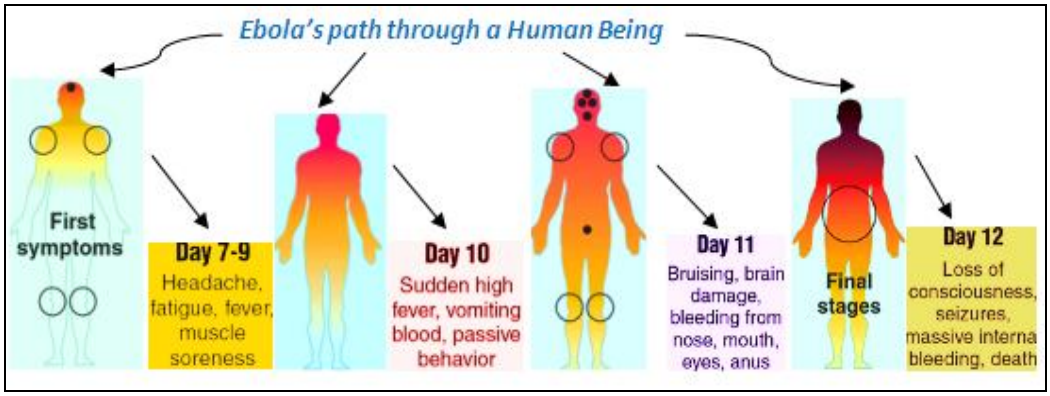


Figure 10: Ebola's path through a Human Being

People remain infectious as long as their blood , body fluids, semen & breast milk of ladies contain the virus. Men who have recovered from the disease can still transmit the virus through their semen for up to 7 weeks .

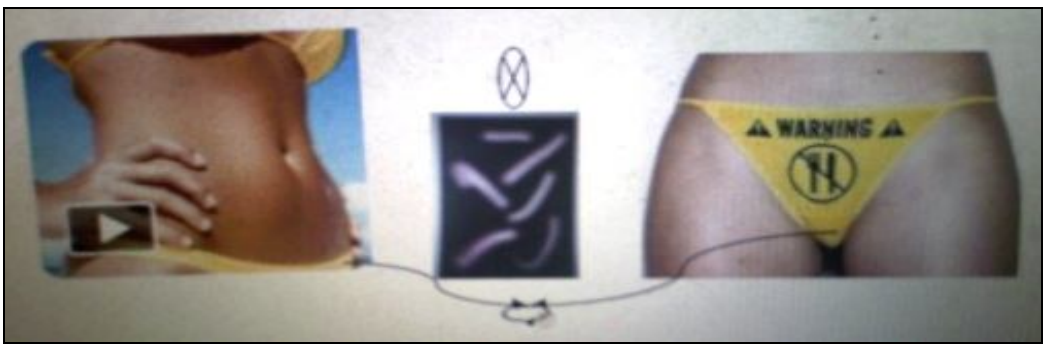


Figure 11:. Ebola Urge of physical Male-Female DNA Traffic

6. Research Phase Five

The Knots of Ebola -- Mathematical Concerns of Biologists .

It was a deep factual problem for Biologists when the pictures of Ebola virus presented showed some knots in the virus-body - property of ebola as can be seen hereunder in samples collected . Molecular biologists who have been studying the knotted shapes of DNA in the ebola really had a problem of knowing if the coiled strands of DNA they observed were knotted or not or whether two knotted pieces of DNA were the same. So they came to consult mathematicians about that knots.

Figure 12: ebola knotting property

Mathematical studies confirmed the knots advancing new knowledge that it can be thought of as a creation of a form by taking a length of flexible stretchy tubing , cutting a hole in the side through which one end can fit exactly , passing an end of the tube through this hole and then joining it to the other end of from the inside and therefore , an apparent curved surface on which starting at any point a continuous line could be drawn along it to any other point having to intersect nowhere . In a nutshell , what constitutes a knot to the eye of a biologist or a layman to mathematical foresight is made up of a curve out of looping with interlacing a string and only then connecting the ends . So, what takes place to understand for a biologist on seeing ebola under microscope is that of continuous twisting & stretching deformations self-characteristic called knots.

Figure 13: KNOTS of EBOLA

7. Research Phase Six

Ebola Knots ? A Big Question ? -- A Mathematical Product or Design ?? : Topology Investigated Ebola .

According to the American Mathematician, Joan S.Birman, the above are pictures of a very clear knot of the Ebola virus. In other words, pictures of long knotted loops of DNA. More important from her viewpoint, braids and knots are ubiquitous in Mathematics. The study of knots is Mathametics which is called Topology.

closed braid<<  opened braid >> 

In the 20th century, scientists and mathematicians began finding applications of knot theory to problems in biology. The closely related theory of tangles has been effectively used in studying the action of certain enzymes on DNA. The interdisciplinary field of physical knot theory investigates mathematical models of knots based on physical considerations in order to understand

knotting phenomena arising in materials like DNA which ebola is configured of. Considering the irritating tendency of extension cords and computer cables to tie automatically into knots themselves when we do not generally care about these domestic happenings behind and below our desktop and printer cable tables, one is sure that there is no interfering outside foreign hand or outside influences obviously . This turns out to be , if cared for and thought analytically , that there is an abstract theory which cannot escape the vigilant mind of a mathematician and rationally makes up to the theory of knots . Hence abstract mathematical knot theory contributed by the forms of convoluted coils appearing like the mystery of knots formations due to the lengths and crossings of the tangling cables with complex knots . The types of
such crossings and knotting taking place are subject to categorization in the mathematical terms as splices & knots .

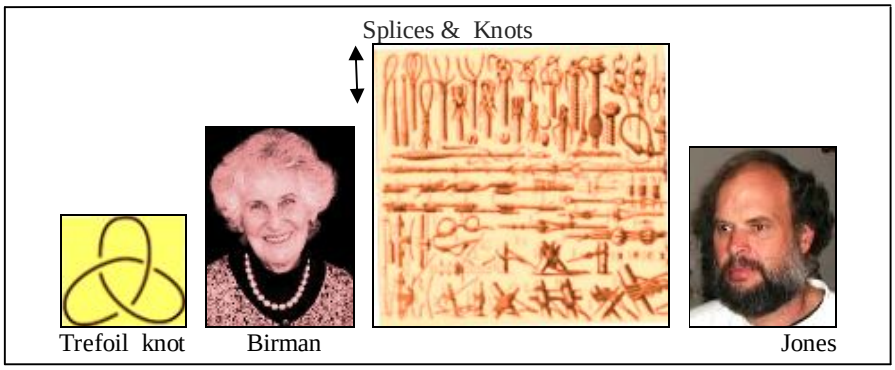


Figure 14

Birman's mathematical work has focused on low-dimensional topology: braids, knots, surface mappings, and three-manifold. A braid can be thought of as a set of hanging strings that have been interlaced in some pattern. The top and bottom ends of such a pattern can be connected together to form a knotted mathematical braid.

She classified knots and links in the three-sphere, which is a fundamental problem in topology. One approach to this problem is to study links via the nested sequence of braid groups. Since each link can be represented as a closed braid and braids form a group, this approach allows one to utilize familiar group invariants, such as group characters. In 1984, this approach led to the discovery by Vaughan Jones of vast new families of polynomial years, mathematicians have developed a variety of knot invariants, often expressed in the form of a polynomial algebraic expression.

As a first step in understanding the underlying meaning of Jones' knot invariants, Birman was able to show in the year 1990 that whereas the classical invariants all described properties of a single knot or link, the new ones related to a space of all knots and encoded data about the way knots fit together. To solve the problem of distinguishing among knots, mathematicians have tried to find schemes for labeling them in such a way that two knots having the different. In the latter case, the label would be enough to indicate that no amount of twisting or tugging would ever transform one knot into the other.

The approach to labeling knots is to use the arrangement of the crossings in a knot diagram to produce an algebraic expression for that knot. Such a label, which stays the same no matter how much a given knot may be deformed or twisted, is known as an invariant.

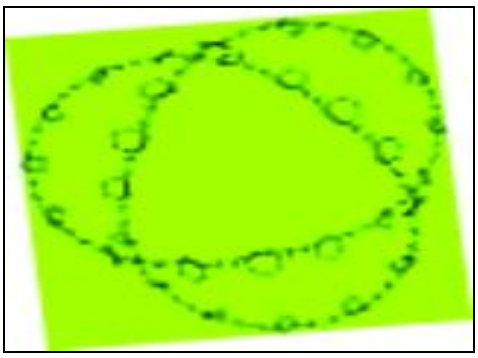


Figure 15: A wild Knot which cannot be smoothly transformed into Polygon

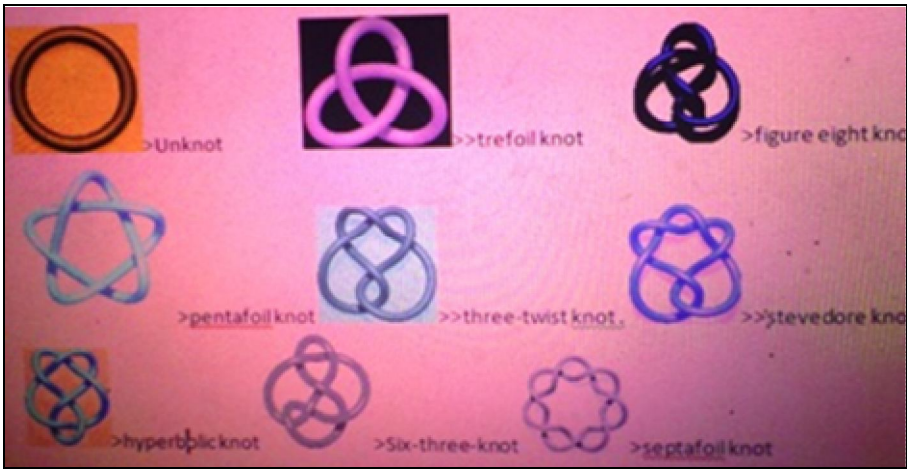


Figure 16 : Knots

Jones' knot invariants have had applications to the work of molecular biologists to understand the knotted shapes of DNA in ebola virus concluding that knots are mathematical objects only next to the very familiar mathematical objects of Numbers studied in a mathematical way resulting into the Number Theory . The cutting edge and the World's most trusted Re-search in Topology occurred in the year of 2008 when the Physicist, Doug Smith at the University of California , America decided to unravel the mystery of knot formation by analyzing knots in DNA saying they targeted tangles in umbilical cords or DNA with two pieces of knotted DNA undividing a cell .

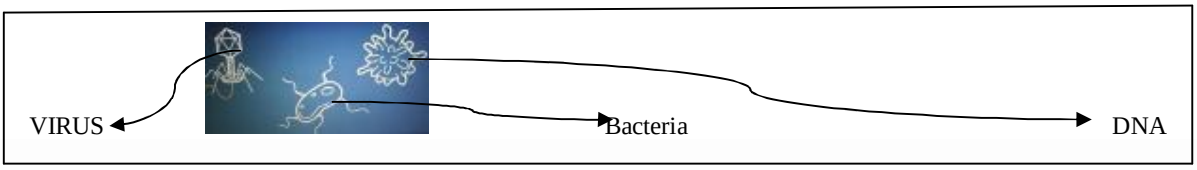


Figure 17

According to me , knotting in this situation of ebola virus mightbe the chaotic infinitely many different knots with their number and variety that occur looking like closed orbits that govern a chaotic flight of the ebola virus inside the human flesh while the knots serving the purpose of a weighty-sticky-halter to stay put in the host cells which means lodging and boarding for the immigrant ebola .Thus , topology gives a language for talking about these knots with a point of view on this kind of knotting physical phenomena , say the ebola knots or the tangling of strands of DNA . As aforementioned, if bacteria tends to typical geometrical forms - spherical, rod-like cylindrical and spiral , a virus could be a topological parametric . Ebola Virus Particles are long and thin with a central core containing single strand .There is a matrix protein layer surrounding the core.. The matrix is adherent to the viral envelope derived from the host cell during budding. On the cell surface are viral trimeric spikes (glycoprotein) that the virus uses to attach to target cells. The virus particles float above an undulating abstract background that suggests cells. Hence ebola knots.

Geometry **:** Topology **:** DNA **: :** Knots **:** Bacteria **:** Ebola Virus **:** World of Inhabitants .

In Mathematics, it has been considered that Geometry and Topology are giving us the primary clue that there is the general relativity between them as to their respectively pointing out shapes and their inwardly connected up utopia . Taking example , one might say coming out of a University after convocation that the shape of the Universe is geometrically spherical argued it be so taught and be wise but at the same time has been recommended topologically connected up intrinsic perfection of the World being flat everywhere like below .

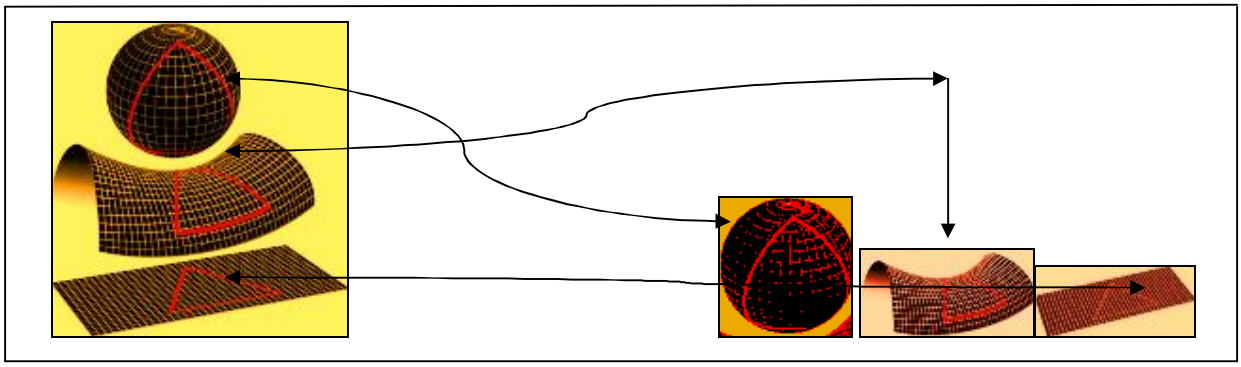
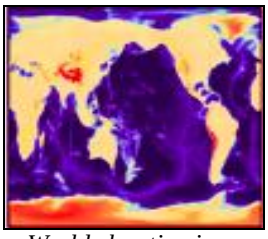
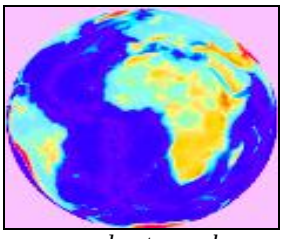


Figure 18

Fig :Topologically flat world of the spherical Globe .With the help of available satellite images and atlas of Earth , one can comprehend the spherical Earth is an onto flattened visualization realism mapping seen as such below.



World elevation image



mapped onto a sphere

Figure 19

Mathematicians & Technologists find that the present scope of knot invariants is part of an out-of-vision thing . Because the current invariants knowledge being unable to distinguish wide classes of distinct knots. Like physicists finding often new particles and forces that make up the physical world, something akin to a grand unified theory that would explain all types of knots is yet to develop.

In similarity to what is said above, recent researchers have disclosed that viruses and bacteria merged with our ancestors over the course of billions of years . Two French biologists , Jonathan Filee and Patrick Forterre have forwarded a plausible hypothesis that we (human beings) are chimeras built from the DNA of eukaryotes, bacteria, and viruses, all mixed together through a natural version of genetic engineering. As could be seen below DNA is the common in Bacteria, Virus and humans.

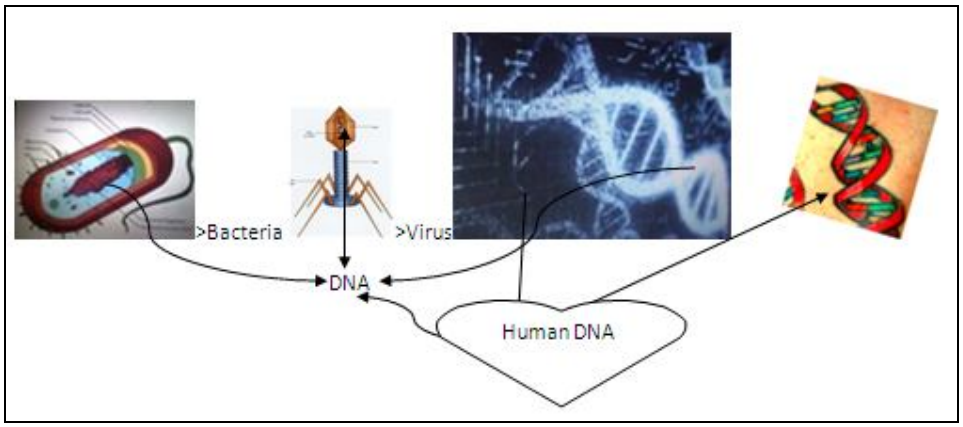


Figure 20

DNA upto 8-10 % inherited from viral ancestors, say prehistoric viruses that inserted their DNA into the genes of our ancestors, hundreds of millions of years ago , establishing themselves as the permanent residents with passage drawn down from parent to child. This is fool-proof clue to the legacy of epidemics past since million years ago reflecting normal genetic wear-and-tear also that happens with time in many viruses. In other sense , viruses had repeatedly invaded genomes with the ability to spread across and spreading within them harming the health of the virus's host infecting more cells directly weakening the immune system with plenty of chances to be passed on to future generations. Pro-actively spreading within every mammal genome might just be a more efficient way for the virus to copy itself not requiring adaptations to survive outside of cells or avoid defenses that target its coat proteins of the protein-spike that the virus uses to enter healthy human cells.

Ebola is not a simple virus but known as a complicated machine that works for its own replication since it is an enveloped virus of proteins. So, an ebola has got its own folds suitable to its function observed by mathematicians as the topology of folds because it is known already that rubber-sheet geometry is not to be solid-state geometry and the mathematical version of the former studied as topology or geometry of shaping shapes study . Also, the possible evolutionary relationships are interpolated and foretold by the topological folds of the ebola virus which has got all of the capsid , nucleocapsid and envelope proteins . An ebola is also recognized in its lipid-enveloped or naked form. There are thus a wide variety of ebola folds due to protein building blocks . Mathematically , topology recognizes the knotting in the ebola virus but at the same time , morphologically ,there are a wide variety of architectures , also called topologies , so far as viruses in general are concerned .

DNA is the genetic material consisting of 2 strands twisted around each other in a double helix visualized as two very long strands that have been intertwined millions of times, tied into and tangled up in knots, and subjected to successive coiling. Hence a complicated knot of number of twists in it as it coils around itself called supercoiling . Enzymes unpack DNA slicing through individual knots and reconnect strands in a more orderly way. An insight into the unknotting of DNA by using principles of Topology became a technique for Topologists with Biologists studying the invariant properties of geometric objects, such as knots. That's how connections between mathematical knot theory and biology have been discovered. By thinking of DNA as a

knot, we can use knot theory to estimate how hard DNA is to unknot which in turn enables to estimate properties of the enzymes that unknot DNA. A mathematical knot is a closed curve. This can be visualized as a closed loop of string. If the string had a knot in it, it would be impossible to unknot without slicing throught the knot. Glance the pictures below.

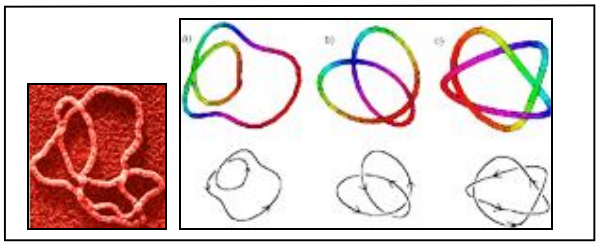


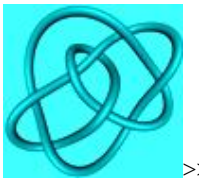
Figure 21:extension of principles of Topology to DNA

The first knot is a loop of string that has been twisted, an "unknot". It could easily be unknotted by pulling on the string to form a single loop. The 2nd knot is a knot. The only way to get rid of the knot would be to cut through it and retie the string. The 3rd one is even more complicated knot. As per topological definitions, a knot is a closed curve in three-dimensional space. Two knots are considered the same if one can be moved smoothly through space, without any cutting, so that it is identical to the second. Mathematical knots are represented by two-dimensional diagrams that can be thought of as the shadow cast by a three-dimensional knot.

8. Research Phase Seven.

Selective Advancements on Knot Theory

Same knot can appear in very different guises but remain fundamentally unchanged. A knotted string is a knotted circle when its two ends are sealed . For looped knots, it is a particular configuration of the knot. It may be an arrangement of the knot.



>>>looped knot

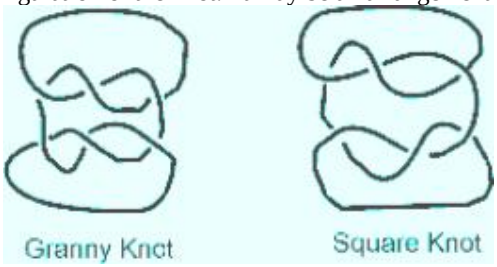
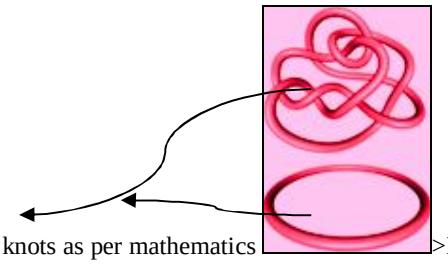


Figure 22

In 1927, mathematician J.W. Alexander created a machine for methodically producing a polynomial (an expression like 5z4 + 9z + 8) from any knot. This method always gives the same polynomial for a particular knot, even if the knot is twisted to look changed. But , it gives an identical answer for knots that are different such as the granny knot and the square knot . Hence, identical Alexander polynomials. which is a weak point in the method . After Alexander , for 60 years knot theory and practice was not studied . In 1983, Vaughn Jones of the University of California, America made a knot invariant, to differentiate knots from one another which Alexander's invariant failed . (eg. granny knot & square knot). In 1988, physicist Edward Witten turned Jone's single invariant into an array of new invariants applying quantum theory but theoretical understanding of knots not fully known . In 1990s, Khovanov of Columbia University developed a new invariant, the Khovanov homology from algebra better than Jone's polynomial. Later , Peter Ozsváth of Columbia University & Zoltán Szabó of Princeton University developed an invariant called knot Floer homology using techniques from symplectic geometry, an improvement on the Alexander polynomial. The knot Floer homology could decide a loop knotted or not and find an unknotted loop (unknot) from any knotted one. Sergei Gukov of University of California took to quantum physics and string theory to improve the Witten invariants .



Same knots as per mathematics >Knots are considered mysteries revealing mathematical superstructures of 3 & 4 dimensional spaces .

Figure 23

9. Research Phase Eight

Knots & Ebola Knots propounded via Graph Theory .

The Ebola River has an indigenous name Legbala in the Ngbandi language implying white water . It is the chief stream of the Mongala River which has been tributary to the Congo River in the northern Democratic Republic of Congo occupying nearly 255 kilo meters linearly. In the year of 1976, Ebola virus was identified in the neighbourhood Yambuku village of the Ebola River by Professor Peter Piot who named it after the river .

It is imperative on my part to refer to the application of the Graph Theory to Knots in general and ebola knots in particular. Substantial contributions are made severally by non-doctoral-research scholars of customs and routines under the general category and by long-standing award- winning fundamentally core-competent Mathematicians in the specialized category , no matter whichever part of the globalised World they hail from as knowledge-powers .

For knowing the classical roots of knots and Graph theory , one has to see as back as the times of Alexander , the Great who performed with his sword cutting and untying of a miracle knot of a chariot which belonged to the ancient King Midas in possession of one miraculous chariot inherited and tied in extraordinary knots to its yoke by the bark of the cor-nell tree preserved by the then generations of ancestors of population with the legendary value and price that the person who would untie the knot is destined to become the ruler of the World . Also, it has been reported that knots on seals and cylindrical packages of ancient merchants and traders were in vogue in the

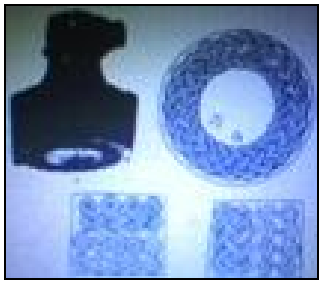


Figure 24: knots as seals

Mesopotamians' times even before the advent of the techniques of proper writing and hand-writing were invented in about 3500 BC. As a matter of fact, the modern Japanese and Chinese modes of writing smacks of traces of knotty joinings here and there. However, ancient Greek Mathematics discloses the art of study of Knots firstly and Graph Theory secondly. A Greek physician named Heraklas, who lived during the first century AD and who was likely a pupil or associate of Heliodorus wrote an essay on surgeon's slings explaining in step-by-step instructions 18 ways to tie orthopedic slings. His work survived because Oribasius of Pergamum (c.325-400), physician of the emperor Julian the Apostate included it toward the end of the fourth century in his Medical Collections. The oldest extant manuscript of Medical Collections was made in the 10th century by the Byzantine physician Nicetas. The Codex of Nicetas was brought to Italy in the 15th century by an eminent Greek scholar, J. Lascaris, a refugee from Constantinople. Heraklas' part of the Codex of Nicetas has no illustrations, and around 1500 an anonymous artist depicted Heraklas' knots in one of the Greek manuscripts of Oribasus Medical Collections. (see Fig below we for drawing of 3rd Heraklas knot together with the original description of Heraklas. Vidus Vidius (1500-1569) a Florentine who became physician to Francis I (King of France, 1515-1547) and professor of medicine in the College de France, translated the Codex of Nicetas into Latin containing drawings of Heraklas' surgeon's slings by the Italian painter, sculptor and architect Francesco Primaticcio (1504-1570) . Heraklas' essay should be taken seriously as far as knot theory is concerned for status of an application of knot theory should be given to Heraklas . The story of the survival of Heraklas' work and reconstruction of his knots in the Renaissance is typical of all science disciplines with the special efforts to recover lost Greek books and knowledges which provided an initiative-engine for the development of modern mathematics of Knots and Graph.

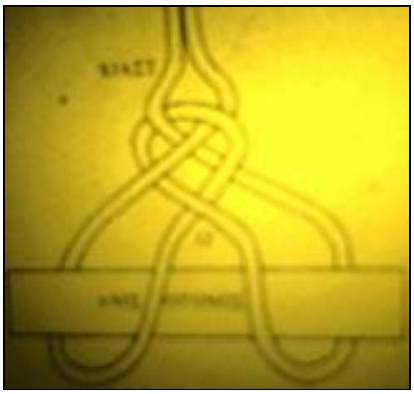


Figure 25:Heraklas knot

Gottfried Wilhelm Leibniz (1646-1716) speculated that there should exist a geometry of position which deals with relations depending on position alone while ignoring magnitudes. As far back as 1679, Leibniz, in his Characteristica Geometrica, tried to formulate basic geometric properties of geometrical figures, to use special symbols to represent them, and to combine these properties under operations so as to produce others. Leibniz envisioned what we now call combinatorial topology.

The first convincing example of geometry of position was studied by Leonard Euler (1707-1783). This concerns the bridges on the River Pregel at Konigsberg (then in East Prussia), shown in Fig. Euler generalized the bridges of Konigsberg problem and on 26 August, 1735 presented his solution to the Russian Academy at St. Petersburg which was published in 1736 . With the Euler paper, graph theory and topology were born. Euler started his paper by

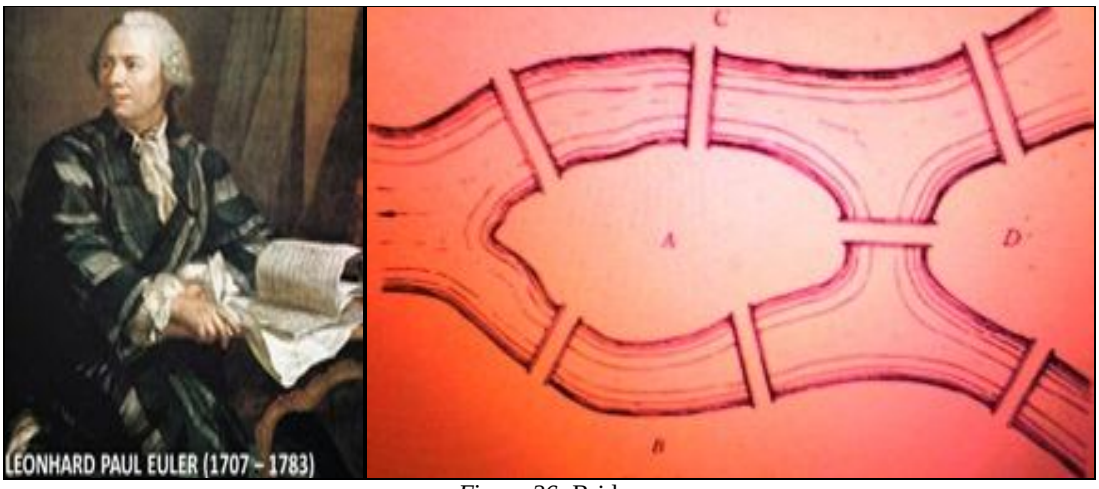


Figure 26: Bridge

remarking that the branch of geometry that deals with magnitudes has been zealously studied throughout the past, but there is another branch that has been almost unknown up to now; Leibniz spoke of it first, calling it the geometry of position . This branch of geometry deals with relations dependent on position; it does not take magnitudes into consideration, nor does it involve calculation with quantities. But as yet no satisfactory definition has been given of the problems that belong to this geometry of position or of the method to be used in solving them.

For the birth of knot theory one had to wait another 35 years. In 1771, AlexandreTheophile Vandermonde (1735-1796) wrote the paper Remarks on problems of positions where he specifically places braids and knots as a subject of the geometry of position. See Fig. In the first paragraph of the paper Vandermonde wrote that whatever the twists and turns of a system of threads in space, one can always obtain an expression for the calculation of its dimensions but this expression will be of little use in practice. The craftsman who fashions a braid, a net, or some knots will be concerned, not with questions of measurement, but with those of position when he sees there is the manner in which the threads are interlaced. This is how the modern connectivity with points and edges as popular in the study of Graph Theory without knowing beforehand elements of knot theory is realized and transformations

of knots into graphs and vice versa is the consequence of the transformational relativity between knots and graphs applications .

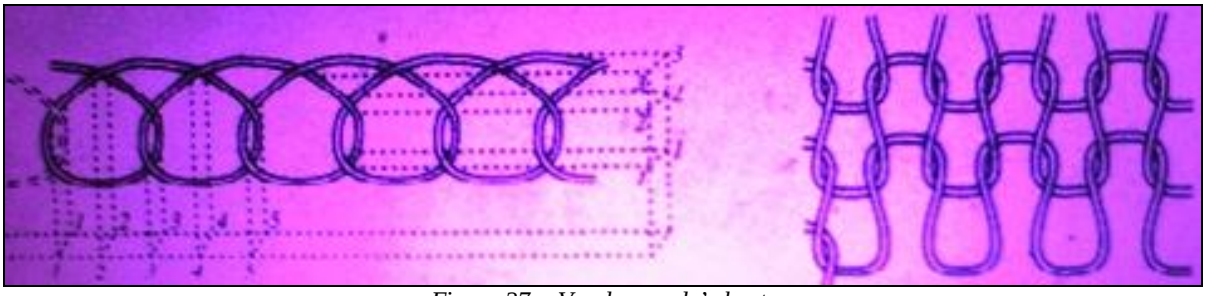


Figure 27 : Vandermonde's knots

Figure 28: Maxwell knot

Figure 29:Meshing

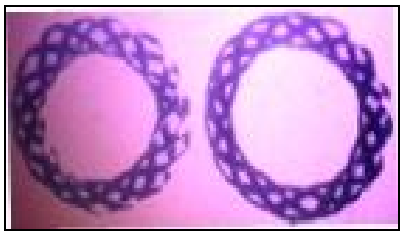


Figure 30:Oscar's Torus knots

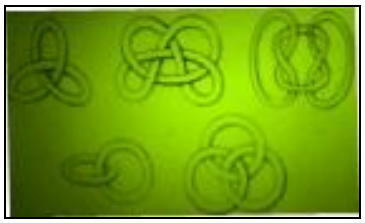


Figure 31: Kelvin knots

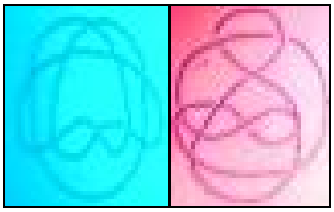


Figure 32: knots of Perko

The first thing that most people think of upon hearing the word knot is probably troubleshooting tangle in a piece of string or perhaps the contortion of shoelaces that prevents shoes from falling off (or stil, a natural domestic sample of creation of knots being in our hair-lump with the non-movement of the comb on the scalp howsoever hard we try to push forward the hairy-knot lurking invisible behind the teeth of the comb in the oiled or dry hairy-mess) . In mathematics, such messes are not knots, however, since they have loose ends floating around. If we take the two
loose ends and glue them together, then we have to name it knot. Of course we really cannot define a knot as a tangled piece of string with its ends glued together. First of all, a piece of string has thickness and exists in the real world. Think about the space in which knots live. Certainly not on a straight line, since there's the whole issue of the glued-together ends. An aspect of knots is knottedness in places where the string goes over or under itself. Thus, we cannot work with knots that lie in the familiar Cartesian plane. However, a three-dimensional space akin to the one in which we live denoted by R3 in Topology is taken for granted on researching knots facilitating that a knot is a simple closed polygonal curve in R3 .See the smooth curved knots exampled below.

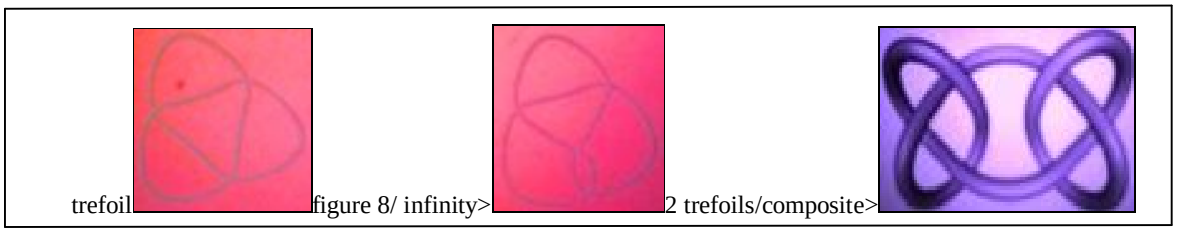


Figure 33

A knot is generalized as a link of one component of several distinct simple closed polygon curves referred to as sub-components with linking around one another efficiency. In other words, a link (knot) of knots. The trefoil and figure 8 knots are called alternating knots because crossings alternate between over and under in the trace of the knot . Like the number theory integers of prime variety, there are also prime knots known for their freedom in which two knots are not tied in the same string. Non-prime knots when added together become composite knots as shown in the figure just above.
Knots and links are described using Graph Theory .Turning knots into graphs and graphs into knots is feasible . A graph which represents the adjacencies between edges in the faces of a plane graph is called a medial graph

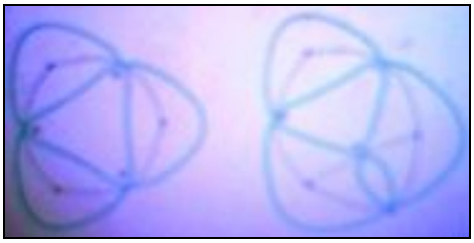


Figure 34: Medial graphs of Trefoil & Figure-8 Knots.

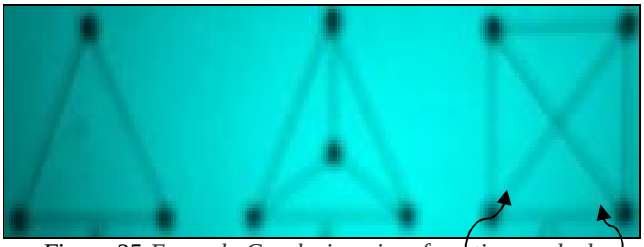


Figure 35:Example Graphs in pairs of vertices and edges .

A graph G = (V, E) is a pair of (multi)sets. V is the set of vertices and E is the (multi)set of edges, consisting of one- and two-element subsets of V as per set theory and binary relation . For all practical purposes , a graph is a set of points (vertices) and

line segments (edges) connecting those points. Graphs of more than edge between two vertices or an edge going from a vertex back to itself are indeed features of graphs called multigraphs or pseudographs . Figure below shows examples .

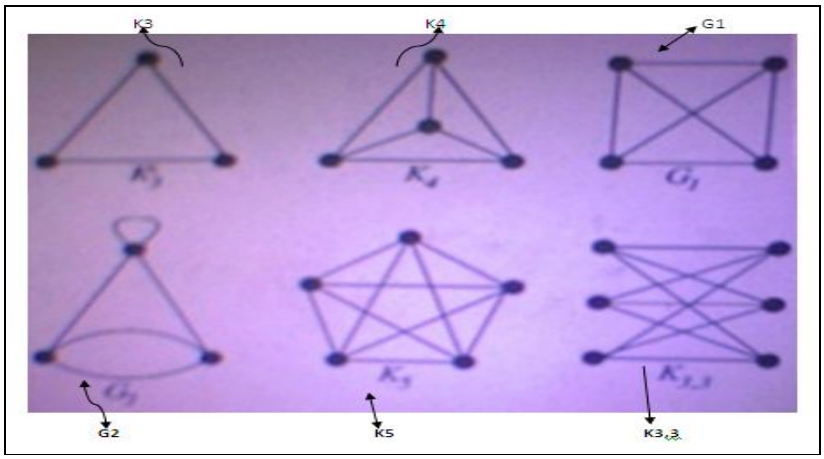


Figure 36

Topological propertyof a graph is planarity. A graph is planar if it can be embedded in the plane with edges meeting only at vertices. Above K3 is planar as well as K4. G1 suggests that G1 is not planar as two of its edges cross in the middle of square but there is no vertex there. However, G1 is isomorphic to K4, as they both contain four vertices and all possible edges between them. Thus, G1 is planar although the way it is drawn is not a planar embedding. The graphs K5 and K3,3 are not planar. In fact, they are the simplest nonplanar graphs and it is well-known that every nonplanar graph contains a graph equivalent one of these graphs .With planar graphs and by one-to-one correspondence between planar graphs and knot diagrams, one can see the medial graphs of trefoils and figure-8 knots above .

On the surface, knot theory is thus applicable in the "real world." Biologists are also interested in knot theory for its applicability to the study of DNA, which can be examined by considering the knot structures into which it is twisted. DNA has the nasty habit of getting tangled and forming knots. Scientists study these knots to know their function in order to disentangle them. Living creatures have also been seen turning themselves into knots and so is the case with the ebola virus knots and snakes sitting on tail which knots itself up for defensive reasons and to go at its prey as examples of physical knots .

10. Research Phase Nine

Ebola's Knots are different from the Snakes' Knotting .

Ebola-like disease has snakes tied up in knots due to a virus and the same is a suspected clue to the ebola in humans. Some of these snakes tie themselves into knots, roll on their back and exhibit behaviors like stargazing ,

Figure 37

staring up into space where they wave their heads in the sky sort of uncontrollably. After in knots, they can't get out of knotting and they die. This fatal condition known as inclusion body disease is caused by a virus . In amongst some of the snake DNA was foreign genetic material that closely resembled that present in viruses called arenaviruses associated with haemorrhagic fever in humans and was like the present Ebola virus offering Virologists an insight that that which twists snakes into knots is self-revealing on genetic difference and ebola virus could be the resultant product of two viruses merging and DNA mutations as such according to the organization of the so-called glycoprotein genes .

For the readers of this Paper , it is clarified not to be under an impression to misinterpret a sick snakes's knotting to be an aspect of mathematical interest due to word similarity in knots & knotting !

However , in my research findings on snake's lengthy body going into contractions that manifest like knots is observed . But , it is a subject of an artificially created microgravity conditioned -- limited and closed on all sides-- environmental domain , in which a healthy snake produced deemed knots-like or knotting of its own body showing three to four rings or holed-spaces as can be seen hereunder under floating momentum –physics in limited time as exhibited below.

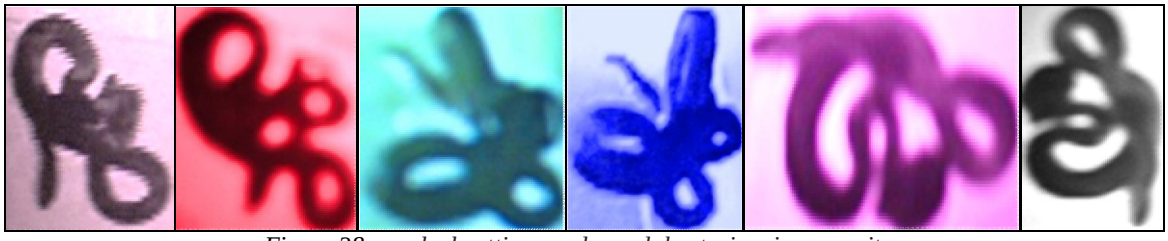


Figure 38: snake-knotting or deemed knots in micro-gravity .

11. Research Phase Ten

Are the Ebola- knot-constructions & Snake-hood-markings signs of ONTOLOGY ?? Are there super-sciences against known Mathematics & Biology ??

Knotting of differential nature occurring in the ebola virus and snakes being diametrically opposite in that the virus Ebola continues to survive without self-annihilation but the snakes meet with the end of life is however, not clueless if one minds the birth marks of a snake in a scientific mode of comparatively essential inner objectives of a living cell . The ebola knots and hood-markings of snakes constituting a biological provocation appearing to convey to mathematicians and biologists their inter-relatedness may be true. . Both being not hidden but openly noticeable and therefore of substance in significance to the observing Mathematicians as well as Biologists for interpretations of bio- mimicry . Or, sorts of non-mathematical and non- physical process of chemical-imperialism as static –sign-system as well as dynamic-sign-system , respectively , as per the pictures seen below . When it comes to seeing reality in this new way, we still only have, at best, a fruitful chaos of ideas and possibilities as to how the DNA transformations are ontologically attractive to the world-view. But the solid results – say mathematical influences or equivalences - will continue and the end product really ought to be nothing less than a new conception of how DNA transforms against the world-view since ebola and snakes are manifesting as a cross-species transmission event of knotting of survival –force and knotting of non-survival-force . In other words , what the foundation ontology of the crawling insects could otherwise be ?

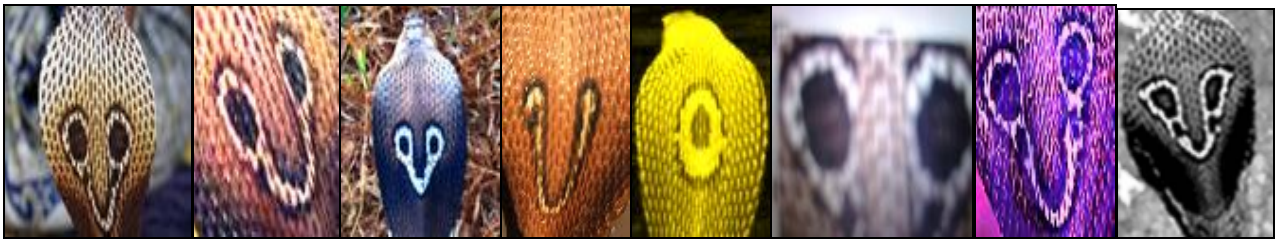


Figure 39: Snake-hood's pair-connected rings above & ebola's looping knot-features below.

Figure 40

On the origins of life in the Solar System. One theory is that genetic material first formed on Mars and promoted on Earth because of its hospitable environment for the emergence of life. It was wet and had the right amounts of seas with salt not required by RNA, a flimsy molecule believed to be the ancestor of DNA. The discovery that DNA may be capable of making the journey between the neighbouring planets adds a supporting piece of evidence that DNA is tough and dry to survive as per the Applied Molecular Evolution Research.

There is no reason for us to be threatened by the ebola – or the reality of evolved life. When we correct wrong assumptions our world expands .We are physical beings but what makes us unique on this planet is that we can have an impact on our surroundings and be aware of it . Science has focused our attention on our physical evolution for over hundred years making humans different from crawling creatures. The gene duplications behind the divergence of the specialized fetal hemoglobin chains occurred some 200 million years ago which corresponds with the appearance of placental mammals . The so-called genomic instructions are buried deeply inside the nuclei of individual cells that cannot for good reasons know which destiny in the adult organism they are meant to occupy and the cellular apparatus is therefore dependent on external instructions to tell it which genetic instructions to execute at each moment .

12. Last & 11th Research Phase

The Conclusion

Genetic Information Flow 'DNA' & Genetic Material DNA as Composite Mathematical Product

An axiom is proposition that is not susceptible of proof or disproof. Its truth is assumed to be self-evident and to be true for the purpose of a chain of reasoning. The foundation of axiom in Science of knots that for every two points there is a curve that contains both those points because no other information is given about knots or points ruling out straight lines in knots practically and therefore it cannot be proven but sanctioned by experience . One may say it is thus knots thought fitting axiom which is self-evident proposition in mathematics and epistemology. Say, a starting point of reasoning as basis for classically conceived argument to be accepted without controversy.

In modern logic, an axiom delimits the realm of analysis and the relative truth is taken for granted within the particular domain of analysis and serves as a starting point for deducing and inferring other relative truths. No explicit view regarding an axiom is ever taken in the context of modern mathematics, as such a thing is considered to be an irrelevant and impossible contradiction. However, that is helpful for the sake of studying the consequences that follow from it .

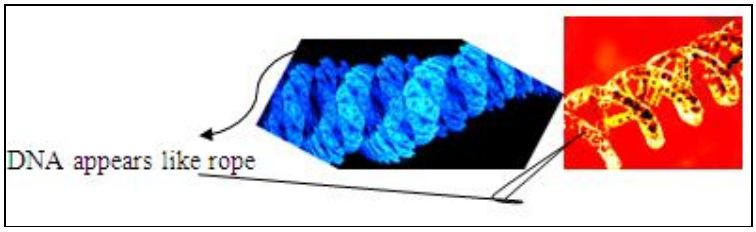


Figure 41

The use of the mathematical descriptions gave solutions of each of the knot models in the form of a graph theory. Graph Theory is a microcosm of the world of mathematics in that the components of any mathematical system have their counterpart in graph theory. The chief ingredients of every mathematical system are of 5 types like the undefined terms, non-technical terms, defined terms, axioms, and theorems. No system, mathematical or otherwise, can define all of the terms involved in that system without entering into a circle of definitions .Every mathematical system also must contain some mathematical terms which are undefined terms. In graph theory, point and line were undefined terms. These are mathematical terms whose meaning was never explained. At times, lines were not what one might intuitively have expected them to be. Concerning knots as mathematical structures but encountered and resolved by graph theory as the open problems significant for the development of mathematics. In most sciences, one generation tears down what another has built and what one has established another undoes. But, in mathematics alone each generation builds a new story to the old structure. 1. Every point is a knot 2 . Every point is a vertex or an edge. 3. Knots have no right angles .4. Knots have no straight lines .5. Knots have no geometry. 6. Knots have calibrated curves 7. There is no knotmeter like thermometer. 8. The size of a knot tends from value one to value infinity since zero knot is not a knot. Mathematicians integrate and differentiate knotting constraints. Fixed models of knots arose after the observation of the atomic configurations of elements in the world of Organic & Inorganic Chemistry furthered by bio-chemistry . Knots were indeed handiworks in the age-old days of primitive races of mankind and hunter-civilizations because animal-skin-cutouts were made use of as binding or tying fibres or ropes flexible and deformable suiting the purposes at hand with or without free ends. Given a piece of rope should be fully knotted , practically one can cut off the excess lengths of rope-ends but mathematically knot has no free or loose ends. In this context, a knot is a one-dimensional curve that winds through itself in three-dimensional space, finally catching its tail to form a closed loop.

Knot Theory & DNA , DNA & Topology , DNA & Differential Geometry , DNA & Graph Theory , DNA & Mathematics of Tangles , DNA & Mathematics of Unknotting Number Theory testify that DNA is composite mathematical product of genetic material and genetic information flow .

13. References

1. George J. Kertz . (1979) . THE NATURE AND APPLICATION OF MATHEMATICS . Goodyear Publishing Company , Inc . Santa Monica , California 90401
2. Paul & Saaty . (1977) . THE 4 COLOR PROBLEM . McGraw –Hill International Book Company . America .
3. Jozef H. Przytycki. (1998). Classical Roots of Knot Theory . Pergamon Press . New York , USA .
4. Chiu & Johnson . (2003) . Advances in Protein Chemistry .Academic Press , London , UK .
5. J.Gimbell & J.W.Kennedy & L.V.Quintas . (1993) . Quo Vadis Graph Theory ? Elsevier Science Publishers , The Netherlands .
6. De Witt Sumners . (1973) . Random Knotting : Theorems , Simulations, Applications , Deptt. of Mathematics , Springer Lecture Notes, Florida State University , America .
7. Alen Watts . Ontological knots of ebola
    i. www.werone.co/speakers/The_Wonderful_Wisdom_of_Alan_Watts.php
8. Ortho Flint . www.math.uwo.ca/~ortho/ortho_poster.pdf. Knots & Nature, Deptt.of Maths ,
9. University of Western Ontario .