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Full Length Research Paper

Medical plants and natural products chemistry in Achebe's 'things fall apart': The metaphor of kola

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By convention, critical readership of literary materials obliges the reader to place more values on the humans than the non-humans, which, very often, is factorial of the human. This restriction to liberal objectivity has subjected readership to the crucible of humanism – a barrier to evolving understandings of readership, which might enrich discourse in other disciplines such as Chemistry. The bearing of the current research, 'thing theory', views all disciplines as organic whole recommending dynamism of imagination to critical conservatives often not enamored by the vagaries of literary fruition. With new life breathed into objects such as kola in such a statement as "*He who brings cola brings life*" critically explored with insinuating effects in the literary text under study, readers' scientific imagination is expanded to benefit from the emerging interdisciplinary fields of theory as an adventure of discovery into the very heart of Chemistry to exhume life principles and truths buried in physical matter. The aim of this study is to enrich interdisciplinary discourse with a burning curiosity to explore new meanings and untapped energies buried in medical plants and natural products represented in literary works.

Keywords: Medical plant, natural product chemistry, Achebe's 'things fall apart', kola.

INTRODUCTION

This study seeks to inspire scholars to entertain post-human perspectives on an art form and institution that has historically been understood as the crucible of humanism. It asks them to prioritize methodological experimentation, and to actively engage with emerging interdisciplinary fields of theory, from new materialism to medical plants and natural products chemistry – network theory to affect studies. Fundamental, therefore to the study are three questions: **i.** What is Literature? **Ii.** What is Chemistry? **Iii.** How relevant is Literature to Chemistry or Chemistry to Literature? Justice shall be done to this study by exhaustively exploring these questions.

What is literature?

There have been various attempts to define literature. Simon and Delyse Ryan, for instance, in their book *Foundation: Fundamentals of Literature and Drama*, begin their attempt to answer the question "What is Literature?" with this observation:

The quest to discover a definition for literature is a road that is much travelled, though the point of arrival, if ever reached, is seldom satisfactory. Most attempted definitions are broad and vague, and they inevitably change over time. In fact, the only thing that is certain about defining literature is that the definition will change. Concepts of what is literature change over time as well.

Some critics have also argued that the definition of literature is culturally relative in that it is only how it is perceived in any culture. In Western Europe prior to the eighteenth century, literature as a term, indicated all books and writing. A more restricted sense of the term emerged during the Romantic period, in which it began to demarcate "imaginative" literature.

The value judgment definition of literature considers it to exclusively include writing that possesses a literary quality or distinction, forming part of the so-called *belles-lettres* ('fine writing') tradition. This is the definition used in the *Encyclopædia Britannica* Eleventh Edition (1910–11) when it classifies literature as "the best expression of the best thought reduced to writing." However, this has

the result that there is no objective definition of what constitutes literature; anything can be literature, and anything which is universally regarded as literature has the potential to be excluded, since value-judgments can change over time.

The formalist definition is that the history of literature foregrounds poetic effects; it is the "literariness" or "poeticity" of literature that distinguishes it from ordinary speech or other kinds of writing. Jim Meyer considers this a useful characteristic in explaining the use of the term to mean published material in a particular field (e.g. scientific literature), as such writing must use language according to particular standards.

Most forays into the question of "what is literature" go into how literature works with the reader, rather than how the author set about writing it. It is the reception, rather than the writing, which is the object of enquiry.

What is chemistry?

Like literature, the definition of chemistry has also changed over time, as new discoveries and theories add to the functionality of the science. The word *chemistry* comes from the word *alchemy*, an earlier set of practices that encompassed elements of chemistry, metallurgy, philosophy, astrology, astronomy, mysticism and medicine; it is commonly thought of as the quest to turn lead or another common starting material into gold. Alchemy, which was practiced around 330AD, is the study of the composition of waters, movement, growth, embodying, disembodying, drawing the spirits from bodies and bonding the spirits within bodies (Zosimos). An alchemist was called a 'chemist' in popular speech, and later the suffix "-ry" was added to this to describe the art of the chemist as "chemistry".

The word *alchemy* in turn is derived from the Arabic word *al-kīmīā* (deworrob si mret eht ,nigiro nI .(الـ كـ يمـ ياء from the Greek χημία or χημεία. This may have Egyptian origins. Many believe that *al-kīmīā* is derived from the Greek χημία, which is in turn derived from the word **Chemi** or **Kimi**, which is the ancient name of Egypt in Egyptian. Alternately, *al-kīmīā* may be derived from χημεία, meaning "cast together".

The term "chymistry", in the view of noted scientist, Robert Boyle in 1661, meant the subject of the material principles of mixed bodies. In 1663, "chymistry" meant a scientific art, by which one learns to dissolve bodies, and draw from them the different substances on their composition, and how to unite them again, and exalt them to a higher perfection – this definition was used by chemist Christopher Glaser.

The 1730 definition of the word "chemistry", as used by Georg Ernst Stahl, meant the art of resolving mixed, compound, or aggregate bodies into their principles; and of composing such bodies from those principles. In 1837, Jean-Baptiste Dumas considered the word "chemistry" to refer to the science concerned with the laws and effects of molecular forces. This definition further evolved until, in 1947, it came to mean the science of substances: their structure, their properties, and the reactions that change them into other substances – a characterization accepted by Linus Pauling. More recently, in the words of Professor Raymond Chang (1998), the definition of chemistry was broadened to mean the study of matter and the changes it undergoes.

Chinua Achebe – A brief biography

Born **Albert Chinualumogu Achebe**; 16 November 1930 – 21 March 2013) was a Nigerian novelist, poet, professor, and critic. He was best known for his first novel and magnum opus, *Things Fall Apart* (1958), which is the most widely read book in modern African literature.

Raised by his parents in the Igbo town of Ogidi in southeastern Nigeria, Achebe excelled at school and won a scholarship for undergraduate studies. He became fascinated with world religions and traditional African cultures, and began writing stories as a university student. After graduation, he worked for the Nigerian Broadcasting Service (NBS) and soon moved to the metropolis of Lagos. He gained worldwide attention for *Things Fall Apart* in the late 1950s; his later novels include *No Longer at Ease* (1960), *Arrow of God* (1964), *A Man of the People* (1966), and *Anthills of the Savannah* (1987). Achebe's novels focus on the traditions of Igbo society, the effect of Christian influences, and the clash of Western and traditional African values during and after the colonial era. His style relies heavily on the Igbo oral tradition, and combines straightforward narration with representations of folk stories, proverbs, and oratory.

One aspect of his biography that is very relevant to this study is that, in 1948, in preparation for independence, Nigeria's first university opened known as University College (now the University of Ibadan), it was an associate college of the University of London. Achebe obtained such high marks in the entrance examination that he was admitted as a Major Scholar in the university's first intake and given a bursary to study medicine. After a year, he changed to English, history, and theology. Because he switched his field, however, he lost his scholarship and had to pay tuition fees. He received a government bursary, and his family also donated money – his older brother Augustine gave up money for a trip home from his job as a civil servant so Chinua could continue his studies.

Medical plants and natural products chemistry –The metaphor of kola in *Things Fall Apart*

[The] absolute infinitude of this multiplicity of objects and events in the world must be ordered by the observer,

according to the ideas he brings to the object of his …enquiry. Scientific enquiry… is both rare and recent in human affairs. It seems to me that 'fiction' has always been, not a falsification of reality but a necessary ordering of it. Real reality cannot be appreciated as it is: an infinite, equally existent number of discrete and ever-changing entities and events. To see the universe in [scientific] terms might be accurate, but would be impossible to absorb, and meaningless in human terms. A selection of events on the basis of chronological sequence, causality, and value judgments has always been necessary; that is to, information about reality has been presented to and by human species in the forms of ... fiction known to us in History, the Law, Religion, Epic Poetry, the Novel, the Drama, and the statements of politicians and journalists. In one sense, everything is fiction; in another sense, fiction is reality, (Rockwell, 1986: viii).

Traditionally, Africans do not radically separate art from teaching. Rather than write or sing for beauty in itself, African writers, taking their cue from oral literature, use beauty to help communicate important truths and information to society. Indeed, according to George, Joseph, (1996), an object is considered beautiful because of the truths it reveals and the communities it helps to build, (p.303). Hence literature:

i. reflects society, makes us think about ourselves and our society, allows us to enjoy language and beauty, it can be didactic, and it reflects on the human condition,
ii. creates a world that can only be seen through reading literature,
iii. changes and or reflects ideologies.

The ideology reflected here is the chemical relevance of cola in Achebe's *Things Fall Apart* (1958), captured in poetic nuances with insinuating effects to mirror not only the culturally rich African society, but also the medical values in this natural plant – kola.

In Chapter 3 of the novel, the protagonist, Okonkwo, visits Nwankibie, "a wealthy man… who had three huge barns".

He took a pot of palm-wine and a cock to Nwakibie. Two elderly neighbours were sent for, and Nwakibie's two grown-up sons were also present in his obi. He presented a kola nut and an alligator pepper, which was passed round for all to see and then returned to him. He broke it, saying: 'We shall all live. We pray for life….(P.14)

The very proverb that inspired this prayer, "He who brings kola brings life", is in the beginning of the novel,

One day a neighbor called Okoye came in to see [Unoka]…. Unoka went into an inner room to and soon returned with a small wooden disc containing a kola nut, some alligator pepper and a lump of white chalk. 'I have kola,' he announced when he sat down, and passed the disc over to his quest. 'Thank you. He who brings kola brings life.'(p.4-5)

When Unoka broke the kola nut, he "prayed to their ancestors for life and health, and for protection against their enemies". This prayer reechoes the proverbs: "He who brings kola brings life" to justify the significance of kola to humanity.

The bearing of the current research, 'thing theory', views all disciplines as organic whole recommending dynamism of imagination to critical conservatives often not enamored by the vagaries of literary fruition. With new life breathed into objects such as *kola* in such a statement as "He who brings cola nut brings life" in the literary text under study, readers' scientific imagination is expanded to benefit from the emerging interdisciplinary fields of theory as an adventure of discovery into the very heart of chemistry to exhume life principles and truths buried in physical matter such as kola.

Thing theory, largely created by Bill Brown (2001), is a branch of critical theory that focuses on the role of things in literature and culture. It borrows from Heidegger's distinction between objects and things, whereby an object becomes a thing when it is somehow made to stand out against the backdrop of the world in which it exists. Thing theorists look at the role of things within literature – at the fixation on particular objects. It looks at the increasingly blurred boundaries between such "things" as object and subject, gift and commodity, art and artifact, alienability and inalienability, as well as at the disciplinary boundaries between ethnography, archaeology, art history, and literary studies.

An objective correlative is a literary term referring to a symbolic article used to provide explicit, rather than implicit, access to such traditionally inexplicable concepts as emotion or color. Popularized by T. S. Eliot in his essay "Hamlet and His Problems", the term was first used by Washington Allston around 1840 in the "Introductory Discourse" of his Lectures on Art:

Take an example from one of the lower forms of organic life - a common vegetable. Will any one assert that the surrounding inorganic elements of air, earth, heat, and water produce its peculiar form? Though some, or all, of these may be essential to its development, they are so only as its predetermined correlatives, without which its existence could not be manifested; and in like manner must the peculiar form of the vegetable preexist in its life, — in its idea, — in order to evolve by these assimilants its own proper organism.

Eliot used the term exclusively to refer to his claimed artistic mechanism whereby emotion is evoked in the audience:

The only way of expressing emotion in the form of art is by finding an "objective correlative"; in other words, a set of objects, a situation, a chain of events which shall be the formula of that particular emotion; such that when the external facts, which must terminate in sensory experience, are given, the emotion is immediately evoked.

The emotion evoked by kola in "He who brings kola brings life" is such that expands one's scientific imagination to benefit from the emerging interdisciplinary fields of theory as an adventure of discovery into the

very heart of cola to exhume life principles and truths buried in it: “He who brings kola brings life.”
For the purpose of this study, three types of kola, namely, kola nut, bitter kola and alligator pepper, traditional plants which are often eaten as snacks especially among the elderly in Nigeria, shall be discussed.

Kola nuts

Kola nut belongs to the plant family S*terculiaceae*, having about 125 species of trees native to the tropical rainforests of Africa. Of these, two species are particularly very common among the Yoruba of South Western Nigeria; these are C*ola nitida* and *C.acuminata*. Kola nut is chewed in many West African cultures, either individually or in group settings and is often used ceremonially. Kola nuts contain large amounts of caffeine and threobromine, and are therefore used as a stimulant. According to Odebunmi, et al (2008),

They produce a strong state of euphoria and well being, enhance alertness and physical energy, elevate mood, increase tactile sensitivity, suppress appetite and hunger, (p.1).

The caffeine in the nuts also acts as a bronchodilator, expanding the bronchial air passages, hence kola nuts are often used to treat whooping cough and asthma. In addition to their use in soft drink manufacture, kola nuts are used in tropical regions as nervous system stimulants to inhibit fatigue and hunger. They are also used in traditional African folk medicine to cure stomach ulcers, diarrhea, dysentery, and other ills.
Kola nut has a wide application in the food and pharmaceutical industries where it is used as sources of caffeine in foods and pharmaceutical products.
According to Ajai et al (2012),

Kola nut also contains traces of essential minerals like K, Ca, Mg Na, Fe Zn, Mn, and P. Some of these minerals act as sources of macro and micro nutrients needed for growth and development and metabolic activities by man. Calcium is essential for the development of bones, sodium relevant for acid base balance and osmotic regulation of the body fluids and the transmissions of nerve impulses. Deficiency leads to lowering of osmotic pressure and reduces utilization of digestive proteins (44-7).

Iron is relevant for metabolic processes involving oxygen transport, storage as well as oxidative metabolism and circular growth. Deficiency of iron in the body leads to anemia, fatigue and palpitation, depressed growth in children, anorexia and resistance to infection. Potassium also influences osmotic equilibrium and the maintenance of acid-base balance in the body. It also facilitates the amino acids uptakes by cells and influences carbohydrate metabolism in cells. It is also required for normal tissue protein synthesis and functioning of the heart and kidney muscles. At this point, one begins to appreciate Achebe’s proverb: “He who brings kola brings life” as the hidden meanings begin to surface.

Constituents of kola

Caffeine, theobromine, theophylline, catechine, epicatechine, D-catechine, phenoline, pholaphens, Kola Red, betaine, protein, starch, fat, thiamine, riboflavin, niacin, ascorbic, acid, betaine, sugar, gum, cellulose, water, calcium, potassium, iron, beta carotene, tannic acid. All of these are very functional for human healthy living justifying “He who brings kola brings life.” *Caffeine*, for instance, an alkaloid ($C_8H_{10}O_2N_4 \cdot H_2O$) found in coffee, tea, cacao, and some other plants. It is also present in most cola beverages. Caffeine was discovered in coffee in 1820. In 1838 it was established that *theine*, discovered in tea in 1827, is identical to caffeine. The drug increases the blood pressure, stimulates the central nervous system, promotes urine formation, and stimulates the action of the heart and lungs. Caffeine is used in treating migraine because it constricts the dilated blood vessels and thereby reduces the pain. It also increases the potency of analgesics such as aspirin, and it can somewhat relieve asthma attacks by widening the bronchial airways. Caffeine is produced commercially chiefly as a byproduct in making caffeine-free coffee.

Bitter kola

According to Blades (2000), bitter kola (or *garcinia cola*), is also known as African wonder nut. Bitter kola is found in the tropical rain region and given different names in Nigeria. It is known as Orogbo in Yorubland, Namijin-goro among Hausa, Akuilu in Igboland. It comes from garcinia cola trees, which belongs to the family of c*lusiaceae* and grows in coastal rainforests in the South Western and South Eastern parts of Nigeria.

Traditionally, “these nuts were chewed as a masticatory substance, to stimulate the flow of saliva,” (Leakey, 2001). But now, they are widely consumed as snack in West and Central Africa. The kernels of the nuts are widely traded and eaten as a stimulant. Omode et al., (1995) says bitter kola is also rich in caffeine and threobromine and is also believed to be an aphrodisiac. Here it could be philosophically argued that truly “He who brings kola brings life” in the sense that bitter kola increases fertility in man which make a man more productive. Onochie and Stanfield, (1960) say, unlike other kola, “bitter kola is believed to clean the digestive system, without side effects such as abdominal problems, even when a lot of nuts are eaten”. Bitter kola, if dried, ground and mixed with honey, can also function to make a traditional cough mixture.

Bitter kola has been identified as a potent antibiotic

which could be efficacious in the treatment of HIV and AIDS. According to Mrs. Chinyere Nwokeke, a researcher with the Nigeria Natural Medicine Development Agency (NNMDA), (who spoke to the News Agency of Nigeria (NAN)) that the kola could be used in treating opportunistic infections associated with HIV. It is “highly recommended in the treatment of HIV and AIDS because of its anti-bacterial, detoxification and cleansing properties.” She said that the chemical Saponin in bitter kola is responsible for its cleansing effect. Saponin is mainly used as tonic for the liver. It enhances the functions of the liver and gall bladder. “It is also very effective in the treatment of cough, diarrhoea, tuberculosis and other bacterial infections…. When food is suspected to be contaminated by bacteria, chew bitter kola immediately after, it will forestall the development of any infection or poisoning," she added. According to a Nigerian online Business Journal, Akanchawa (2008) researches in modern science have revealed that bitter kola contains chemical compounds that will help the breakdown of glycogen in the liver and has other medicinal uses which account for its longevity property in man. “Bitter kola is anti-poison too, it has the ability to repel evil men and spirits, it could sound superstitious but it works, she said. The naturalist said that the seed and the bark of bitter kola should be eaten together in cases where food poisoning is suspected. It helps to detoxify the system.” Nwokeke said it can also be used to repel snakes for those who live in areas that are prone to snakes. She added that bitter kola could be used in the treatment of breast cancer as it has anti-cancerous effect. For children, when ground and mixed with honey, bitter kola could be used in the treatment of measles and mumps. “It should be taken orally and also applied externally in the case of mumps.” Nwokeke also revealed the efficacy of the bitter kola in vomiting for both children and adults. “It can be used to clear coarse voice, it clears the voice by stimulating the production of mucus along the lining of the vocal tube which softens the dry throat.” It has also being revealed that the body craves for bitter foods from time to time. Nature advocates a balance in everything, when sweet foods are eaten in excess, the body tends to be more acidic, in order to balance this, bitter foods should be eaten occasionally. The body is at its optimum health when it is slightly alkaline

It is now obvious why literature, as represented by the text under study, does elucidate the metaphor of kola. It uses language creatively with insinuating effects. With Chemistry as the binocular to examine kola, one begins to appreciate the truth in the proverb, “He who brings kola brings life.”

Alligator pepper

This kola, also known as **(*Afromomum melegueta*),** is a West African spice belonging to the plant family *Zingiberaceae*. It is commonly known as guinea grain and is a close relative of the grain of paradise, which is obtained from the closely-related species, *Afromomum exscapum*. However, unlike grains of paradise which are generally sold as only the seeds of the plant, alligator pepper is sold as the entire pod containing the seeds. Alligator pepper is a very popular spice used mainly as food, in brewing, and in veterinary and traditional medicine (Igwe et al., 1999). It is also believed to have purgative, galactagogue, anthelmintic and hemostatic properties and also to be very effective against schistosomiasis.

Nutritional values

According to Standard methods of the Association of Official Analytical Chemists (AOAC, 1984), these nuts were used to determine the moisture, crude protein, crude fat, total ash and crude fibre contents of each sample. Moisture content was determined by heating 2.0 g of each sample to a constant weight in a crucible placed in an oven maintained at 105oC. The dry matter was used in the determination of the other parameters. Crude protein (% total nitrogen x 6.25) was determined by the Kjeldahl method, using 2.0 g samples; crude fat was obtained by exhaustively extracting 5.0 g of each ample in a Soxhlet apparatus using petroleum ether (boiling point range 40-60oC) as the extractant. Ash was determined by the incineration of 10.0 g samples placed in a muffle furnace maintained at 550oC for 5 h. Crude fibre was obtained by digesting 2.0 g of sample with H2SO4 and NaOH and incinerating the residue in a muffle furnace maintained at 550oC for 5 h. Total carbohydrate was obtained by difference. Each analysis was carried out in triplicate. In the experiments carried out at the Cocoa Research Institute of Ghana (CRIG), Tafo, it was discovered that that kola nut could act as sources of some of these vital nutrients in order to complement their deficiency in human diet. In a research carried out by Odebunmi, E. O., Oluwaniyi, O. O., Awolola, G.V. and Adediji, O. D. of the Department of Chemistry, University of Ilorin, Ilorin, Nigeria in 2008, it was discovered that,

The proximate composition and the mineral content of three (3) traditional ‘snacks’, kolanut (Cola nitida), bitter kola (Garcinia cola) and alligator pepper (Afromomum melegueta) were evaluated. The results show that C. nitida has the highest moisture, crude fat and crude fibre contents of 66.4, 5.71 and 7.13%, respectively. Protein and ash contents were highest in A. melegueta (7.18 and 2.49%, respectively). G. cola has the least content of all nutrients considered except moisture. Generally, C. nitida and G. cola have relatively comparable nutrient compositions while the composition of A. melegueta is relatively different from those obtained for the other two samples. A. melegueta has non-detectable quantity of potassium and phosphorous but has the highest quantity

of calcium (388 mg/Kg dry matter), magnesium (960 mg/Kg), iron (37.8 mg/Kg), zinc (32.93 mg/Kg) and manganese (68.53 mg/Kg). C. nitida has the highest content of potassium (3484.67 mg/Kg) and phosphorous (411.43 mg/Kg). G. cola also recorded the least content of all minerals except K and P which were absent in A. melegueta. Manganese was not detected in either of kola nut or bitter kola.

Decaffeinated coffee

Caffeine can be removed from coffee by treating the green beans with chlorinated hydrocarbon solvents. The beans are roasted by ordinary procedures after removal of the solvents. Decaffeinated coffee is used by people hypersensitive to the caffeine present in regular coffee. In the 1980s nonchemical methods of decaffeination became more common.

Lowers body weight

An animal study published in 2009 in the *Nigerian Journal of Physiological Sciences* found that mice fed a kola nut or caffeine-enriched diet ate less and weighed less at the end of the study than the mice in the control group. It was only mice on the caffeine-enhanced diet, however, that drank less water and had less locomotors activity; mice on the kola nut diet did not show significant decrease in these areas. The scientists concluded that a kola nut diet could help lower body weight and that the effects of kola nut -- particularly in the areas of locomotor activity and thirst -- may not be entirely due to the caffeine content in kola nuts.

May help with prostate cancer

A 2009 article in the "Journal of Toxicology" stated that compounds derived from kola nuts were shown to be effective in stopping prostate cancer. These nonsteroidal compounds from the kola nut, phytoandrogens or phytoestrogens, may cause a chain reaction that leads to prostate cancer cell death. The scientists, however, stated that their findings warranted significant further research. Consult with your doctor before using kola nut to avoid any complications with medication your doctor is prescribing.

Protects against infections

A 2004 edition of "Phytotherapy Research" found that kola nut extracts can help prevent the growth and spread of certain bacteria. Members of the mycobacterium species – responsible for illnesses such as meningitis and tuberculosis -- showed significant reduction in growth and development when introduced to kola nut extracts that were between 4 and 10 micrograms per milliliter. The extracts were made from the root, stem and leaves of the kola nut plant. The root extract had the highest concentration and was the only one effective against the bacteria for tuberculosis and meningitis.

CONCLUSION

"He who brings kola brings life" is not only a factual statement but also a philosophical one. In Africa, for instance, kola is a symbol of peace, friendship, and hospitality, a bit like the Indian peace pipe. It is seen as a sacred plant and used in fertility ceremonies. West Africans have been using Kola socially and medicinally since historic times. They chewed the seeds for their stimulating effect and as a treatment for fever. Slavery brought the Kola tree to Brazil and the Caribbean. Kola arrived in the United States after the civil war, with a reputation that Caribbean people ascribed "innumerable fabulous virtues." In the 19th century, a now famous Atlanta pharmacist was experimenting with a new head ache remedy, mixing kola, cocoa and sugar in his backyard; he added carbonated water and created a new refreshing drink…coca cola. Two years later, he sold the recipe to an Atlanta business man and he began marketing the drink.

The economic benefits of kola have been deliberately avoided in this paper even when they strongly justify the proverb: "He who brings kola brings life." They would attract critical attentions when a study on the relevance of literature to economics or business administration beckons.

Be that as it may. There is need to quickly advise against taking high dose of kola because of the caffeine they all contain. Pregnant and breast feeding women should avoid high dose of them as should people who have conditions such as high blood pressure, diabetes, epilepsy, anxiety, fertility problems, heart disease, osteoporosis, insomnia, stomach distress. Kola nuts, for instance, contain high amounts of N-nitroso compounds which are carcinogenic. In any society where the chewing of Kola nuts is a common practice, there is a high incidence of oral and gastrointestinal cancer which may be related to this habit.

In a 2006 publication of the "African Journal of Biotechnology," scientists noted that liquid extracts from the kola nut boosted heart rate and metabolic rate. When taken in too high a dose, however, the kola nut extract could potentially cause heart failure in the rats used for the study. Scientists, when comparing their conclusions to previous studies on caffeine's effect on heart rate and metabolism, found the results of their kola nut study to be similar. In low concentrations, caffeine – like kola nut – boosts heart rate and metabolism but at greater concentrations can be fatal. Scientists concluded that people who eat more than one kola nut per day may

be at greater risk of developing heart disorders. By this, it could be concluded also that the bringer of life can also take it. And that is “He”.

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