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THE CONTRIBUTIONS OF BIOLOGICAL SCIENCE TO NATIONAL DEVELOPMENT: NIGERIAN EXPERIENCE

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Abstract

The world is a global village and globalization is a process of interaction and integration among the people, companies,and government of different nations, a process driven by international trade and investment and aided by information technology. This process has effects on the environment, on culture, on political systems, on economic development andprosperity, and on human physical well being in societies around the world. This current wave of globalization has been driven by policies that have opened economies domestically and internationally. Therefore, the imperative role of scienceto national development cannot be neglected and there is a lively debate on the link between biological science and national development. The motivations for science research way from one field to another. Much medical research, for example, focuses on finding answers to questions such as why cancer cell develops and how to inhibit their growth. Military research is also usually focused, investigating, for instance, the effect of strong bursts of electromagnetic energyon missile guidance systems. Biological science generates continuous innovation (technological, organizational, managerial) generated by learning entities that have been shown to be responsible not only for productivity increases, but also for dynamic competitive advantage of firms, industries, education and nations in the unfolding global economy.This paper discussed environmental conservation, biological sciences with regards to the teaching Profession and implication of teaching methods to national development in biological sciences. The paper concluded that biological sciences have unravel many ideas used in education, medical, agricultural and industrial fields. Medical personnel cannot diagnose the course of a particular illness without a biological scientist in the laboratory. The paper recommended that biological sciences should form part of the training programmes in schools from secondary to tertiary institutions where students are trained.

Keywords: Biological Science, Contributions, National Development

Introduction

In a society like ours, there is need for individuals with appropriate knowledge and skills in the pharmaceutical, medical,agricultural, industrial and scientific aspects of the economy. For a nation to advance they must have well trained and capable persons in handling so many sensitive areas connected to health, food production, manufacturing of finished products coupled with general satisfaction with little or no importation of goods from other nations of the world. These aspects have not been achieved in Nigeria because patients are still flown abroad for medical treatment, while food and other finished products are still imported. These bring about inflation and general economic backwardness (Aina, 2013).

Nigeria is a developing country and has a long way to catch up with the more scientific and industrial advanced countries.Biological sciences are keys that can open the door to this scientific and industrial advancement in Nigeria as the only science that study life. The idea of saving human life brings about the idea of producing gargets such as microscope andother scientific equipment used in kidney and heart transplant or for the extraction of plant and animal products used forpharmaceutical companies. These bring about training to suit these purposes since life is precious in all its ramifications. Biological sciences build human and animal life and boost food production through gene manipulation. In doing this, thenon-living components of our environments such as soil, air, sun and water also play useful roles for the betterment of plant and animal lives. Traditionally, biological sciences have formed part of the training programmes in schools from secondary to tertiary institutions where people are trained (Baba, 2014).

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The contributions of Biological Sciences to national development cannot be over-emphasized in which our society benefits in so many ways. Such areas are mostly in the laboratory analysis and production of different products like bread,cheese, beverages, breweries, antibiotics, vaccines, vitamins, enzymes and so on. Modem biotechnology rests upon biological foundation for survival. The part played by microorganisms in our ecosystem are indispensable because they make possible nutrients to be mineralised and released through biodegradation. The cycles like carbon, oxygen, nitrogenand sulphur that takes place in terrestrial and aquatic systems are sources of nutrients in ecological food chains and foodwebs. Today, there are still struggles in microbiological analyses on cure for Advance Immune Deficiency Syndrome (AIDS) and malaria vaccines in which the world cry out for help (Betty, 2011).

Biological practices start from home through health education such as general cleanliness, care and prevention of diseases, gestation, feeding, and method of First Aid treatment during snake bite, scorpion bite and other accident that take place at home and at work. These prepares the one towards better output for the development of any nation. The educational system of Nigeria has adapted itself more and more to meet the demands for recruitment and training by which the whole range of a complex and varied occupational hierarchy depends. The problem turns out to be not only a question of the provision of schools and universities, and the allocation of resources in money and materials, but also a question of the different scientific attitudes, assumption and experimentation with regards to biological courses in schoolswhich are associated with the different occupational status in our society (Dutta, 2015).

Ottaway (2010) said that education is concerned with the preparation of the child for his future occupation in life. Our society springs into the dynamic and changing life that we all expect; hence the fundamental group is of course differentstatus which builds better society. Biological sciences contributes in the different fields of our economy in terms of health,industrial and agricultural sectors. Biological sciences contribute to national development in so many areas. Such areas are explained as follows: Agriculture. The methods commonly employed for the improvement of the quality, yield, sweetness, flavour, and high vitamin content of food crops, fish and meat is as a result of animal hybridization and crossing between cultivated crops. This was first discovered by the father of genetics, Gregor Mendel in 1856. Introduction of high-yielding, disease-resistant varieties, short duration varieties, early-maturing crops which avoid floodor drought and protection against diseases and pests were discovered through genetics manipulation by studying genetic make-up of food crops. Occupations such as farming, forest guard, hunting and timber contractors get their jobs throughagricultural practices; all these contribute to the progress of our economy. Many economic plants with a variety of uses have been discovered in their natural state particularly in forests, while a good number of them are now cultivated for food and industrial uses (Gomwalk, 2010).

It is of interest that India is the largest producer of tea, sugar cane, groundnut and jute; China produces rice; USA producescorn and cotton; Brazil produces coffee while Ghana produces cocoa and Russian Federation produces beet sugar. Plantbreeding has grown so much in economic importance that agricultural and plant breeding stations all over the world haveembarked on programmes of artificial plant breeding to enhance the quality and yield of particular crops, and the powerof resistance to pests and diseases. Apart from selection, and breeding, hybridization is needed to improve crops, poultrybirds and tasty meat from pork, beef and chicken. Studies on how plants can draw their Nitrogen from air rather than from expensive fertilizer are in progress. All these are work on genetics in which biological sciences play vital roles (Ibrahim, 2013).

Pharmaceutical, Medical and Veterinary Science Trained medical personnel treat human and animal diseases (vertebrates). The drugs used are mostly extracts from plants and animals. The general system of human and other animalshave to be known for easier treatment by which biological sciences bring about many ideas about diseases. Such biological scientists are: Fracastoro (1946) who suggests that invisible organisms cause disease. Jenner (1978-1982) introduced cowpox vaccination for smallpox. Bassi (1835 -1844) discovered that silkworm disease is caused by a fungus and proposed that many diseases are microbial in origin. Semmelweis (1847 -1850) shows that child microorganisms donot arise by spontaneous generation. Koch (1882-1886) discovers tuberculosis and that anthrax disease are caused by Bacillus anthrasis. Metchnikoff (1884-1889) described phagocytosis just as Ross (1897-1922) shows that malaria parasite is carried by mosquitoes and Reed (1900-1926) proves that yellow fever is transmitted also by mosquitoes. Landstemer (1902-1912) discovers blood group while Wright and others (1903-1908) discovered antibodies in the blood ofimmunized animals. Beijerinck (1888-1892) isolated root nodule bacteria for Nitrogen fixation used by plant while Ivanowsky provides evidence for virus causation of tobacco mosaic disease. Pasteur (1885-1891)

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develops rabies vaccinewhile Winogradsky studies sulphur and nitrifying bacteria. Gallo and Montagnier (1983 - 1984) isolated the human immunodeficiency virus (HIV). In 1986 the first hepatitis B vaccine was produced by genetic engineering and approved for human use. All these laboratory discoveries have helped in the treatment of human and animal diseases (Michael, 2015).

These discoveries clear the way for superstitious beliefs such as in sickle cell anaemia disease and albinism which peopleattributed to some supernatural forces. If we understand how individual genes work, then we may be able to control certain genetic diseases of man such as diabetes and haemophilia (inability for blood to clot); develop new varieties of bacteria that could be used to produce expensive and rare antibiotics drugs, hormones like Insulin and antibodies. Plantscan also be assisted to draw their Nitrogen supply from the air rather than from expensive chemical fertilizers (Prescott,2012). Gene manipulations have been used to handle certain diseases like colour blindness in which red-green colour appear grey. Industries for national development is needed in food processing industries in order to maintain high standardof hygiene and prevent diseases like: cholera, dysentery and typhoid. Pollution of air, soil and water body through gasesand effluent in our environment have to be controlled in order to avoid unfathomed illnesses. In water processing plant, microbiologist analyse water sample to be free from Coliform and other pathogenic organisms transmitted through waterpollution especially when the water level is very close to soak-away safety tank (Nakano, 2017).

In brewery industries drinks are hygienically tested to be satisfactory for public consumption through laboratory analysisso that any pathogenic life forms are not found. Pasteurised milk, canned food like corned beef, tin tomatoes, salad cream,sardine, cornflakes and other foods are packaged hygienically by scientist who study biological sciences. In cosmetic industries, raw materials are derived from plants and animals such as oil and perfume (from plant extract) only those thatknow something about human skin work perfectly in this industry. Animal fats are used for blue band production while bakery use yeast as their rising and fermenting agents. All these are work of biological scientists (Nnabuo, 2012).

Environmental Conservation

The environmental health officers take control over environmental issues connected with conservation of plants and animals, sanitation in our homes and public places and issues on general pollutants in our fragile environment. General public enlightenment as regards bush burning, and other dangerous gases such as carbon monoxide and sulphur dioxidein our environment have been explained by public health officers to cause greenhouse effect and ozone layer depletion if not controlled. The uses of dangerous chemicals like Gamalin-20. Nitrogen- phosphorus-potassium (NPK) fertilizer tokill aquatic life forms in our river to be dangerous to our health when consumed (Onasanya, 2011). Environmental officershave tried to conserve animals going into extinction especially slow walking animals like chameleon and other low birthrate animals like elephant, tiger, lion, and others by operating forests reserves and zoological garden. Forest guards prevent economic plants like timber from deforestation especially when they are too young to cut down. Good numbersof medicinal plants are cultivated in various states in an experimental as well as commercial basis. Biological sciences crated this idea of environmental conservation and public health effects (Nnamdi, 2014). Most plants are tested in the laboratory to know their medicinal content. Such plants that have been tested in Nigeria are ginger which serve as antibiotics and preservative for stomachic digestive and carminative medicinally. Garlic has effective remedy for high blood pressure, rheumatic and muscular pain, giddiness and sore eyes. It also aids in intestinal and stomach ulcers and nature's best antiseptic. It can also be used in cases of torpid liver and dyspepsia. It has also been linked as a good tonic for the lungs. Wild plants are sometimes tested with pathogens to know their antibiotic effect. Aloe vera was discoveredthrough this procedure and is widely used in hospital for fast healing of wounds. Wastes in our environment have been reconverted into usable products such as paper into tissue paper; plastics converted into useful materials and waste iron re-melted for other uses (Norton, 2015).

Teaching Profession

The teacher, like any other personnel, plays many scientific roles with the different statutes he occupies both in his privateand public life. The nature of the teacher's occupation places him in the special position of having a complicated set of roles in connection with his occupation. Such contributions that involve biological sciences in schools are as follows:

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(i) Teachers in lower schools teach general hygiene like brushing of mouth regularly, cutting of nails and hair, washing and ironing of school uniform, having good sleeping posture, observing some exercises and sweeping the classrooms and clearing of surroundings. The teacher encourages the pupils to wet a dusty floor in order to prevent respiratory diseases.He also teaches appropriate method of treating potable water before drinking especially in rural communities.

(ii) Teachers have administered first aid treatment to injuries during snake bite, sports injury or other minor illness beforethe doctor's prescription. These have saved many situations in the lives of pupils. Some plant herbs have also been usedto remove poison. For example, Coconut water has been used to remove poison from the system. Also dilute vinegar, orange and lemon juice has served as reliever to strong alkaline caustic soda consumption (Norton, 2015).

(iii) Teaching aspects of food that aids growth and development; as in the use of roughages which build the intestinal linings and the teaching of developmental stages of a child including sex education are taught in schools. They also teachways of handling electrocution or shock through electricity and bad news also ways of avoiding bad habits like smoking,and drinking; and the consequences of these bad habits to the body such as cancer, tuberculosis, atherosclerosis and shortlife span.

Implication of Teaching Methods to National Development in Biological Sciences

Okoro (2012) said that national development contributes to the economy of the nation. Education serves as instrument for building the biological sciences which build the different facets of professional bodies involved in skills and expertiseneeded for development. According to Gomwalk (2010) the wealth and economic self-reliance of a nation is proportionalto the level of her scientific and technological development. Nwagbo (2011) emphasised that the level of science and technological advancement is in turn dependent on the quality of the teachers. The teachers must therefore command confidence in teaching the theoretical as well as the practical aspects of biology in secondary schools' syllabus in order to instill the spirit of laboratory consciousness. Okenyi, 2013) opined that the quality of a teacher is proportional to the quality of students and quality of students is equally proportional to the citizenry of a particular country.

The training of the biology teacher to be practically oriented in biological practical is very important for future laboratory analysis of his students. Mendel solved the problem of heredity because he was exposed to biological practical (Olorode,2016). Mendel study till today has gone a long way in solving so many problems arising from day-to-day problem of marriage like paternity dispute of a child during argument about pregnancy, or problems of rhesus positive mother carrying a rhesus negative child like that of her husband lead to still-birth of the child because the negative rhesus factorof the child can react with rhesus negative factor of the mother leading to many complications for the child (Olutola, 2016). It has also solved problems of child mal-formation leading to imbecile or poor development of the brain. Many medicinal plants have also been realised among the forest plants which has been extracted for curing diseases; all these are through laboratory analysis. Better yield of food produce such as fish, meat and food crops through cross breeding and chromosome or gene manipulation coupled with artificial mutation have been used to produce new features of plantsand animals (Omorogbe, 2013).

Conclusion

Biological sciences unravel many ideas used in education, medical, agricultural and industrial fields. Medical personnelcannot diagnose the course of a particular illness without a biological scientist in the laboratory. For instance, typhoid ormalaria parasites are unraveled by test in the laboratory and the therapeutic agent used for curing such ailment are also analysed before the doctor's prescription is done. So also, in food production and raw materials useful in industries neededto boost output, is yet to be achieved due to poor manpower development in biological sciences. Such areas like pharmaceutical, medical, agricultural and industrial sectors of our economy are bound to bring about advancement in Nigeria depending on the training rendered to young scientists at school.

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Suggestions

The following suggestions are stated:

(1) Teachers should be made to command confidence in teaching the theoretical as well as the practical aspects of biologyin secondary schools in order to instill the spirit of laboratory consciousness.

(2) There should be the training of biology teachers to be practically oriented in biological practical for future laboratoryanalysis of his students.

(3) The environmental health officers should take control over environmental issues connected with conservation ofplants and animals, sanitation in homes and public places and issues on general pollutants in their fragile environment

(4) Biological sciences should form part of the training programmes in schools from secondary to tertiary institutions where students are trained.

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