Studying the Causes of Heat Emission and their Effect on Vectors and How to Maintain Animal Productivity and Health

18th of September 2022

Egypt's Vision for Cop27: The Role of Animal Health in Egypt's National Climate Commitments

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Professor of Parasitology, Faculty of Veterinary Medicine, Cairo University.

Prof. Mona Ibrahim Elenbaawy

Professor of Microbiology, Faculty of Veterinary Medicine, Cairo University.

(SESSION B)

Prof. Mohamed Abd El-Hameed Shalaby

Professor of Virology, Faculty of Veterinary Medicine, Cairo University.

Prof. Mona Ibrahim Elenbaawy

Professor of Microbiology, Faculty of Veterinary Medicine, Cairo University.

Prof. Zakia Attia Ahmed

Professor of Animal, Poultry & Environmental Hygiene, Faculty of Veterinary Medicine, Cairo University.

Prof. Mohamed Moawad Ali El-Bahy

Dr. Mohamed Moawad Ali El-Bahy (El-Bahy,M.M.) is an emeritus professor at the Department of Parasitology,Faculty of Veterinary Medicine,Cairo University. He has Invention: El-Bahy-Malone DISCLOACK-9029-900807-MT (Diagnosis of *Fasciola hepatica* infections by detection of stable antigen from bile and feces). USA, Patent office, Baton Rouge LA: 70821.

He has been appointed as head of the Parasitology Department and rewarded Scientific Research Award of Cairo University (1995), State Incentive Prize (1998) and Menoufia University Distinguished Research Award (2001). He published **72** articles in international and local journal. He was a PI or Co-PI for 10 research and applied projects funded from local and international funding agents.

Remote Sensing as a Tool for estimating the effects of Climate Changes on the Risk Assessment of Parasite and Vectors

Abstract

Climate parameters' such as temperature, relative humidity, hydrological regime components as rain fall underground water table, surface water abundance and quality as well as Agro climatic databases …etc.) are key factors have direct effects on the seasonal and regional distribution of the parasites and vectors. Pathogens are able to tolerate special range of each of the previous parameters. Alterations in these parameters by increase or decrease adversely affect the epidemiology, survival, and infectivity of these pathogens.

Remote sensing is one of the most effective spatial tools depends on satellite technology that able to accurate measuring the variations in large number of ecological and climatical factors which reflects on the stability of the disease life cycle and epidemiology. Association of this climate data as layers with the ground survey study of the target parasites and linking of this data variation on geographical base will use in building a complete system of information on a geographical base, known as Geographic information system (GIS). In this system the available data are registered to the identical scale and geographic projection of the target area map. This allows analysis of all information by location. This facilitates accurate determination of the disease risk assessment that can renewed annually in relation to the suspected climate changes.

GIS translating epidemiological information into a format that will assist in design a control strategy on a geographical basis.

In conclusion the authorities must adopt the remote sensing technology to follow up the changes in climatic parameters aiming to estimate its reflection on the parasitic disease epidemiology and distributions. This supports the design of more accurate control programs for target parasites in the selected area.

Prof. Azza Mohamed Mahmoud Elgendy

Azza M. Elgendy is Professor of Insect Molecular Science at Cairo University, Faculty of Science. She got her PhD from Department of Agrobioscience, Graduate School of Biotechnology, Kobe University, Japan. Her current research involves the study of the immune response of *Culex* as vector for avian malaria "*Plasmodium cathemerium"*. Also, she studied the *Culex* microbiomes and used for reduction of *Plasmodium* population inside the mosquito's body. Further, she studied the impact of using these isolated bacteria on the mosquitos' biology as a pilot studied for field application. She is a member of international team work to study the interaction of hormones, neuropeptides, monoamines and clock genes for regulation of vitellogensis in the American cockroach. She is a member of the North American Society for Comparative Endocrinology (NASCE). She is a reviewer in many journals such as Insect Science, Scientific Reporter, International Journal of Agricultural and Food Technology. She was examiner for scholarship offered by DAAD in the field of biology.

Impacts of climate change and environmental modifications on vector-borne diseases

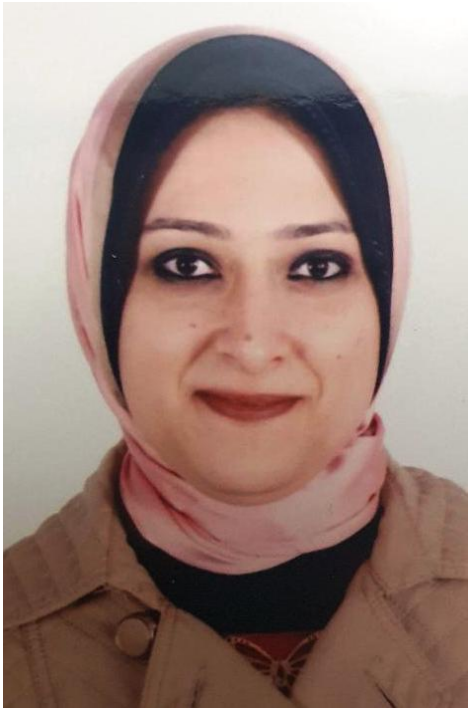
Abstract

Insects are the most successfully existing multi-organisms during earth history. According to "Intergovernmental Panel on Climate Change 2022 report", Climate change wider geographic distribution of many vector-borne diseases in Asia, Europe, Central and South America and sub-Saharan Africa, potentially putting additional billions of people and animals at risk by the end of the century. Climate change affect insect vectors. Increased temperature degree can increase the geographic spread and/ or distribution of vectors. Extending of warmer season can lead to an increase in the duration of disease transmission seasons, vector life span.

Temperature change, heat weaves, can affect the behavior of vectors, for example, change the biting behavior of mosquitoes. Increased rainfall can increase the amount of standing water, creating more breeding areas for many vectors insects and drought lead to food shortage and immigration of life organisms. Vector-borne diseases comprise three elements: the pathogen, the vector, and the host. Pathogens can be parasites, viruses or bacteria that cause infections in humans and/or animals. The vector is a living organism that transmits an infectious agent, pathogen, from an infected animal to a human or another animal. Vectors can be mosquitoes, flies, ticks, or other insect species. Hosts can be humans or livestock or other animals that become infected and eventually sick after being infected by a vector. On the other hand, heat stress, intensity and duration, can directly affect the health of the host animals by causing metabolic disturbances, oxidative stress and a drastic decrease in immune capacity leading to infections and death.

Approaches for controlling outbreak of Vector Born Diseases: A strategy should be adopted to integrate data from public health, animal health, agriculture, and environmental sciences to determinant risk factors associated with the various health states at the Human/ Animal/ Environment interface. Technological and digital innovations have enabled the incorporation of climatic data into surveillance systems, enhancing their capacity to predict trends in outbreak prevalence and location. Furthermore, the ecological requirements of zoonotic pathogens and the importance of anthropogenic factors must be taken into account in order to better manage the spread of zoonosis. Innovative control protocol for insect vectors is urgently needed such as: using of the gut bacterial contents to reduce or kill pathogen inside the vector. Clear genomic data for both vector and pathogen can help for blocking or reduction of pathogen development inside its vector. Finally, we can use eco-safe compound such as chlorophyllin derivatives as pesticides.

Asst. Prof. Marwa Mohamed Attia



Dr. Marwa Mohamed Attia is an early career academic with research interest on animal and human disease of zoonotic and economic importance. I am looking to enrich my experience concerning work on international standards in a research team contributing to research projects. Enthusiastic, outgoing, highly motivated and hard working with excellent laboratory, research and teaching skills developed through sixteen years work and study experience. I have a **51 relevant research** on Scopus with **11 *h*-index** and a total of **83.576** Impact Factor. I win several awards from Cairo University. I have a **15 regional published** research items. Member on several international society. The World Association for the Advancement of Veterinary Parasitology (WAAVP);Member on The Egyptian Parasitology Society; Member on Egyptian Veterinary Society; Member on the Quality Assurance unit in the Faculty of Veterinary Medicine; Cairo University; Member on the Measurement and Assessment unit in the Faculty of Veterinary Medicine; Cairo University. I am a Reviewer for many Scientific relevant journals.

The significant effects of the climatic changes on arthropod vectors and the vector-borne parasitic diseases

Abstract

Climate change (earlier spring seasons, shorter and milder winters, and hotter summers, conditions) significantly affects vectors and vector-borne diseases in humans and animals. Temperature, humidity, rainfall, and other climatic factors are known to affect the reproduction, development, behavior, and population dynamics of the arthropod vectors of several diseases such as parasites; bacterial and viral populations (mosquitoes, sandflies, fleas, flies, and tick-borne diseases). Climate can also affect the development of pathogens inside vectors, the population dynamics and ranges of the nonhuman vertebrate reservoirs of many vector-borne diseases as well as the vector control. Whether climate change increases or decreases the incidence of vector-borne diseases in humans and animals will depend not only on the actual climatic conditions but also on local non-climatic epidemiologic and ecological factors (transportation).

The veterinary and human physicians are the first ones to notice the emergence of the disease transmitted by vectors that could suffer from the prevention measures. The increase of the arthropod vector depends upon different factors such as environmental factors such as forest fragmentation, the establishment of parks, and various developments; and climatic factors; such as the increase or presence of several arthropod species not present in a specific free locality, such as the presence of several species of ticks and flies in Europe and Africa which are not in their normal habitat. Different important parasitic diseases increase in the last few years due to an increase in vectors population which in turn increases due to the worth effects of climatic changes in different countries throughout our world.

Prof. Hussein Mohamed Omar

Dr. Hussein Mohamed Omar is an emeritus professor at the Department of Parasitology, Faculty of Veterinary Medicine, Cairo University. His research interest is on parasite taxonomy, immune biology, pathophysiology, zoonoses and molecular diagnosis of parasitic diseases. He has published 77 papers. He joined international research projects in Germany, Britain, Spain, USA and Saudi Arabia.

Dr. Omar is a peer-reviewer for international and local journals and active member in several societies of parasitology and related fields. He has been visiting professor at Ohio state University and Texas A&M and adjunct professor at Al-Qassim University, Saudi Arabia.

Climate Impact to Geo-and Bio-helminth Parasites of Medical and Veterinary Importance

Abstract

Our planet's warming is increasing and threatening many ecosystems everywhere. As the global temperatures continue to climb, it raises confusion to the relationship, prevalence, and spread of parasites and disease.

Egypt is highly subjectable to water scarcity, droughts, rising sea levels, and other adverse impacts of climate changes, of these, gradual or pulse rise of temperature. Such adverse changes affect helminth parasites (Geo- or Bio-helminths) and their different hosts.

Warming can alter a parasite's life cycle, limit the range of suitable host species, or even impair the host's immune response.However, not all pulse heat events will cause the same response. What may benefit a particular helminth parasite or host in one ecosystem can be detrimental in another.

The extrinsic incubation period of helminth species in the soil (Geohelminths such as ascarids and trichurids) or within the invertebrate intermediate hosts or in the vertebrate paratenic host (Bio-helminths, as spirocercan and acanthocephan) will be greatly affected.

Some invertebrate intermediate hosts can withstand and adapt themselves with environmental changes like the ants (Hymenopteran vectors) others, severely affected as beetles (Coleopteran vectors) or fail to keep larval stage developing as soil mites (Acarine, cryptostigmin vectors).

Other vertebrate hosts (Paratenic hosts, mammalian, or non-mammalian) may also be affected and consequently disease dispersion should be variable. Species from different classes of helminths, namely trematode, cestode, nematode and acanthocephalan worms will be dealt with.

From above, it is clear how climate change, has the capability to drive helminth parasites of animal and human worldwide.

Prof. Mohamed Abdelhameed Shalaby

Principal Investigator of the bilateral project between faculty of Veterinary Medicine, Cairo University and Institute of Virology, Gottingen University Germany entitled: "Application of mobile recombinase polymerase amplification (RPA) for the rapid diagnosis of relevant viruses in veterinary medicine" with the cooperation with Prof. Frank Huferet ,Director of Virology institute ,UMG, Goettingen, Germany.The project is financed by Alexander Von Humboldt foundation ,Germany with A total Sum of 65,ooo Euros. (2012-2014). He also published more than 100 papers in various aspects of virology and immunology published in local and int. journals

Dr Shalaby is a member of many scientific societies and he is now the president of the Egyptian Society of Virology. He is a member in the National Committee for Promotion Of Univ. Staff – of Microbiology.(Supreme council of universities), member of the Committee for the Promotion of Scientific Staff at the Institute for Animal health Institute ,Agriculture Research Center, Ministry of Agriculture. Egypt and a member of The National Committee of biological Science, 2014 Academy of Science and Technology/Egypt.

Dr Shalaby was awarded the National Encouragement Award in Agricultural Sciences from the National Academy of Sciences and Technology(2002), was awarded The Merit Prize of Cairo University in Basic Sciences (2006), and awarded an extension to Alexander von Humboldt foundation at the Dept. of Microbiology ,Goettingen University(August6-October,30,2018) The plan Foccus on: Serotyping of foot-and-mouth disease virus using oxford nanopore sequencing He organize with Prof. Dr.Czerny and Dr Ahmed Abd elwahed the int. Summer School on imported and neglected infectious diseases Between Cairo University And Goettingen University (Sept.16-27, 2018 ,Cairo Egypt) and supervised the 7th Int. Virology Conference Organized by the Egyptian society of Virology, Hurghada ,Egypt (November,27 –December 1St, 2018)

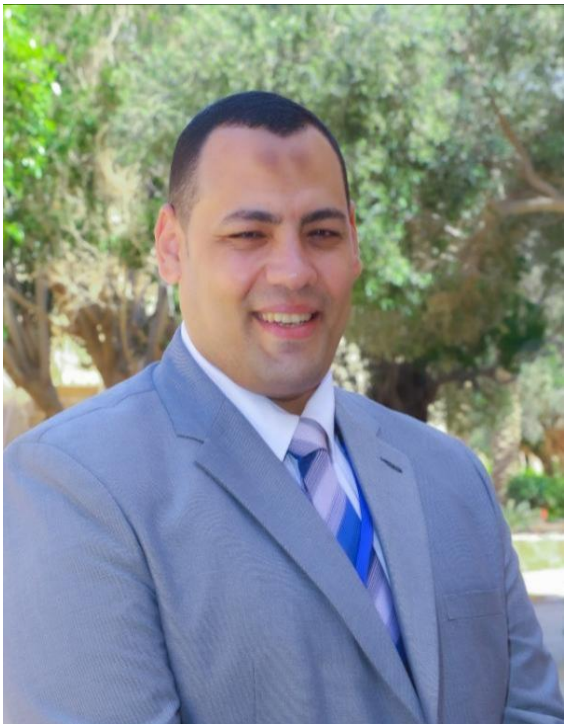
How might climatic change affect the spread of viruses

Abstract

In the coming decades, ecological degradation, rising temperatures, and extreme weather events could intensify the threats to human and animal health posed by viruses

At least 10,000 virus specues have the ability to infect human but, at present, the vast majority are circulating silently in wild mammals. However, changes in climate and land use will lead to opportunities for viral sharing among previously geographically isolated species of wildlife.

Asst. Prof. Abd-Alla Mohamed Samy



Dr. Samy is currently associate professor at Ain Shams University. He has expertise in vector-borne diseases, disease burden analysis, and health economics. His research addresses several questions at the interface of ecology, epidemiology, public health, and global health. He is broadly interested in studying zoonosis, arboviral epidemiology, and the climate change influences on disease dynamics and spread. His lab uses an interdisciplinary and multi-faceted approach to research questions, typically using a combination of field and lab experiments, geographic information system, remote sensing, ecological modeling, and phylogeography. His current work on arboviruses and mosquito-borne diseases is focused on developing disease forecasts, understanding the major drivers of disease spread, and identifying the possible shifts at disease risk in response to global warming in the future. He is the section editor of "viruses" at the prestigious journal PLOS Neglected Tropical Diseases. He works also as associate editor of PLOS One, Frontiers in Medicine, Frontiers in Public Health, and Journal of Wildlife Diseases. Dr. Samy is a leading expert in global health and the member of the European MediLabsecure project. He is also a honorable member of the African Network of Neglected Tropical Diseases (ARNT). Dr. Samy received recognitions by the 2014 Young Investigator Award of the American Society of Tropical Medicine and Hygiene (ASTMH), and the Fulbright Fellowship.

Disease dynamics and spread under climate change: predicting next viral pandemic

Abstract

The world is presently experiencing the most serious known outbreaks of several arboviruses and other neglected tropical diseases. We identify disease transmission scenarios and present a set of analyses to develop disease risk maps. These maps are used to detail transmission risk in multiple dimensions and fill gaps of knowledge in vector surveillance and control programs. We examine several case studies for diseases that strike many populations across the world and cause higher rates of morbidity and mortality among these populations.

Asst. Prof. Tamer Fawzy Ismail

Dr. Tamer F. Ismail, Associate Professor of Animal, poultry and Environmental Hygiene, Dept. of Veterinary Hygiene and Management, Faculty of Veterinary Medicine, Cairo University. He had obtained his PhD degree in 2012 on Epidemiology from Interdisciplinary Graduate School of Engineering and Agriculture, University of Miyazaki, Japan. Currently, he manages biostatistics courses for undergraduate and postgraduate Veterinary Medicine students. He is sharing in teaching epidemiology and other department's curricula. His research interests focus on Environmental pressure in relation to Antimicrobial resistance of pathogens, methods of pathogen transmission and surveillance of public health important diseases

Climate Change: Causes, Consequences, Mitigation and Adaptation

Abstract

Global climate change will have a profound impact on Earth's ecosystems and individual species. Greenhouse gas concentrations have continued to increase.The most important of these anthropogenic greenhouse gases is CO2. Water vapor, methane, nitrous oxide, ozone, and chlorofluorocarbons also add to the insulating effect of CO2. Rising atmospheric temperatures and concentrations of water vapor will likely lead to: rising sea levels that would flood many low-lying coastal cities; some forests being consumed in vast wildfires; some rivers drying up; certain ecosystems collapsing; the extinction of at least a fourth and perhaps half of the world's species; more intense and longer-lasting heat waves; and more destructive storms and flooding. The change of the local microclimate brings with it a vast set of consequences due to the spread of insects, and the temperature changes.

Communicable diseases can be spread by multiple ways usually divided into four simple categories. Diseases "transmitted by water" are those by oro-faecal transmission, such as cholera or various forms of diarrhoea. The increase in the temperature of the sea and the inland waters accelerates the proliferation of the vibrio and cholera is changing its geographical distribution. Water-based diseases are those where a parasite spends part of its life cycle in water, as in the case of schistosomiasis. There are also signs of the spread of this disease outside the endemic areas, for example in some parts of China, and many low-income countries. Water-washed diseases are those in which the causal agents are usually eliminated if rules of elementary hygiene are followed; examples are scabies and trachoma. In this case, the crucial problem is the availability of water for washing, and therefore a reason for concern is the desertification of extensive areas of the planet. Lastly, water-related diseases are due to the fact that the vector of a parasite has a life cycle that includes water. The best-known example is malaria, linked to the cycle of the Anopheles and the presence of stagnant water. The change in the distribution of communicable diseases following climate change is a phenomenon which will not exclusively concern low-income countries. In the past few years, we have been seeing the appearance in Europe of infectious diseases which previously did not exist or were unknown—for example chikungunya or the Zika virus, both transmitted by the Aedes mosquito—which are linked not only to migration and transcontinental travel but also to climate change, or the interaction of the two factors. In conclusion, if nothing is done to reduce our emissions of greenhouse gases, the 21st century will see climate changes that are dangerous, possibly catastrophic.

Asst. Lecturer
Hassan Aboul-Ella

Hassan Aboul-Ella, a senior teaching assistant of microbiology, faculty of veterinary medicine, Cairo University. His research interest is directed towards the computational biology, industrial microbiology, and applied immunology scientific fields. His current research work is focused on developing rapid diagnostics, preparation and evaluation of economically afforded vaccines for infectious agents. He participated in several scientific projects and research papers related to emerging mycotic agents, rapid diagnostics, fungal vaccines, and mycotoxins control. He is an active member of scientific research group in Egypt, American society of microbiology, and British society of immunology

The global warming and its effect on the microbial communities

Abstract

In the era of climate change, how will life evolve to a rapidly fluctuating environment? A persisting question that is must to be clearly answered by the whole world. The adverse effect of climate change associating extreme weather patterns, regularly rising temperatures, increased occurrence of storms, flooding, and other disastrous environmental events, act as a global danger bell. Climate change affects every living organism on earth, from humans to tiny algae. Over three billion years, the planet has been facing several climatic changing conditions, through which, the microbial communities were the most persistent in the face of those unfavorable environmental conditions. With smaller genomes, rapid reproduction cycles, and microscopic life forms often have a major advantage over more complicated organisms when it comes to adapting to novel environments, from deep-sea hydrothermal vents to glacial ice. The organisms that survive in these extreme environments are often capable of performing biochemical reactions—making or breaking minerals, transforming elements from one form into another and producing compounds—that dramatically alter the microbe's immediate surroundings and impact the entire planet. The effect of climate changes especially global warming on the microbial communities can be categorized into two main domains, firstly, the effect on the beneficial microbial members those participate by some way in adjusting the ecosystem through their contribution as main drivers in several environmental elemental cycles as carbon, nitrogen, phosphorous or as a major gases consumers as carbon dioxide and methane or even their role in keeping the environmental gases equilibrium as nitrous oxide. On the other hand, the global warming also indirectly has greatly affect the distribution map of pathogenic microbial communities through its direct impact on the surrounding environment, seasonality, hosts, and vectors. Finally, a general outlook to the future of climate change, regardless to the climate change that may occur, the microbial communities have several capabilities making them able to face this change.