

Editorial

One thing that the Earth has and no other planet has is 'life'. Scientists are busy looking for life on extra-terrestrial bodies with a focus currently on Mars and the expedition is led by NASA. Until we discover it elsewhere, we can say that life is exclusive to our planet. Life on Earth expresses in myriad forms – from very tiny microscopic entities to gigantic marine creatures. Humans are one among these forms. Scientists broadly classify all life-forms into three major groups, namely, animals, plants and microbes and believe humans as the fourth exclusive group. In totality, all forms of life together, including humans, belong to one component of an ecosystem and are termed as 'biotic component'. An ecosystem would have another important component which is known as 'abiotic component' and includes all non-living parts such as the soil, rocks, atmosphere and so on. Hence, an ecosystem is an integration of abiotic and biotic components. There is a great deal of interaction and interdependence between abiotic and biotic components, with a skew towards greater dependence of biotic components on abiotic components. Furthermore, there is an enormous variety of interactions among biotic components. All these interactions together shape our planet and induce changes in it with passage of time.

Abiotic as well as biotic factors have more to do with how these components of an ecosystem affect one another. Abiotic factors in an ecosystem are the non-living things that affect living things in the ecosystem. Similarly, biotic factors in an ecosystem are the living things that affect other living things in the ecosystem. A biotic factor could affect other creatures in many ways, such as, consumption, competition, predation, parasitism, amensalism, commensalism, mutualism, neutralism and symbiosis. A fire burning a forest floor is an example of interaction between abiotic (fire) and biotic (forest floor) components. The cattle grazing on grass is an example of interaction between two biotic components in which one component (grass) is affected by the other (cattle).

Our knowledge of both abiotic and biotic components has progressed exponentially in recent decades and is growing rapidly. Scientists are busy in understanding not only the variety of life-forms, but also biotic interactions of various kinds. Everyday thousands of such studies are added to science throughout the world. This volume of *The NEHU Journal* (January-June,

2017 issue) is the first attempt of its kind to focus on researches in biotic systems in the context of the region but with bearing worldwide. The volume includes nine articles and one book review. The articles encompass results of primary research as well as a meta-analysis based on reviews. The only 'book review' is a review of a pictorial guide on wild orchids of Meghalaya.

The volume opens with the highlight of the results from a phytosociological study at macro-level. The author, Uma Shankar, establishes the occurrence of hitherto unknown 'tropical rainforests' in the State of Meghalaya. The rainforests are mystic and most diverse ecosystems in the world, generally concentrated around the equator of the Earth, primarily due to hot and humid environment. The occurrence of rainforests in Meghalaya which is not only far away from the equator but also is north of the Tropic of Cancer is certainly amusing if not exclusive. This study from the region would have a global appeal as the scientists are involved in mapping the expanse of the rainforests on Earth and trying to understand the limits of the distribution of this important ecosystem in relation to prevailing climate.

Symbiosis is an important interaction between two types of organisms in which both organisms derive benefit. About 25 species of dicotyledonous forest trees are known to form a symbiotic relationship with a very special microorganism, *Frankia*, which belongs to actinomycete group. The micro-symbiont *Frankia* facilitates fixing of nitrogen in the forest trees to aid their nutrition and growth. In the second article of this volume, Rajni Varghese and Arvind Kumar Misra present the results of molecular diversity of *Frankia alni* which forms a symbiotic relationship with *Alnus* trees native to the northeastern region. The study is of global importance as agronomists worldwide are targeting improvement of nitrogen status of forest soils by inducing tree-actinomycete symbiosis.

The northeastern region is endowed with a great diversity of species of medicinal plants. One of the most valued plants of local origin but with global demand is *Curcuma* of family Zingiberaceae. With a total of about 120 species worldwide, the genus *Curcuma* has some highly medicinal species in the wild of the northeastern region. The authors of the third article, Judith Mary Lamo and Satyawada Rama Rao succinctly present morphological characters, distribution and economic importance of three wild curcuma species.

Orchids adorn the northeastern region of India. In plant kingdom, the

family Orchidaceae is one of the largest groups of flowering plants with approximately 30,000 species which is nearly 10% of all flowering plants. As many as 1330 species are known to occur in India and two-thirds of these occur in the northeastern region alone. The region is credited as a place of origin of several species of orchids. Many orchid species are endemic to the region. Unfortunately, several of the species of orchids are under threat of extinction due to overexploitation or habitat loss. The authors of the fourth article, Prasenjit Paul and Suman Kumaria, enlist important orchids of northeast India with their conservation status. They also enlist orchid species that can successfully be grown *in vitro*.

Fishes have special significance in the northeastern region as people here relish delicacy of fishes in many forms. The region is well-known for diversity of fishes. We know that fishes survive in water. However, the authors of the fifth article, Nirmalendu Saha and Bodhisattawa Banerjee, bring to us two catfishes which survive during considerable period of the year when water recedes to the minimum due to their ability to breathe in air, as is common in many amphibians. These catfishes regularly face ammonia toxicity and have consequently developed biochemical adaptations in their nitrogen metabolism to survive well inside the mud peat during summer months when water to float and submerge is not enough. The authors highlight and review the role of ureogenesis and synthesis of urea via the ornithine-urea cycle which brings in a unique adaptation. The uniqueness of this biotic interaction is of immense academic as well as applied relevance to fish biology.

The forests are blessed with a distinct group of organisms which have often challenged biologists to secure a place either with plants or with animals. Mushrooms among macrofungi are an extremely attractive group of organisms which displays enormous diversity in the forests of northeastern India. While some species are poisonous, 'puffball' mushrooms are consumed by humans as a delicacy. The demand for mushrooms is soaring and with it the risk of accidental consumption of poisonous mushrooms is also high due to poor nutritional understanding of many species. The authors of the sixth article, Madhusmita Borthakur and Santa Ram Joshi address this global issue with an example of molecular characterization of irregular potato-shaped puffball mushroom, *Scleroderma* from northeast India.

The ecosystems are blessed with a group of eusocial insects called termites which relieve of ecosystems of debris and release nutrients for

recycling. Interestingly, however, termites are regarded as pests of woods and plants ignoring the fact that they render a precious ecological service to the ecosystems at almost no cost. Surprisingly, these voracious detritivores weigh more than the weight of all humans in the world – apparently unbelievable! The authors of the seventh article, Sudipta Choudhury, Khirod Sankar Das and K. Chanreila L. Nonglait present us a short note on the diversity of termite fauna in northeast India with a discussion on the ecological and medicinal importance of termites.

The traditional knowledge of the use of plant and animal resources for food and medicine rests safely with the indigenous tribes of the forested regions worldwide. The Khasi tribe in northeast India, which is indigenous of Meghalaya is rich in assimilated knowledge of the use of organisms and their products found in vicinity. The authors of the eighth article, Karen R.R. Mihsill and Bela Keshan recorded diminutive ethno-zoological information on the use of faunal species by the Khasi tribes in East Khasi Hills and concluded that the indigenous traditional knowledge is still important today.

All organisms have ‘biological rhythms’ (clocks), which repeat at periodic intervals. The rhythms with a cycle of approximately 24-hour duration (or a day interval) are known as circadian rhythms. Besides plants and animals, circadian rhythms are well evolved in humans. In the ninth article, a team comprising of Anand Dixit, Iadlangki Bamon, Sanborlang Byrsat and Rajnu Chetri present us an overview of biological rhythms in general and a review of rhythms observed in human circadian system with a note on the implications on human body in instances of disruption of these rhythms.

I join the members of the Editorial Committee in complimenting the authors for their positive response to a call to bring out this Special Issue of *The NEHU Journal* on the theme “*Research in Biotic Systems*”. With responsibility of the editor of this special volume, I sincerely thank Prof. A.K. Misra, Prof. B.B.P. Gupta, Prof. R.N. Sharan, Prof. N. Saha, Prof. S.N. Ramanujam, Dr. S.R. Joshi, Dr. P.K. Ambasht, Dr. R.C. Sundriyal and Prof. S.C. Garkoti, who reviewed the articles that are included as well as those which could not be included in this volume. To my belief, all reviewers responded to my request at a very short notice. I place on record my special thanks to Prof. H. Srikanth (Chief Editor) and all my fellow members of the editorial committee to have shown a great deal of confidence in me while

closely watching the progress of the issue with patience. I firmly believe that the biologists as well as those interested in topics in biology will find this issue interesting. I also deem that this issue will ignite curiosity in biologists of the northeastern region of India to generously contribute quality articles to the future issues of *The NEHU Journal* which is currently in the list of UGC recognized journals. Thank you, readers! Now engross yourself in this volume.

Uma Shankar
Volume Editor