At normal atmospheric pressure the amount of work a man can perform seems to be limited by his cardiovascular system. At depth below water however, alveolar ventilation is the limiting factor. Primary physiological problems that are faced by man while going to different depths of sea are (i) effects of cold environment, compression, nitrogen narcosis, oxygen tolerance and toxicity, inadequate pulmonary ventilation and the complicated problem of safe return to normal sea level atmosphere. At the end of World War II, diving operations at depth of 500 to 600 ft were considered to be heroic ventures interms of biomedical knowledge and technology; however, in recent times, ocean dives upto 3000 ft have been well established in many of the developed countries. Results from these studies indicate that man can spend long periods of time at the depths of continental shelf with suitable technology and can perform moderately heavy physical work without any ill effects. We in India are lagging behind in researches in this direction. Necessity and importance of undertaking research investigations in the context of national development has been emphasised.

Due to rapid growth in urbanization, tremendous increase in industry and due to increased use of chemical fertilizers and pesticides for better agricultural production, the ecological balance in the environment has been disturbed and a new dimension of health hazard has been added. Atmosphere is being polluted by many toxic gases from various sources, discharge of many organic compounds and heavy metals from our industries and bacterial contamination of food and water from sewage disposals. In addition, inhalation of cotton dust, silica dust, coal dust and asbestos fibres and fumes of lead, mercury, benzene and many other organic chemicals in the respective industries cause many occupational hazards in respect to health of the workers directly and indirectly on the working capacity of man. Role of physiology in improving the working environment and output of work has been discussed.

Botany

Some stressed habitats and functioning of Communities in them by L. P. Mall, Department of Botany, Vikram University, Ujjain 456 010.

Most of the higher plants live in terrestrial habitat, where soil, air and biota have got some normal characters with regard to water balance, salt content, micro-organisms and aeration. Any character reaching outside the amplitude of the normalcy becomes unfavourable to plants. Thus any environmental factor, potentially unfavourable to living organisms is a sort of stress of the environment. Such stresses can be due to very high or very low temperature conditions, excessive water, its deficit, or a combination of both, solar radiation rich in IR, UV or ionising property, presence of excessive amount of salt in the substratum, presence of toxic matter, inorganic or organic, and heavy wind, etc. These stresses could be natural or man made.

Some natural stressed habitats:

1. Shallow temporary ponds and pools mostly along roads and rail tracks in which water remains on soil surface for some months and for the remaining months of the year remains dry. This is a very specialised stressed habitat and only very special types of plant community with about 40–50 plant species appear. Their seeds are adapted to remain in mud for 3–4 months without any loss of germinability or viability. On the other hand submergence in mud becomes a pre-requisite in many cases for germination of seeds. As such plants come up in September or October, after drying of water, their seeds have developed a requirement of low temperature of about 14°C for at least two hours daily.

2. Hydrosaline habitats

Along protected sea coasts in tropical and subtropical regions, a special type of forest, known as mangrove forest develops. Normal soil has soluble salts less than 0.1% but in some cases salts of soil may be more than 0.5% where only some limited type of special plants develop, and they are usually herbaceous or small shrubs. The mangrove forest soil has salt content ranging from 1.0% to 4.0% or more. Apart from this stress the mangrove habitats are periodically inundated with water, with the result that in soil layers lower than 10 cm, usually anaerobic condition prevails. The soil of mangrove is also poor in nutrient, especially fixed nitrogen. Excess of sodium in any soil inhibits absorption of potassium, a very important element needed in large amounts. Thus mangrove forest is a very rare example, developing under such stressed conditions due to several factors.

To cope with different stresses mangrove plants have several morphological and physiological adaptations. They are: 1) Aerial roots to facilitate exchange or gases, 2) Power of resistance against sodium toxicity, 3) Even in presence of excessive amount of sodium, the absorption of potassium is not inhibited, 4) They have various devices to either excrete extra salt through glands on leaves, or ultra-filter at root level itself, 5) Xylem tissue shows great negative pressure (tension) −30 to −60 bars which helps in the absorption of water, 6) Nitrogen fixing micro-organisms, present on lenticular barks and decaying leaves provide good medium for diazotrophs to fix nitrogen, 7) the regeneration is also facilitated due to viviparous seedlings, 8) The leaves of seedlings, which get submerged in sea water at high tide, show some hydrophobic chemicals, such as lipids, wax esters, and hydrocarbons.

3. Man-made stressed habitats – In our hectic efforts to improve the quality of living, we are using our resources at a very fast rate. Richards Fitter in 1970 gave the following equation to show the relationship between quality of living (q) use of resources (r) and human population (p).

$$q = {}^{r}p^{2}$$

Thus we are using our resources at a very fast rate producing huge amount of toxic wastes. These wastes settle on soil or mix with our water sources, and air deteriorating their characters and their life support system. The crop of such soils and biota of water resources suffer badly. This has been shown by several scientific studies including those in River Khan, Chambal and soils in the vicinity of Nagda Industrial Complex near Ujjain (M.P).

People, these days, have become ecology-conscious and in their enthusiasm express that 'due to industries, the ecology of such and such a place is degraded'. Ecology is a science and cannot be degraded. All that they mean is that eco-system or environment is degraded. Therefore, such expressions should be avoided.

Zoology, Entomology & Fisheries

Genetics of Dosage Compensation: An old concept in new perspective by A. S. Mukherjee, Department of Zoology, Calcutta University, Calcutta 700019.

In almost all higher living systems, Nature has been specially concerned in upholding the task of evolving a distinctive sex dimorphism, that is man and woman, concurrently promoting the establishment of the sex chromosomes. It has so happened that in most organisms (except birds and butterflies), the female has two X chromosomes and the male has only one X and one Y. Since the X is single in the male, it carries only one set of X-coded genes, while the female carries two such sets. Now, Nature had to face the problem of discrimination between sexes. And so by the process of selection and evolution, the problem was solved by allowing only similar end product. Consequently, equalization of the X-coded gene product was achieved. This equalization could be achieved by keeping one of the two X-chromosomes in the female active, or hyperactivating the only X in the male. The former is true for mammals to which group we human beings belong, and the latter holds true for many insects like fruitflies. I have demonstrated the latter. Researches have been undertaken on both systems by many groups in India and abroad. My group in Calcutta University has been engaged in solving the intricacies of the mechanism as to how the hyperactivation of the X in male fruitfly is realized. We are in a position to predict (by interplay of two opposite regulatory signals from the X and autosomes, which we have termed, Modulator and Activator), the *operational manifesto* of such gene activity of the X chromosome. The prediction can be extended to various abnormal sex types by extrapolating an equation based on the products of these signals.

The significance of these findings is crucial for the regulation and differentiation in higher systems. It is also evolutionarily highly significant in that Nature has taken care of the eco-genetical imbalance by bringing about the balance in the gene products among the two *Morphs* of the same species, namely man and woman. I have called it a 'prophylactic measure of ecological management at the genetic level'.