

Biological Robustness and Fragility

Introduction:

Biological Robustness means that when a biological system faces internal environments or external environments changes, it can remain its function and adapt to the new environments. By contrast, Biological Fragility is defined as that when a biological system faces irresistible destruction, the biological system would be completely destroyed and lose its original function. In short, Biological Robustness is the resistance and adaptability of a biological system to change, and Biological Fragility is the sensitivity and fragility of a biological system to change.

Example of Biological robustness:

Biological robustness manifests in various ways, including the maintenance of life activities and the ability to adapt to the environment. To give a particular example, when a human is in a cold environment, the pores on the skin would contract to reduce the loss of heat. Moreover, the human body would speed up its own metabolism to produce more heat to counteract the cold environment. Conversely, when a person is in a hot environment, The body's pores would dilate and expel sweat. In addition, blood vessels dilate to increase blood flow so that the blood can carry more heat to the surface of the skin, raising the skin temperature. This ultimately increases the amount of heat dissipated by the skin to the environment.

Example of Biological fragility:

Biological fragility can also be expressed in a variety of ways. For example, when there is a prolonged drought in an area, the plants will wilt and lose their leaves and the animals will die because of a lack of food. Another example of biological fragility is the decline of amphibian populations around the world. Amphibians are highly sensitive to changes in their environment, such as pollution, habitat loss, and diseases. These stressors have caused significant declines in amphibian populations in many parts of the world.

Importance of Biological Robustness:

Robustness is a ubiquitously observed property of biological systems. It is considered to be a fundamental feature of complex evolvable systems. (Kitano, H.,2004) In the biological system, each species plays an important role, they are helpful to maintain the balance of the ecosystem. Moreover, the disappearance and reduction of these species may lead to the collapse of ecosystems. However, when the biological system experiences the disturbances of the external environment, such as disasters and climate changes, Biological Robustness can be helpful to resist those disturbances and maintain biodiversity.

For instance, when the population of a specific species decreases, other species can occupy their living space and food by adapting and competing. Eventually, other species would replace the original species and play a role in the biological system to prevent the collapse of the biological system. In addition, some species can also act as buffers in ecosystems in order to reduce the impact of environmental stress on other species. These buffering species can provide protection to ecosystems so that they can maintain their stability and sustainability in

face of external disturbances.

However, when a biological system becomes fragile, the consequences of that can affect not only individual organisms but also entire the biological system. For example, when a species becomes fragile and vulnerable to changes, it can go extinct, leading to a loss of biodiversity. This loss of biodiversity can have a cascading effect on the entire ecosystem, affecting other species that depend on the extinct species for food or other resources.

To avoid biological fragility, we need a range of measures to protect biodiversity and the stability of the biological system. First, we need to protect habitats. Habitat protection is one of the key factors in preventing the extinction of living species. We can protect habitats by developing conservation policies, limiting development, and reducing the wildlife trade. Second, we need to reduce pollution. Pollution can have a serious impact on biodiversity and ecosystem stability. Therefore, we need to take measures to reduce pollution, for example, by limiting industrial effluents, promoting clean energy, and so on. Finally, we need to control invasive species. Invasive species can upset the balance between species in local ecosystems, leaving some species vulnerable to disturbance.

Conclusion:

For all the reasons previously mentioned, on no account can we ignore the importance of Biological Robustness. Biological Fragility can lead to a range of problems, eventually, even destroy the entire biological system. However, by protecting habitats, reducing pollution, and controlling invasive species, biological systems will be more stable and able to withstand greater external disturbances.