

Answer on Question #54683 – Biology – Other

Question:

(a) What do you mean by adaptive radiation? Discuss the adaptive radiation in Molluscs.

(b) Write the short notes on the following :

(i) Communication among honey bees : The Dance language

(ii) Hook Worm (*Ancylostoma duodenale* and *Necator americanus*)

(iii) Silk

Answer:

a) According to evolutionary biology, adaptive radiation is a process in which organisms diversify rapidly into a multitude of new forms, particularly when a change in the environment makes new resources available, creates new challenges, or opens new environmental niches.

The gastropods and bivalves were originally marine organisms, living in salt water. They subsequently evolved to take advantage of freshwater habitats. Without much change in their outward appearance, these animals developed physiological mechanisms to retain salts within their cells, a problem they did not face as marine organisms. This new development prevented excessive swelling of their bodies from intake of freshwater. Several groups of freshwater snails then produced species adapted to life on land. The gills they originally used for the extraction of oxygen from water were transformed in land snails into lungs, which extract oxygen from air. Similarly, the excretion of ammonia typical of aquatic mollusks evolved into uric acid excretion typical of birds and reptiles.

b) i) It has long been known that successfully foraging honey bees perform a dance on their return to the hive, known as waggle dance, indicating that food is farther away, while the round dance is a short version of the waddle dance, indicating that food is nearby.

ii) Nematode species, *Ancylostoma duodenale* and *Necator americanus* causes the second most common human helminthic infection (after ascariasis). Humans are the definitive hosts for both of them. Major morbidity associated with hookworm is caused by intestinal blood loss, iron deficiency anemia, and protein malnutrition. They result mainly from adult hookworms in the small intestine ingesting blood, rupturing erythrocytes, and degrading hemoglobin in the host. This long-term blood loss can manifest itself physically through facial and peripheral edema; eosinophilia and pica caused by iron deficiency anemia are also experienced by some hookworm-infected patients. Recently, more attention has been given to other important outcomes of hookworm infection that play a large role in public health. It is now widely accepted that children who suffer from chronic hookworm infection can suffer from growth retardation as well as intellectual and cognitive impairments.

iii) The key to understanding the great mystery and magic of silk is the blind, flightless moth, *Bombyx mori*. It lays 500 or more eggs in four to six days and dies soon after. The eggs are like pinpoints – one hundred of them weigh only one gram. From one ounce of eggs come about 30,000 worms which eat a ton of mulberry leaves and produce twelve pounds of raw silk. The original wild ancestor of this cultivated species is believed to be *Bombyx mandarina* Moore, a silk moth living on the white mulberry tree and unique to China. The silkworm of this particular moth produces a thread whose filament is smoother, finer and rounder than that of other silk moths. Over thousands of years, during which the Chinese practiced sericulture utilizing all the different types of silk moths known to them, *Bombyx mori* evolved into the specialized silk producer it is today; a moth which has lost its power to fly, only capable of mating and producing eggs for the next generation of silk producers.