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IDENTIFICATION of CERTAIN ADAPTATIONS of FIVE ORGANISMS THROUGH NATURAL SELECTION in RESPONSE to SOME of the ENVIRONMENTAL PRESSURES OPERATING in CERTAIN of their SELECTIVE ENVIRONMENTS

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In this essay several adaptations, which five organisms have developed through the process of natural selection in response to certain environmental pressures presented them in some of their respective selective environments, will be discussed.

Attention here is first turned to the Walking Stick Insect, carausius morosis, which is a fine example of an animal that has adapted to it's biotic environment via remarkable camouflage. In this instance of simulation, the Walking Stick has evolved a physical resemblance to the twigs of locust, cherry, oak and walnut trees upon which it lives and feeds throughout many parts of central and north eastern United States and Canada. This adaptation is isn response to the environmental pressures of avoiding it's predators in it's biotic environment by being difficult to visually discriminate from the background of these trees.

One must take into consideration that those insects which most closely resembled the stems of trees and thus escaped easy detection by predators, survived to reproduce. The twig-like appearance was then selected for theough the process of natural selection.

Behaviourally speaking, the Walking Stick also maintains a

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stratagem of mimicry by assuming asymetrical stances. They hold their legs in asymetrical positions to feign the asymetry of twigs which assists in the avoidance of detection by predators as well as holding them in twig-copying positions when they move about.

The Walking Stick Insect has evolved another defense to the environmental pressure of predators in their abiotic environment which involves the production of certain chemicals , very similar to catnip, which they eject to forciblt drive away certain predators. This may be to their disadvantage if the predator is a cat.

Female Walking Sticks, in response to the environmental pressures presented by their abiotic environemnt, have adapted their egg-laying technique to counter the potentially detrimental effects of abiotic factors such as wind and rain. The females lay their eggs on leaf surfaces, bare rock faces and openly on tree bark which leaves the eggs at the mercy of certain climatic conditions. The female Walking Stick's adaptation to these environmental pressures includes the use of a protective envelope created by a fluid that acts as a waterproofing,shelac-type substance as well as a glue which adheres the eggs to the open surfaces. This could also be viewed as an adaptation in terms of parent-offspring relationship with respect to that selective environment.

Next this essay views the Anemonefish,amphiprion percula, a member of the family pomacentridae(damselfish)which is one of a number of colorful chromis (reef fish) inhabiting warm coral waters of the S. Pacific.

This little fish is most reknown for the intriguing and intimate relationship it carries on with certain of the giant sea Anemones(coelenterata).

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One may look at this fish's immunity to the stinging battery of of tentacles of the sea anemone in a number of ways. This fish may have had a natural immunity to the sea anemone's poison prior to taking up residence within it's tentacles. In reaction to threats,posed from the environmental pressures from predators in it's biotic environment, those anemonefish that found protection by fleeing into the sea anemone's tenetacles were selected for. Here a behavioural adaptation was selected for. It has not been ascertatined whether or not a mucous secrettion manifested through the skin of the anemonefish is responsible for it's immunity to the sea anemone's poison which is lethal to would be predators of the anemonefish.

Another possible explanation,for the anemonefish's immunity to the poison of it's host and also a reason it has been dubbed 'clownfish', is a behavioural adaptation which involves the anemonefish turning somersaults and actively stroking the sea anemone's tentacles in a manner which may cause the sea anemone to shut down it's poison. This shutting down is to the advantage of the sea anemone for some consider the stroking of the tentacles to be a signal that food is on it's way. The anemonefish,through it's antics, alerts the sea anemone that either food is swimming within range,that the anemonefish is about to go out and lure a would be predator back to it's death by having it chase it into the sea anemone,or,that the anemone fish will shortly bring back bits of dead food which it presents to the sea anemone who devours it forthwith. The anemonefish is 'paying' for it's rent and protection by furnishing food for it's host.

These are adaptations the anemonefish has made in response to the

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environmental pressures prevalent in it's biotic environment and are generally understood to be symbiotic or commensal adaptations whereby both organisms involved benefit from the relationship them have with one another. Mutualism has been suggested as a term for this kind of relationship is as much as there is a 'reciprocity of services' that takes place between 'tenant' and 'landlord'.

An adaptation that the anemonefish has made in response to environmental pressures resulting from conditions within it's sexual selective environment is that both male and female take up residence in the same anemone after having found eachother on one of their brief excursions away from the sea anemone. This adaptation is to the genetic advantage of both partners as they are free to attend to the particulars of mating while being protected from interuption by predators as they are within the realm of the sea anemone's tentacles. Taking up residence in the same sea anemone increases the odds of reproducing more anemonefish.

In the selective environment of parent-offspring relationships, the anemonefish female takes care to lay her eggs well within the extension of the sea anemone's protective boundaries. The male of the pair then attends to the eggs until they hatch while the female attends to the needs of the anemone. These are adaptive behavioural modifications that function during the time it takes for the anemonefish eggs to hatch and which are in response to the environmental pressures prevailing in the parent off-spring selective environment of the anemonefish.

The following organism to be discussed in this essay is the Satin-Eyed Bower Bird, ptilonrhynchus violaceus, of Australia. The

male

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male bird,which is the elaborate architecht of this species,demonstrates an unusual adaptation to the environmental forces existing in his sexual selective environemt. He has responded to the need to attract the female bower bird not only by building his impressive bower-used just for mating and courtship as the female nests elsewhere afterwards to lay eggs and rear the chicks-but also through his intentional choosing of particular objects to decorate the display ground,or'garden', in front of his bower. He choses objects which match the dominant colors in the female's plummage. These colors are specifically blue,grey,brown yellow or greenish. The articles he generally selects to embellish his display ground that are one or a combination of these colors include stones, snail shells, snake skin sheddings, wasp nests, fungi, feathers and flowers.

An adaptation to the environmental forces found in his abiotic environment is that he has made adjustments to selecting materials that happen to be available when he lives near human settlements. So he has adapted his collections for the display ground to include match boxes, milk bottle tops, string, candy wrappers and stray bits of laundry. All of these are chosen to match the female's plummage.

The male Satin-Eyed Bower Bird also often paints his bower and generally uses the juice of berries and a twig to apply the pigment tp the walls of his structure. An adaptation that this bird has made to human settlements near his home shifts his response to environmental pressures coming now from the abiotic environment wherein the materials available for painting now include the dye from a blue washing bag or the charcoal from a campfire with a plastic straw taken as a paintbrush.

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With respect to adaptations in his social selective circumstances, the Satin-Eyed Bower Bird has evolved a loud call to announce his presence to other male bower birds in the vicinity of his bower. One of his main preoccupations, after the construction of his honeymoon suite, is to keep other male bower birds away. In terms of interspecific competition, the male bower bird's tactics involve the selection of a good vantage point on a branch above the bower he has built. From this station he emits this loud call and then launches attacks on any other male bower birds that hvae ventured into his territory.

It is important to note that the announcement call the male bower bird uses to identify himself to other male bower birds differs considerably from the soft,whirring song he emits during courtship. He sings to the lady bower bird while he is enticing her by picking up various of the collected objects in his display ground to show her. She may move in and place one of the objects differently or rearrange a twig in the bower while he is not looking.

When he has her in view he continues his whirring song and postures to her while distending his eyes at her. These are behaviours particular to this species which result from the need of the male bower bird to identify himself positively as the male of her kind so that mating can take place. The whirring song is an adaptation to his sexual selective environment which, along with his other courtship practices, is directed at and reserved for the female bower bird he is inviting to mate.

Behavioural adaptations to the environmental pressures of his abiotic environment include not only using what physical materials are available to him to construct his bower and 'garden'. They include finding a suit-

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able place from which to view his work in progress. Depending on the physical attributes of his environment, the male bower bird may find a high rock to which he will occasionally adjourn to take stock of of his work and get an overall picture of what he is building. If he has built near a slanting hill he will find a place to view his structure from below at a different angle.

He has been termed to 'admire' his work a distance from it's site by cocking his head in a particular manner, to get the best perspective, and then moving in to rearrange a stick in the support system of the bower or reposition an object in the display 'garden'. This is a behavioural adaptation to accomodate his needs in his abiotic selective environment, part of which he has created.

The Cheetah, acinonyx jubatus, a member of the family felidae, is another organism of interest in this discussion. Having the reputation for being the fastests running organism on this earth, speed, with respect to the Cheetah, may be considered an adaptation in response both to the environemtal pressures of it's abiotic and biotic environments.

The abiotic environment of the Cheetah includes the savannah which requires the vasts stretches of it's open plain to be traversed. It's biotic environment calls for the overtaking of swift prey.

Being at the bottom of the heirarchy of large predators in terms of physical strength, the Cheetah is resigned to bringing down, for the most part, the smaller and weaker prey animals like the Thompson Gazelle as opposed to the Water Buffalo or Giant Eland which may be easily felled through sheer strength by an individual Lion or thrugh the power of numbers as is the case with packs of the Cape Hunting Dog.

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Keen eyesight is an adaptation partly due to the situation existing in the Cheetah's abiotic environment which includes a higher percentage of successful kills achieved through the element of surprise when undertaken by the light of the full moon.

The Cheetah hunts successfully on nights of a full moon because it can see better than it's prey which is also caught more off guard at night.

In terms of the environmental pressures presented by the selective environment of parent-offspring, the mother Cheetah has adapted to her young's inability to keep up, initially, with her great speed on a hunt. What she has done is learned to capture a young and therefore slower animal and bring it back alive to her cubs who must then learn capture and killing techniques on their own through experimentation with the young prey. The mother takes no part in their experiment aside from providing the small game for them.

Their adaptations to handling hunger, a pressure from their biotic environment, bring out their killing instincts and other behavioural adaptataions allow them to improve and refine their pursuing, taking down and killing methods.

During this process, the pressures expressed in their social environment bear upon them to compete with their siblings for the young prey.

The Orange Star Lichen, calaoplaca elegans, is one of a primitive group of plants and the last creature, or rather, set of creatures, considered in this essay.

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The Orange Star Lichen is in fact two organisms=living in association with each other. Their relationship is also a symbiotic one. One partner in this relationship is an alga which benefits the other partner, a fungus, by manufacturing energy,through it's chlorophyll, into the form of carbohydrates which is then of use to the fungus. The fungus keeps the alga from drying out by providing moisture for it as well as making mineral nutrients available to the alga.

In terms of adaptations to one another, the alga and the fungus together in the form of a lichen, found that they could exist successfully in many places that separately, they otherwise, could not. The adaptation to one another resulted from the need to pioneer new territory. One could also say that those organisms that successfully existed together as a lichen were selected for to continue on and make more lichens.

Reproduction of a lichen is an adaptation in response to elements in their abiotic environment. Bits of the lichen break off and are carried by the wind to take hold elsewhere. The Orange Star Lichen may also produce particles(soredia),at times,which are also carried off by the wind to become new lichens when they land in a suitable place.

The Orange Star Lichen has adpated to surrounding conditions presented by it's biotic environment by living where other plants offer little or no competition. The Orange Star Lichen is a primary colonizer of bare rock.

In response to the conditions at issue in the Orange Star Lichen's

abiotic surroundings, the lichen has developed a lifespan that can last as long as thousands of years. It' s abiotic environment includes the feature that it habits northern and arctic regions which give sunlight, warmth and water sparingly to the lichen. The adaptataion at play here, then, is a growing process which is very slow in terms of the time scale most other organisms' growth rate and life cycles proceed at.

From the inclusive cases of the organisms discussed in this essay, examples of adaptations occurring in response to forces existing within each of the five selective environments, have here been detailed.

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