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IDENTIFICATION of CERTAIN
ADAPTATIONS of FIVE ORGANISMS
THROUGH NATURAL SELECTION
in RESPONSE to some of the
ENVIRONMENTAL PRESSURES OP-
ERATING in CERTAIN of their
SELECTIVE ENVIRONMENTS

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The Walking Stick insect, *Carausius Morosus*, is a fine example of an animal that has adapted to its biotic environment via remarkable camouflage. Living and feeding on leaves of locust, cherry, oak and walnut throughout many parts of the United States and Canada, it has evolved a body structure which resembles the twigs of these trees. This is in response to the environmental pressures of avoiding its predators by being difficult to visually discriminate from the background of these trees. One might also take into consideration that those insects which most closely resembled these twigs, thus escaping easy detection from predators, were selected for through the natural selection process. Behaviourally, they also mimic parts of these trees by holding certain of their legs in asymmetrical positions to assist in the avoidance of detection as well as holding them in certain twig-copying positions when they move about.

The Walking Stick insect has also evolved another defense to the environmental pressure of predators in their biotic environment which involves the production of certain chemicals, very similar to catnip, which they eject to drive away predators.

Female Walking Sticks, in response to the environmental pressures posed by their

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posed by their abiotic environment have adapted their egg-laying techniques to counter the effects of wind, rain and other animals brushing or washing their eggs off the open spaces of rock and tree surfaces where they are laid. Their adaptation is the use of a protective envelope created by a fluid that becomes a waterproof shelac-type substance as well as acting as a glue to adhere the eggs to the open surfaces.

The Clown Anemonefish, *Amphiprion Percula*, is a member of the family of Pomacentridae (damselfish) and is one of a number of colorful Chromis (reef fish) inhabiting warm coral waters.

This little fish is most reknown for the intriguing and intimate relationship it carries on with the sea anemone.

One may look at this fish's immunity, to the stinging tentacles of the sea anemone in a number of ways. This fish may have had a natural immunity to the tentacles and then have found it to it's advantage to take up residence within the sea anemone in response to the environmental pressures posed by predators in it's biotic environment. This would have been a behavioral adaptation allowed to occur because a mucous secretion protects it from the poison that is lethal to would be predators. Another behavioural adaptation seems to be that the fish strokes the tentacles of the anemone in a certain manner which may cause the anemone to shut down it's poison so the Clown anemonefish remains unharmed. It could also be conjectured that those clown anemonefish fleeing predators by taking refuge in sea anemones who could withstand the poison were selected for as they survived and could live on to reproduce.

An adaptation that the clown anemonefish makes in response to environmental pressures



within it's sexual selective environment is that both male and female clown anemonefish will mate and take up residence within the same sea anemone. This adaptation is to the genetic advantage of both partners as they are thus freed to attend to the vagaries and rituals of mating protected from interruption of predators while they are within the safe realm of the sea anemones tentacles.

In the selective environment of parent-offspring relationships, the clown anemonefish female takes care to lay her eggs well within the extension of the sea anemone's tentacles and so well out of reach of potential predators.

One may say that the clown anemonefish 'pays' for it's protection and it's rent by feeding it's host. Behavioural adaptations that have been observed include the small fish bringing bits of dead food to the sea anemone which the sea anemone then seizes and devours forthwith. It has also been observed to dart out of the anemone, catch the attention of a potential predator, allow itself to be pursued and lead the predator into the sea anemone's grasp. [These are adaptations in response to the environmental pressures of the clown anemonefish's biotic environment and are generally understood to be symbiotic or 'commensal' adaptations whereby both organisms involved benefit from the relationship they have with one another. 'Mutualism' has been suggested as a term for this relationship in as much as there is 'a reciprocity of services' that takes place between the 'tenant' and it's 'host'.

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The Australian Satin Eyed Bower Bird, Ptilonorhynchus Violaceus, demonstrates an unusual adaptation to the environmental pressures existing in his sexual selective environment. He had adapted to the need to attract the female bower bird not only by his elaborately built bower-used just for mating as she nests elsewhere-but also through the

his intentional choosing of particular objects to decorate the display ground in front of his bower. He chooses objects which match the dominant colors in the females plumage. These colors are specifically blue, gray, brown yellow or greenish. The objects he generally chooses to decorate the display ground in front of his bower that are of a combination or one of these colors include stones, snail shells, snake sheddings, wasp nests, fungi, feathers and flowers.

An adaptation to the environmental pressures found in his abiotic environment is that he has made adjustments to selecting from materials that happen to be available when he lives near human settlements. So he has adapted his collections for the display ground to include bits of string, pieces of bottles, candy wrappers, stray bits of laundry and other such articles which match the dominant colors in the female bower bird's plumage.

With respect to adaptations in his social environment he has evolved a loud call to announce his presence to other male bower birds in the vicinity of his bower. This call may precede an attack on another male bower bird which he launches from his station on a branch above the bower from where he is keeping watch. This call is very different from the whirring song he uses in courtship when he is enticing a female bower bird by picking up various of his collected objects, posturing and distending his eyes at and to her. The whirring song is an adaptation to his sexual selective environment which, along with his other courtship tactics, is directed 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 construct his elaborate bower and display ground. They include his finding a good vantage point to step back and take stock

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of his work in progress. He has been termed to 'admire' his work a distance from it's site by cocking his head in a particular way and then moving in to adjust the position of an object in the display ground or rearrange a stick in the support system of the bower.

The Cheetah, acinonyx jubatus, a member of the family felidae, has the reputation of being the fastest running animal on earth. This adaptation may be viewed as being in response both to the environmental pressures of it's abiotic environment which require the traversal of vast stretches of relatively open plains areas as well as to the environmental pressures of it's biotic environment which call 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 the smaller and weaker prey species like the Thompson gazelle as opposed to the water Buffalo or Gnu which is easily felled through sheer strength of an individual lion or through the power of numbers in the case of the Cape Hunting Dog.

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 full moons because it can see better than it's prey which is also caught more off guard at night.

In terms of the environmental pressures posed 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 slower animal, like a young thompson gazelle, and bring it back alive to her cubs who then must learn killing and capture techniques on their own

through experimentation with the young prey. The mother takes no part in their experient aside from providing the small game for them. Their adaptations to the pressures of the biotic environment, i.e., hunger, bring out their killing instincts and their behavioural adaptations allow them to improve and refine their pursuing, taking down and killing techniques. During this process, the pressures posed by their social environment bear upon them to compete with their siblings for the young prey.

The Orange Star Lichen, calaplaca elegans, is one of a primitive group of plants that are in fact two plants existing in association with one another in a symbiotic relationship. The plants involved are an alga and a fungi. They benefit one another by the alga providing energy in the form of carbohydrates

The Orange Star Lichen, calaplaca elegans, is a very interesting primitive plant that is in fact two organisms living in association with one another. Their relationship is a symbiotic one in which an alga, through it's chlorophyll, provides energy in the form of carbohydrates which is useful to the fungi it is existing with while the fungi provides minerals which are useful to the alga as well moisture which prevents the alga from drying out.

The Orange Star Lichen has adapted to the environmental pressures posed by it's biotic environment by living where other plants provide little or no competition. It is a primary colonizer of bare rock, sandy soil

This Lichen has responded to environmental pressures posed by it's abiotic environment by developing a lifespan that can last thousands of years. It's abiotic environment, northern and arctic regions, provides little warmth, water and sunlight so the adaptation is a growing process which is very slow in terms of the time scale most other organisms' growth rate



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A Look at Five Organisms
and their Adaptations to Certain
their Selective Environments

AMPHIPRION PERCULA

A member of the family Pomacentridae (damselfish) the clown anemone fish is one of the many lovely chromis or reef fish that populate certain coral waters. It is best known for the intimate and intriguing relationship it has with the invertebrate sea anemone.

Amphiprion Percula

Adaptation-immunity to the stinging tentacles of the sea anemone.

Selective pressure: stinging tentacles of the sea anemone

Selective environment: Biotic environment in which it interacts with other species.

The C. A. fish has adapted to the environmental pressures of its biotic environment by developing an immunity to the stinging tentacles of the sea anemone.

There is some question as to whether or not the C.A. fish developed an immunity to the tentacles of the S. A. or whether or not it was initially immune to the stinging tentacles of the sea anemone and

There is some question as to whether or not the C.A. fish adapted its habits to living most of its life, mating and often laying eggs within the sea anemone because the S.A. provided protection from predators of the C.A. Fish who were not immune to its sting or whether the C.A. fish developed an immunity to what would have been a predator's sting and evolved a symbiotic relationship with what became its host.

The organism I am discussing is the C.A. fish

The first organism being examined in this essay is the C.A. fish whose intriguing and intimate symbiotic relationship with the S. A. invites questions about adaptations the environmental pressures of its biotic environment had natural selection bring about.

One possibility is that the C. A. fish had a natural immunity to the stinging tentacles of the sea A. It was there for to its advantage to take up residence, mate and have the female rear young in a neighboring

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and life cycles proceed at.

The Orange Star Lichen has adapted to it's abiotic environment in terms of the way in which it reproduces.

