

## Chapter 1 : Blue Crab, Maryland State Crustacean

*The majority of crustaceans are aquatic, living in either marine or freshwater environments, but a few groups have adapted to life on land, such as terrestrial crabs, terrestrial hermit crabs, and woodlice. Marine crustaceans are as ubiquitous in the oceans as insects are on land.*

What Are Some Predators of Crustaceans? By Jasey Kelly steaming crab legs and veggies image by jcpjr from Fotolia. Lobsters and crabs are crustaceans, so are crayfish, shrimp and pill bugs. Many species have 10 legs and thick, colorful carapaces over their backs that help protect from predation. Because so many types of crustaceans exist in so many different habitats, they are eaten by nearly every type of carnivore. Aquatic Predators Many lobsters and crabs prefer to live on sandy bottoms or in rocky ocean habitats. Not surprisingly, many of the predators of bottom-dwelling crustaceans are fish and other aquatic species. In the ocean, many bottom-dwelling crustaceans are preyed upon by bottom-feeding fish, octopi, and larger fish and marine mammals that can get to them. Larger animals that are unable to filter smaller phytoplankton prey on small planktonic crustaceans such as krill: Baleen whales feed entirely upon these small creatures. Alligators, crocodiles and other carnivorous reptiles also feed heavily on crustaceans. Birds Birds are major predators of both aquatic- and land-dwelling crustaceans. Sea birds will gather various types of crustaceans from the water. Long-legged waders push their bills through the sand or mud to dredge up small crustaceans. Many bird species consume land-dwelling crustaceans such as crabs. Some birds drop hard-shelled crustaceans from heights to break them open. Birds particularly enjoy feeding on crustaceans that are soft-shelled or are moving between shells. Raccoons, opossums, apes, monkeys, rats, seals and sea lions among others enjoy a crustacean feast if it presents itself. Land-dwelling crustaceans such as various hermit crabs run the risk of consumption by any number of larger carnivorous predators. Humans Humans are a formidable predator for several species of crustaceans, particularly crab, lobster and shrimp species. Crabs are a delicacy because of the muscle in their pincers and legs, lobsters because of their significantly muscular tail. Crayfish, a freshwater crustacean, are a delicacy to many, particularly in the southern United States.

### Chapter 2 : “ Crabs, crayfish and other crustaceans ” Te Ara Encyclopedia of New Zealand

*Crabs and crayfish are crustaceans, a subdivision of arthropods - the large group of animals without backbones (invertebrates) that includes insects, spiders, mites, scorpions and springtails. Arthropods have jointed legs and a hard outer shell that acts as a skeleton.*

All crustaceans have a hard exoskeleton, allowing them to face the unique challenges that come with life in water and life on land. This exoskeleton provides protection from predators and from desiccation (drying out). The exoskeleton also functions as a method of body support in terrestrial environments. The characteristic jointed appendages of crustaceans allow them to bridge the gap between a marine and a terrestrial life. These appendages are important in locomotion, defense, and acquisition of food. Jointed Appendage Example of the jointed appendages which crustaceans possess allowing for both terrestrial and marine life. There is incredible diversity of size in crustaceans, allowing them to fill a wide range of niches both above and below water with ease. Where do they live? Although crustaceans are found living in both aquatic and terrestrial environments, most are adapted to life in the water. Regardless of where they are found, crustaceans fill many roles within the ecosystem, providing vital support to the food web. Some are amphibious, meaning they are able to leave the water, often to scavenge for food on land. Certain crabs spend so much time on land that they are considered land crabs, although they still need to return to water when it is time for their offspring to hatch. Aquatic crustaceans can live in marine or freshwater habitats, in addition to inland brines containing very high salt concentrations. Crustaceans have adapted to many different habitats within the water; ranging from open waters, to the sandy sea bottom, to ocean trenches, to buried in the sea bottom itself, to mud, to rocky outcrops. Crustacean Ocean Habitats Crustaceans are adapted to various habitats within the ocean, listed in red. Most crustaceans are mobile organisms that survive by hunting for food and shelter themselves. Some are completely stationary, such as the barnacle, and spend their entire life in one place waiting for food to come to them. Still remaining are the parasitic crustaceans that live on or inside of another organism; relying on them for food, shelter, and protection. Some of the largest crustaceans known are the Japanese Spider Crab, almost four meters across. The smallest crustacean known is the stygotantulus, and is only one micrometer long. Life Cycle and Ecology Most crustaceans reproduce sexually, meaning that there are two separate sexes. Others are hermaphrodites, having male and female reproductive parts. There are a few species that are able to change sex throughout the course of their lives. Finally, some reproduce by a type of asexual reproduction called parthenogenesis, in which eggs do not require fertilization to be developed. Depending on the species of crustacean, one of the sexes may be much larger than the other. This physical difference between the two sexes of a species is known as sexual dimorphism. Often, males have larger pincers that help them to attract female mates, and clasping organs that they use to attach and hold onto females during mating. Male appendages are also often specialized to transfer sperm to the female to promote successful fertilization. In males, sperm is held inside of closed cases known as spermatophores. The spermatophores can be placed next to the openings of female ducts, allowing sperm to be released directly into them. Various species of crustaceans have adopted different methods of carrying and releasing their eggs, protecting the continuation of the lineage itself. Some females release their eggs directly into the water, while others carry their eggs in special appendages on their abdomen. These appendages release a fluid that flows over the eggs, cementing them to the body and preventing them from being lost in the surrounding water. Still other crustaceans have a brood pouch that they use to transport their eggs. After fertilization and development has occurred within each egg, larvae emerge. There are multiple larval forms, but nauplius larvae are generally seen. These larvae have legs undivided into segments, three pairs of appendages, and a single eye. Each larva grows while experiencing multiple molts, with the number depending on the species. Throughout molting, limbs develop and segments are added. In certain crustaceans, this larval stage is not present, and the young are born looking like the adults. Throughout Evolutionary Time Crustaceans first arose in water and had

to adapt to life on land. One belief is that velvet worms an annelid species with a chitinous cuticle are the link between annelids and arthropods Meyer, However, more recent theories state that velvet worms are a sister group to the arthropods, which means that they diverged from a common ancestor at the same time. Regardless, it is possible to say that the first arthropods were most likely worm-like in appearance Meyer, After the rise of the arthropods, they experienced a slow divergence from an ancient shared ancestor which resulted in crustaceans, as well as many other groups of arthropods Meyer, There is some controversy as to whether this divergence occurred once, or several times. The great diversification of crustaceans however is known to have occurred during the cretaceous period and accounts for much of their wide diversity especially in crabs Fossil Record, Many of the habitat preferences exhibited by crustaceans have been maintained to present day. This is best shown by species like the tadpole shrimp *Triops cancriformis*, one of the oldest species on earth which has survived unchanged since the Triassic period Eder, Species such as this give us a look into the history of crustaceans, their habitat, and how they behaved well over million years ago. Extant Diversity While there is great diversity of form in the group Crustacea, several distinguishing characteristics allow the many species of the subphylum to be identified despite great range geographically and physiologically. Most crustaceans are aquatic and can be found in both freshwater and marine environments, while some have adapted to life on land. Crustaceans are widespread regardless of the environment in which they are found Bruce, Crustaceans show a diversity in size greater than any other animal group, ranging from a tenth of a micrometer to almost four meters. Most crustaceans have appendages that allow them to move independently, with the exception being a few species that are parasitic and live attached to their hosts. These species include whale lice, fish lice, sea lice, crustacean lice, and tongue worms. Adult barnacles also live a sessile life, attached to a substrate usually a rock and unable to move independently. Below is a picture of a common crab, with many appendages available for free movement Bruce, Common Crab Note the paired sets of appendages useful for locomotion. While most crustaceans are aquatic, some are found in terrestrial environments as well. Aquatic crustaceans are found in both freshwater and marine environments, with most being marine. Within the many species of hermit crabs alone, populations adapted to both terrestrial and marine life can be found. There are many similarities between these species, including a scavenged shell that acts as an exoskeleton and is molted several times throughout life, scavenging as a means of food acquisition, a nocturnal lifestyle to avoid predators, and communal living in groups Crustacea, n. Aquatic hermit crabs have multicolored, striped, or speckled legs and barnacles growing on their shells, while terrestrial hermit crabs have solid-colored red or purple legs. They are found in different habitats, with aquatic crabs living in muddy or sandy areas within feet of the shore and food source, while terrestrial crabs live in forests and usually gather around sand hills. An aquatic hermit crab is seen in the picture below, with its characteristic speckled legs visible Gomez, n. Hermit Crab Hermit crabs find shells grown by other crustaceans to inhabit in order to have protection from predators and the environment. As the crabs grow, they out grow shells and find new ones. There are nine classes and subclasses of crustaceans, diverse in the habitat they are most adapted to survive in: The class Branchiopoda includes tadpole, fairy, and brine shrimps. They are able to survive long periods of desiccation, making them slightly more adapted to an arid environment than other classes of crustacean. The brine shrimp are the only taxa of branchiopods that are able to survive in saltwater. The species of this class feed on either plankton or marine detritus dead organic matter. The class Remipedia consists of tiny blind crustaceans with many repeated body segments that are found in coastal aquifers containing saline groundwater and feed on either small living organisms or detritus. The class Cephalocarida is commonly referred to as the horseshoe shrimps, and are found in marine environments feeding on marine detritus. The class Copepoda consists of small crustaceans found in nearly all marine and freshwater environments. Some are known to live in wet terrestrial environments such as swamps or bogs. Their diet consists of phytoplankton and detritus. Ostracoda is a class of crustaceans commonly known as seed shrimp, living on or inside the upper layer of the sea floor. They have a wide range of food acquisition ranging from scavenging, filter feeding, or a herbivorous or carnivorous diet. The class Branchiura consists of the fish lice, which are parasitic aquatic crustaceans. Tantulocarida is a highly specialized class of parasitic aquatic crustaceans feeding on other crustaceans, including the previously discussed copepods and ostracods. The

class Thecostraca includes the sessile marine barnacles. Mystacocarida live between grains of sand on intertidal beaches. The final class of crustaceans is Malacostraca, which is the largest of the classes. It contains 40, living species, divided among 16 orders. Its members are abundant in all habitats in which they are found. This class includes both aquatic and terrestrial crustaceans; its aquatic members being crabs, lobsters, crayfish, krill, and shrimp Subphylum, n. Three orders of the Malacostracans have terrestrial members. Common names of these members include sand fleas, pill bugs, and terrestrial hermit crabs and crayfish. Sand fleas burrow in the wash zone of ocean waves and use their antennae for filter feeding. Pill bugs are nocturnal detritivores that feed almost exclusively on dead plant matter. An example of a pill bug can be viewed in the picture below. Pill Bug A pill bug is one example of a terrestrial crustacean. Ecosystem Services Crustaceans are important in many ecosystems because they play a significant role in many food webs, both marine and terrestrial. As they vary so widely in size, habitat, and physiology, they fulfill niches of many different types. Smaller crustaceans often have the ability to recycle nutrients as filter feeders, such as krill. Krill, of the class Malacostraca, are an important food source for many organisms ranging from very small to as large as a blue whale. Larger crustaceans are an important food source for larger aquatic animals, and for humans.

## Chapter 3 : 10 Weird And Wonderful Species Of True Crabs - Listverse

*Crabs are omnivores, feeding primarily on algae, and taking any other food, including molluscs, worms, other crustaceans, fungi, bacteria and detritus, depending on their availability and the crab species.*

*Gecarcinus quadratus*, a land crab from Central America Crabs are generally covered with a thick exoskeleton, composed primarily of highly mineralized chitin, [4] [5] and armed with a single pair of chelae claws. They were previously thought to be a monophyletic group, but are now believed to represent at least two distinct lineages, one in the Old World and one in the New World. Males often have larger claws, [12] a tendency which is particularly pronounced in the fiddler crabs of the genus *Uca* Ocypodidae. In fiddler crabs, males have one claw which is greatly enlarged and which is used for communication, particularly for attracting a mate. Reproduction and lifecycle[ edit ] Crab *Pachygrapsus marmoratus* on Istrian coast, Adriatic Sea Crabs attract a mate through chemical pheromones, visual, acoustic, or vibratory means. Pheromones are used by most fully aquatic crabs, while terrestrial and semiterrestrial crabs often use visual signals, such as fiddler crab males waving their large claws to attract females. The vast number of brachyuran crabs have internal fertilisation and mate belly-to-belly. For many aquatic species, mating takes place just after the female has moulted and is still soft. Females can store the sperm for a long time before using it to fertilise their eggs. In this location, they are protected during embryonic development. Females carrying eggs are called "berried" since the eggs resemble round berries. When development is complete, the female releases the newly hatched larvae into the water, where they are part of the plankton. The release is often timed with the tides. The free-swimming tiny zoea larvae can float and take advantage of water currents. They have a spine, which probably reduces the rate of predation by larger animals. The zoea of most species must find food, but some crabs provide enough yolk in the eggs that the larval stages can continue to live off the yolk. Female crab *Xantho poressa* at spawning time in the Black Sea, carrying eggs under her abdomen Each species has a particular number of zoeal stages, separated by moults, before they change into a megalopa stage, which resembles an adult crab, except for having the abdomen tail sticking out behind. After one more moult, the crab is a juvenile, living on the bottom rather than floating in the water. This last moult, from megalopa to juvenile, is critical, and it must take place in a habitat that is suitable for the juvenile to survive. After living for a short time as larvae in the ocean, the juveniles must do this migration in reverse. In many tropical areas with land crabs, these migrations often result in considerable roadkill of migrating crabs. They are covered with a hard shell, which would otherwise prevent growth. The moult cycle is coordinated by hormones. When preparing for moult, the old shell is softened and partly eroded away, while the rudimentary beginnings of a new shell form under it. At the time of moulting, the crab takes in a lot of water to expand and crack open the old shell at a line of weakness along the back edge of the carapace. The crab must then extract all of itself including its legs, mouthparts, eyestalks, and even the lining of the front and back of the digestive tract from the old shell. This is a difficult process that takes many hours, and if a crab gets stuck, it will die. After freeing itself from the old shell now called an exuvia, the crab is extremely soft and hides until its new shell has hardened. While the new shell is still soft, the crab can expand it to make room for future growth. They can communicate by drumming or waving their pincers. Crabs tend to be aggressive towards one another, and males often fight to gain access to females. For many crabs, a mixed diet of plant and animal matter results in the fastest growth and greatest fitness. Some eat plankton, some eat primarily shellfish like clams, and some even catch fish.

*Crab, any short-tailed member of the crustacean order Decapoda (phylum Arthropoda) especially the brachyurans (infraorder Brachyura), or true crabs, but also other forms such as the anomurans (suborder Anomura), which include the hermit crabs.*

Four species of horseshoe crabs exist today. The other three species are found in Southeast Asia. Many people view horseshoe crabs as dangerous animals because they have sharp tails. A pair of horseshoe crab in "amplexus. Key Levalier Horseshoe crabs are known for their large nesting aggregations, or groups, on beaches particularly in mid-Atlantic states such as Delaware, New Jersey and Maryland in the spring and summer, where their populations are largest. Horseshoe crabs can nest year-round in Florida, with peak spawning occurring in the spring and fall. The male fertilizes the eggs as the female lays them in a nest in the sand. Horseshoe crab larvae emerge from their nests several weeks after the eggs are laid. Juvenile horseshoe crabs resemble adults except that their tails are proportionally smaller. The young and adult horseshoe crabs spend most of their time on the sandy bottoms of intertidal flats or zones above the low tide mark and feed on various invertebrates. Why are horseshoe crabs important? Horseshoe crabs are an important part of the ecology of coastal communities. These shorebirds have evolved to time their migrations to coincide with peak horseshoe crab spawning activity, especially in the Delaware and Chesapeake bay areas. Red knots feast on horseshoe crab eggs. Horseshoe crabs are also extremely important to the biomedical industry because their unique, copper-based blue blood contains a substance called "Limulus Amebocyte Lysate", or "LAL". Bleeding crabs in a laboratory. This compound coagulates in the presence of small amounts of bacterial toxins and is used to test for sterility of medical equipment and virtually all injectable drugs. Research on the compound eyes of horseshoe crabs has led to a better understanding of human vision. Horseshoe crabs are also utilized in several fisheries. The marine life fishery collects live horseshoe crabs for resale as aquarium, research, or educational specimens, and the American eel and whelk fisheries use horseshoe crabs as bait along many parts of the Atlantic coast. Currently, with the help of the public, biologists at the Fish and Wildlife Research Institute are trying to document nesting sites of horseshoe crabs throughout the state. No, horseshoe crabs are in a class by themselves; they are more closely related to spiders, scorpions, and ticks. They differ from true crabs in that they have no antennae and no mandibles mouth parts for grinding food. Like spiders, they have a pair of chelicerae small appendages for moving food into the mouth. Are horseshoe crabs really ancient? Yes and no, that idea comes from the fact that million years ago, ancestors of horseshoe crabs were abundant. The anatomy of the species we have today is not much changed from those older forms. The life span of an individual horseshoe crab is also remarkable-it can live for up to 20 years. Can a horseshoe crab hurt me? Horseshoe crabs do not bite or sting. Despite the ferocious look of the tail, it is not used as a weapon. Instead, horseshoe crabs use their tails for righting themselves if they are flipped over by a wave. They do have spines along the edge of their carapace, so if you must handle them, be careful and pick them up by the sides of the shell, not the tail. What do horseshoe crabs eat? They eat almost anything. Horseshoe crabs are mainly predators. They feed on small clams, crustaceans, and worms; however, they will also eat other animals and even algae. Because they have no mandibles or teeth, they crush hard food between their legs before passing it to their mouth. Like birds, horseshoe crabs also have gizzards for grinding food before it reaches their stomachs. What is so special about horseshoe crab blood? Only horseshoe crabs have a blood-clotting agent known as Limulus Amebocyte Lysate, or LAL, which clots in the presence of certain bacterial toxins. These toxins are difficult to detect by other means. Why do I see so many dead horseshoe crabs on the beach? Horseshoe crabs commonly get overturned by high wave action during spawning and may not be able to right themselves. Other observers have mistaken horseshoe crab molts for dead crabs. Like all arthropods including crustaceans and insects , horseshoe crabs have a hard exoskeleton shell on the outside of their body. In order to grow, the crab must shed its old exoskeleton and form a new, bigger one. Unlike true crabs, which back out of their old exoskeletons, horseshoe crabs push forward, leaving their molts behind them, leaving a split in the front.

**Chapter 5 : Crustaceans - Padre Island National Seashore (U.S. National Park Service)**

*Shrimps, crabs, and lobsters belong to a group of invertebrates called crustaceans. They have hard shells and often walk around on jointed legs. Most crustaceans live underwater, but some, such as wood lice, are land-dwellers.*

Crustaceans - Miscellaneous Hermit crabs live inside empty snail shells in shallow water along beaches and in estuaries, small specimens on mudflats and large ones offshore. Some hermit crabs are entirely terrestrial, needing the water only to lay eggs. The size of the crab determines what kind of shell, and upgrades are required as the crab grows. The Flat Clawed Hermit Crab *Pagurus arcuatus* right is the largest in our area, and will often use Moon Snails and Whelks, but you will only find the big ones in deeper water. Small ones use Periwinkles and Oyster Drills. Like good suburbanites, Hermit Crabs are always on the lookout for bigger and better shells, and when they find one they like, a quick switch is in order to see how it fits. They will also try to steal good shells from each other. This makes them very amusing to watch in an aquarium. Snail Fur is a type of hydroid that lives only on Hermit Crab shells, you could call it "crabgrass". Hermit Crabs are not true crabs, but are an intermediate form having a soft shrimp-like tail that is protected inside the snail shell. The four hind legs that appear to be missing are evolved into grippers that hold the crab inside the shell so strongly that you will tear the animal in half before you can extract it. The claws are usually shaped so that together they will exactly block off the opening when the crab retreats inside. Hermit crab anatomy - more similar to lobsters and shrimps than to true crabs. A very unhappy hermit crab, temporarily deprived of its shell A large Hermit Crab struggles to right its upended Moon Snail shell Acadian Hermit Crab *Pagurus acadianus*

Shrimps Crustaceans - Miscellaneous Shrimps live in all habitats from freshwater lakes to salt marshes to deep ocean. The illustration at right shows a "Grass Shrimp," however, there are too many types of shrimps to even begin to list them. Shrimps grow from 1" to 8", depending on species. Shore Shrimps are extremely common. Small individuals may be completely transparent, while larger ones may be camouflaged or striped. They are generally found clinging to pilings and rocks, or in eelgrass and seaweed or other structure. There are several species of Shore Shrimps, but a magnifying glass is needed to tell them apart. All have pointed heads, bug eyes, arched backs, and two pairs of claws. A different sort - the Sand Shrimp *Crangon septemspinosa*. Sand Shrimps occur in small numbers among the much more common Shore Shrimps, from which they are easily differentiated by their blunt heads. They also have much more flattened bodies, and move differently. All of these small shrimps feed mainly on algae. Mantis Shrimps right are not true shrimps. These 10" predators have powerful pinching forelegs which can lacerate a finger. They have flattened bodies and 8 pairs of legs all together, but most are small and weak. Mantis Shrimps are secretive burrowers in mud bottoms from coastal shallows to the deep. They are seldom seen, but are reportedly good eating. Sand Bug Mole Crab Crustaceans - Miscellaneous The Sand Bug *Emerita talpoida* lives on or rather in ocean beaches, burrowing in the surf zone, and at times free swimming. It is totally harmless and grows to 1. These odd and somewhat comical little creatures seem to do everything in reverse - they dig backwards, walk backwards, and swim backwards. Fishermen dig them up for bait. Sand Bugs filter-feed with their long feathery antennae, which are withdrawn into protective sheaths when not in use. Not the long eye stalks that allow the animal to remain completely buried, and the short powerful limbs. They are unable to walk in any conventional sense, but are powerful diggers, and also surprisingly swift if somewhat random swimmers.

Amphipods Crustaceans - Miscellaneous Amphipod crustaceans typically range in size from 2 to 50 mm, although a few may be larger. Amphipods are common in aquatic ecosystems throughout many parts of the world, inhabiting marine, brackish, and freshwater environments. A few species are also terrestrial. Amphipod means "different foot", a reference to the varied legs that are evident in the illustrations, as opposed to isopods. The order Amphipoda, which contains nearly 7,000 described species, is divided into three suborders: Gammaridea, Caprellidea, and Hyperidea. Gammaridea, with more than 6,000 described species, is not only the largest amphipod suborder but also contains all of the freshwater and subterranean taxa. Approximately 21 superfamily groups, 95 families and more than 1,000 genera are recognized within this suborder. The Gammarus or Scud above, to 1. At times, clouds of these will reduce visibility to near zero. At night they are attracted to bright lights, and may surround you in a

swarm. Skeleton Shrimps right are bizarre but extremely common amphipods. They are like sea-going Praying Mantises, clinging to buoys, pilings, drifting flotsam, and anything else that is solid with the last three pairs of legs, and snatching food items with the pincer-like forelegs. You may even find them clinging to your suit when you exit the water. Copepods Crustaceans - Miscellaneous Most copepods are harmless plankters or bottom dwellers. In fact, copepods are the most numerous of all crustaceans in terms of both species and population. The Ribbon Louse *Lernaeenicus* spp. I have observed these bizarre creatures only in the aquarium. The head at lower left is buried in the body of the host, while the worm-like body hangs outside. Only the twin tails betray its true and almost unrecognizable nature - this is a copepod crustacean. Planktonic copepods Crustaceans - Miscellaneous Isopod means "same foot", a reference to the similar legs that are evident in the illustrations, as opposed to amphipods. Isopods are the most widespread of all arthropods, found from the highest mountaintops to the deepest seas. Most isopods are small, although some deep-sea types grow to over a foot in length. Isopods are mainly harmless scavengers, although some are parasites, and larger types can pack a painful bite. The most well-known type of isopod is the common terrestrial Pill Bug or Sow Bug right which can be found under any rock or log. Marine pillbugs are very similar to their land-dwelling cousins. Gribbles *Limnoria lignorum* below are tiny wood-boring amphipods. Gribbles hollow-out wooden structures at the tide line. I make no claim as to the accuracy, validity, or appropriateness of any information found in this website. I will not be responsible for the consequences of any action that is based upon information found here. Scuba diving is an adventure sport, and as always, you alone are responsible for your own safety and well being.

### Chapter 6 : Crave Crustaceans Lobster and Crab Shirts â€” Supporting Autism Research

*Crustaceans include crabs, lobsters, shrimp, krill, barnacles, and related species. There are approximately 40,000 crustacean species, the great majority of which are aquatic. Crustaceans are the only primarily aquatic group in the phylum Arthropoda, which also includes the insects and spiders.*

These crabs use empty snail shells. Their bodies lack a hard protected carapace; without a shell they are extremely vulnerable to predators. Hermit crab *Pagurus samuelis*. The soft abdomen is asymmetrical, usually curling to the right. There are two pairs of antennae and five pairs of legs. The first pair of legs is modified to form chelae, or pincersâ€”the right one usually largerâ€”that are shaped so as to cover the shell entrance when the animal is inside. The crab walks on its second and third pairs of legs and uses its shorter fourth and fifth pairs to grip the central column of the snail shell. Abdominal appendages on the female carry the eggs, which are held there until they hatch; the young pass into the water as swimming larvae. The larvae eventually metamorphose into small crabs, at which time they must search for their own shells. As the crab grows and becomes too large for its shell, it must find and move into a larger one. The availability of suitable shells is often limited, so competition among hermit crabs for shells of the proper size and in good condition is intense.

Decapod Hermit crab *Coenobita* sp. Semiterrestrial, tropical species of *Coenobita* inhabit sections of bamboo stems, broken coconut shells, and other articles, in addition to seashells. *Pylocheles*, a deepwater crab of the Indian Ocean, lives in bamboo sections; *Xylopagus*, found in West Indian waters at depths of 100 to 1,000 metres to 1,000 feet, lives in hollow cylinders of wood. Other species make homes in coral, sponge, or the empty tubes formed by polychaete tubeworms. Some species live in close association with other animals. *Pagurus Eupagurus bernhardus*, a common, bright red hermit crab of European and North American coastal waters, often carries one or more anemones on its shell. The robber crab, native to islands of the South Pacific, is a terrestrial species that has discarded the shell-dwelling habit. *Pagurus pollicaris*, a large hermit crab of the Atlantic coastal waters of North America, is reddish brown and about 10 to 12 cm 4 to 5 inches long. Learn More in these related Britannica articles:

**Chapter 7 : Crustaceans | Organismal Diversity**

*European Green Crabs eat a wide range of molluscs, fish, and small crustaceans, causing significant damage to the shellfish industry. They live in shallow water of estuaries and bays. The European Green Crab is an invasive species.*

Belonging to the same group as insects, spiders, mites and scorpions, they are the bugs of the sea. Crustaceans are the bugs of the sea. Crabs and crayfish are crustaceans, a subdivision of arthropods, the large group of animals without backbones invertebrates that includes insects, spiders, mites, scorpions and springtails. Arthropods have jointed legs and a hard outer shell that acts as a skeleton. However, they are well represented on land, notably by woodlice or slaters and some sand hoppers, and in freshwater habitats. Between 50, and 67, species are known worldwide. However, scientists estimate the total number of crustaceans to be 10 times greater than this. Characteristics A crustacean has the following features: Moulting In order to grow, all crustaceans periodically cast off their old exoskeleton, to reveal a new one beneath. This process is called moulting and leaves the crustacean vulnerable to predation and cannibalism. In the common red crayfish *Jasus edwardsii* the first moult occurs soon after hatching, and moulting continues for the rest of its life. The markings on each crayfish are unique and are retained through each moult, the crustacean equivalent of fingerprints. Diversity Crustaceans show a greater diversity of body form than any other animal group, and include worm-like slaters isopods, short-bodied crabs and long-bodied shrimps and prawns. There is a great range in size, from less than a tenth of a millimetre parasitic species and those that live between sand grains to nearly half a metre giant crabs, lobsters and slaters, which can weigh up to 20 kilograms. Crustacean groups The most recent classification of crustaceans comprises six classes. One of these the cave-dwelling Remipedia is not known in New Zealand, and another the Cephalocarida is known only from a single species. The Cephalocarida are believed to be close to the ancestral form from which other crustaceans evolved. The best-known crustaceans are edible species such as crabs, crayfish and shrimps. They belong to the Malacostraca class, along with slaters and sand hoppers. New Zealand crustaceans Most of the major crustacean groups are found in New Zealand waters, though many warm-water groups are absent or weakly represented. In the number of species known in New Zealand was 2, though the figure is always increasing. The actual number of species could easily be 10 times that figure because, with the exception of crayfish, crabs and shrimps, many of the groups have not been well studied. A number of species are endemic to New Zealand, unique to the country like kiwi and tuatara. Crabs With their stalked eyes, wide bodies, large nippers and sideways scuttling movement, crabs are well represented in New Zealand. There is even a freshwater crab *Halicarcinus lacustris* in the streams and lakes of Auckland and the Waikato. Characteristics Crabs have wide, flat bodies with no obvious tail. The head and chest are fused and protected by a shield-like structure called a carapace. The tail is tucked under its body. Males have a narrow tail; females have a broad, rounded one that supports their eggs. True crabs have a pair of claws followed by four pairs of walking legs. Various other crustaceans hermit crabs, porcelain crabs and king crabs superficially resemble crabs but have only three pairs of walking legs. Habitat and food At least 30 species are known from the intertidal realm. The purple rock crab is not a fussy eater and consumes seaweeds as well as live or dead animals, including smaller members of its own species. It is a cold-water species, found around the southern South Island and the subantarctic islands in shallow to relatively deep metres habitats. There is a lot of muscle in its body and long legs, but with little demand for crab meat in New Zealand no fishery has developed around this species. Fast grower The only commercially harvested crab is the paddle crab *Ovalipes catharus*, which is a coastal species that supports a small and relatively low-value fishery. Its body grows very quickly, from 3 centimetres to 10 centimetres in a year, and when fully grown it can be up to 15 centimetres wide. Hermit crabs Hermit crabs inhabit empty shells of sea snails, which they carry about with them as they scuttle over the sea floor. They do this to protect the soft, vulnerable abdomen, which is offset to one side of the body. As the hermit crab grows, it needs to find larger shells for protection. Sixty species are known in New Zealand. Scientists group them with hermit crabs rather than true crabs, for like hermit crabs they only have three pairs of walking legs and an offset abdomen. Our largest king crab *Lithodes murrayi* has a body width of 20 centimetres and leg span of up

to 1 metre. Crayfish Crayfish or rock lobster? They inhabit rocky reefs at depths of 5 to metres. Overseas, New Zealand crayfish have been marketed as rock lobster, and this name now has official status. To add to the confusion, two species occur around the coast. Red crayfish *Jasus edwardsii* are more common, although the larger green packhorse crayfish *Sagmariasus verreauxi* are widespread. Red crayfish are also known as spiny rock lobsters because of the spiny growths on the sides of their tail. In contrast, packhorse crayfish are sometimes called smooth-tailed rock lobsters. Two other marine crayfish occur in New Zealand waters: Body and senses Red crayfish grow to about 45–50 centimetres long and typically weigh around 2–3 kilograms, although 8-kilogram individuals have been caught. Packhorse crayfish grow up to 60 centimetres long and reach weights of 15 kilograms. Crayfish are well-endowed with features that help them explore and respond to their surroundings. A pair of long antennae project from their heads and can be rotated in all directions to touch and explore their rocky habitat. These also serve as defensive lances, as they have serrated edges and can be used to poke or frighten off predators. Between the antennae is a pair of short, jointed feelers that function as sniffers, detecting chemicals in the water. Crayfish can detect the slightest of movements when under water, but bright sunlight may damage their eyes when they are pulled from the water. Adult life For much of their life red crayfish are social animals with quite complex behaviour. During the day they hide in caves and crevices, and at night they venture out in search of food. Sea stars, kina sea urchins, crabs and shellfish make up the bulk of their diet. Crayfish reach maturity around 7–11 years of age. Mating occurs in late summer and autumn. They signal their readiness to mate by releasing urine. She gathers the fertilised eggs and attaches them to long hairs under her tail, where they remain for three to five months before hatching. Larvae A newly hatched crayfish larva makes a one- to two-year journey out into the South Pacific Ocean, where it floats about feeding and undergoing numerous moults before swimming back to the coast. It has a few changes of identity along the way. It begins life as a small spidery creature called a naupliosoma larva. After hatching, the naupliosoma swims up toward the surface and undergoes another moult into a leaf-like larva, known as a phyllosoma. In this form, the crayfish larva spends an extended period floating in ocean currents that carry it far from shore. The final phyllosoma moult transforms the larva into a miniature 2. It is at this stage that the crayfish swims back to the coast. It is a mystery how the postlarvae know their way back. Trans-Tasman crossing Red crayfish are also found around southern Australia. Scientists think that many crayfish phyllosoma larvae drifting in the Tasman Sea might have hatched in Australia. If they survive the crossing, these little Aussie reds develop into kiwi crays. Migratory juveniles Sometimes juvenile crayfish embark on extraordinary migrations along the east coasts of the North and South islands. Crayfish originally tagged in Otago have been caught in Fiordland – after a journey of kilometres. They walk along the sea floor against the current, down the Southland coast, around the southern tip of Stewart Island then up the Fiordland coast towards South Westland, where their journey ends. Mass migrations are exceptional. One occurred in and the next in , but each year a few crayfish migrate over large distances. The reason they undertake these trips is unknown, although it has the effect of spreading the population around the coast. Traditionally they were caught by hand or taken in baited pots that were lowered around coastal reefs. Round or beehive-shaped pots, known as pouraka, were constructed from the stems of a native vine, pirita or supplejack, which were lashed together with harakeke flax fibre. Pots were set during the day and left overnight. Commercial crayfishing was slow to develop. A small canning industry operated from until the s, but the demand for crayfish was not high until In that year some crayfish tails were sent to the United States and an export market quickly developed. Boom and bust Large volumes of crayfish were caught from the Fiordland coast and around the Chatham Islands in the s and s. With high prices being paid overseas for crayfish tails, many fishermen decided to go crayfishing. They used steel-frame and wire-mesh cages in preference to the traditional supplejack pots. By the late s, more than crayfishing boats were operating around the Chatham Islands. There was enormous waste of crayfish meat at this time as only the tails were frozen and exported; the bodies were usually dumped at sea or buried on land. The boom years ended in the s as crayfish landings in the Chatham Islands dropped from a peak of 5, tonnes in , to around tonnes in With a long period until maturity, the crayfish population was unable to recover quickly from such an intensive harvest. Managing the fishery In and the government attempted to control the number of boats harvesting crayfish by

declaring certain areas to be controlled fisheries. Recreational crayfishing Around 1000 tonnes of crayfish are legally caught by recreational and customary fishermen each year. Regulations govern the size of animals that may be taken, and there is a limit of six crayfish per person per day. Females carrying eggs have to be returned to the sea. Keystone species Crayfish play an important role in determining the type of habitat that prevails in an area.

*Lobsters and crabs are crustaceans, so are crayfish, shrimp and pill bugs. Many species have 10 legs and thick, colorful carapaces over their backs that help protect from predation. Because so many types of crustaceans exist in so many different habitats, they are eaten by nearly every type of carnivore.*

A native crab Crabs and crayfish are crustaceans, a subdivision of arthropods – the large group of animals without backbones invertebrates that includes insects, spiders, mites, scorpions and springtails. Arthropods have jointed legs and a hard outer shell that acts as a skeleton. However, they are well represented on land, notably by woodlice or slaters and some sand hoppers, and in freshwater habitats. Between 50, and 67, species are known worldwide. However, scientists estimate the total number of crustaceans to be 10 times greater than this. Characteristics A crustacean has the following features: Moulting In order to grow, all crustaceans periodically cast off their old exoskeleton, to reveal a new one beneath. This process is called moulting and leaves the crustacean vulnerable to predation and cannibalism. In the common red crayfish *Jasus edwardsii* the first moult occurs soon after hatching, and moulting continues for the rest of its life. The markings on each crayfish are unique and are retained through each moult – the crustacean equivalent of fingerprints. Diversity Crustaceans show a greater diversity of body form than any other animal group, and include worm-like slaters isopods, short-bodied crabs and long-bodied shrimps and prawns. There is a great range in size, from less than a tenth of a millimetre parasitic species and those that live between sand grains to nearly half a metre giant crabs, lobsters and slaters, which can weigh up to 20 kilograms. Crustacean groups The most recent classification of crustaceans comprises six classes. One of these the cave-dwelling Remipedia is not known in New Zealand, and another the Cephalocarida is known only from a single species. The Cephalocarida are believed to be close to the ancestral form from which other crustaceans evolved. The best-known crustaceans are edible species such as crabs, crayfish and shrimps. They belong to the Malacostraca class, along with slaters and sand hoppers. New Zealand crustaceans Most of the major crustacean groups are found in New Zealand waters, though many warm-water groups are absent or weakly represented. In the number of species known in New Zealand was 2,, though the figure is always increasing. The actual number of species could easily be 10 times that figure because, with the exception of crayfish, crabs and shrimps, many of the groups have not been well studied. A number of species are endemic to New Zealand – unique to the country like kiwi and tuatara.

**Chapter 9 : Facts About Horseshoe Crabs**

*Horseshoe crabs are actually not true crabs at all, being more closely related to arachnids (a group that includes spiders and scorpions) than to crustaceans (a group that includes true crabs, lobsters, and shrimp).*

Bays and estuaries, sometimes found in fresh water, spend their winters in the mud. Blue crabs are relatively stationary and make only local movements. Females prefer saltier waters near inlets for both carrying their young and spending the winter. Males, on the other hand, move to less saline waters at the heads of bays or in tidal creeks. Young hatch in salty waters and move back into bays and estuaries as they grow older. Planktonic larval crab Spawning: Blue crabs spawn between June and August, producing , to 2,, eggs which the female carries on her abdomen. Females may spawn 2 to 3 times before dying. Eggs hatch in 9 to 14 days. Plant or animal matter, alive or dead. In order to grow, blue crabs must shed their hard chitinous shells. Shedding is a precarious time, for the crab may get hung up in its old shell and die; if it does emerge successfully, its new shell is very soft, rendering the helpless crab vulnerable to predators. For this reason, crabs usually seek the protection of shallow grass beds during the molt. Young crabs molt every few days, while older crabs molt every days. After molts, female crabs reach maturity. During the last molt, while the female is still soft, mating takes place. The female mates only once, storing the sperm needed for several spawnings. Recreational crabbing is particularly important in the Upper Barnegat, Little Egg Harbor and Maurice River estuaries, comprising 65 to 86 percent of the total recreational harvest in these areas. The blue crab is especially popular with rental boaters. The blue crab supports a valuable commercial fisheries in Delaware Bay. Over 80 percent of the catch is taken during the warmer months in wire traps. The remainder is harvested during the winter with dredges. Since , New Jersey landings have fluctuated widely, with a peak of 2. This peak reflects the recent increased abundance of blue crabs. Sportfishing Facts and Techniques: The best places to catch crabs are in tidal creeks, rivers and shallow bays. One of the most popular methods is to use baited lines or traps from the bank or a boat. Most common baits are bunker and chicken necks, but any fresh fish remains will work well. A very inexpensive bait line can be made by tying a 6 oz. A long handled net is needed to scoop up the crabs which are brought to the surface clinging to the bait. When crabbing from a boat it is a good idea to use both hand lines and traps for sometimes one will produce better than the other. It is also effective to anchor your boat at the bow and stern, to prevent unnecessary movements of the baits. Another technique, especially effective for soft or shedder crabs, is to wade the shallows with a scoop net. This method works only when the water is clear and calm. Remember to release all females bearing an egg mass or sponge. It is found in the same environments as the Blue Crab, and has similar habits. In person, it is one of the most attractive creatures in our waters, colored in purple and cream, with some scarlet and blue mixed in. Also known as a Calico Crab. Bottom Crabs Crustaceans - Crabs Lumped together here are what might be considered to be "normal" aquatic crabs. There are many other similar types. The claws of many crabs are good eating - break one off and let the crab go, it will grow a new one. It is usually found sheltering in nooks and crevices. It is a fairly unaggressive species, more likely to hunker down and cover up its face as in the top picture than pinch if molested. Labrador to South Carolina. Green Crab *Cancerus maenas* The Green Crab is an introduced species that is originally from Northern Europe, but has invaded many areas throughout the world. It is a direct competitor for native species, especially the Rock Crab, with whom it shares habitat and feeding preferences. The much larger male holds the vulnerable freshly-molted female in a protective embrace. The Jonah Crab is similar to the Rock Crab, but it is normally found in deeper water. Occasionally, a Jonah Crab may wander into shallow water and can be found by scuba divers. The Jonah Crab has rough-shaped teeth along the sides of its shell, while the Rock Crab has smooth-shaped teeth. In addition, the Jonah Crab has a more heavily armored appearance than the Rock Crab, and is much more likely to fight back if provoked. Nova Scotia to Florida. Mud Crabs are often abundant in sponge colonies, among bushy bryzoans and hydroids on pilings, and intertidally under rocks or other debris on protected shores. The claws are distinctly unequal. Although they are fearsome-looking, they are actually slow moving, and their usual claws-out threat display is mostly bluff. Spider Crabs have relatively small round bodies to 4" , long legs, and rather weak claws. They are found

subtidally to at least ft, on any type of bottom, and are very common in rivers and inlets. They often cover themselves with detritus for camouflage, and can also burrow in soft sediments. A related species is used for food in Europe. The only thing more unattractive than a Spider Crab is two of them mating.