= Carcinus maenas =

" Shore crab " redirects here . This may also be used for crabs in the superfamily Grapsoidea .
Carcinus maenas is a common littoral crab , and a widespread invasive species , listed among the 100 " world 's worst alien invasive species " . It is native to the north @-@ east Atlantic Ocean and Baltic Sea , but has colonised similar habitats in Australia , South Africa , South America and both Atlantic and Pacific coasts of North America . It grows to a carapace width of 90 millimetres (3 @.@ 5 in) , and feeds on a variety of molluscs , worms and small crustaceans , potentially impacting a number of fisheries . Its successful dispersion has occurred via a variety of mechanisms , such as on ships ' hulls , packing materials , and bivalves moved for aquaculture .
C. maenas is known by different names around the world . In the British Isles , it is generally referred to as the shore crab , or green shore crab . In North America and South Africa , it bears the name green crab or European green crab . In Australia and New Zealand , it is referred to as either the European green crab or European shore crab .

= = Description = =

C. maenas has a carapace up to 60 millimetres (2 @.@ 4 in) long and 90 mm (3 @.@ 5 in) wide , but can be larger outside its native range , reaching 101 mm (4 @.@ 0 in) wide in British Columbia . The carapace has five short teeth along the rim behind each eye , and three undulations between the eyes . The undulations , which protrude beyond the eyes , are the simplest means of distinguishing C. maenas from the closely related C. aestuarii , which can also be an invasive species . In C. aestuarii , the carapace lacks any bumps and extends forward beyond the eyes . Another characteristic for distinguishing the two species is the form of the first and second pleopods (collectively the gonopods) , which are straight and parallel in C. aestuarii , but curve outwards in C. maenas .
The colour of C. maenas varies greatly , from green to brown , grey or red . This variation has a genetic component , but is largely due to local environmental factors . In particular , individuals which delay moulting become red ? coloured rather than green . Red individuals are stronger and more aggressive , but are less tolerant of environmental stresses , such as low salinity or hypoxia . Juvenile crabs on average display greater patterning than adults .

= = Native and introduced range = =

C. maenas is native to European and North African coasts as far as the Baltic Sea in the east , and Iceland and Central Norway in the north , and is one of the most common crabs throughout much of its range . In the Mediterranean Sea , it is replaced by the closely related species Carcinus aestuarii .
C. maenas was first observed on the east coast of North America in Massachusetts in 1817 , and may now be found from South Carolina northwards ; by 2007 , this species had extended its range northwards to Placentia Bay , Newfoundland . In 1989 , the species was found in San Francisco Bay , California , on the Pacific coast of the United States . Until 1993 , it was not able to extend its range , but reached Oregon in 1997 , the state of Washington in 1998 and British Columbia in 1999 , thus extending its range by 750 kilometres (470 mi) in ten years . By 2003 , C. maenas had extended to South America with specimens discovered in Patagonia .
In Australia , C. maenas was first reported " in the late 1800s " in Port Phillip Bay , Victoria , although the species was probably introduced as early as the 1850s . It has since spread along the south @-@ eastern and south @-@ western seaboards , reaching New South Wales in 1971 , South Australia in 1976 and Tasmania in 1993 . One specimen was found in Western Australia in 1965 , but there have been no further discoveries in the area since .
C. maenas first reached South Africa in 1983 , in the Table Docks area near Cape Town . Since then , it has spread at least as far as Saldanha Bay in the north and Camps Bay in the south , over 100 kilometres (62 mi) apart .

There have been appearances of C. maenas recorded in Brazil , Panama , Hawaii , Madagascar , the Red Sea , Pakistan , Sri Lanka and Myanmar ; however , these have not resulted in invasions , but remain isolated findings . Japan has been invaded by a related crab , either C. aestuarii or a hybrid of C. aestuarii and C. maenas .

It is believed , based on the ecological conditions , that C. maenas could eventually extend its range to colonise the Pacific coast of North America from Baja California to Alaska . Similar ecological conditions are to be found on many of the world 's coasts , with the only large potential area not to have been invaded yet being New Zealand ; the New Zealand government has taken action , including the release of a Marine Pest Guide in an effort to prevent colonisation by C. maenas .

= = Ecology = =

C. maenas can live in all types of protected and semi @-@ protected marine and estuarine habitats , including habitats with mud , sand , or rock substrates , submerged aquatic vegetation , and emergent marsh , although soft bottoms are preferred . C. maenas is euryhaline , meaning that it can tolerate a wide range of salinities (from 4 to 52 ?) , and survive in temperatures of 0 to 30 ° C (32 to 86 ° F) . The wide salinity range allows C. maenas to survive in the lower salinities found in estuaries , and the wide temperature range allows it to survive in extremely cold climates beneath the ice in Winter . A molecular biological study using the COI gene found genetic differentiation between the North Sea and the Bay of Biscay , and even more strongly between the populations in Iceland and the Faroe Islands and those elsewhere . This suggests that C. maenas is unable to cross deeper water .

Females can produce up to 185 @,@ 000 eggs , and larvae develop offshore in several stages before their final moult to juvenile crabs in the intertidal zone . Young crabs live among seaweeds and seagrasses , such as Posidonia oceanica , until they reach adulthood .

C. maenas has the ability to disperse by a variety of mechanisms , including ballast water , ships ' hulls , packing materials (seaweeds) used to ship live marine organisms , bivalves moved for aquaculture , rafting , migration of crab larvae on ocean currents , and the movement of submerged aquatic vegetation for coastal zone management initiatives . Thresher et al. found C. maenas dispersed in Australia mainly by rare long @-@ distance events , possibly caused by human actions .

C. maenas is a predator , feeding on many organisms , particularly bivalve molluscs (such as clams , oysters , and mussels) , polychaetes and small crustaceans . They are primarily nocturnal , although activity also depends on the tide , and crabs can be active at any time of day . In California , preferential predation of C. maenas on native clams (Nutricola spp .) resulted in the decline of the native clams and an increase of a previously introduced clam (the amethyst gem clam , Gemma gemma) . C. maenas has been implicated in the destruction of the soft @-@ shell clam (Mya arenaria) fisheries on the east coast of the United States and Canada , and the reduction of populations of other commercially important bivalves (such as scallops , Argopecten irradians , and northern quahogs , Mercenaria mercenaria) . The prey of C. maenas includes the young of bivalves and fish , although the effect of its predation on winter flounder , Pseudopleuronectes americanus is minimal . C. maenas can , however , have substantial negative impacts on local commercial and recreational fisheries , by preying on the young of species , such as oysters and the Dungeness crab , or competing with them for resources .

= = Control = =

Due to its potentially harmful effects on ecosystems , various efforts have been made to control introduced populations of C. maenas around the world . In Edgartown , Massachusetts , a bounty was levied in 1995 for catching C. maenas , to protect local shellfish , and 10 tons were caught .

There is evidence that the native blue crab in eastern North America , Callinectes sapidus , is able to control populations of C. maenas ; numbers of the two species are negatively correlated , and C.

maenas is not found in the Chesapeake Bay , where Callinectes sapidus is most frequent . On the west coast of North America , C. maenas appears to be limited to upper estuarine habitats , in part because of predation by native rock crabs (Romaleon antennarium and Cancer productus) and competition for shelter with a native shore crab , Hemigrapsus oregonensis . Host specificity testing has recently been conducted on Sacculina carcini , a parasitic barnacle , as a potential biological control agent of C. maenas . In the laboratory , Sacculina settled on , infected , and killed native California crabs , including the Dungeness crab , Metacarcinus magister (formerly Cancer magister) , and the shore crabs Hemigrapsus nudus , Hemigrapsus oregonensis and Pachygrapsus crassipes . Dungeness crabs were the most vulnerable of the tested native species to settlement and infection by the parasite . Although Sacculina did not mature in any of the native crabs , developing reproductive sacs were observed inside a few Metacarcinus magister and Hemigrapsus oregonensis . Any potential benefits of using Sacculina to control C. maenas on the west coast of North America would need to be weighed against these potential non @-@ target impacts .

= = = Use as a food = = =

Legal Sea Foods , an East Coast of the United States restaurant chain has arranged to purchase green crabs in season from local fishermen , in the first known commercial use for the crabs in the US food industry . Legal plans to test crab and shrimp etouffee , crab risotto with spring vegetables , and crab minestrone , all made with green crab stock , in their test kitchen during the winter of 2015 and offer the dishes in their other restaurant locations during the crab season .

= = Fishery = =

C. maenas is fished on a small scale in the north @-@ east Atlantic Ocean , with approximately 1200 tonnes being caught annually , mostly in France and the United Kingdom . In the northwest Atlantic , C. maenas was the subject of fishery in the 1960s , and again since 1996 , with up to 86 tonnes being caught annually .

= = Taxonomic history = =

Carcinus maenas was first given a binomial name , Cancer maenas , by Carl Linnaeus in his 1758 10th edition of Systema Naturae . An earlier description was published by Georg Eberhard Rumphius in his 1705 work De Amboinsche Rariteitkamer , calling the species Cancer marinus sulcatus , but this predates the starting point for zoological nomenclature . A number of later synonyms have also been published :

Monoculus taurus Slabber , 1778
Cancer granarius Herbst , 1783
Cancer viridis Herbst , 1783
Cancer pygmaeus Fabricius , 1787
Cancer rhomboidalis Montagu , 1804
Cancer granulatus Nicholls , 1943
Megalopa montagui Leach , 1817
Portunus menoides Rafinesque @-@ Schmaltz , 1817
Portunus carcinoides Kinahan , 1857

The lectotype chosen for the species came from Marstrand , Sweden , but it is assumed to have been lost . In 1814 , writing for The Edinburgh Encyclopaedia , William Elford Leach erected a new genus , Carcinus to hold this species alone (making it the type species of the genus , by monotypy) . In 1847 , Nardo described a distinct subspecies occurring in the Mediterranean Sea , which is now recognised as a distinct species , Carcinus aestuarii .