

Echinometra viridis (Reef Urchin)

Order: Camarodonta (Globular Sea Urchins)

Class: Echinoidea (Sea Urchins)

Phylum: Echinodermata (Starfish, Sea Urchins and Sea Cucumbers)



Fig. 1. Reef urchin, *Echinometra viridis*.

[<https://commons.wikimedia.org/w/index.php?curid=11448993>, downloaded 24 February 2016]

TRAITS. *Echinometra viridis* is elliptical in shape with approximately 100-150 spines (Blevins and Johnsen, 2004). Each spine has a violet tip, rarely seen in other species, and a thin white ring at the base (McPherson, 1969). The spines of *E. viridis* are short and thick, with sharp points (Kluijver et al., 2016). The colour of this species ranges from reddish to maroon, with green spines. The approximate size is a body of 5cm and spines of up to 3cm (Kluijver et al., 2016). *Echinometra* species are known to reproduce sexually however they reveal no clear external sexual dimorphism (Lawrence, 2013).

DISTRIBUTION. This species is geographically located in the Caribbean Sea, from southern Florida and Mexico to Venezuela (Kroh and Mooi, 2013) (Fig. 2).

HABITAT AND ACTIVITY. Located along the shoreline to the outer edge of the reef, at depths ranging from 1-20m (McPherson, 1969) and temperatures from 26-28°C (Lawrence, 2013). They are found in the intertidal zone (McPherson, 1969), in small dark crevices of rocks where they are protected from predators and turbulence (Blevins and Johnsen, 2004). McPherson (1969) collected *E. viridis* from shallow coral reef “patches” off the Florida coast; a reef patch is located between the fringe and barrier of the reef, it is usually separated by algae and coral, and rarely reaches the surface of the water. There is an overlap of *Echinometra* species with respect to habitat and diet (Cameron, 1986). During the day, *E. viridis* is found hidden in rocks and anchors itself even more strongly when disturbed (McPherson, 1969). When predation is low at night, *E. viridis* ventures into deeper waters (McClanahan, 1999).

FOOD AND FEEDING. *E. viridis* comes out of its protective crevices to feed. Its diet consists of seagrass, *Thalassia testudinum* (Lawrence, 2013), algae and calcium carbonate particles (McPherson, 1969). *Echinometra viridis* can be classed as a primary consumer since it is herbivorous and prey for other species such as the jolthead porgy (*Calamus bajonado*), triggerfish (*Balistes vetula*) (McClanahan, 1999) and other large fishes of the reef. It therefore lies in the 2nd trophic level, between algae and fishes.

POPULATION ECOLOGY. *E. viridis* lives in large crevices and under corals (Fig. 3), varying in population density depending on the area it is found. Populations of *E. viridis* are plentiful in areas where water flow and algal drift climax; this is mainly in shallow patches of the reef (McClanahan, 1999). Around Jamaica, the population density reported has been 10-15 individuals per m², around Panama a density of 1-4 individuals per m² (Birkeland, 1997) and on reefs in Belize between 4-10 individuals per m² (McClanahan, 1999). Population density can be dependent on temperature, seasonal reproduction and predation. *E. viridis* and *E. lucunter* are sympatric in the Caribbean (Lawrence, 2013); this leads to additional competition for resources. In a high density population, there is small growth (Cameron, 1986), but it has little effect on algal biomass at low population density (Lawrence, 2013).

REPRODUCTION. Displays seasonal spawning, during the dry season when the sea surface temperature is at its highest (Alvarado and Solis-Marin, 2013). There is an increase in spawning from January to a peak in August (Fig. 4), a decline to October and an increase or restoration by November (Keegan and O'Connor, 1985). Metamorphosis is achieved in 2 weeks at temperatures ranging from 23-25°C (Cameron, 1986). Evidence has shown that synchronous spawning occurs when the population is thinly dispersed or scattered (Lawrence, 2013). Attachment of sperm to egg is influenced by the protein bindin, in which *E. viridis* shows polymorphism with *E. lucunter* in the Caribbean. Sperm and eggs are released in the water and bindin attracts them together for fertilization (Lawrence, 2013).

BEHAVIOUR. Territorial behaviour has been displayed by defence of crevices when intruders are involved (Lawrence, 2013). A predator-free space is maintained, rather than a territory for the benefit of food reserves. *E. viridis* maintains its core area and territory for safety. This in turn reduces growth rate of the population. Antipredator behaviour is also shown by the fact that *E. viridis* doesn't leave its crevices during the day and at night seldom leaves for feeding.

APPLIED ECOLOGY. *Echinometra viridis* is not listed as an endangered species nor is it listed as at risk. This species has not been deemed a pest since it maintains a mutualistic relationship with other species as well as its environment. It helps control the algal levels of reefs it inhabits.

REFERENCES

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Author: Zandra Ali

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Fig. 2. Geographical distribution of *E. viridis*.

[<http://www.discoverlife.org/mp/20m?map=Echinometra+viridis>, downloaded 3 March 2016]



Fig. 3. Population of *E. viridis* in its habitat.

[http://gallery.usgs.gov/photos/05_03_2010_q74Xpc0ONi_05_03_2010_13#.VuIWW_krLIU, downloaded 6 March 2016]

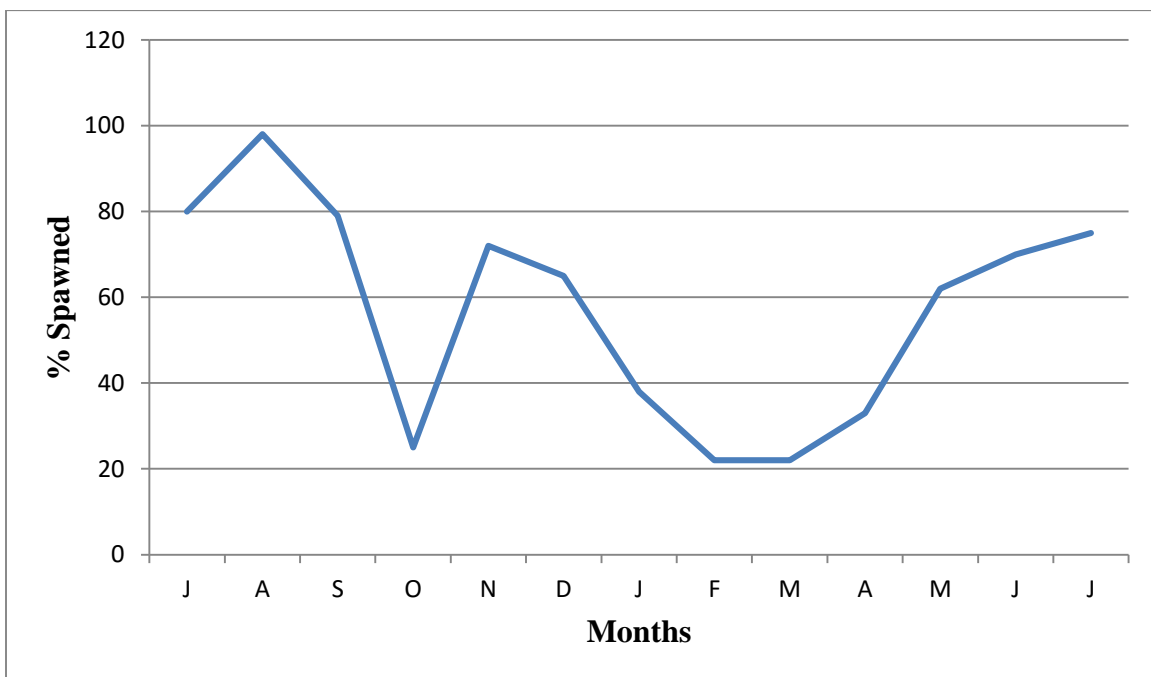


Fig. 4. Reproduction of *E. viridis* for one year, beginning with July.

[Redrawn from Keegan and O'Connor (1985)]