

red sea urchin

BIOLOGY FACT SHEET

Strongylocentrotus franciscanus

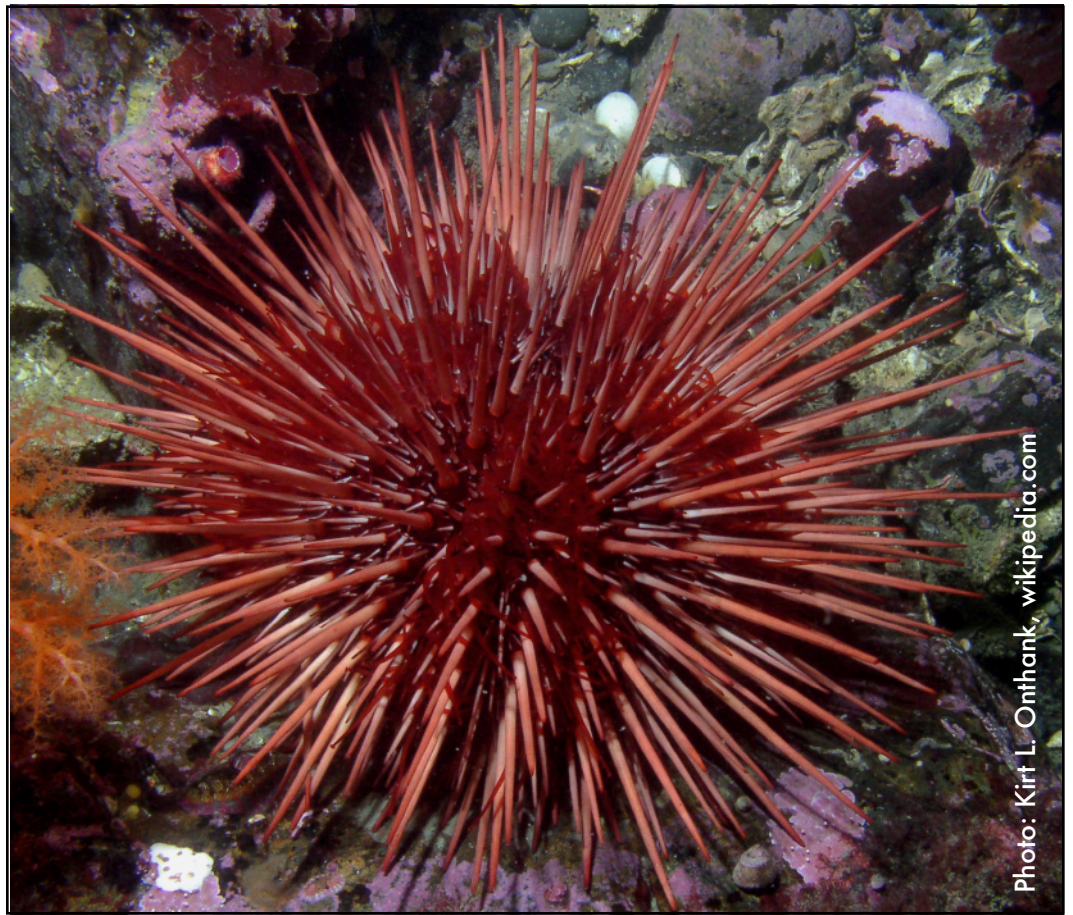


Photo: Kirt L. Onthank, wikipedia.com

San Diego seafood profiles

Taxonomic description

- An echinoderm, in the marine invertebrate group along with sea stars, brittle stars, and sea cucumbers.
- This largest species of sea urchin can grow to be 18 cm (7") diameter with spine lengths of 8 cm (3") [1].
- Recognizable by its dark red almost black body color and large spines.

Distribution

- Found on the west coast of North America as far south as the tip of Baja California, Mexico [2,3]

Life history

- Spawns year round and peaks June – November in San Diego [3].

- When eggs are fertilized they develop into free-swimming larvae for 6-8 weeks until they settle to the sea floor and become juveniles [1]
- Larval and juvenile growth rates depend on water temperature.
- Can live 200 years [4] but most don't

Habitat

- Lives from lower rocky intertidal to depths of 160 m (525 ft).
- Major food source is kelps, so is common in kelp forests
- In San Diego, main predators include spiny lobster & California sheephead [2]; north of Pt. Conception main predator is the sea otter.
- Sensitive to water temperature changes as well as low salinity.

- Sea urchin feeding removes giant kelp so it can structure the whole forest ecosystem.

References

- [1] Red Sea Urchins, *Mesocentrotus franciscanus* ~ MarineBio.org." MarineBio Conservation Society. Web. July 8, 2013. <<http://marinebio.org/species.asp?id=45>>. Last update: 1/14/2013
- [2] Tegner, M. J., P. K. Dayton. 1981. Population structure, recruitment & mortality of two sea urchins (*Strongylocentrotus franciscanus* and *S. purpuratus*) in a kelp forest. *Mar Ecol Prog Ser* 5: 255-268.
- [3] Kato, S, S.C. Schroeter. 1985. Biology of the Red Sea Urchin, *Strongylocentrotus franciscanus*, and Its Fishery. California. Marine Fisheries Review 43: 1-20. <http://spo.nmfs.noaa.gov/mfr473/mfr4731.pdf>
- [4] Ebert, T. 2003. Red sea urchins found to live up to 200 yrs. Science Daily www.sciencedaily.com/releases/2003/11/031106051646.htm

Did you know?

Among their spines, urchins have two other types of arms: suctioning tube feet and claw-like pedicellaria used to grab food, move and clean themselves. Look closely!



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FISHERY FACT SHEET

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Sea urchin fishing boat offloading at
Driscoll's Wharf in San Diego Bay

Photo: Pete Halmay

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Seasonal availability

- In California, available year-round with reduced effort Mon-Thurs from April-Oct[1]

Managing authority

- California Department of Fish & Wildlife regulates the fishery
- California Sea Urchin Commission represents interests of California's sea urchin divers; operates under state law to ensure environmental, economic and social sustainability of the fishery.

Gear type

- Fishers use hookah lines for diving to depths of 12-33 m (40-110 ft)
- Collected by hand from crevices using a rake and placed in a collection basket
- In So. California, red sea urchins must have a minimum test diameter of 3.25" (8.2 cm)

Status of the fishery

- Little sustainability concern for local stocks at current level of exploitation & productivity
- Current efforts partner scientists & local fishers to expand monitoring & attain a "profitable, sustainable, locally managed fishery"[3]
- In 1987, after a 1970's State control effort that left ~75% of urchin population depleted in California[2], the industry initiated a moratorium on the fishery, including limited entry, seasonal closures & minimum size limits.
- Despite there being only 18 urchin divers in San Diego with an average age of over 50yr, no new dive permits can be issued at this time

Potential ecosystem impacts

- Minimal impacts when the management strategy considers: (a) amount of sea urchin relative to kelp biomass. E.g., the local fishery may limit population booms that form sea urchin barrens, areas where all of the kelp has been eaten. (b) the harvest of only high quality ("fat") sea urchins (≤50% of total),

which leaves plenty behind to function in the ecosystem and "fatten up".

- In areas with limited rocky substrate, juvenile urchins may depend on the spines of larger, adult urchins for shelter [4] so high harvest rates may affect sea urchin recruitment in these conditions.

References

- [1] California Fisheries Fund . 2009. California Sea Urchin. California Fisheries Atlas .California Fisheries Fund. http://californiafisheriesfund.org/reso_atlas_urch.html.
- [2] Good, D. 2012. Fishing with the Urchin King Pete Halmay. San Diego Magazine. www.sandiegomagazine.com/San-Diego-Magazine/June-2012/The-Urchin-King/.
- [3] California Ocean Protection Council. Nov 2008. The San Diego Sea Urchin Project. www.opc.ca.gov/webmaster/ftp/project_pages/CA_Fisheries/SDWA_Final_Report_NoAppendices.pdf.
- [4] Nishizaki M.T., D.J. Ackerman. 2004. Juvenile-adult associations in sea urchins *Strongylocentrotus franciscanus* and *S. droebachiensis*: Is nutrition involved? Marine Ecology Progress Series 268: 93-103.
- [5] Halmay, Pete. "San Diego Sea Urchin Fishery." Personal interview. 12 July 2013.

Did you know?

The California sea urchin fishery began in 1970 and most were exported to Japan until ca. 2000, when the Japanese economic bubble burst and sea urchins became popular in domestic markets

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NUTRITION FACT SHEET

Strongylocentrotus franciscanus



Uni appetizer at Baci Ristorante, www.sandiegobaci.com; Photo: Kristen Goodrich

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Edible portions

- The gonads of both male and female red urchins are a culinary delicacy, known as either "roe," "uni" or "ricci del mar."
- Gonad quality is ranked on the size, color, texture, taste, and firmness [1]

Description of meat

- Roe, or uni, has smooth, buttery texture with a sweet, complex taste

Culinary uses

- Local sea urchin is mostly available live or fresh.
- Cleaning and cracking the test (the shell) is manageable. Instructions can be found in multiple online resources (e.g., [4])
- Sea urchin can prepared many ways: Freshly cracked & eaten from the test, as sushi, like caviar on pasta, rice, seafood, crackers & cheese, as a flavor enhancer in soups, custards, and pasta dishes[2]

Nutritional information

Sea urchin raw (3.5 oz) [2,3]

Nutrition Facts	
Serving Size 3 pcs of sushi (100g)	
Amount Per Serving	
Calories 120	Calories from Fat 43.2
	% Daily Values*
Total Fat 4.8g	7%
Saturated Fat 0.63g	3%
Cholesterol 290mg	97%
Sodium 220mg	9%
Total Carbohydrate 3.3g	1%
Dietary Fiber 0g	0%
Sugars 0g	
Protein 16g	
Vitamin A -	• Vitamin C -
Calcium -	• Iron -
* Percent Daily Values are based on a 2000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.	

Omega 3 fatty acids 1.83 grams
Zinc 17.00 ppm

Toxicity report

- No known toxins

Seasonal availability

- Year round

References

- [1] Leet, W.S., C.M. Dewees, R. Klingbeil, E.J.Larson, eds. 2001. California's Living Marine Resources: A Status Report. California Dept of Fish and Wildlife. www.dfg.ca.gov/marine/status/status2001.asp.
- [2] Fat Secret: All Things Food and Diet. 2013. Uni (sea urchin). www.fatsecret.com/diary.aspx?pa=fjrd&rid=1948231
- [3] Pacific Urchin Harvesters Association. 2013. Sea Urchin Nutritional Information. <http://puha.org/assets/sea-urchin-nutritional-information.asp>.
- [4] Taste with the eyes. 2013. www.tastewiththeeyes.com/2013/03/do-you-know-how-to-clean-a-sea-urchin/.

Did you know?

Fishermen can predict the quality of sea urchins by "reading the bottom", or assessing habitat conditions such as food supply, water movement, replenishment of sea urchins.

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CULINARY INFO SHEET

STEP 1: CLEAN

Tools:

- Rubber Gloves
- Cutting Board
- Kitchen Shears
- Spoon

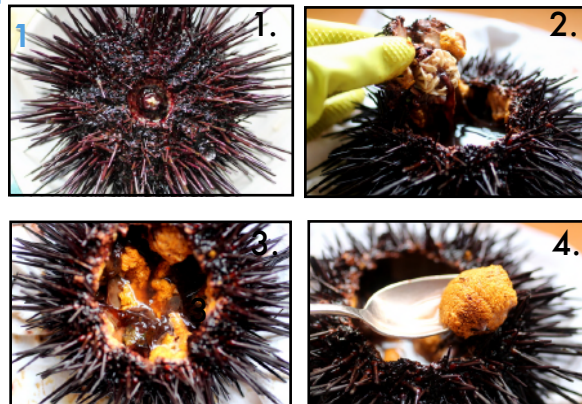


Photo Credit: tastewiththeeyes.com [1]

Method:

1. **POSITION** Using gloves, place the sea urchin on a cutting board with the hole facing you.
2. **OPEN** Insert kitchen shears into the hole and cut in a shallow circle large enough to fit your spoon.
3. **SEPARATE** Drain the liquid and organs from the hole.
4. **COLLECT** Use a spoon to remove the roe (uni) intact.
5. **CLEAN** Gently rinse the uni under cold water, then drain.

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STEP 2: PREPARE

Appetizer | Uni Bruschetta

Adapted from Pacific Urchin Harvesters Association [2]

Ingredients (serves 4):

- 1/4 yellow onion, minced
- 1/2 tbsp. dry sherry*
- *Non-alcoholic substitution: orange juice
- 1/2 tbsp. fresh lemon juice
- 1/2 tbsp. cilantro, chopped
- 1 tbsp. extra virgin olive oil
- 2 sea urchin (~10 pieces of uni)
- Pinch of salt and pepper
- 12 slices of baguette



Photo Credit: Flickr |
ihearttummy.blogspot.com [3]

Method:

1. In a bowl, combine the minced onion, sherry, lemon juice, cilantro, & 1 tbsp. of olive oil.
2. Gently toss the uni in the mixture, adding salt & pepper to taste.
3. While mixture is marinating, brush the bread slices with remaining olive oil and grill over medium heat until both sides are golden.
4. Slice the toast, top with uni mixture and serve.

Entrée | Uni Pasta

Adapted from Pacific Urchin Harvesters Association [2]

Ingredients (serves 4):

- 2 tbsp. extra virgin olive oil
- 1-2 cloves of garlic, crushed
- Pinch of chili pepper
- 3/4 lb. spaghetti or linguine
- 1 sea urchin
- Pinch of salt
- 2 tbsp. parsley, minced



Photo Credit: Flickr | Casa dell'Albero [4]

Method:

1. In a pot, bring water to a boil.
2. Heat olive oil in a pan and sauté garlic with chili pepper until light golden color.
3. Place pasta in pot and cook according to package directions.
4. As pasta is cooking, mix uni with garlic mixture and sauté for 7-8 minutes, adding salt to taste.
5. Drain the pasta and mix well with uni-garlic mixture.
6. Sprinkle with parsley and serve immediately.

SERVING SUGGESTIONS:

Uni is best eaten raw, sautéed, or baked.

OTHER RECIPE IDEAS:

With soy sauce/lemon over rice; ceviche; risotto; mousse; chowder.

Many dishes may be served using the urchin shell as a bowl.



References

- [1] Lynn, Lori Taste With the Eyes. Available: www.tastewiththeeyes.com/2013/03/do-you-know-how-to-clean-a-sea-urchin/
[2] PUHA. Pacific Urchin Harvesters Association. Available: www.puha.org/assets/sea-urchin-recipes.asp
[3] ihearttummy. Available: ihearttummy.blogspot.com/2013/03/sea-urchin-bruschetta-uni-toast.html
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