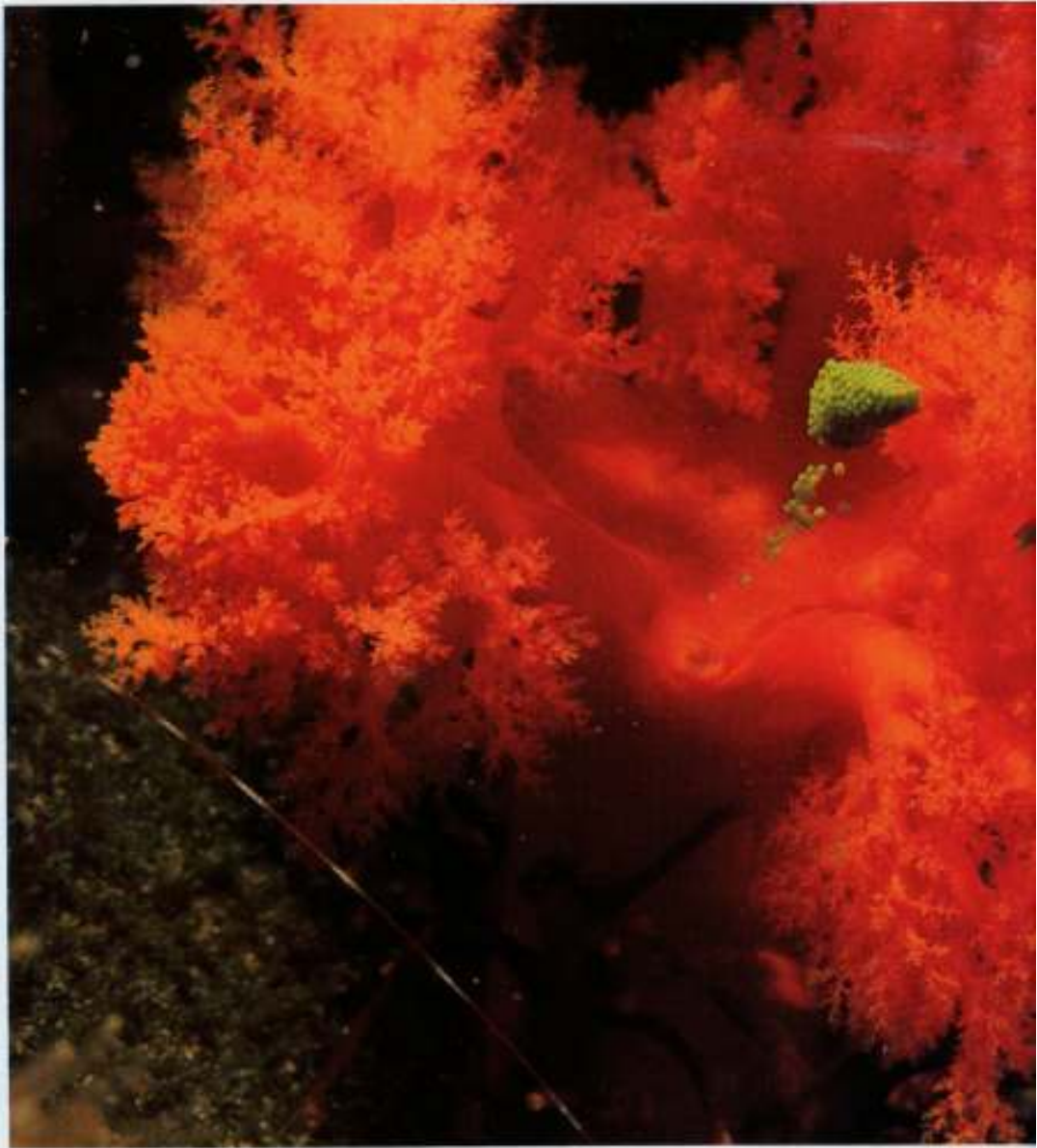


In the waters of Puget Sound, a female tea cucumber (Cucumaria miniata) below, extrudes a pencil-thin pellet of green eggs, which are fertilized as they drift through waters clouded by sperm (the white plumes in the photo at right).



Sex Among the Sessile

With the onset of spring in cool northern Pacific waters, even sea cucumbers bestir themselves

Text and photographs by Ronald L. Shimek



Spring brings a resurgence of color to the cool, rich waters around the San Juan Islands just north of Puget Sound. On the surface, there is a dense bloom of green phytoplankton taking advantage of the longer days, clearer skies, and warmer seas. Below, the rocky ocean bottom becomes a waving carpet of colored tentacles—red, white, orange, black—as sea cucumbers reach out from their burrows to feed on the tiny floating plantlife.

The sea cucumbers here are among the most numerous of the animals adapted to feed on the phytoplankton. Relatives of the rigid sea stars and hard, spiny sea urchins, sea cucumbers have a much-reduced skeleton beneath their leathery skin. They have abandoned the radial symmetry found in the rest of the echinoderms and have become elongated, with a mouth and tentacles at one end. Although some sea cucumbers may burrow through sediment or move over the ocean bottom on small tube feet, most are sedentary and let their food come to them.

Of the several species of sea cucumbers in the San Juan Islands, none is more resplendent than the orange *Cucumaria nitida*, which reaches lengths of six to twelve inches and lives in dense aggregations of one hundred or more per square

yard. When feeding, *C. nitida* extend the crowns of their mucous-laden tentacles from their burrows and then stick the tentacles, one by one, into their mouths to remove the adhering plankton. When other species of sea cucumbers are feeding nearby, the show of tentacle crowns is spectacular.

In the winter, microscopic planktonic plants are uncommon in the waters of the San Juan Islands, so the cucumbers do not feed. They remain retracted in their burrows and may spend this time repairing damaged tentacles while their gonads mature and ripen. As spring approaches, the sea cucumbers become more and more laden with mature gametes. An ebb tide on a sunny day is often the best time to catch the action.

Usually a single male spawns first: crawling clear of its burrow, it releases a plume of sperm into the water. As this sperm suspension drifts downstream, it causes other males and females to stretch from their burrows and spawn. The genital aperture of both sexes is located between a pair of feeding tentacles. In the female, the membrane covering the genital pore ruptures and a pencil-thin strand of green eggs is extruded. These are soon fertilized by sperm swimming around in

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Different species of sea cucumber often spawn simultaneously, filling the waters with eggs and sperm. The eggs of *Cucumaria peperta*, below, are nearly the same color as *C. miniata*. Strands of eggs may get as long as four inches before the strong tidal currents begin to break them up, right.



the water. The egg strand gradually breaks up, and the buoyant eggs drift slowly away to develop alone among the plankton.

While watching one or two *Cucumaria* spawn is interesting, a whole population spawning together is a far more impressive sight. The gamete suspensions can be so dense that they cloud the water.

Scott McEuen of the University of Alberta found that simultaneous spawning is common in many local populations. This insures that sperm and eggs are released together so that fertilization may occur. The spawning of the male of one species of *Cucumaria* often causes the spawning of both sexes of other related species. The echinoderm fauna of this region is so diverse and abundant, that on the right spring day, a diver may find five or more species, including sea stars, spawning. Whether they spawn independently, in response to the same seasonal cue, or in response to the spawning of the sea cucumbers is still uncertain. But the immense numbers of eggs released means that many will survive.

Cucumaria eggs are yolky (the fat in them cooks them green). Although the eggs are toxic to fish, certain invertebrates seem to be immune to the poison. One of

those invertebrates is a small predatory crustacean, *Parapleustes pugetensis*, the saddleback amphipod. These fast-moving amphipods are often abundant (20,000 per square yard) where *Cucumaria* are common. *Parapleustes* will swim up off the bottom, grab *Cucumaria* eggs and carry them away. Predation by amphipod swarms could wipe out the spawn of one or a few individual sea cucumbers, but the huge number of eggs released during one of the simultaneous spawns insures that most eggs survive. (*Parapleustes* is not above being a generalist predator and, in fact, during a feeding frenzy will bite a diver's face.)

The young cucumber embryos and larvae, small green dots about one millimeter in diameter, float in the waters of the San Juan Islands for several weeks after spawning ends. Then they settle to the ocean bottom and take up the sessile existence of adults.

Throughout the spring and early summer, many other groups of marine animals in the San Juan Islands reproduce by liberating gametes that will develop into planktonic larvae. While always interesting and occasionally impressive, these spawning events seldom rival the synchronous spawnings of sex cucumbers. □

