

The Parasites and the Pair of Earrings

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Cleopatra once bet Marc Antony that she could orchestrate the dearest dinner in history. Marc Antony accepted with a nod and then watched as Cleopatra proceeded to crush one of her pearl earrings into her drink and imbibe. Dear indeed! Marc Antony declined the other earring and granted Cleopatra the victory. Marc Antony could neither imagine nor stomach a more expensive meal than a single milky pearl.

The story of Cleopatra's earrings might not be true, yet the story expresses something of the mystery and preciousness we attach to pearls. An even greater mystery of pearls, however, is that few who would don them, including Cleopatra, know the secret of their formation. We all know pearls can come from oysters. But how do the flaccid insides of these creatures yield gems so precious they would quiet Marc Antony, and be fit for the naked necks and ears of Queen Isabelle, Mary Queen of Scots, Marie Antoinette, Elizabeth Taylor, our dear wives, and our mothers? Despite what your jeweler might like you to believe, it has nothing to do with a grain of sand.

Pearls, it turns out, long the gem of the uncommonly wealthy, are often the products of dead worms, which remain entombed at the center of natural pearls, minute, translucent, and ethereal. Larval trematodes and tapeworms drill into the flesh of mussels to use them as intermediate hosts en route to the later hosts, which are in most cases ducks, or fish. The mussels' immune systems battle the worms by encircling them in layer after layer of nacre, the same calcium-based material found in their shells. The invader suffocates and then rests for eternity in its tiny chamber. Pearls can form around any kind of invader, including fish, copepods, and even snails, but most often the prize at the center of the gem is nothing more, or less, than a worm.

Nacre production evolved as early as a half billion years ago with the evolution of mollusks. Had dinosaurs an aesthetic like ours (and thumbs) they could have clad themselves in pearls. Nacre is a general response of mussels and other mollusks to being invaded by a foreign body. Each pearl is a success story of a mollusk immune system, a stone-hard lymphocyte. Many different mussel species and even some snails can produce pearls. There are nearly as many kinds of pearls in nature as there are mollusk and snail species, thousands of jewels in the mud of rivers, lakes, and seas. Even the oyster species we eat can produce pearls, though they are typically tiny and tooth breaking rather than large and elegant.

The beauty of pearls is an accident of the mussel immune system. Most commercial pearls are milky because that is the color of the nacre secreted by oysters. Pearls can also be black, blue, red, even a sort of forest green, all of which depends upon a combination of what caused the pearl to form, and the exact composition of the nacre secreted by the mollusk. Pearls are smooth, because layer upon thin layer of nacre is added as the mussel ages. Pearls are often round in part when the encysted worm at the center of the pearl is round. Pearls formed around fish look like pearly fish.

That pearls are often worm larvae coated in the strange goo of a bumpy mollusk may make them seem somehow less stunning, or at least less romantic, but it should not. The value of pearls is due to a combination of their rarity and their beauty. Artificial pearls (usually produced by inserting a bit of oyster shell into an oyster to stimulate the invasive effects of a worm) are often indistinguishable from natural pearls, but are less valuable because they are produced in multitudes. Natural pearls are treasured because they are rare; a rarity due to the rarity of the precise interaction between the oyster and its parasites, and the geography of that interaction.

Pearls are at their most abundant where tapeworms and trematodes are at their most abundant, which is likely where ecosystems are intact, full of the multiple hosts on which tapeworms depend, bony fish, sharks, rays, and in some cases ducks. Pearls are not just dependent on biodiversity, they are biodiversity, its gemstone so to speak. Where we interfere with worm, mussel, or even the worms' later hosts – the pearls disappear. We have extinguished many species of freshwater mussel in the last hundred years, and with each, a unique pearl (and potentially a unique worm). Neither parasite nor mussel, pearls are symbols of the complicated food webs in our waters. Cleopatra did not just wear and eat pearls, she wore and ate an ecological interaction. What are we then to learn of Cleopatra from the story of her earrings? She had exquisite taste.