



The Spineless Clone

Long before the subject made waves in scientific circles, sea anemones knew there were more ways than one to make two

By Hillary Hauser
Photographs by Bob Evans

WITH ALL OF THE experimenting that's going on with genetic engineering, at the top of the list of controversy is cloning. Test-tube babies are one thing, but cloning involves still more scientific manipulations in the creating of a man. Therefore it is more objectionable to many who maintain that procreation should be left entirely to nature.

Much of the negative reaction to cloning began with the story of the millionaire ("Max") who spent a lot of money to have a baby cloned from himself. In the book, *In His Image: The Cloning of a Man*, author David Rorvik described in detail the scientific creation of a child. Rorvik, who had previously written of the dangers of genetic engineering, wrote that the millionaire wanted a baby cloned in his exact likeness. Rorvik supposedly gathered a team of scientists and through a complicated series of maneuvers, the millionaire got his baby.

This book and the claim to the first human clone in history created sparks in the scientific world for a time, but many experts both scientific and literary were skeptical and thought that the millionaire, and the book, were a product of an overactive imagination. They said that if the millionaire and child did exist, their identical genes could be detected in about fifty different ways. However, father, child and

surrogate mother were staying anonymous and inaccessible in order to protect the child (who would no doubt be discovered soon enough when he began to look like his father's twin).

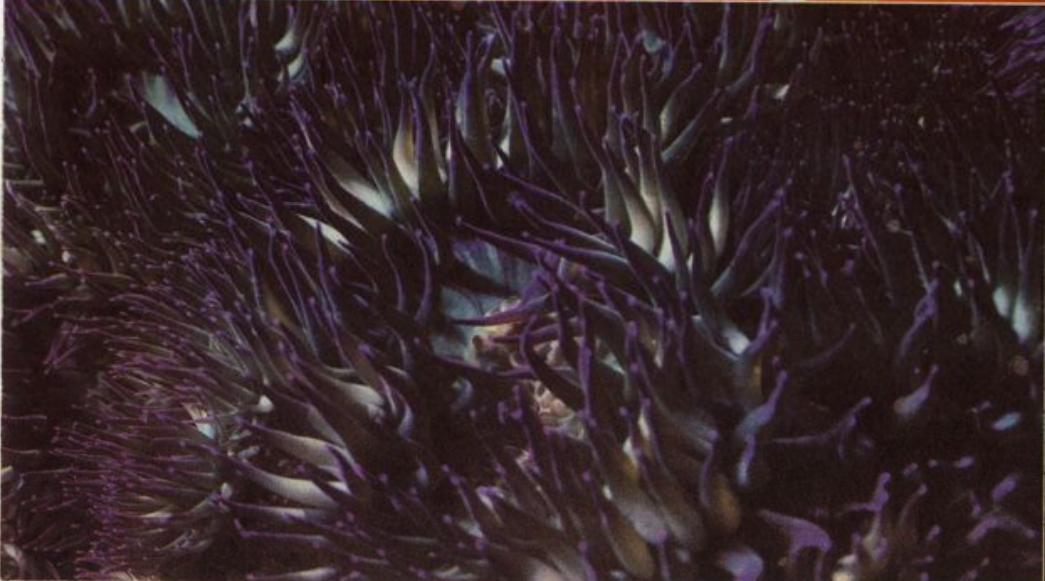
True or not, Rorvik's story started a lot of moralization and speculation about cloning. The big question many people still ask is: Is cloning really possible? Even with animals?

The answer to this is yes. Many people remember the experiments that were done in the early Sixties in which scientists successfully cloned frogs. However, this is only one example, and not the best one at that. The fact is that there are animals in the sea that clone naturally and regularly, without teams of scientists around, and their activities have never made headlines in the news. In fact, rarely, if ever, is the subject even mentioned outside of marine biology classes.

The sea anemone provides one of the best examples of the cloning that goes on in the ocean. The anemone is an invertebrate animal that looks like a bright flower on the reef. Most beachgoers know them as those squishy things on rocks that close up tight and squirt out water if poked. Underwater, anemones are quite lovely as they wave their tentacles about in the currents, stinging and paralyzing passing plankton, microscopic in size, which they eat.

While most anemones can and do reproduce in normal, sexual, fashion,

Diver peers between clones of pink club anemones (Corynactis californica) and Metridiums, below a large Metridium senile; opposite page from lower left Anthopleura elegantissima, close-up of club anemones, clone of club anemones, a clone of white Metridium senile





Two examples of *Anthopleura elegantissima* which reproduce by asexual fission



quite often they'll reproduce by other, asexual, means; that is, they clone. It is hard for sperm-and-egg oriented humans to accept the fact that entire animals can develop from a piece (or cell) of another animal, without a sperm or egg in sight, but here are the three ways that sea anemones do it: (1) budding, (2) splitting apart ("fission"), or what is called (3) "pedal laceration."

In budding, the parent anemone produces a tiny anemone from a mature cell which then crawls out of the parent and walks away. The club anemone (*Corynactis californica*) does this, and is sometimes called, appropriately, aggregate anemone, since the animals keep reproducing this way until they have formed large, colonial aggregates of their own kind. Colonial groups of genetically identical anemones are called clones and with club anemones the clones can be quite easily differentiated by their colors. They can be white, pink, orange, purple or brown. The territory of each clone will grow by further budding of clone-mates, spreading over rocks or pilings until they meet another clone. At this point, the line of battle is established and the clones will push their borders and "fight." The fighting consists of waving tentacles, which sting and paralyze. Club anemones are so-called for their little white "clubs" on the end of the tentacles. These contain the stinging cells, which discharge into the victim. After repeated attack, the defeated anemone either contracts or retreats. If it has no place to go (i.e., if it were surrounded by other non-clone types), it will release its hold on the reef or rock and float away to die. An interesting item: clone-mates can stand repeated contact with one another, while non-clone types cannot, even though they are the same species of anemone.

The anemones that reproduce by asexual fission—splitting apart or dividing—are best represented along the west coast of the United States by *Anthopleura elegantissima*. Most beachgoers are familiar with these as

the tightly clustered, gray-green anemones that carpet the rocks and tide-pools but which are so nearly completely covered with sand and shell fragments as to be camouflaged. This particular anemone reproduces by splitting itself down the middle, each half marching off in different directions, each of them two genetically identical animals, each animal having the same color and sex. In the actual splitting apart, the column of the anemone becomes longer and longer and then the animal tears itself upward from the bottom until both the column and the disk have been torn in half. The torn edges of each half come together and heal, and the new anemones are about half the size of the original one.

Anthopleura elegantissima forms territorial clones just like the club anemones, but they don't have such radically different colors as do the club anemones; to the human eye, the clones may not be so obvious. However, the different clones also "fight," keeping their clones intact and free from the infiltration of animals from another clone. If anemones from two different *A. elegantissima* clones somehow become integrated, they will attack each other repeatedly until they segregate again into their compatible, segregated, groups. Biologists have noticed that the anemones on the borders of these clones show damage from such encounters with enemy anemones, while those in the center of the clones do not.

The "pedal laceration" technique is often an alternate method of reproduction in anemones that can reproduce by splitting themselves in half. In this curious procedure, the base of the column becomes enlarged, spreading a thick film over an area that is about twice as large as normally occupied by the anemone. Then it contracts back to its normal size, leaving pieces of film behind. These pieces then become new anemones, almost microscopic in size but with tentacles and mouths and ready to grow into

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bigger adults. The *metridium* anemones can reproduce this way (and also by budding, by fission and by sexual union).

Most anemones that reproduce asexually can reproduce sexually, that is, with sperm floating in the ocean current to the egg that is with the female, with the resulting "baby," or larva, leaving the female animal and floating to a new home (or crawling out and walking away). Now, here's the interesting part: In most cases, the asexual procedure is only used by the animal when it needs to gain territory rapidly, thereby ensuring its survival. (After all, the solitary anemone knows that if it doesn't get busy, the enemy anemones will eventually surround it and attack it!) But, once its numbers are multiplied sufficiently, the anemone will revert back to sexual reproduction because, in the animal kingdom, asexual reproduction may provide safety in numbers but sexual reproduction ensures the development of strong characteristics within the species. Using this line of logic, we might conclude that if the cloning method of reproduction were used to the exclusion of sexual reproduction, the species as a whole would be weakened.

One should not attempt to draw a parallel between sea anemones and people, but as I reflect upon the subject of cloning I can't help but think of that millionaire creating little millionaires by pedal laceration. I wonder if Max—if indeed he does exist—is worried about his survival in the midst of working class people. Or, maybe he is blond and can't stand brunettes and redheads, or perhaps he is tall and can't live next door to short people. Then there is the lovely thought of clones of people who can't tolerate each other, who attack others to gain territory, who multiply themselves together in one place but in the overall picture only manage to weaken their strain and their species. But I said one shouldn't draw parallels; millionaires are millionaires and anemones are anemones and hopefully never the twain shall meet.