museum memo

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Clever Crustaceans

CRABS had always appealed to us as comical fellows with funny faces. Their lateral haste as they fled to safety, their claws widespread in defiance when trapped and the ogling of their stalked eyes all seemed to be the acts of a buffoon. We knew from our school days that the crab

wears its skeleton on the outside instead of keeping it decently covered as mammals do. Our profoundest contemplation of these crustaceans came when we confronted them in softshell form, neatly browned and flanked by tartar sauce and shoestring potatoes.

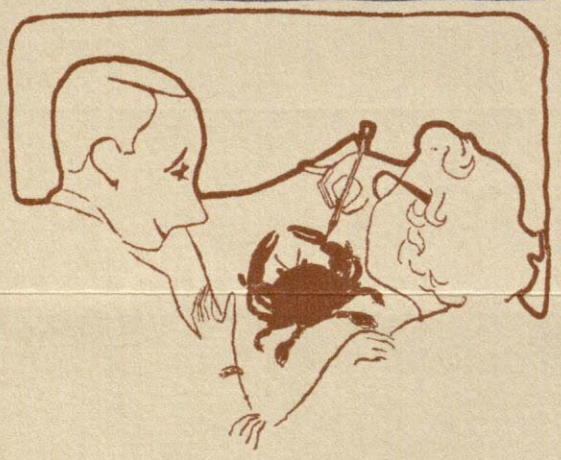
That was about the extent of our crab lore until the other day when we got to hobnobbing with Dr. Dorothy E. Bliss, Assistant Curator of Invertebrates in the Department of Fishes and Aquatic Biology. This is an age of specialization in the natural sciences just as it is in other fields of human endeavor. Dr. Bliss is specializing in the study of a decapod crustacean, *Gecarcinus lateralis*. This turned out to be the common subtropical land crab at which we had often laughed. But through the lucid lecture of Dr. Bliss we saw the critter in an entirely new light.

Dr. Bliss, who came to the museum last July is a graduate of Pembroke College in Brown University and received her Master's degree from Brown in 1942. For a time she taught at Milton Academy Girls' School, at Milton, Massachusetts, and then obtained her doctorate from Radcliffe College in 1952. She stayed on at Harvard as a Research Fellow in Biology.

Seated at a table in her laboratory and illustrating her remarks with diagrams on a large sheet of paper, she explained at the

(Spots by Joseph M. Sedacca)

outset that she was particularly interested in the growth metabolism of these crabs. What makes them grow and what makes them stop growing? They live in holes in the sand, emerging only at night to prowl for food. In order to grow they must form



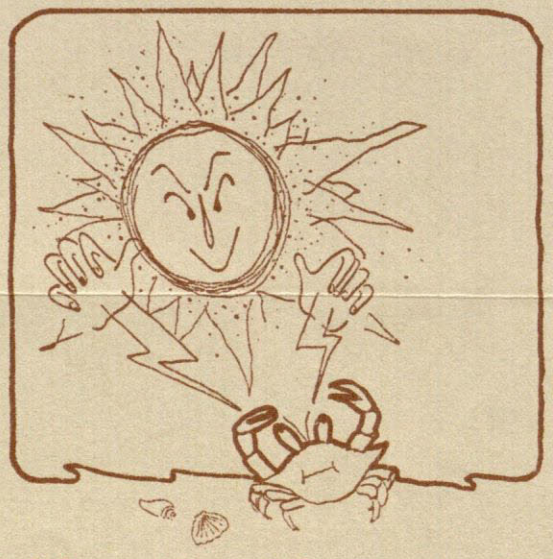
a new shell inside their current one and then molt. In this shedding process the new shell must be bigger than the one they discard.

Among aquatic crabs this problem is solved by pumping up the new soft shell with water. (It is during this transition that we get those delicious softshell crabs.) But the land crab has to have access to moisture which it absorbs into pericardial sacs beneath the posterior of its upper shell. Upon shedding it pumps up its new shell with this reserve of water.

This is all very fine but during the molting process the crab is extremely vulnerable. Sunshine would shrivel it. Its enemies would regard it as a tender morsel and lack of moisture would throw the whole thing out of kilter. If these crabs went around shedding haphazardly pretty soon there would be no more land crabs. Being a lowly critter, they can't decide when to molt and when not to molt. How, then, does the crab stop growing when things look bad and start growing again when conditions get better?

Dr. Bliss believes it is accomplished through a neurosecretory process; nerve cells which produce a hormone which inhibits growth. The hypothesis is that when sunlight strikes the stalked eyes of the crab a complicated set of reactions take place which cause the nerve cells to give off this molt-inhibiting hormone. This represents the heart and core of the neuroendocrine research being carried on by Dr. Bliss. It is certain that these nerve cells produce a stainable material and, if it can be proved that this material contains the growth-inhibiting hormone, another scientific goal will have been reached.

Besides darkness the crab also must have moisture, favorable temperature and be in a burrow before it can grow and molt. The absence of any one of these conditions inhibits the process. Dr. Bliss



led the way to some glass cases in which squads of her experimental crabs were living. To provide darkness for the crabs and yet be able to observe them she had simply covered their eye stalks with plaster of Paris. As a substitute for

underground burrows she had placed ordinary, clear water glasses on their sides in the sand.

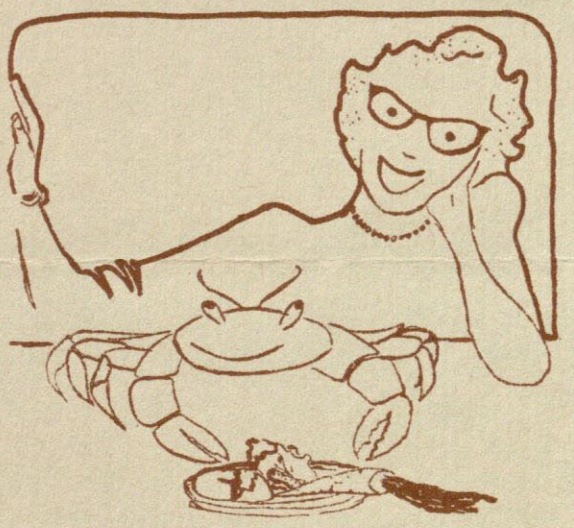
The crabs live blindfolded in these glasses and molt as readily as though they were in natural surroundings. By changing any one or a combination of the four factors Dr. Bliss can cause them to stop growing or start again.

"Do you know what autotomy is?" Dr. Bliss asked us at one point. We confessed our ignorance and she explained that if a crab's leg is injured or broken or grabbed forcibly it can break the whole thing off at a spot near the body merely by giving the member in question a quick flip. Having achieved autotomy, it develops a limb bud in which form a leg is regenerated. At the next molt the crab simply unfolds its new leg. This odd power of the crab has helped the experimenter, for the growth of these new limbs serves as an indicater of the growth of the crab.

As we thought about this Dr. Bliss led us to another row of cases in which she kept more crabs. They were colorful critters in hues of purple, red and yellow. They are shipped to her from the museum's Lerner Marine Laboratory at Bimini, in the Bahamas, where Dr. Bliss has done field work with the crabs.

She feeds them peanuts, carrots, lettuce and eggshells. When they first arrive from the competitive environment of Bimini they are quite thin and gorge on peanuts until their livers become fat. Then they taper off and eat just comfortable amounts. They become quite tame after a time although Dr. Bliss said the females were much harder to tame than the males. You can draw your own anthropomorphic conclusions. We are merely putting down what Dr. Bliss said.

To prove her point Dr. Bliss reached into a case and hauled out a crab. It



didn't bite or even seem to resent the intrusion but sat contentedly in her hand.

"For a crab to do this sort of thing is really quite remarkable she said. "They're probably as adaptable as an animal like this can get."

This brought us back to our original concept of the crab, a virtually brainless but comical crustacean. We asked a lot more questions about the research work and Dr. Bliss was very patient in her explanations. As we departed we glanced furtively into one of the cases and a crab wiggled one of its stalked eyes at us. It was still a comical gesture but this time we accepted it with greater understanding. We felt we were on better terms with crabs.

JOHN O'REILLY