

Reports

Painless Killing of Crabs and Other Large Crustaceans

Abstract. Large crustaceans used for food are customarily scalded to death. This is unnecessary torture, for it can be avoided easily. It is possible to kill the animals quickly, without pain, by placing them in cool fresh water and raising the temperature steadily to about 40°C.

The ability to feel pain and avoid it is probably an absolute necessity for motile organisms, but where pain cannot be avoided it is useless, and to inflict it only results in the torture of helpless creatures, whatever the circumstance. Predatory animals quite generally inflict pain in the process of getting food, and C. S. Sherrington pointed out some years ago that life existed for eons on the earth without the manifestation of pity or compassion, until the relatively recent advent of the human mind. Attitudes of kindness are not uniformly present in the human race, but probably the more civilized components of this group agree with the zoologist W. K. Brooks (1), who said, "As for myself, I try to treat all living things, plants as well as animals, as if they may have some small part of a sensitive life like my own. . . ." Thus, there is some tendency for civilized man to avoid inflicting unnecessary pain upon lower animals. Recent laws concerned with the painless killing of cattle in slaughterhouses are a case in point. However, these laws, and public sympathy, largely apply to mammals, and the invertebrate animals are given very little consideration, as yet.

The more hardy crustaceans, such

as several kinds of crabs, lobsters, spiny lobsters, and the like, are generally taken alive and sold alive, because the consumer has come to believe that a dead crab or lobster is a spoiled one. The assumption is not always justified, but it is a good rule of thumb, and its widespread application has prevented a great deal of food poisoning. Because of the fact that a live crustacean is the only accepted guarantee of an unspoiled one, these animals are killed at the time of cooking. In the home the prevalent custom is to scald the crabs to death in boiling water. Commercial packers and canners make use of live steam for the same purpose. Some people think nothing of this because the victims are lower animals, and others excuse themselves on the grounds that the process only lasts a few seconds. However, anyone who watches the violent reactions of crabs being scalded to death can see that they suffer extreme pain, and fishery marketing agents have pointed out that thousands of American housewives will not cook fresh lobsters or crabs because of that fact.

The purpose of this report is to describe an easy and painless way to kill large crustaceans, which depends upon the simple fact that most aquatic organisms can withstand very little heat. Marine organisms, especially those in tropical and warm temperate regions, live in their natural environment much closer to the lethal limit of heat than to the lethal limit of cold. Most tropical marine invertebrates cannot survive when water temperatures rise above 37°C, and nearly all of them are killed by the equivalent of mammalian blood heat. (These remarks do not apply to intertidal animals.) Crustaceans from colder climes may even be killed by temperatures of 30°C. Further details are given in the "Treatise on Marine Ecology and Paleocology" (2).

Some people try to kill crabs by placing them in fresh water. This is not effective with euryhaline organisms, such as the blue crab, which sometimes invade fresh water (3). However, fresh water has some anesthetizing effect because it leaches salt from the body

fluids. Only one more thing is needed for painless killing of crabs and that is a low flame under the pot, which slowly raises the water temperature to about 40°C. Crustaceans subjected to this treatment die quickly and easily without showing distress. The water feels only lukewarm to the hand, and the dead crabs or lobsters are perfectly limp because death from heat occurs long before coagulation of the protein, which takes place at about 70°C (4). Occasionally, a crab in the bottom of the pot, where his legs are in direct contact with the metal, will stir about because he feels the heat. This can be prevented by using a small wire or metal lattice to keep the animals on the bottom from direct contact with the vessel.

I have demonstrated this little experiment several times, but the facts deserve wider publicity because they may lead to some lessening of the practice of inflicting unnecessary pain. There is a false idea in some quarters that crabs are not good unless they are scalded to death suddenly. With the procedure described above, as soon as the crustaceans are dead, the heat can be turned up and the water boiled quickly; the meat of crabs treated in this manner is just as good as that of animals killed by scalding.

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References

1. W. K. Brooks, *The Foundations of Zoology* (Columbia Univ. Press, New York, 1907), p. 17.
 2. G. Gunter, *Geol. Soc. Am. Mem. No. 67* (1951), vol. 1, chap. 8.
 3. ———, *Science* **87**, 87 (1938).
 4. L. V. Heilbrunn, *Am. J. Physiol.* **69**, 190 (1924).
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Depression of Taste Sensitivity to Specific Sugars by Their Presence during Development

Abstract. A chemoreceptor neuron of the adult blowfly contains several different sites for activation by sugars. It appears that the number or affinity of the sites for fructose and perhaps those for glucose may be depressed by rearing the larvae in the presence of the sugar in question.

The labellar and tarsal chemosensory hairs of the blowfly (*Phormia regina* Meig.) contain two neurons that respond to chemical stimulation (1). The input of one of these, the S fiber, is responsible for the behavioral modality "acceptable" and is evoked by a highly specific group of polyols, especially sugars (1-3). Behavioral studies of the effectiveness of sugar mixtures sug-

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Type manuscripts double-spaced and submit one ribbon copy and one carbon copy.

Limit the report proper to the equivalent of 1200 words. This space includes that occupied by illustrative material as well as by the references and notes.

Limit illustrative material to one 2-column figure (that is, a figure whose width equals two columns of text) or to one 2-column table or to two 1-column illustrations, which may consist of two figures or two tables or one of each.

For further details see "Suggestions to Contributors" [*Science* **125**, 16 (1957)].