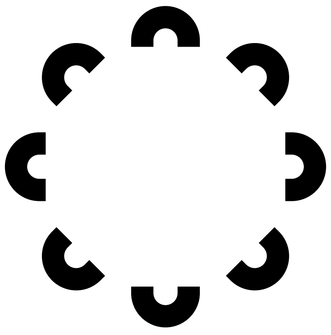

ISOLARII 1

SALMON: A RED HERRING

FOREWORD BY
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In the blind production of color in the marine food web, the microalga *Haematococcus pluvialis* synthesizes a molecule that humans, who think with their eyes, call a pigment. Until swimming the oceans with *Salmon: A Red Herring*, I had always thought of color as being for its own sake — if I thought of it at all. That color was for, well, color. A fundamental quality of things that are seen, color just was. But this book elaborates the material and energetic life of pigments, includ-

ing the industrial capture and distortion of red, in ways that has me seeing red, anew.

This particular pigment, the red of salmon's pinks, is named Astaxanthin, from the Latin *Astacus* — lobster, and the Greek *xanthós* — yellow, and was coined by chemists in 1933 exploring the structure of these curious molecules constituting the red of cooked lobsters. But of course in the world of microbial perception, astaxanthin is not there "for" its color, and is produced by the organism under duress — in environments high in salt, low in nutrients, under excess sunlight. Just as chlorophyll and other plant pigments are the energetic nexus between the sun and the sugars and proteins of the plant body, astaxanthin for the microbe is biochemically enabling. Chock full of carbons linked by double bonds, astaxanthin molecules can donate electrons to dangerously unbalanced reactive oxygen species such as superoxide and other

free radicals generated by ionizing radiation from the sun or by cellular metabolism. Oxidants, sharp-edged bull-in-a-china-shop atoms with unpaired electrons, are highly chemically reactive, and inside a cell can damage or break important things — DNA, proteins, lipids. Astaxanthin smothers the blow, takes the edge of. Such antioxidant powers of astaxanthin are thus the primary sense of the molecule for a microbe: an ability to tamp down internal chemical volatility by donating electrons.

The creatures that eat the algae capture astaxanthin ready-made, rather than making it themselves, and turn it to their own purposes. Lobsters, for example, twist the astaxanthin molecule up in a tight embrace with another protein, which changes how it refects light, appearing blue-green and thereby assisting in camouflage. For salmon, the pigment becomes a building block for vitamin A. It becomes the pink of flamingo feath-

ers and participates in the play of sexual selection. It also continues to function as an antioxidant for the cells and eggs of all these creatures, providing resiliency to stress and buffering heat shock. And, more lately in the great span of evolutionary time, astaxanthin has become a nutritional supplement in the treatment of macular degeneration or a salve for the stressed-out detoxifcation fantasies of the inhabitants of industrialized societies.

The word elaborate, from the Latin *elaborare* — to labor or endeavor— was used by the seventeenth century chemist and philosopher Robert Boyle to describe the production of honey. Honey was elaborated by the bee. *Salmon: A Red Herring* may thus be appreciated as an elaboration of color as foodstuff both of, and for, the strange voracious industrialized metabolism of the contemporary world. We learn that a great hallmark of intensifed industrial agri-

culture has been to treat the food web like a coloring book, emptying the fish or egg yolk-shaped object of color — and then coloring it back in, pouring in farmed or synthetic pigments from a feed bag, attempting to stay within the lines. Even if the pigment is initially constructed by synthetic chemistry from petrochemicals, this refilling of the grayed-out organism is more than an artificial color that dyes or covers up, such as making margarine yellow. The pigment with its energetic biochemical properties is part of the filigree of metabolic processes that allows these creatures to live just enough to become human food — as well as drawing the consumer to purchase the filet in the grocery store. Beyond appearance, therefore, the industrialized energetic economies of pigments are in play, forcing us to think not just with our eyes about the devastating and provoking question we are presented with in this work — *what color is the Anthropocene?*

It has become commonplace to talk about food as having a “carbon footprint”: the amount of greenhouse gases such as carbon dioxide and methane released into the atmosphere by the activities underlying its production. One thinks of the gasoline fueling the tractor or the long-haul truck, the methane from cows, and other combustive activities. Not so much of the revivification of the long-dead organic matter that constitutes coal tar and petroleum, to make the carbon chains of living color, to answer the bleaching, electron-hungry oxidants generated in the stressful churn of the (warming, acidifying) ocean pen filled with a million fish. In *Salmon: A Red Herring*, we also trace a kind of color footprint for food, an Anthropocene in the cell, both a specter-grey and suspiciously garish set of affairs. Read and prepare to be consumed.

—HL

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