GARDEN

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Mimicry and the Monte Carlo Predator

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Throughout the modern era Socrates' student Xenophon has retained his reputation as one who knew how to evade capture, even deep in the territory of the enemy[1]. At Heraclita in Pontus, in the year 412, however, Xenophon's ten thousand soldiers found themselves exposed when they stopped in a mountain town whose inhabitants had fled upon hearing news of the soldiers' advance. In the scene of abandonment created by their hasty departure the inhabitants had placed combs of honey, seemingly unprotected.

However, the effect upon the soldiers who tasted the combs was—as Xenophon recounts in Anabasis—"that they all went quite off their heads, and suffered from vomiting and diarrhea, with a total inability to stand steady on their legs. A small dose produced a condition not unlike violent drunkenness, a large one, an attack very like a fit of madness, and some dropped down, apparently at death's door. So they lay, hundreds of them, as if there had been a great defeat, a prey to the cruelest despondency."

According to Pliny's annotators the honey was tainted by the oleander plant, which grows in great abundance in the Mediterranean. In the animal kingdom, toxin from the oleander is used to similar effect—creating such scenes of despondency well beyond this region.

As caterpillars the *Euploea core*, for example, completely stuff themselves with the leaves of the poisonous plant. Because their toxicity is preserved into adulthood *Euploea* can be seen flying in a leisurely manner down rivers and through forested areas in India, Tibet, northern Australia, the Indian Ocean, the Mascarene Islands, the Seychelles, the Ryukyu Islands of southern Japan, throughout the Indonesian Archipelago, the Philippines, New Guinea, the Bismarcks, the Solomons, and the Islands associated with New Caledonia, the New Hebrides, Fiji, Samoa, Tonga and as far eastwards as Niue, the Cook Islands and the Society Islands.

Society—owing to a preponderance of economic terms fancifully derived from the Crusoe-scape of contemporary life—reflects in the naturalist's description of the survival of a species in its habitat. From the standpoint of the predator, biologists speak of the unprofitability of consuming certain prey, and of the profitability of consuming certain others. Here butterflies circulate as profitable or unprofitable relative to their palatability as prey.

Bright bands, spots, and stripes cover the wings of the *Euploea core*, in white, cream, and beige, to sign their unprofitability as a foodstuff. In some forms of the *Euploea core* one can still almost see gnashing incisors, now a fading simulation, which once glistened in the prehistory of the species. Had it not been in a position to advertise its toxicity as its means of survival, the *Euploea core* would have had to survive, as so many Lepidoptera do, by whatever shock it could conjure with its wings alone.

Mimicry emerges when frightful images or distasteful signs are worn on a body that, in the mouth, a predator would not find distasteful in the least.

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1 Guy Debord, *Cette mauvaise réputation*, page 109. "Xénophon, au début de *l'Anabase*, formule un très juste raisonnement à ce propos, quand on se trouve dans une passe périlleuse."

The *Papilio clytia*, which is also known as the Common Mime, offers an excellent example of this phenomenon because it is not the least bit poisonous. Here the *Clytia* breaks with the colors and patterns of other black bodied swallowtails, with their crisp black and white stripes. Like a sudden change in direction from a couturier, the *Papilio clytia* displays the same dark velvet brown throughout its body, wears the same spotted fringe around its head and thorax, and shows white bands and sub-terminal markings nearly identical to those that adorn the *Euploea*. However, the *Papilio clytia* seems to have subjected the suggestive contour of the white and cream patterns of the *Euploea* to a process of modern geometricization. The obsolete mimicry of a tooth becomes a cream triangle, aposematic marks become white chevrons and orange trapezoids.

In Leeds In 1984[2], a mathematical reconstruction of the eating habits of the Kingfisher bird, simulated the fate of its prey to answer the question of whether the emergence of its harmless mimic increases the predation of the poisonous butterfly. Using the Monte Carlo equation—which would soon become the basis of simulated images well beyond the frame of the scene I currently describe[3]—this computer simulated the predator's evaluation of the wings of butterflies to test the effect of their mimicry. Programmed to have a constant, moderate hunger, this simulation of the Kingfisher would never become desperate enough to risk poisoning over a quick catch and could therefore eat through hundreds, even thousands, butterflies. As computational power and memory capacities increased, the consumption of one thousand became 10,000 overnight.

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2 John R. G. Turnder, et al, "Mimicry and the Monte Carlo predator: The Palatability Spectrum, and the Origins of Mimicry," *Biological Journal of the Linnean Society*, Volume 23, Issue 2-3, October 1984, pages 247–268

3 James Kajiya, "The Rendering Equation," SIGGRAPH '86 Proceedings of the 13th annual conference on Computer Graphics and Interactive techniques, pages 143-150