

# THE WRATH OF KUHN

## Meditations on Fire Philosophy

by Stephen J. Pyne

The invitation to speak came with the request that I prove, contrary to written evidence, that I can be a man of few words. So let me speak informally and briefly about a subject many of us would willingly avoid, namely, fire philosophy, or the assumptions we make about fire and how we know it.

Fire is a creature of context; the ways we might conceive of fire are as varied as its settings. But all of us here know that in practice one ring rules them all. That prevailing convention goes like this. Fire is a chemical reaction, the rapid oxidation of hydrocarbons, shaped by the parameters of its physical environment. These determine how the zone of combustion moves about the landscape. From this premise all other fire scholarship and fire practices derive. Fire ecology studies how this physical process affects the living world, which must adapt to fire's presence as it would to windstorms and floods. Fire anthropology studies how people have likewise accommodated fire as a mechanical implement. Fire management means identifying physical means of control, primarily through kindling, quenching, slashing and otherwise shoving hydrocarbons around. Fire politics involve negotiating between fire's physical reality and society's ambitions.

So basic are these beliefs that I am willing to assert that few now among us can imagine any other figurations. Yet this conception does not arise intrinsically from nature. It is an assumption, like Euclid's Fifth Postulate (the one about parallel lines). We can choose other axioms and create alternative fire geometries (as it were) that are equally consistent and comprehensive. In keeping with the fire community's predilection for triangles, I suggest two.

Call the first the biological paradigm. It holds that fire is biologically constructed, that its integration occurs within the organic medium that propagates it, that its fundamentals reside within the living world. Life creates fuel, life creates oxygen, life through ecological processes and evolutionary selection sculpts the essential conditions that make fire possible. Fire's core chemistry is a *biochemistry* that takes apart what photosynthesis puts together (when this occurs within cells, we call it respiration; when in the wide world, fire). Those physical parameters like terrain, wind, and drought only matter insofar as they influence the biomass through which combustion proceeds. Ice, wind, water, lava - all can come and go without a particle of life present; fire cannot; it exists only insofar as its organic substrate allows. Fire is thus not a mechanical force that disturbs ecosystems: it is a biochemical process that feeds upon that matter. We often say of a disease that it spread like wildfire; it might be more apt to say of a fire that it spread like a disease, a contagion of combustion. The issue is not whether fire is "natural" but what kind of natural process it is. Or to say that it is analogous to biological features, but that its biotic matrix is what determines its character.

This conception pushes the physical parameters to the margins - important as pruners of fire's behavior but not its principal determinants, influential to the extent they make themselves felt in the matrix of biomass. The conception also invites measures of biological control, which are possible from the level of genetic tinkering to ecological engineering to biospheric

transformation. Not least the paradigm allows us to address through a common language and conceptual matrix those issues that most plague fire's management beyond the need to contain a flaming front, issues such as ecological integrity, sustainability, biodiversity, and bioethics. Reducing landscapes to fuel arrays says nothing about such matters and implicitly dismisses them as beyond the pale of inquiry. By contrast, reconfiguring fuel arrays into fire habitats would permit a common point of discussion. It would, for example, make restoring fire resemble reinstating a lost species. And defining fire biologically would allow us, humanity, as unique fire creatures, to find a niche in fire's ecology. We would complete the circle of life for the cycle of fire. However paradoxical, through us fire is becoming more or more absorbed into the living world.

The third conception is cultural. It says that fire's fundamentals reside with us. Humanity has become the primary means for shaping fire regimes globally and is apparently even warping climate, that ultimate expression of physical constraints. It says that fire studied apart from human practices is meaningless, that our problems with fire, be they too much or too little, whether a million-acre burn is deemed a disaster or an ecological marvel, are culturally conditioned. Even what we choose to study (or not) and how we choose to study it is a cultural call. The integration of the physical and biological parameters occurs, that is, within institutions and the realm of ideas. What links fires kindled by lightning bolts on nature reserves with internal combustion in power plants is us. This conception thus enjoins us to look for fire's management through cultural controls. The paradigm proclaims that our scholarship must move beyond the natural sciences, and transcend the social sciences, and embrace all forms of inquiry including folklore, the arts, and the humanities because the core circumstances that shape fire's presence on the land will involve human values, beliefs, ignorance, virtues and vices, all the messy, muddled things that make us what we are and shape what we do.

Each paradigm can explain the whole of fire's phenomena on its own terms. Each can absorb the others. They are, as it were, non-Euclidean geometries of fire. By way of illustration, consider how each might address the megafires that have blistered the planet over the past 15 years. The physical paradigm might liken those fires to a tsunami, an expression of geophysical forces, primarily climatic, over which humanity has scant control and against which we can only adapt through physical countermeasures. The biological paradigm might, instead, liken those outbreaks to an emergent plague such as avian flu, the outcome of broken biotas combined with favorable climate and human meddling. For appropriate countermeasures it might look to models from epidemiology for fire's containment. The cultural paradigm would note that almost all of these disturbances have resulted from human land-usage or changes in institutions, that megafires more resemble a revolt or an ecological insurgency. It would seek remediation through modifying human behavior and understanding, which is to say, how we define and respond to the problem. Each paradigm brings special insights. Choosing among them resembles a game of rock-scissors-paper.

Many, perhaps most, of you will protest that all fire knowledge belongs to a common scholarship, that I am suggesting that we replace a physical conception, well aflame, with a metaphysical one, at best smoldering. You will urge instead that each of my proposed paradigms has its niche within a universal scaffolding. The physical paradigm can instruct us in fire's control along its flaming front; the biological, the management of fire in landscapes and

macro-biotic settings; the cultural, the role humanity should exercise, how and where we should apply our firepower. They coexist. Let matters continue as they do now. My reading, however, is that it won't work that way. The power of each paradigm comes from its comprehensive worldview; each needs room to develop distinctively its full gamut of understandings. Throw them together and the default pressures will reassert a hierarchy in which everything derives from the reigning physical paradigm. One ring does rule them all.

My call to this group is not to hurl that ruling ring into Mount Doom, or to junk science for the amorphous scholarship behind fire's cultural paradigm. Funding will prevent the first, and your instincts as scientists, the second. Besides, calls for paradigm shifts are a cliché of our time, and deserve the righteous wrath of Thomas Kuhn. What I do urge is a lusty attempt to center fire within biology. Fire should take its place fully beside browsers and primary producers, amid the biogeochemical cycles of nitrogen and carbon, among evolution's biotic selectors, firmly alight within the living world without which it cannot exist. It is not enough to say that fire is natural or ancient or can exist apart from humanity, or that it is something to which life must adapt. What is needed is to assert that in its essence it is biologically constructed and to elaborate that proposition into a unifying theory that can range from genes to the biosphere. Today fire remains a sidebar in the life sciences. It should be on the commanding heights.

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