

Anomalies and Surprises¹

HENRY H. BAUER

*Professor Emeritus of Chemistry & Science Studies
Dean Emeritus of Arts & Sciences
Virginia Polytechnic Institute & State University*

Abstract—Surprises are anomalies when they not only occur unexpectedly but also run distinctly counter to established beliefs. Is then every anomaly also a surprise? Yes and no. They always surprise those working in the given field; but historians and philosophers of science and other pundits know that anomalies are *bound* to crop up as science progresses; indeed, science progresses *because of* the recurrence of anomalies.

The contemporary and widely acclaimed knowledge explosion has a little-remarked corollary: anomalies will occur more frequently. At the same time, the increasing influence exerted by those who provide research funds makes more damaging the tendency to ignore anomalies and stick with what has successfully brought funding in the past.

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I find myself surprised that more than 20 years have passed since this Society was founded. I'm grateful for this opportunity to review some of what I've learned during these couple of decades and to express my great appreciation to the founders and members and supporters of the Society—who helped me to expand my intellectual horizons. I think that is tantamount to remaining young—even if some people regard it not as youthfulness but as immaturity or naivety.

Peter Sturrock suggested the topic, “When is a surprise an anomaly?”

I suppose primarily when the surprise is not only unexpected, which it is by definition, but when it also somehow contradicts well-established beliefs. I may be surprised when 50 people suddenly swarm into my home for a surprise birthday party, but it doesn't inflict damage to my view of what are normal happenings. However, if I were surprised to find myself being examined by strange beings after being abducted in a UFO, that would be an *anomalous* surprise: my world-view would be shaken by it.

Is therefore every anomaly also a surprise?

I used to think so; but I no longer do, and that's what I want to talk about.

Anomalies as Anomalous

I believe I was quite typical of people trained in science in presuming that

anomalies are anomalous. Again typically, my training had included no philosophy of science; and the history we were taught was the traditional chronological recounting of striking progress, of science steadily attaining deeper and broader knowledge and understanding.

But the chance reading of a book brought me face-to-face with apparently substantial evidence that Loch Ness Monsters might be real animals; and that caused me to wonder why organized science seemed not to be curious about it.

Fortunately for me, I started seriously thinking about that just as this Society was being founded. But for a number of years, my associations within this Society only increased my state of puzzlement. On the one hand, it seemed obvious to me that only a few of these extraordinary claimed anomalies could turn out to be valid to any significant extent: Nessies, Bigfoot, UFOs, psychic spoon-bending, reincarnation, spontaneous human combustion, faith healing, etc., etc. On the other hand, I'd come to know and respect people who between them take very seriously quite a range of such extraordinarily anomalous claims. Surely many of them *had* to be misguided?

Anomalies as Standard in Progress of Science

Now let's consider for a moment the history of anomalous claims. Surely, what we now call anomalies were not always surprising. An anomaly goes against expectation. When humankind had little knowledge, there would also have been few guides as to what to expect: things would just occur and they would be accepted as *naturally* occurring, as occurring quite *naturally*.

For centuries before modern science emerged, people engaged in increasingly systematic observation of nature—what historians call natural history. To start with, this must have been quite open-minded: little was known and what was observed was just taken to be so. But as knowledge accumulated, apparent generalities and connections appeared; and one could reasonably expect to find certain things under given circumstances. One could be rather sure that the next swan to be seen would be white, and the next crow would be black.

So *scientific* anomalies came into being when science reached some level of confidence about what the world consists of and how it works.

A high level of such confidence was reached toward the latter part of the 19th century. By then physics, later chemistry, then geology, and finally biology had become recognizably modern, with encompassing paradigms. Increasingly since then we have “known” pretty much what to expect as we study the world in ever more detail.

However, history teaches that such confident expectation has always been succeeded by humiliating surprise.

Scientific anomalies run counter to accepted scientific *theory*. But it is erroneous to equate our stock of accumulated scientific knowledge with the current theoretical paradigms: knowledge *grows* while theories *change*. The error of equating knowledge and theories is committed—usually unwittingly, of course—by many practicing scientists, and most egregiously by the science

groupies who often call themselves “skeptics”. Anomalies always come as surprises to them, moreover as *unwelcome* surprises.

It remains one of the most neglected insights into the nature of science that it progresses not steadily but by revolution and against continuing resistance. Four decades ago already, Thomas Kuhn (1970) described scientific revolutions and Bernard Barber (1961) described “Resistance by scientists to scientific discovery”. Barber pointed out that contrarian facts or ideas are *routinely* and *inevitably* resisted at first by the scientific community; he mentions Abel (mathematics), Arrhenius and Faraday (physical chemistry), Ampère and Ohm and Maxwell (electricity and magnetism), Heaviside (radio reflection from the ionosphere), Karl Pearson (biometry), Magendie (chemistry in medicine), Lister (antiseptis), Pasteur (fermentation as biologically caused), Darwin (evolution as a result of natural selection)—a panoply of now-revered names who were anything but revered by their peers when they first proposed their discoveries. In a similar vein, Gunther Stent (1972) has described instances of “premature” science—ignored by the mainstream for long periods before being accepted—for example, Mendel’s discovery of rules of heredity or Alfred Wegener’s drifting continents (Sullivan, 1974).

In other words, when it comes to the *progress* of science rather than its everyday journeyman activity, anomalies are by no means anomalous.

Nevertheless, anomalies always come as a surprise to the practitioners of the specialty in which they appear. It is not, however, a surprise, objectively speaking, that anomalies crop up all the time and periodically force changes in the way we view the world. Scientists just expect anomalies to appear in somebody else’s backyard rather than in their own.

Anomalies as Increasingly Common

I am going further, though, than suggesting that anomalies are a normal occurrence: I believe they are going to become increasingly prominent.

It is generally accepted that knowledge has been expanding and science has been growing at an ever-increasing pace. Since anomalies are a regular and necessary part of the scientific revolutions that mark the progress of science, it follows *necessarily* that they will crop up more frequently.

Why has not the scientific community learned by now that it is anomalies that lead to progress and therefore should not be so studiously ignored, denigrated, and resisted?

Because the scientific community is a collection of human beings. Individually, humans prefer not to have to change their minds. Collectively, they are even *more* determined not to change. New approaches therefore have a hard time getting established, no matter what history or logic may teach. Parkinson’s Law bears remembering: when a human institution has gained hegemony, that’s also a signal that it is obsolescent. Parkinson cited the British Navy, but I believe the same law applies to the invisible colleges of the scientific community.

An established paradigm, an accepted world-view, or a set of scientific theories becomes established because of its success in organizing and “explaining” what is known. At no stage, though, can *everything* be known. Thus any paradigm is obsolescent from the moment it becomes established—it is ignorant of the new knowledge that waits to be gathered.

Should we then aim to overthrow paradigms as soon as they become accepted? Of course not. There are more suggestions of new approaches and apparent anomalies than there’s room for at any given time. In science, the enormous reliability taken more-or-less for granted nowadays depends on guarding vigilantly against premature attacks on existing theories and data. As Bernard Barber made plain, it is appropriate, necessary, and *useful* that anomalies be treated by the scientific community with great disbelief until they become overwhelming and irresistible. In science as in other human spheres, this much can be said for the past: it has worked, and moreover it has worked quite well enough for its own time, and so we should think several times before changing anything. Not only should something be clearly broken before we fix it, we should be very sure that the new fix will work appreciably better.

So resistance to new discovery performs a vital function. Is there any way to judge when it becomes excessive?

One possibility suggests itself. Resistance serves a vital *intellectual* function, placing the burden of proof properly on the new claim. However, resistance can also arise from entrenched *non-intellectual* interests; and when that happens it becomes dysfunctional. Standard examples are drawn from political interference in science as in Nazi Germany or the Soviet Union. In a free society like ours, there is much less purely political interference; still, whatever controls the functioning of society entails vested interests that can impinge on scientific progress. Currently, I think the reliance on economic markets to regulate just about everything that goes on in society holds quite a considerable danger to science, both for research and for applications of research.

In an increasing number of specialties, research becomes ever more expensive; so those paying for it want to exercise more control and they look for immediate exploitable applications: I quote, “everybody is working away at ‘projects’ whose outcome must be known in advance, since otherwise the inordinate financial investment could not be justified.... a current paper of mine costs about twenty to twenty-five times more to produce than an equivalent article did thirty-five years ago”; and *that* was written nearly twenty-five years ago (Chargaff, 1977: 55–56, 64, 65). So those who want to do research feel increasingly under pressure to produce what their patrons want: “scientists have to sing for their money long after they have lost their youthful voices” (Chargaff, 1977: 65). One result of commerce-driven science is the growing number of scandals, especially in biomedical research, where nasty side-effects or lack of efficacy of new drugs seem increasingly to be hidden from public view until significant damage has been done.

Another example of vested research interest, again from Chargaff: “as by one command, every other university, institute of technology, and research

laboratory feels the sudden need of opening a cancer institute.... One must be astonished at the sudden plethora of therapeutic talent” (Chargaff, 1977: 87n); “in our time a successful cancer researcher is not one who ‘solves the riddle,’ but rather one who gets a lot of money to do so. It is all quite similar to the history of alchemy, another truly goal directed, though much less costly, enterprise” (Chargaff, 1977: 89).

Nowadays there’s the tragedy of AIDS, where the mainstream dogma that HIV is the cause may be subjecting tens or hundreds of thousands to inappropriate, indeed deadly so-called “treatment” that has brought several drug companies unprecedented profits.²

Twenty years ago, I thought that this Society could fill a useful niche by looking at things that mainstream science ignores. I’ve come to think that we can also serve an increasingly useful function for mainstream science itself, by giving a forum for the less anomalous unorthodoxies that are increasingly suppressed within the mainstream because of the vested interests of funding organizations and businesses and industries that trade on applications of scientific knowledge.

At the same time, the example of the mainstream becoming corrupted under the dominance of fund-providers might also be a warning to us: tempting as it may be to seek substantial support for our work, there is much to be said for maintaining our amateur status.

Note

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² An excellent guide to unorthodox views about AIDS is the “rethinking AIDS” Web-site: <http://www.virusmyth.com/aids/>

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