Forever Tentative

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I WAS STIMULATED, CONCERNED, and saddened simultaneously as I read David Bailey's article in DIALOGUE (Summer 1988) and reread Richard Pearson Smith's Spring 1986 article, both discussing science and the LDS Church.

I was stimulated to research and assess for myself if the problem was as dramatic as these two seemed to think. I was concerned that neither Bailey nor Smith seemed to recognize, or at least to acknowledge in these articles, the key difference between scientific *facts* and scientific *theories*, which are very different things. Neither writer mentions the inherent limitations of the "certainty" of scientific theories. Finally, I was saddened to note that, for Smith at least, "science" was "right" and the Church was "wrong," and that, as Smith put it, the situation is "a reason to question the Church, not science" (1986, 109).

Bailey in a general way, and Smith in a more personal fashion, gives a synopsis of "the generally accepted scientific position" on the main issues of "science versus the LDS Church." Neither one acknowledges, that I can see, that even within the scientific community itself these "theories" are (and doubtless always will be) hotly debated. Both articles left me with the impression that, in the authors' opinions, the only opposition to these theories comes from the "creationists" Bailey mentions, and within the LDS community from certain General Authorities such as Joseph Fielding Smith, Bruce R. McConkie, Mark E. Peterson, Boyd K. Packer, Ezra Taft Benson, and others "who prefer a literalistic interpretation of the scriptures" (1988, 72).

To cite one example, Bailey states that Einstein's theory of relativity is "now considered to be among the most universal and firmly grounded of all scientific theories" (p. 62). This is true, but he fails to point out that some credible

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scientists disagree with the theory and argue for alternative theories that explain the observed facts. For instance, Melvin Cook, noted LDS scientist and author of two controversial books (1966; Cook and Cook 1968), directed me to a book, *The Einstein Myth and the Ives Papers: A Counter Revolution in Physics* (Hazelett 1979), which discusses the fact that "Herbert Ives, a Bell Laboratories physicist, arrived at a comprehensive theory which accounts for all of the phenomena and experiments that Einstein's theory is supposed to encompass" ("Book News" 1979, 1). Ives's credentials in this matter are substantial; he was an accomplished physicist, "responsible for the momentous Ives-Stillwell experiment, the first proof that moving clocks slow down" ("Book News" 1979, 2). (Bailey, Smith, and others may be interested to know that this book was brought to Melvin Cook's attention by President Benson, who, Cook assures me, is very much aware of and interested in these issues.)

Moreover, an afternoon with the computerized magazine index at a branch of the Salt Lake County Library turned up evidence of a lively debate on this matter (Findlay 1987; "DI Herculis" 1985; Barber 1986; Fischbach 1986; Thomsen 1983). According to the *Science News* article: "One of the dangers of writing down a universal theory of gravitation, as Einstein did with his general relativity, is that it lies open for any obscure object in the universe to detract from it" ("DI Herculis" 1985, 74). This article then reports " 'an apparent discrepancy with general relativity' in the motion of the binary star system DI Herculis," a very dim object discovered thirteen years after the publication of Einstein's theory. A competing theory advanced by University of Toronto physicist John W. Moffat can, however, account for the discrepancy.

A few months later, Moffat's theory resurfaced in the press (Barber 1986) in a completely different connection, providing a fascinating insight into the way science *really* works. After reexamining data from a 1922 experiment, University of Washington physicist Ephraim Fischbach (1986) of the Seattle Institute for Nuclear Theory reported findings contrary to relativity that "will fundamentally alter man's conception of the universe" (Barber 1986, 42). Moffat commented, "This could be one of the most important scientific discoveries of the century" (in Barber, 1986, 42). Moffat, who has been collecting data to support his theory since 1979, remains undaunted by his colleagues' skepticism: "It is not easy to do what I'm doing. It was not easy for Einstein either. He had a difficult time with his colleagues because he was overthrowing Newton" (in Barber 1986, 42).

Further insight comes from an article on the 1983 Second New Orleans Conference on Quantum Theory and Gravitation held at Loyola University of New Orleans. The debate was vigorous, the viewpoints varied. The article's concluding paragraph reveals things in a very different perspective from the certainties of science portrayed by Bailey and Smith: "In spite of much theoretical progress the basic questions remain open: how to mate quantum physics with gravity and cosmology and whether it can be done through Einstein's theory or needs some serious modification of it. The future, cosmologists hope, will have answers" (Thomsen 1983, 157). To this degree of "certainty" the Church and its members should scramble to adjust the gospel?

The 1983 conference by no means encompasses the controversy. In his recent book, *A Brief History of Time* (1988), Stephen Hawking, one of the most respected figures in modern physics, adds fuel to the fires of debate raging about relativity. Hawking is the Lucasian Professor of Mathematics at Cambridge University, a chair once held by Isaac Newton. The bottom line of Hawking's book? "He has unsettled both physics and theologians by suggesting that the universe has no boundaries, was not created and will not be destroyed" (Jaroff 1988, 58). Noting some problems that relativity has encountered, Hawking suggests that "Einstein's general theory of relativity would have to be modified" (Jaroff 1988, 60) and postulated some solutions different from the currently accepted theory Bailey urges us to accept.

The second topic in Bailey's overview is quantum theory. Bailey tells us: "Its basic notions are, like relativity, on extremely firm ground" (Bailey 1988, 63). Quantum theory, like relativity, is widely accepted, but its foundation of "extremely firm ground" more closely resembles shifting and unsteady sand. In a 1988 *Scientific American* article, June Kinoshita observes:

> The Pauli exclusion principle, named for its author, the cantankerous Austrian physicist Wolfgang Pauli, is a keystone of modern physics. Indeed, without it physics, if not matter, would collapse. Physicists consider the principle to be airtight. But now two theorists . . . have formulated a relativistic quantum field theory that could poke a small but detectable hole in Pauli's principle. (p. 27)

Her comment, "It will be some years before results are in," implies that the small hole may be just the beginning. A *Scientific American* article on "Gravity and Antimatter" (Goldman et al. 1988) is subheaded "New Ideas Challenge Independence of Gravitational Acceleration from Mass and Substance." Again we see that these "basic notions" are not quite as settled as Bailey and Smith suggest.

The third major theory Bailey summarizes is the "big bang" theory of creation. Here he qualifies, "I must emphasize that the big bang theory is not as fundamental and well-established as relativity and quantum theory. However, the weight of evidence supporting the theory has increased to the point that it must be taken seriously" (p. 64). Again Bailey notes no alternative theory by credible scientists. A quick check on the computerized index, however, turns up ample evidence for alternate scientific theories (Lerner 1988; Peratt 1988; Horgan 1987; Burbridge 1988).

These articles underscore the fact that this debate has been going on for at least thirty years and that aside from Nobel Prize laureate Hannes Alfven and the "plasma dissidents," there is also a group known as "the red-shift dissidents" who, led by Halton Arp, challenge the big bang interpretation of the crucial "red-shift" phenomenon. And, perhaps most important to me, the tales of Hannes Alfven and Halton Arp offer critical insight into the "objective and impartial" world of scientific research.

First a brief look at Alfven, as told by Los Alamos National Laboratories physicist Anthony L. Peratt:

> In 1939 Alfven advanced a remarkable theory of magnetic storms and auroras that has widely influenced contemporary theory of the dynamics of the earth's magnetosphere.

> He used the notion . . . to calculate the motions of electrons and ions. This method came to be universally adopted by plasma physicists . . . Yet in 1939, when Alfven submitted the paper to the leading American journal *Terrestrial Magnetism and Atmospheric Electricity,* the paper was rejected on the ground that it did not agree with the theoretical calculations of Chapman [British-American geophysicist Sydney Chapman, whose theories were widely accepted until finally proven wrong in 1974, four years after Chapman's death, by satellite measurements vindicating Alfven's theory] . . . . Alfven was forced to publish this seminal paper in a Swedish-language journal not readily accessible to the worldwide scientific community. (1988, 195)

Peratt points out that this was not an isolated incident in Alfven's career.

> For much of his career Alfven's ideas were dismissed or treated with condescension. He was often forced to publish his papers in obscure journals (p. 192). . . . At no time during his scientific career prior to winning the Nobel Prize was Alfven generally recognized as a leading innovator by those in the scientific community who were using his work (p. 195). . . . None of his work has been published in the *Astrophysical Journal,* the information organ and policy setter of the American Astronomical Society, of which Alfven is a member. (p. 197)

Peratt's speculations concerning the causes for American opposition to Alfven's work are especially relevant to our discussion.

> One probable reason is that a matter-antimatter symmetric universe [Alfven's theory] is irreconcilable with Big Bang cosmology, currently the dominant model. . . . Because his ideas often conflict with the generally accepted or "standard" theories, Alfven has always had trouble with the peer-review system, especially as practiced by Anglo-American astrophysical journals. "I have no trouble publishing in Soviet astrophysical journals," Alfven says, "but my work is unacceptable to the American astrophysical journals." (p. 197)

Science writer and plasma physics researcher Eric Lerner observes: "A more typical assessment of Alfven's ideas is the one given by James Peebles of Princeton, a Big Bang pioneer: 'They're just silly,' he says flatly" (1988, 72). Now there's a dedicated, objective, and open-minded scientist seeking after truth!

As John Gribbin, another noted science writer, has pointed out, "There are those who think of science as 'cut and dried' — which merely proves they don't understand how science is really done" (1987, 68). Lawrence Krauss of Yale University, while *defending* the big bang theory, concedes, "There are a lot of fundamental assumptions we base our model on that may be wrong" (in Horgan 1987, 24).

Next let us consider the tale of Halton Arp, the putative dean of the so-called "red-shift dissidents," as told by Geoffrey Burbridge, a world-renowned astrophysicist, former director of Kitt Peak National Observatory and currently at the University of California, San Diego. Burbridge has been at the forefront of quasar astronomy for more than two decades. When Arp was working at the Mount Wilson and Las Campanas Observatories some years ago, he was considered to be among the top twenty or thirty scientists in the world in his field. Then he began to point out some troubling problems regarding the red-shift phenomena, a critical piece of evidence in the argument for big bang cosmology.

> Skip Arp started with impeccable credentials. Educated at Harvard and Cal-tech, after a short spell in Indiana he was appointed to a staff position at the Mount Wilson

> and Palomar observatories, where he remained for 29 years. A little more than 20 years ago Arp began to devote all his time to extragalactic astronomy. . . . Soon he found many cases of apparent association between galaxies and quasi-stellar objects, or quasars.
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> All of this would have been completely acceptable if the associated objects had the same results, but they did not. Yet Arp believed in the reality of the associations, and after struggles with referees, his papers were published. Others were finding similar results, and . . . entered the literature. (1988, 39, 41)

How was this prominent scientist received in bringing out his ideas and observations?

> Arp's ranking in the "Association of Astronomy Professionals" plunged from within the first 20 to below 200. As he continued to claim that not all galaxy redshifts were due to the expansion of the universe, his ranking dropped even further.
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> About four years ago came the final blow: his whole field of research was deemed unacceptable by the telescope-allocation committee in Pasadena. Both directors (of Mount Wilson and Las Campanas, and Palomar, observatories) endorsed the censure. Since Arp refused to work in a more conventional field, he was given no more telescope time. After abortive appeals all the way up to the trustees of the Carnegie Institution, he took early retirement and moved to West Germany [where he now works at the Max Planck Institute for Physics and Astrophysics]. (p. 41)

In Arp's case, the scientific community does not provide a model of impartial and benevolent tolerance for alternate opinions. As Burbridge observes:

> The community of astronomers is totally polarized by this argument. Most do not want to hear about it. The strong disbelievers hold that those who propose or believe in this hypothesis are variously naive, ignorant of how to do statistics, overly zealous, or worse. They claim . . . that in fact the redshift controversy is over; that is, the status quo has been maintained. This last statement is often made in meetings to which the proponents of unorthodoxy are either not invited, or not allowed to speak. (p. 40)

In the next to last chapter of his book, Arp gives his account of the way he was barred from the telescopes. He writes, "The six-person telescope allocation committee . . . sent me an unsigned letter stating that my research was judged to be without value and that they intended to refuse allocation of further observing time" (in Burbridge 1988, 43).

Alfven has been arguing his position for decades, and Arp for some twenty years (Arp et al. 1973). Furthermore, not one of the participants in these scientific debates is a "creationist" of any sort, so far as I can determine. Shouldn't Bailey's review at least have mentioned that there are a number of prominent scientists who dissent from the mainstream opinion, especially when the information is so readily available?

That Bailey does not even mention such opposition within the scientific community itself is distressing to say the least. Either Bailey didn't bother to look, or he chose not to tell us. Neither seems defensible to me if he is serious about "systematically examin[ing] this subject" (p. 61). Bailey, Smith, and others who want to "accommodate" the gospel to the current scientific theories would do well, it seems to me, to remember physicist Max Born's famous statement, "Physics, as we know it, will be over in 6 months" (in Hawking 1988,

156). He delivered that pronouncement in 1929, nearly sixty years ago, and still the debate rages on.

I do not suggest that we can casually abandon the theory of relativity, quantum mechanics, and the big bang theory just because some discrepancies and contrary opinions exist. These theories *may* turn out to be correct, or at least partially so. For the most part, scientists have good reason to believe the dominant theories in science today. These theories have come to be dominant because they do the best job, in the opinion of many in the scientific community, of explaining a lot that needs explaining. Most scientists are conscientious seekers after truth (although they are clearly as susceptible to human foibles as anyone else). As David Bailey points out in his "Reply" in this issue, some of the competing theories I have mentioned differ only subtly from the mainstream views he espouses, and the conventional theories have recently received some important support. My point is not that these theories are necessarily wrong — only that they are not nearly as certain as Bailey contends. The famous scientist Jacob Bronowski pointed this out:

> There is no permanence to scientific concepts because they are only our interpretations of natural phenomena. Why are they only provisional? Because the part of the world that we can inspect and analyze is always finite. We always have to say the rest of the world does not influence this part, and it is never true. We merely make a temporary invention which covers that part of the world accessible to us at the moment. (1978, 96)

In his "Reply," Bailey also responds that the gospel too is "forever tentative," citing polygamy, the Adam-God doctrine, blacks and the priesthood, and so on. Apostle and scientist John A. Widtsoe rebuked such a notion when he said:

> I belong to various scientific societies. In them I find that theories come and go. . . . I can cling safely to the church, to the Gospel of Jesus Christ, it has steadying power, it does not change nor vary. It is the same today, yesterday and forever. . . . Do not misunderstand me as I speak on this theme. . . . I do not mean that this Church and kingdom is static, that we stand still. I believe in a living, growing Church, which is in need of and does receive revelation from day to day. Nothing is more certain to me than that we are founded on revelation from God, and that we are guided daily by such revelation. We shall have revelation for our guidance to the end of time. (1934, 9–10)

As for the "theological" questions both Bailey and Smith raise, many become much less formidable once we recognize the limitations of science pointed out earlier. Henry Eyring addressed this issue years ago, when he said:

> I am convinced that, wise as men are, and in spite of the wonderful things they have done, the Creator of this universe goes so far beyond anything that men understand that it is ridiculous to talk of the two in the same terms. . . . Since all truth has a single source, the apparent conflicts that often trouble us reflect only our incomplete understanding and must eventually be happily resolved. (1969, 45)

Instead of asking, as Keith Norman does in a 1985 *Sunstone* article, "Mormon Cosmology: Can It Survive the Big Bang?" we might more profitably

inquire, "Can the Big Bang Survive Herbert Ives, Hannes Alfven, Halton Arp, John Moffat, and Others?" Bailey contends that the big bang theory "creates some problems for Mormon theology" (p. 74) and cites Norman's essay. Yet in another paper Bailey cites, Russell T. Pack, a theoretical chemist doing research in quantum mechanics at Los Alamos, notes that "Norman's essay is a collection of red herrings. I know many Mormons who are professional physical scientists, but don't know any of them who are troubled by the questions raised by [Norman's] essay" (Pack 1987, 4). This is an interesting omission from Bailey's paper.

Scientific theories are by their very nature "forever tentative," as Hugh Nibley puts it (1986, 213). Why should we worry about accommodating our religious beliefs to scientific theories that almost assuredly will change in twenty years, just as today they are different from what they were twenty years ago?

I also object to the word "theology" as a label for the religious philosophy of a church based on revelation. As Leeman Perkins pointed out in a 1966 letter to DIALOGUE: "The religion of the Latter-day Saints does not have its foundations in theology in the traditional sense in which McMurrin treats it, but in revelation. . . . The epistemology of the church is vastly different from that utilized by traditional philosophy and her theological stepchild" (p. 8). Hugh Nibley discusses this subject at length in *The World and the Prophets* (1987, see especially chapters 5–7, 9, and 15).

Science is wonderful — as far as it goes. But scientific theories come and go, almost always marked by wrangling between factions. This is the very nature of scientific theorizing, an inescapable part. It seems to me critical that we keep this limitation firmly in mind, lest science become something that could "deceive even the very elect." Commenting on those students at BYU who lost, or abandoned, their testimonies because of the neat "ascent of man" schematic of twenty years ago (now in complete disarray, as the Leakey-Johanson debate shows), Nibley laments, "It is sad to think how many of those telling points that turned some of our best students away from the gospel have turned out to be dead wrong!" (1986, 57).

In conclusion, I for one am glad that President Benson and other Church prophets have steered the Church away from the quicksands of ever-changing "scientific" debates, lest our church, like apostate Christianity, someday find itself in the position of that learned Pope who had to summon his friend Galileo and force him to recant his findings because that church had not been so wise. That some General Authorities have from time to time become embroiled in the debate is regrettable, although here too a check of the pertinent sources finds the men in question much more moderate and less "anti-scientific" than Bailey, Smith, and others have suggested.

Even if they were right, however, we would be wise to remember Boyd K. Packer's April 1988 conference address, offering thanks for the principle of repentance in his life. He points out that one of our tests of faith is that sometimes all-too-human men and women do the Lord's work here on earth, making mistakes as they go. (And this is no less true of science.) There is no need to "choose" between the Church and "science" — this is a false dichotomy. I

believe the Church of Jesus Christ of Latter-day Saints is true, and I urge Bailey, Smith, and others, when faced with an apparent contradiction between the Church and science, to stick with the Church, for science will eventually come around. As Heber J. Grant said:

> When I was a young unmarried man, another young man who had received a doctor's degree ridiculed me for believing in the Book of Mormon. He said he could point out two lies in that book. One was that the people had built their homes out of cement and that they were very skillful in the use of cement. He said there had never been found and never would be found, a house built of cement by the ancient inhabitants of this country, because the people in that early age knew nothing about cement. He said that should be enough to make one disbelieve the book. I said: "That does not affect my faith one particle. I read the Book of Mormon prayerfully and supplicated God for a testimony in my heart and soul of the divinity of it, . . . and I have accepted it and believe it with all my heart." I also said to him, "If my children do not find cement houses, I expect that my grandchildren will." He said, "Well, what is the good of talking with a fool like that?" Now, since that time houses made of cement and massive structures of the same material have been uncovered. (1929, 129)

To all interested in the issues raised by Bailey, Smith, and others, I close with the counsel of President Gordon B. Hinckley: "Fundamental to our theology is belief in individual freedom of inquiry, thought, and expression. Constructive discussion is a privilege of every Latter-day Saint" (1985, 5). To that end, may the dialogue continue!

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