Fundamentalist Beliefs in the Christian Religion, American Civil Law and the Physical Sciences.

(draft of part A of the online Outline)

A. The word "fundamentalism" is used here to denote a belief in an exact symbolic representation of Truth. The person believes that symbolic representations are both inerrant and also authoritatively self-fulfilling, that is, inherently free from error and with a mandate compelling belief in the representation. Such beliefs have been prominent in all three ***institutional disciplines*** under examination, namely, the Christian religion, American civil law and the physical sciences.

In all three institutional disciplines, fundamentalism has served as an original foundation for development of later beliefs. Fundamentalist beliefs are challenged by facts of development that show continual systemic changes in such representations.

"Fundamentalism" was an invention of the 20th century. It originally referred to a religious movement that affirms certain core beliefs about the Christian religion and the divinity of Jesus Christ but the meaning has expanded. Of importance here is the fundamentalist belief in ***Biblical inerrancy***, which is to say, a belief that the Bible is free from error. Of course, this was a belief that had been part of Christian dogma going back at least as far as the 4th century, when Christianity became the Imperial Religion of the Roman Empire. Implicitly, there is a belief in a ***Truth*** which can be ***put exactly into words***, and such implicit belief supports a belief that those words are in Biblical texts. Here, I use the word "fundamentalism" in a more general sense to refer to an implicit belief in an ***exact symbolic representation of Truth*** regardless of the forms of the symbols.

Historically, Christian fundamentalism was invented by a group of American Christians who were reacting against a "modern" approach to Biblical criticism that developed in Germany during the 19th Century and that challenged the underpinnings of beliefs in Biblical inerrancy, implicit and express. Examined below is a chronicle of the modern approach to Biblical criticism, *Paul and His Interpreters* (1912) by Albert Schweitzer, written before the author became a medical missionary. Schweitzer focuses on ***development***, first, by examining the changes that occurred in early Christianity, as the religion grew from the teachings of Jesus to the churches of Paul and then to the era of "dogma" that became established during the third and fourth centuries; and, second, by following the successive teachings of the 19th Century German theologians who progressively stripped Biblical texts of claims of inerrancy. Development is a chief topic of my Testimony and an instrument I use in this essay to deflate beliefs in an exact symbolic representation of Truth. One who believes that he has Truth does not develop.

The "fundamentalist" notion that Truth can be exactly represented by symbols has also been common among lawyers and physical scientists, the former looking for Truth in a code of legal formulas and the latter looking for Truth in a system of mathematical formulas. My alternative approach seeks knowledge rather than Truth and expands the scope of inquiry to look at action, practice, procedures, persons and freedom.

Fundamentalists also believe in the ***authority*** of their symbolic representations, namely, that the representation carries with it a mandate that the person conform his or her selections to the forms and/or ranges allowed by the representations. Authority implies the existence of a ***commanding power*** that is of secondary importance here but worthy of note. Of course, persons recognize the powers of physical forces, courts and, perhaps, divine judgment. What I emphasize here is that symbolic representations are believed to be the proper authoritative expressions of that power.

In self-affirming fundamentalism, the authoritative power is part of the belief in an exact symbolic representation of Truth. In physical sciences, symbols supposedly carry their own authority by reason of their mathematical form, their genesis in experiment and their successful defense against challenge, at least according to the fundamentalist belief. In the superseded fundamentalist view of civil law, a legal rule was an authoritative statement that determined the outcome of a dispute and the duty of a judge or juror was simply to follow the rule and declare the result.

Whether superseded or not, fundamentalist beliefs and obedience to authority have been incorporated in all our conceptual systems. Thus, as a core belief, a Christian is instructed to follow the example of Jesus Christ. "Let this mind be in you, which was also in Christ Jesus" who "being found in fashion as a man, ... humbled himself, and became obedient unto death, even the death of the cross." (Philippians 2:5, 2:8, KJV) When the Sheriff's Deputy arrives with an Order signed by a Judge, declaring some act of the recipient to be in violation of the rights of the neighbors and commanding the recipient to cease and desist that act, the recipient is likewise advised to obey. Those who attempt to use technology must comply with its requirements for the technology to be useful, a fact of life summed up in the phrase "Read the Friendly Manual."

Belief in the commanding power of symbolic representations is at least as old as Pythagoras and Deuteronomy (c. 7^{th} - 6^{th} century B.C.E.) and seem to have been originally specific to Greece and Judah respectively. Focusing on physical science, many scientists, e.g., the "mechanical cosmologists" discussed in Page 1, believe, in the style of Pythagoras, that mathematics expresses Truth. For example, Roger Penrose, a mathematical physicist, assumes the existence of "the mathematical scheme, which governs the structure of the universe." (*Emperor's New Mind* (1989) at 433.)

The fundamentalist notion of "exact symbolic representation of Truth" through mathematics was introduced by Galileo (1564 - 1642), leading to the "religious war" between Christian cosmologists and mathematical cosmologists that continues to the present day. W. Rowland, *Galileo's Mistake: A New Look at the Epic Confrontation between Galileo and the Church* (2001) entertainingly casts Roman Catholic inquisitors in roles where they appear as tolerant conciliators trying to discipline Galileo's stubborn mathematical fundamentalism. See also Paul Feyerabend, *Against Method* (3d. ed. 1993) at 121 portraying Galileo as an opportunistic self-promoter by whom "the facts ... are arranged in a new way, approximations are made, known effects are omitted, different conceptual lines are drawn, so that a *new kind of experience* arises, *manufactured* almost out of thin air. This new experience is then *solidified* by insinuating that the reader has been familiar with it all the time. It is solidified and soon accepted as gospel truth..." (Emphases in original).

Fundamentalism was once the conceptual style of the American legal system. Culminating in the 1930's, a conceptual revolution occurred in American civil law, during which the legal system rejected fundamentalism and commenced on the era of legal practice that is still ongoing. A participant in that revolution was Jerome Frank, who was active in Franklin D. Roosevelt's New Deal, including serving as Commissioner of the SEC, and whom Roosevelt later appointed as a Judge of the United States Court of Appeals for the Second Circuit. In *Law and the Modern Mind* (3d ed. 1935), which he intended to be a major statement of principles for the new era, Frank castigated "Legal Fundamentalism" for a number of reasons, including the erroneous belief, then commonly held, that a code of written formulas decided the outcome of legal disputes, a belief he disparaged through such insults as "word-magic," "verbomania," "belated scholasticism" and "childish thought-ways."

The chapters on "childish thought-ways" in *Law and the Modern Mind* were based on early work of Jean Piaget, a pioneer in the psychology of child development. (My own dependence on Piaget is shown in a web page on my websites and throughout the materials.) From a developmental perspective, the present American legal system has become more mature as a result of the revolution. The change in American civil law was comparable to the maturation of a child from the cognitive capacities of a seven-year-old to those of a teen-ager. Such maturation is embodied in changes in legal doctrine and practice. As a result of the revolution, fundamentalism has been superseded by developmentalism.

As discussed below, the present legal system can be described by a ***developmental jurisprudence*** that specifies the selections (choices or decisions) available to a judge or jury and tracks the changes made in such selections in response to changes in society. Legal doctrine is thus defined through procedures where the central events are the exercises of personal freedom by judges and jurors, constrained by the discipline of the legal institution.

A conceptual revolution comparable to the 1930's legal revolution is ongoing in the physical sciences, as shown in "Fundamentalism versus the patchwork of laws" in *The Dappled World: A Study of the Boundaries of Science* (1999) by Nancy Cartwright, an eminent academic philosopher of science. The opening of such a revolution is conveniently credited to Thomas S. Kuhn's 1962 publication of *The Structure of Scientific Revolutions*, which introduced a historical approach. Kuhn also found works of Piaget to be "particularly important." (See the Preface to the Second Edition, Enlarged of *The Structure of Scientific Revolutions* (1970) at vi, n. 2; see also Kuhn, *The Essential Tension* (1977), "Concepts of Cause in the Development of Physics," based on Piaget's approach and originally published in a journal established by Piaget.)

Kuhn draws a distinction between "normal" science that works "within a paradigm" and "revolutionary" science that changes a paradigm. The term "paradigm" has a cluster of meanings but, as I see its meaning in the physical sciences, it denotes a particular conceptual view along with a focus around a specific physical system. A new paradigm typically involves both a new conceptual view and a specific physical system, e.g., Sadi Carnot's Ideal Heat Engine that was introduced in 1825. The distinction between "normal" and "revolutionary" science in Kuhn's analysis closely resembles the distinction between "run of the mill" and "landmark" cases in the legal environment and both are variants of the contrast between synchronous and

developmental resemblances introduced in connection with Bible-based scriptures. The three kinds of changes exhibit important common features, chiefly a discontinuity between stages that Kuhn calls "incommensurability" and that Schweitzer finds insurmountable in attempting to connect the life and teachings of Jesus with the Pauline Churches or the era of Christian dogma. Lawyers too must adapt to sudden changes in laws enacted by the legislature or declared by the courts.

Based on the Quad Net model and "universal critical point principles" (Page 2, sections A.4 - A.6), I suggest that there is a critical moment during a change from one paradigm to the next in the scientific domain. During the critical moment, "competing paradigms" co-exist and there are two or more possible theories that a scientist can select through an exercise of freedom. I find support for my position in John Worrall's "Scientific Revolutions and Scientific Rationality: The Case of the 'Elderly Holdout'," in *Minnesota Studies in the Philosophy of Science*, vol. XIV, Scientific Theories, C. Wade Savage, ed. Worrall considers certain arguments based on Kuhn's works "to be a particularly sharp challenge to the claim that the development of science has been a rational affair." Worrall's discussion illuminates exercises of freedom during scientific changeovers.

Worrall's example is based on the history of theories of light. Indeed, the history of theories of light shows the errors in claims of cosmological certitude.

Newton taught that light consisted of particles that he called "corpuscles" that were emitted by a light source. The corpuscular or "emissionist" theory of light thereafter became obligatory but it could not explain large classes of phenomena. When Augustin Fresnel (1788-1827) submitted an alternative "wave theory of light" to the Paris Academy of Sciences, he was derided. One academician, following through the mathematical implications of the wave theory, "objected to Fresnel's theory on the ground that, if correct, the shadow of a round object should have a bright center, and this, of course, was not true!" (Shamos, *Great Experiments in Physics* (1959) at 109.) Fresnel and a friendly academician were able to show, under laboratory conditions, that there was, in fact, a "white spot at the center of the shadow." This dramatic unified discovery of fact and theory was part of a scientific revolution that led to the physics of electricity and magnetism, which was a "wave theory."

The wave theory of light had its own difficulties. Two are important here.

First, scientists compared supposed waves of light to waves in water and sound waves in air and concluded that some "medium" was needed to support the waves. Accordingly, there grew up a compulsory belief in a "luminiferous (light-bearing) ether" that was everywhere in the Universe and that was both extremely subtle (because it did not slow down the planets) and also enormously strong (needed to propagate waves at the very high speed of light). No known material combined such contrary properties.

A second problem was discovered by David Brewster, later knighted for his achievements, the "elderly holdout" against the wave theory discussed by Worrall. If a narrowed beam of sunlight is passed first through a gas consisting of a single chemical species and then through a spectrum to display all the colors, there is a "whole series of sharp, dark absorption lines." Each line

means that light of a particular wavelength (or, equivalently, frequency) is being absorbed. Omitting some words and symbols in the quoted matter: "The wave theory is forced to say that the ether within that gas freely undulates to a red ray whose index is 1.6272 and also to another red ray whose index is 1.6274; while its ether will not undulate at all to a red ray whose index is 1.6273." Such phenomena were totally unknown in sound or water waves.

There were other problems with the wave theory, notably the photo-electric effect that was the subject of a 1905 paper by Einstein that re-introduced the particle theory, using the name "photon." A particle or "photon" theory of light is compulsory today. Einstein later opposed the probabilistic concepts that are part of the particle theory becoming an "elderly holdout" in his own way. The "Podolsky-Einstein-Rosen paradox" is a proposed physical system that presents a serious difficulty for believers in the exact truth of present conceptions of light as photons.

There were, therefore, three stages of development of theories of light and two transitions, first from a particle (corpuscular or emissionist) theory to a wave theory in the early part of the 19th century and then from a wave theory to a particle (photon) theory in the early part of the 20th century. It is this historical back and forth, repeated with variations as to numerous other subject matters, that leads some to "conclude[] that every fundamental scientific theory, no matter how firmly entrenched it might appear for a time, is eventually rejected and replaced by another theory inconsistent with it."

Worrall examines the cross-over from the emissionist theory to the wave theory and suggests examining the situation as viewed by a practicing physicist in about the year 1830. Certain factors of the situation weigh in favor of the emissionist theory and certain factors weigh in favor of the wave theory: "if the wave and emission theory of light are compared as they stood in 1830, then a case can certainly be made out that, whatever the other merits of the wave theory, the emission theory still outscored it in terms of mathematical manipulability." However, this factor was clearly outweighed by the most important factor, the "predictive empirical success" of the wave theory. What this means is that the wave theory opened the way to new discoveries in places where the emissionist theory was barren: "the emission theory had failed to produce anything remotely capable of standing alongside Fresnel's success in predicting in minute detail the sizes and separations of diffraction fringes, let alone his success with the 'white spot' at the center of the shadow...and so the list goes on." Such success is reflected in "fruitfulness" shown by "supplying ideas for developing specific theories *independently of empirical results*." (Emphasis in original.)

Worrall is particularly concerned with the possibility of describing the shift from one theory to another chiefly in terms of "objective" factors, such as empirical accuracy, empirical scope, consistency, simplicity and fruitfulness or, alternatively, the extent to which "subjective (or idiosyncratic) factors have played a role in the choices actually made by scientists." Kuhn, in particular, holds that objective " criteria do not supply a choice algorithm ...in live cases of theory choice and, in particular, during scientific revolutions [because] these different criteria seldom, if ever, tell in the same direction."

Worrall's own resolution harkens back to the teachings of Pierre Duhem (1861-1916), a physicist

and philosopher of science whose ideas were later developed by W. O. Van Quine (1908-2000). Given a body of experimental results, there are multiple possible explanations that "leave the theoretical scientist enormous freedom." "Duhem went on, however, to applaud the 'good sense' that was enjoyed by the best theoretical scientists and that in effect curtailed this freedom." "Duhem's good sense, indeed, consists basically in following the types of procedures that have paid off for science in the past." Brewster's adherence to the emission theory was "contrary, not to any eternal rules of deductive logic, but to what appears to be the best scientific practice."

These passages recall the opening paragraph of Lecture I of Holmes' *The Common Law* (1881), the opening call for the revolution in American civil law:

> "The life of the law has not been logic; it has been experience. The felt necessities of the time, the prevalent moral and political theories, intuitions of public policy, avowed or unconscious, even the prejudices which judges share with their fellow-men, have had a good deal more to do than the syllogism in determining the rules by which men should be governed. The law embodies the story of a nation's development through many centuries, and it cannot be dealt with as if it contained only the axioms and corollaries of a book of mathematics."