

## EINSTEIN'S CONCEPT OF RATIONALITY IN SCIENCE AND RELIGION

Richard Fleming

Historically, science and religion often have been held to be irreconcilable antagonists. Scientific advances and the individual scientist or community of scientists who advocate such advances have frequently come under the vicious attack of orthodox religions, such attacks often taking a physical as well as a verbal form. The conflict between Galileo and the Roman Catholic church is, of course, a paradigm example of such attacks.

Einstein found the historical antagonism between science and religion to be not only socially destructive but philosophically unsound and indefensible as well. In a much quoted phrase he held that "[s]cience without religion is lame, religion without science is blind."<sup>1</sup> It is this important dialectical relationship between science and religion in Einstein's thought that this essay will address. Generally, the concern will be with the role the non-rational plays in rational inquiry. This general concern will be specified through examining science as a rational inquiry and religion as the ground for those feelings which are necessary for the promotion and well-being of science.

### I.

What is the nature and aim of science? What is demanded of a discipline which attempts to explain nature? These questions, although philosophical in character, are crucial for an understanding of science as well as for the philosophy of science. That is, for Einstein, there is a close working relationship between philosophy and science. Philosophical generalizations and assertions about science must first be based on

established scientific methods and results. Once such philosophical structures are established, they tend to influence the very scientific methods and thoughts which gave them birth. In this way a dynamic relationship between science and philosophy is established: philosophy influencing science by critical examination of scientific method, and science incorporating and rejecting the insights of philosophy's careful scrutiny. The latter, in turn of course, leads to new philosophical speculations and analyses of scientific procedure.

It was the understanding of scientific pursuit and philosophical speculation that led Einstein to conclude that science is an open, never ending pursuit. "Science is not and will never be a closed book. Every important advance brings new questions. Every development reveals, in the long run, new and deeper difficulties."<sup>3</sup>

Science, for Einstein, attempts to make meaningful associations between the separate impressions and experiences which arise in the physical world by establishing concepts and methods which allow for such associations and connections. It is this conceptual framework of science which philosophy constantly scrutinizes and by means of which science provides explanation of the empirical world. Science, claimed Einstein,

is the century-old endeavor to bring together by means of systematic thought the perceptible phenomena of this world into as thorough-going an association as possible. To put it boldly, it is the attempt at the posterior reconstruction of existence by the process of conceptualization.

Einstein envisions, therefore, two different realms which science must join in order to achieve the comprehensiveness and explanatory power which it seeks, those two realms being the external physical world and the mental conceptual world. Of the former, Einstein held that the "belief in an external world independent of the perceiving subject is the basis of all natural science."<sup>4</sup> That is, prior to all scientific pursuits the belief in the independence and objectivity of the external world is required. Concerning the latter, Einstein claimed that the origin of our concepts resides in ordinary thought and that "[t]he whole of

science is nothing more than a refinement of everyday thinking." Everyday thinking, however, is not without its faults, and science must therefore cleanse itself of the deep-rooted and often uncritically repeated prejudices which ordinary thought contains. Most importantly, science must always view its own existence as depending not on ordinary thought (although having its origin there) but essentially on the creativity of the mind. Science starts with everyday concepts which explain the external world and then, through the free creative use of the mind, these concepts are refined toward clear and careful methodological thought.

It is the creation of concepts which is to provide a framework for the creation of order, associations of experiences and, ultimately, explanation of the external world. It is also that which philosophical thought carefully scrutinizes. Hence it is through the critical analysis of the concepts of science that philosophy ultimately has an influence on our understanding of the scientifically interpreted external world. This is the case in that the external world is only understood through our conceptual apparatus. Finally it is precisely the aim and nature of science to join these two realms and attempt to achieve an understanding of empirical facts through conceptual constructions.

While the attempt to connect freely chosen concepts with the phenomena of the external world provides a general description of the aim of science, it says nothing about the particular aims and nature of scientific theories. With regard to this, Einstein argued that scientific theories are regulated by two essential demands. First, the theory must not contradict empirical fact. Scientific truth is that which can stand the test of experience. The theoretical constructions of science must not be adhered to at the expense of empirical facts. If the very life of a concept depends on the adoption of assumptions which violate the evidence of experience then the concept must be rejected. Second, the theory needs to contain and strive for "naturalness" or "logical simplicity" in its concepts and premises. Scientific theories are to exhibit as great an explanatory power as possible with the simplest and least cumbersome of assumptions. The aesthetic concerns of simplicity and harmony must be central goals in the creation and adoption of scientific theory. Thus in his attempt at combining conceptual constructions and empirical facts, the scientist must be guided by the specific aims of external confirmation

and inner perfection.<sup>8</sup> "Science is not," Einstein stressed,

just a collection of laws, a catalogue of unrelated facts. It is a creation of the human mind, with its freely invented ideas and concepts. Physical theories try to form a picture of reality and to establish its connection with the wide world of sense impressions. Thus the only justification for our mental structures is whether and in what way our theories form such a link.

The most important guidelines that such a "theoretical link" must observe are the adherence to empirical fact and the need to be as aesthetically simple and harmonious as possible. "A theory is the more impressive the greater the simplicity of its premises is, the more different kinds of things it relates, and the more extended is its area of applicability."<sup>10</sup> Simplicity in assumed or postulated concepts and in premises, without loss of explanatory power, is a major aim of scientific theory. Thus while Einstein held science to be a "posterior reconstruction of existence by the process of conceptualization" priority in that process must be given to existence itself--in that experience is the final test for the validity and truth of scientific theories--and to the coherence and simplicity of the concepts because only such simplicity and coherence will allow human comprehension to be its most adequate.

According to Einstein, scientific theories are constructed in order to allow for an understanding of the external world that surpasses in logical order and completeness any conception which one might have in everyday thought. Such theories rest on the belief that aesthetic harmony and simplicity of basic concepts will result in an understanding of the external world. In more general terms, science is to be seen as based on the belief that there is a rational order and harmony in the physical world which, through the proper creation and usage of mental concepts, can be rationally comprehended.

This general belief occupied a great deal of Einstein's thought. He claimed that from the earliest attempts at theorizing to present day theories there has been the desire to find a unifying theoretical

basis for science. In fact, he stressed that the confident belief that such a goal may someday be reached is the chief passion and devotion which maintains the theorist in his work. That is, the belief in the ability to comprehend and understand is at the foundation of all scientific work.

Without the belief that it is possible to grasp the reality with our theoretical constructions, without the belief in the inner harmony of our world, there could be no science. This belief is and always will remain the fundamental motive <sup>12</sup>for all scientific creation.

The scientific method itself would not have led anywhere, and indeed would not even have been born without a passionate desire and striving for clear understanding. It was such a passion that Einstein labeled the religious feeling of science. <sup>13</sup>

Those who feel a need to comprehend and who try rationally to understand are generally captured by a religious awe which directs their pursuit. Scientific inquiry, for Einstein, is influenced and directed by the religious feeling of wonder and awe. The

scientist is possessed by the sense of universal causation . . . . His religious feeling takes the form of a rapturous amazement at the harmony of natural law, which reveals an intelligence of such superiority that, compared with it, all the systematic thinking and acting of human beings is an utterly insignificant reflection. <sup>14</sup>

The importance Einstein was to place on this religious feeling was in part the reason he moved out of the mainstream of theoretical physics. That is, the rise of quantum mechanics proved to be the dominating force in theoretical physics in Einstein's later years, yet he rejected it as a future conceptual basis for theoretical work in physics. His refusal of its general validity came from the very essence of this scientific-religious feeling. The uncertainty principle upon which quantum mechanics staked its claim had upset the traditional doctrine of universal

causality and harmony of the world and this dramatic change Einstein could not accept.

Is there really any physicist who believes that we shall never get any inside view of these important alterations in the single systems, in their structure and their causal connections? . . . To believe this is logically possible without contradiction; but, it is so very contrary to my scientific instinct that I cannot forego the search for a more complete conception.<sup>15</sup>

Einstein held that the scientific belief in unity, objectivity and causality--which can essentially be reduced to the belief in the rationality of the world and our ability to understand it--was absolutely essential to the pursuit of physics; and if he were convinced that these concepts had to be rejected, so also then would his pursuit of physics have had to end.

Quantum mechanics is certainly imposing. But an inner voice tells me that it is not yet the real thing. The theory says alot, but does not bring us any closer to the secret of the 'old one.' I, at any rate, am convinced that He is not playing at dice.<sup>16</sup>

Thus the religious feeling of the scientist in the harmony and simplicity of the world and in our ability to create concepts which will allow for rational comprehension of that harmony and simplicity is what gives science its very life. If this feeling and those aspects of the scientific pursuit are attacked or rejected, then what is left is at best a crippled discipline.

Hence it is the aim of science to unite the empirical data obtained from the external world with the conceptual world or mental constructs created by the human mind. This desire to achieve a conceptual understanding of our experience is based on the belief that such a comprehension is indeed possible. The desire to understand and the belief in the possibility of rational comprehension are based on the primitive feelings of wonder and awe. It was these feelings, properly nurtured, that Einstein was to denote as cosmic religious feeling and it was this concept which

was, for Einstein, to lie at the heart of not only science but rational inquiry itself.

## II.

To give a rigorous yet useful definition of religion without distorting and misrepresenting its nature is an extremely difficult task. Religion, like other human institutions and activities, is living, growing and evolving. It would seem therefore to be without definite boundaries and impervious to specific characterization. Nonetheless, a temporary working definition is required if the attempt at ascertaining some of the essential aspects of religion is to be made.

Einstein suggested that any such definition of religion should emphasize its setting of directives to govern the emotional and ethical aspects of human existence. We are generally agreed, he stressed, that religion "deals with goals and evaluations and, in general, with the emotional foundation of human thinking and acting." It is usually thought to be "concerned with man's attitude toward nature at large, with the establishing of ideals for the individual and communal life, and with mutual human relationship." Thus Einstein viewed an important part of religion as the attempt to instill ideals that support those human thoughts and actions that contribute most significantly and positively to man's attitude toward his natural and social environment.

These ideals religion attempts to attain by exerting an educational influence on tradition and through the development and promulgation of certain easily accessible thoughts and narratives (epics and myths) which are apt to influence evaluation and action along the lines of the accepted ideals.

The relationship and interaction of human beings is a prime concern of religion and central in any understanding of its nature according to Einstein. While fully ready to acknowledge that the fundamental nature of religion is obscure and nebulous and that other disciplines, e.g. politics, are usually thought to concentrate on human interactions, Einstein still held that an essential part of the nature of religion must be tied to the concerns of the individual and the

relationships among human beings. Such a belief caused him to approach religion and its problems in a slightly different manner than might usually be the case.

Rather than asking for the nature of religion, "I should prefer to ask," he remarked, "what characterizes the aspirations of a person who gives me the impression of being religious." We must look and see what religious individuals are like and what things direct their lives if we are to know what constitutes the essence of religion. Such a looking and seeing resulted in Einstein's observation that a

person who is religiously enlightened appears to me to be one who has, to the best of his ability, liberated himself from the fetters of his selfish desires and is preoccupied with thoughts, feelings, and aspirations to which he clings because of their super-personal value.

Spinoza and the Buddha were for Einstein two such religious persons who had broken away from egocentric desires and goals. "[A] religious person," Einstein continued, "is devout in the sense that he has no doubt of the significance and loftiness of those super-personal objects and goals which neither require nor are capable of rational foundation."

Hence the religious person is one who can escape the demands and desires of the self and strives instead to reach the goals and values that stand over and above self-centered existence. "In this sense religion is the age-old endeavor of mankind to become clearly and completely conscious of these values and goals and constantly to strengthen and extend their effect."<sup>18</sup> Thus, for Einstein, religion is to establish basic directives which will enable human beings to escape the bondage of ego-centric cravings, desires and fears. Or, to state the case more concisely and simply, religion is to help individuals obtain "liberation from the self."

To understand the immense importance that this latter concept plays not only in Einstein's understanding of religion but also in the nature of rational inquiry itself, an outline of the three stages of religious development as seen by Einstein is mandatory.



Einstein held that the birth of religion was the result of a variety of emotional experiences and self-reflective thoughts about such experiences. While no precise or necessary set of such an array of emotions or thoughts could be given, one important emotional experience could be singled out as the catalyst for the birth of religious feelings and actions. "With primitive man," Einstein argued,

it is above all fear that evokes religious notions--fear of hunger, wild beasts, sickness, death. Since at this stage of existence understanding of causal connexions is usually poorly developed, the human mind creates for itself more or less analogous beings on whose wills and actions these fearful happenings depend.

In order to satisfy these beings or gain self-security, ritualistic actions, sacrifices and the like were precipitated and established, traditionally being passed down from generation to generation. This form of religious activity, although "not created, is in an important degree stabilized by the formation of a special priestly caste which sets itself up as a mediator between the people and the beings they fear, and erects a hegemony on this basis." Thus early or primitive religious activities achieved a steadfastness of character and important social function due in large part to priestly or political leaders who used the primitive fears of the populace to promote their own interests or, more benevolently, to establish more security among the secular or lower classes. This type of religious activity, whether primitive in the historical or intellectual sense, Einstein labeled the religion of fear.

The religion of fear can and does give way to another type of emotion and social concern which rests, for Einstein, on a higher intellectual and social level.

Fathers and mothers and the leaders of larger human communities are mortal and fallible. The desire for guidance, love and support prompts men to form the social or moral conception of God. This is the God of Providence, who protects, disposes, rewards and punishes.

Religion has at this stage changed its basic emphasis and more accurately mirrors the common "civilized" notion of God and religion than does the religion of fear. It is at this new stage that we have

the God who, according to the width of the believer's outlook, loves and cherishes the life of the tribe or of the human race, or even life itself; the comforter in sorrow and unsatisfied longing; he who preserves the souls of the dead. This is the social or moral conception of God.<sup>20</sup>

An objection might be made here concerning Einstein's discussion of religious stages. Although containing some truth, any such view of religious progress or activities like Einstein's is much too simplistic and rationally structured to represent the nature and development of religious life. Einstein would have readily agreed that his discussion of religious development was far too simplistic if it was only understood as having historical or factual intent. Certainly, however, his view was not to be so simplistically grounded; rather it was to be taken as a heuristic device in which certain important aspects of religious life were compared and contrasted. He did not, for instance, wish to present the different stages in which he grouped religious activity as discontinuous leaps.

The development from a religion of fear to moral religion is a great step in a nation's life. And yet, that primitive religions are based entirely on fear and the religions of civilized peoples purely on morality is a prejudice against which we must be on our guard. The truth is that all religions are a varying blend of both types, with this differentiation: that on the higher levels of social life the religion of morality predominates.<sup>21</sup>

The distinctions Einstein draws, therefore, between the different levels of religion are not historically or factually crucial but are meant to stress the importance of a certain concept and emotion or a set of feelings which play a vital role in some forms of religious activity.

Thus religion can be usefully seen as developing from a primitive stage where the predominate emotion is fear, to a second stage which is more directly concerned with moral feelings and desires. Common to both of these stages is the concept of an anthropomorphic God. God is understood as an entity with humanoid qualities which created humans in his/her own image. God is asked for forgiveness, benefits, wishes, and believed to have a direct role and concern in the lives of human beings. It is, in fact, according to Einstein, through the abandonment of this latter concept that the third stage of religious development results. This third stage is therefore, dominated by feelings which lead to the abandonment of the belief in a personal active God who judges human actions or who influences the operations of the phenomenal world.

The feeling which is predominant in this third stage of religious activity and which leads to the rejection of a personal God, Einstein called "cosmic religious feeling." As religion evolves from one stage to another, Einstein believed that more and more of the personal fears and desires of human beings are overcome and relinquished. This loss of personal constitution is, it will be remembered, the very purpose and goal of religion. Religion is to help humans achieve liberation from the self. Any concept of a personal God who is expressly concerned with the desires and cravings of the individual must therefore be rejected. Thus both Einstein's view of the nature of religion and his discussion of its development point to the same essential notion: liberation from the self. Cosmic religious feeling, in addition, is so constituted that the

individual feels the nothingness of human desires and aims and the sublimity and marvellous order which reveal themselves both in Nature and in the world of thought. He looks upon individual existence as a sort of prison and wants to experience the universe as a single significant whole.

This feeling and level of religious development was not, Einstein believed, something unique to his thought. He found the Psalms of David and many of the thoughts of the prophets to be asserting the same notion. In an even stronger manner, Buddhism seemed to

him to have captured this religious feeling and to have employed it to great advantage.<sup>22</sup>

Cosmic religious feeling is, therefore, exceedingly individualistic in its emphasis on these feelings which reveal the sublimity and order of the physical world and the futility of personal human cravings and desires. It further can give rise to no concept or definition of a personal God and allows for no standard dogma or theology.

With this understanding of the third stage of religious development, the nature of cosmic religious feeling, and the importance of self liberation, the question naturally arises how such a level of development or such a feeling of liberation is to be achieved or communicated. That is, it seems that the concept of "cosmic religious feeling" fully engulfs the subjective and stands in opposition to the objective. Is it not the case that this high level religious feeling and the liberation from the self, which Einstein so championed, actually result in the isolation of the self? Has the rational attempt at explaining religion merely revealed that it is non-rational? Einstein's answer to such questions was clearly no, but the full understanding of that answer requires a return to the question of the relationship between religion and science.

### III

Two important positions in Einstein's understanding of science and religion have now been outlined. First, it was seen that Einstein found the general concern of science to be the connecting of the world of mental or formal concepts with the world of experience. Such a link was to provide rational explanation of empirical fact by means of as simple and coherent a set of assumptions and concepts as possible. Science is, however, ultimately based on the belief that there is a rational harmony and order in the external world and that that order is rationally explainable and comprehensible by means of humanly constructed concepts. It is this latter belief that Einstein grounded in religious feeling.

Second, as we have seen, religion was held to have several stages of development in which each new stage stressed or resulted from a strong emotion which allowed the abandoning of the previous stage through the releasing of more and more personal desires. The

final stage or aim of religion was centered around cosmic religious feeling which was the abandoning of all egocentric desires and led ultimately to the liberation from the self.

It seems, therefore, that prevalent in all dealings with and inquiries into the mysterious--the rationally unknown and the non-rational--is a fundamental religious attitude which demands a respect for that which is rational. That is, any attempt to penetrate the mysterious is essentially a search for a knowledge of the existence of something which human inquiry apparently cannot penetrate. Such a pursuit dictates, obviously, an emotional faith and respect for the profundity of reason and the aesthetic harmony of world order. It is, further, in such pursuits that such a faith and respect increases and thrives. Attempts to penetrate, explain and comprehend the mysterious result in an enhancement and development of our religious faith in reason. These attempts, as they become more and more sophisticated stress more and more the objective rational order and harmony of the external world and the need for liberation from the subjective, personal self in order for an understanding of such order to be achieved. Thus, when stripped of their outer foliage, disciplines such as religion and science, the non-rational and rational, reveal common roots.

It is, therefore, only as a result of a basic religious attitude or faith in reason, that science can be initiated and, as will now more completely be seen, it is only as a result of scientific or rational inquiry that advancement toward cosmic religious feeling and liberation from the self can be achieved.

For Einstein it was natural that religion strive to promote rational inquiry.

The further the spiritual evolution of mankind advances, the more certain it seems to me that the path to genuine religiosity does not lie through the fear of life, and the fear of death, and blind faith, but through striving after rational knowledge.

Just as importantly, however, the scientist must achieve an attitude of emancipation from personal desires and obtain a religious feeling of wonder toward the grandeur of intelligibility within existence. Such

an attitude and feeling were, for Einstein, "religious, in the highest sense of the word. And so it seems to me," he stressed, "that science not only purifies the religious impulse of the dross of its anthropomorphism but also contributes to a religious spiritualization of our understanding of life."<sup>23</sup>

It was with this understanding that Einstein thought it clear how cosmic religious feeling was to be communicated and how non-rational religious feelings were to be exhibited rationally. While cosmic religious feeling is clearly to be understood as residing in the subjective, Einstein did not believe it was restricted to the functioning of the individual. Such a restriction would, in fact, hinder if not make impossible the liberation from the self which is to result from cosmic religious feeling. "In my view," claimed Einstein, "it is the most important function of art and science to awaken this feeling and keep it alive in those who are capable of it."<sup>24</sup> The third stage of religious development, therefore, can be awakened and communicated through the pursuit of objective rational disciplines like science. This awakening is, in fact, the highest function that rational inquiry can provide. Reason is to enlighten and promote within the subjective individual the religious wonder and awe of the mysterious objective world. While religious feelings give rise to science, it is scientific inquiry that intensifies and promulgates these feelings.

In spite of important commonalities conflicts between science and religion remain. The ultimate and most prominent conflict between religion and science lies in the scientist's firm belief in the universal harmony of nature and the commitment of the first two stages of religious development to the notion of a personal God.

The man who is thoroughly convinced of the universal operation of the law of causation cannot for a moment entertain the idea of a being who interferes in the course of events--provided, of course, that he takes the hypothesis of causality really seriously. He has no use for the religion of fear and equally little for social or moral religion. A God who rewards and punishes is inconceivable to him for the simple reason that a man's actions are

determined by necessity, external and internal, so that in God's eyes he cannot be responsible, any more than an inanimate object is responsible for the motions it under goes.

Until religion relinquishes the notion of a personal God who intervenes in human affairs, religion and science will be in constant opposition. Just as clear, however, is the fact that science and religion can resolve this conflict through a new stage of religious development and a complete understanding of the belief in the law of causation, i.e. through an emphasis on cosmic religious feeling. Those who are only aware of the results of a scientist and not of his toil easily conclude that scientists have no need for religion. "Only those who realize the immense efforts and, above, all, the devotion which pioneer work in theoretical science demands can grasp the strength of the emotion out of which alone such work, remote as it is from the immediate realities of life, can issue." The scientist must and does remain true to his purpose "in spite of countless failures. It is cosmic religious feeling that gives man strength of this sort."<sup>25</sup>

Thus, while religion and science are certainly concerned with different aspects of human life, they ultimately require each other for an understanding of their respective pursuits. For example, it might conceivably be argued that science and religion are completely independent of each other, for while it is the job of science to ascertain what is and not what should be, religion clearly is to supply us with the latter by establishing ethical codes and rules which are to govern the lives of humans. Such a recognizable conflict Einstein was willing to admit; but, rather than demonstrating the irreconcilability of the two disciplines, such differences merely exposed the strong reciprocal or dialectical relationship and dependency between the two. "Though religion may be that which determines the goal, it has, nevertheless, learned from science, in the broadest sense, what means will contribute to the attainment of the goals it has set up." Science, equally so, cannot advance or create without persons completely committed and respectful of truth and understanding. "This source of feeling, however, springs from the sphere of religion. To this there also belongs the faith in the possibility that the regulations valid for the world of existence are rational, that is, comprehensible to reason. I

cannot," Einstein continued, "conceive of a genuine scientist without that profound faith. The situation may be expressed by an image: Science without religion is lame, religion without science is blind."<sup>26</sup>

Thus, most interestingly, Einstein argued that the profound reverence and commitment to reason which governs the life of the scientist is essentially a religious faith and feeling of the highest order. The pursuit of any rational inquiry, the ability of humans rationally to comprehend, as well as the belief in the rational order of the world, are all based on a non-rational commitment to reason itself. It is, however, the very function of rational inquiry to promote and keep alive this feeling and belief by exhibiting the world in rationally understandable and comprehensible ways. It is in this sense, therefore, that science and religion, the rational and non-rational, are to be seen as standing in a dynamic or dialectical relationship to each other.



## NOTES

<sup>1</sup>Albert Einstein, "Science and Religion," in Out of My Later Years [henceforth OLY] (Totowa, New Jersey: Littlefield, Adams and Co., 1967), p. 30.

<sup>2</sup>Albert Einstein and Leopold Infeld, The Evolution of Physics [henceforth EOP] (New York: Simon and Schuster, 1938), p. 51.

<sup>3</sup>Einstein and Infeld, EOP, p. 292.

<sup>4</sup>Einstein, "Science and Religion," OLY, p. 28.

<sup>5</sup>Albert Einstein, "Clerk Maxwell's Influence on the Evolution of the Idea of Physical Reality," in The World As I See It [henceforth TWS] (New York: Covici, Friede Pub., 1934), p. 60.

<sup>6</sup>Einstein, "Physics and Reality," OLY, p. 59. For a discussion of Einstein's views on the specific nature of this refinement and the metaphysical makeup of the world, see my "Einstein and the Limits of Reason," forthcoming in Proceedings of the International Einstein Conference (New York: A. M. S. Press).

<sup>7</sup>Einstein, EOP, p. 178; "On the Method of Theoretical Physics," TWS, p. 31.

<sup>8</sup>Albert Einstein, "Autobiographical Notes," in Albert Einstein Philosopher-Scientist, Vol. I, [henceforth EPS] ed. Paul Arthur Schlipp (New York: Harper and Row, 1959), pp. 21-23.

<sup>9</sup>Einstein, EOP, p. 294.

<sup>10</sup>Einstein, "Autobiographical Notes," EPS, p. 33.

<sup>11</sup>Einstein, "On the Method of Theoretical Physics," TWS, pp. 33-34; "Science and Religion," OLY, p. 28.

<sup>12</sup>Einstein, EOP, p. 296.

<sup>13</sup>Einstein, "The Common Language of Science," OLY, p. 109; "Religion and Science: Irreconcilable?" in Ideas and Opinions [henceforth IO] (New York: Dell Publishing Co., 1973), p. 61.

<sup>14</sup>Einstein, "The Religiousness of Science," TWS, pp. 267-68.

<sup>15</sup>Einstein, "Physics and Reality," OLY, p. 89.

<sup>16</sup>Albert Einstein, Max Born and Hedwig Born, The Born-Einstein Letters (New York: Walker and Co., 1971), p. 91.

<sup>17</sup>Einstein, "Religion and Science: Irreconcilable?" IO, p. 59.

<sup>18</sup>Einstein, "Science and Religion," OLY, pp. 28-29.

<sup>19</sup>Einstein, "Religion and Science," TWS, p. 262.

<sup>20</sup>Einstein, TWS, p. 262-63.

<sup>21</sup>Einstein, TWS, p. 263.

<sup>22</sup>Einstein, TWS, p. 264.

<sup>23</sup>Einstein, "Science and Religion," OLY, p. 33.

<sup>24</sup>Einstein, "Religion and Science," TWS, p. 265.

<sup>25</sup>Einstein, "Religion and Science," TWS, p. 265-67.

<sup>26</sup>Einstein, "Science and Religion," OLY, pp. 29-30.