

Religion and Natural Science ⁴

In former days, when a natural scientist had to address a general audience of laymen on a subject taken from his own special field of activity, in order to awaken a certain interest in the minds of his listeners, he would be forced to link his discourse to certain palpable experiences and views of daily life, in the fields of technology, meteorology or biology, and to use these as his starting points to explain the methods applied by science in order to push forward from concrete individual problems to a knowledge of universal laws. Not so today. The exact methodology now employed by natural science has proved to be so extraordinarily productive in the course of centuries that natural-scientific research nowadays dares approach also problems intuitively less obvious than those lying within the fields just mentioned, and is able to tackle successfully also problems in psychology, in epistemology, indeed even in general attitudes toward life, thereby subjecting these problems to a treatment that is thorough from its own point of view. We may justly say that in these days no question, be it ever so abstract, can arise in our civilization without being related, in one way or another, to a problem that can be handled by the methods of natural science.

Accordingly, I will not appear to be too bold as a student of nature in discussing religious problems.

This is a subject, the significance of which for our entire civilization is becoming progressively more manifest and which will undoubtedly be of a decisive importance for the question as to the fate that awaits us.

I

“Tell me—how do you stand to religion?”—If Goethe’s *Faust* contains at all a simple phrase that captivates even a sophisticated listener and arouses a hidden tension within him, it must be this worried question of an innocent girl, in fear for her newly-found happiness, to her lover whom she recognizes as a higher authority. For this very same question is the one which from time immemorial has innerly moved and worried countless human beings in search of peace of mind and knowledge at the same time.

But Faust, slightly embarrassed by this candid question, can think offhand only of this mildly defensive reply: *“I want to deprive nobody of his sentiments and his church.”*

I could choose no better phrase to introduce our subject. I have not the slightest intention to loosen the foundation under the feet of those among you who have made peace with their conscience and have gained that firm foothold which is a prime requisite of one’s conduct in life. To do so would be a reprehensible undertaking, unfair both to those who feel so secure in their religious faith that they do not permit a natural-scientific knowledge to

influence it in any manner whatever, as well as to those who feel no need for any particular religious activity and are fully contented with an intuitive ethics. But these latter are likely to represent a small minority only. For the history of all eras and races teaches us only all too impressively that the candid faith which nothing can confuse, such as that which religion instills in its followers who are busy in active life, is the very fountainhead of the mightiest incentives to significant creative achievements, in the field of politics no less than in the realms of art and science.

This candid faith—and let us not delude ourselves about this—no longer exists today, even among the great masses of the nation, nor can it be revived any longer by considerations and measures oriented toward the past. For “to believe” means “to recognize as a truth,” and the knowledge of nature, continually advancing on incontestably safe tracks, has made it utterly impossible for a person possessing some training in natural science to recognize as founded on truth the many reports of extraordinary occurrences contradicting the laws of nature, of miracles which are still commonly regarded as essential supports and confirmations of religious doctrines, and which formerly used to be accepted as facts pure and simple, without doubt or criticism.

Therefore, he who is in earnest about his faith and cannot bear to see it conflict with his scientific learning, must decide in his conscience whether in all honesty, he may still consider himself a member

of a religious community whose creed incorporates a belief in miracles.

For a while many could still find a certain temporary reassurance by trying to steer a middle course and limiting themselves to accepting as true a few miracles of especial importance. But such an attitude is untenable in the long run. The faith in miracles must yield ground, step by step, before the steady and firm advance of the forces of science, and its total defeat is indubitably a mere matter of time. The young generation of our own era, which in any case is sharply critical, toward traditional views, no longer permits itself to be bound innerly by doctrines which it regards as contradictory to the laws of nature. And the spiritually most gifted members of the young generation in particular, those destined to be the future leaders of their nation and who not seldom harbour a burning desire for religious satisfaction, are the ones most painfully hit by such incongruities. They are the ones who must suffer most heavily if they are sincere in seeking a compromise between their religious and their scientific beliefs.

Under these circumstances, it is no wonder that the atheist movement which calls religion an arbitrary delusion invented by power-hungry priests and which has nothing but words of derision for the pious faith in a supreme power above man, is eagerly taking advantage of the progress of scientific knowledge; allegedly in alliance with natural science, the movement continues to spread at an ever quickening pace its disruptive influence over all nations and classes of mankind. I need not go here

into a more detailed discussion of the fact that the victory of atheism would not only destroy the most valuable treasures of our civilization, but—what is even worse—would annihilate the very hope for a better future.

Thus, Marguerite's question to the man to whom she gave her love and trust gains a most profound significance also for those who anxiously endeavor to find out whether the progress of natural sciences is actually bringing about a destruction of true religion.

If we study Faust's concise reply, spoken with all care and tenderness of feeling, we find that we cannot give it here as our own, for a double reason: First, we must remember that this reply, both in form and content, is designed for the power of comprehension of a simple uneducated girl, and is therefore not meant to impress the intellect as well as the emotions and the imagination. But then—and this consideration is of a more decisive importance—we must bear in mind that these words are spoken by a Faust ruled by sensual desire, a confederate of Mephistopheles. I am sure that the redeemed Faust, whom we meet at the end of the second part, would give a somewhat different answer to Marguerite's question. But I do not presume to conjecture on the secrets which the poet chose to keep permanently as his own. I prefer to attempt to cast some light, from the perspective of one trained in the spirit of exact scientific research, on the question of whether and to what extent a truly religious attitude is compatible with the facts of knowledge gained through natural science—or to

express it more concisely: Whether a person trained in natural science can be truly religious at the same time.

For this purpose, first of all let us discuss two special questions, quite separately from each other. The first one is: What demands does religion make on the beliefs of its followers, and what are the characteristics of a genuine religious attitude? The second question is: What is the nature of the laws natural science teaches us, and what truths does it regard as indubitable?

Once we shall have answered these two questions, we shall be in the position to decide whether and to what extent the demands of religion are compatible with those of natural science, and therefore, whether religion and natural science can exist side by side without clashing with each other.

II

Religion is the link that binds man to his God. It is founded on a respectful humility before a super-natural power, to which all human life is subject, and which controls our weal and woe. To be in harmony with this power and to enjoy its good graces, is the incessant endeavor and supreme goal of the religious person. Only in this way can he feel protected from the foreseen and unforeseen dangers, which threaten him in this earthly life, and can he enjoy that purest of all happiness, the inner peace of mind and soul that is secured only by a firm link to God and by an unconditionally trusting faith in His

omnipotence and benevolence. In this sense, religion is rooted in the consciousness of the individual.

But its significance transcends the individual. Instead of each individual possessing his own distinctive religion, religion seeks to become valid and meaningful for a larger community, for a nation, for a race, and ultimately for all of mankind. For God is the sovereign of every country on this earth; the whole world with all its treasures and all its horrors is subject to Him, and there is no portion either of the realm of nature or of the mind without His omnipresence.

Therefore, the spirit of religion unites its adherents in a universal alliance, and sets before them the task of mutually acquainting each other with their articles of faith and giving them a common manifestation. But this can be accomplished only by clothing the substance of religion in a definite external form, suitable because of its intuitive clarity for the creation of a mutual understanding. In view of the great diversity of the races of man and of their ways of life, it is only natural that this external form is quite different in different parts of the world, so that a large variety of religions have come into existence in the course of the ages. A common feature of all of them consists in the rather natural assumption of a personified or at least an anthropomorphic deity. This leaves room for the most diverse concepts of the attributes of God. Each religion has its own distinct mythology and also its own distinct rituals, elaborate to the most minute details in the more highly developed religions. These are the source of certain interpretive

symbols of religious worship, which are capable of acting directly on the imagination of the great masses, arousing their interest in religious matters and giving them a certain understanding of the deity.

Thus, a systematic unification of mythological traditions and a strict observance of solemn ritualistic customs invest the worship of God with an external symbolical form, and centuries of incessant observance and systematic education of generation after generation increase the significance of such religious symbols. The holiness of an unfathomable deity is translated into the holiness of intelligible symbols. They are a source of strong stimulation for the arts as well. In fact, the mightiest benefits ever enjoyed by art were the result of its becoming a servant to religion.

Yet, a careful distinction must be made here between art and religion. A work of art carries its significance essentially within itself. Even though, as a rule, it owes its origin to external circumstances and in consequence often awakens trains of thought moving at a tangent, still it is basically self-sufficient and requires no specific interpretation in order to be appreciated. This fact becomes most clearly evident in music, most abstract of all arts.

On the other hand, a religious symbol always points beyond itself. Its significance is never exhausted by its own features, however much veneration it may enjoy because of its own age and the operation of a pious tradition. It is important to emphasize this because the development of civilization makes the high esteem enjoyed by certain religious symbols subject to certain

inevitable changes in the course of the centuries, and it is in the interest of a genuine spirit of religion to establish the fact that what stands behind and above these symbols is unaffected by such changes.

To cite here just one of a great many specific examples: A winged angel has been regarded from time immemorial as the most beautiful symbol for a servant and messenger of God. But there can be found among persons trained in anatomy, some whose scientifically conditioned imagination does not permit them, despite their best intentions, to see any beauty in such a physiological impossibility. Nevertheless, this circumstance need have not the slightest adverse effect on their religious convictions. They ought, however, to be on their guard not to impair or destroy the pious attitudes of those who still find solace and edification in the sight of a winged angel.

But the overrating of the significance of religious symbols opens the gates to another, far more serious danger of an onslaught by the atheistic movement. It is one of the favorite techniques of the atheists, whose aim is the undermining of every true religious feeling, to direct their attacks against old-established religious rites and customs and to hold them up to ridicule or contempt as outmoded anachronisms. Through such attacks against symbols, they expect to hurt religion itself, and the more strange and conspicuous those views and customs are, the easier it is for the atheists to score a success. Many a religious soul has succumbed to these tactics.

Against this peril there is no better defense than to understand clearly and thoroughly that a religious

symbol, be it ever so venerable, never represents an absolute value but is always only a more or less imperfect sign of something higher and not directly accessible to human senses.

Under these circumstances, it is quite understandable that the history of religions records the frequent recurrence of the idea to restrict or even eliminate completely the use of religious symbols and to treat religion more as a matter of abstract reasoning. But even a brief reflection shows such an idea to be entirely inadequate. Without symbols, human beings could not communicate with each other at all. This applies not only to religious communication, but to all human transactions in secular daily life as well. Language itself is actually nothing else than a symbol for something higher—for thought. To be sure, individual words also arouse a typical interest in themselves, but viewed more closely, a word is just a series of letters; its meaning lies fundamentally in the concept which it expresses. And it is basically of a secondary importance whether the concept is represented by one word rather than by another, in one particular language rather than another. If the word is translated into another language, the concept itself remains unaffected.

Another example: A flag is the symbol of the glory and honor of a regiment of soldiers. The older the flag, the higher its value. In the heat of the battle, the bearer of the flag considers it to be his supreme duty not to desert the honored emblem at any cost, to protect it with his own body if need be, even to give his life for it if he must. Yet, a flag is just a

symbol, a piece of a bright-colored cloth. The enemy can capture it, soil, mutilate it, but can never destroy the higher concept, of which it is the symbol. The regiment will still retain its honor, get a new flag, and perhaps exact suitable retribution for the insult to its emblem.

Just as in an army—and more generally in every community of men facing great tasks together—religion also finds symbols and their corresponding ecclesiastical rituals absolutely indispensable. They signify the highest and most venerated of all the products of human imagination directed heavenward. But we must never forget that even the most sacred symbol is of human origin.

Had mankind taken this truth to heart at all times, it would have been spared an infinity of woe and suffering. For the terrible religious wars, the horrible persecutions of heretics and their attendant tragic consequences, are in the last analysis the outcome of conflicts between opposing propositions, each possessing a certain validity and each originating in the circumstances that a common abstract idea, such as the belief in an omnipotent God, was confused with its visible but distinct media of expression, such as ecclesiastic articles of faith. Certainly there is nothing more distressing than the bitter fight of two adversaries, each of whom is fully convinced of the rightness of his cause and is filled with honest enthusiasm for it, feeling that he must devote all his energy to the battle, even sacrifice his life in it. How much productive work could have been accomplished if in the domain of religious activity

such valuable energies had been united instead of employed for mutual extermination.

The deeply religious individual who gives expression to his belief in God through a veneration of his beloved sacred symbols, does not insist on them blindly, but has an understanding for the fact that there can be other persons as deeply religious as himself to whom other symbols are no less beloved and sacred,—just as a definite concept remains unaltered whether it is expressed by one word or another, in one language or another.

But a comprehension of this state of affairs still does not explain the nature of the characteristic features of true religious conviction. For now another question, the one of the truly fundamental significance, must be answered: Does that higher power which stands behind the religious symbols and lends them their essential significance, dwell solely in the human mind, and is it obliterated also in the moment when that mind ceases to exist, or does it stand for something more? In other words: Does God live in the soul of the believer only, or does He rule the world independently of whether or not one believes in Him? This is the point at which minds part company basically and decisively. This question can never be cleared up scientifically, by logical conclusions based on facts. The answer is solely and exclusively a matter of faith—religious faith.

The answer of the religious person is that God exists, that He existed before there were human beings on the earth, that he holds the whole world, believers as well as disbelievers, in His omnipotent

hands since the beginning of eternity, and that He will continue to rule from His heights inaccessible to human imagination long after the earth and everything on it will have crumbled to dust. All those who profess this belief and, filled by it with humility and unquestioning trust and devotion, feel protected by the Almighty from every danger in life, all those—but only those—may consider themselves truly religious.

This is the essential content of creed which religion requires its followers to profess. Let us now see whether and how these requirements are compatible with those of science, natural science in particular.

III

In proceeding to examine what laws science teaches us, and what truths it considers to be inviolable, our task will be simplified and our purpose fully served by keeping to the most exact of all natural sciences, physics. For this is the branch of science which by every logic could be expected to be the most likely to conflict with the demands of religion. Therefore, we are to inquire what kind of discoveries physical science has made up to our most recent days, and what limits these might set for religious faith.

I hardly need to point out that viewed historically and on the whole, the findings of physical research and the conclusions resulting from them do not exhibit a purposeless change, but have been steadily

improving in precision and completeness until the most recent days, some times at a faster at other times at a slower rate; and we therefore have every reason to regard the knowledge thus far accumulated by physical science as being of a lasting character.

What then is the substance of these findings? First of all, it must be noted that all data of physical knowledge are founded on measurements, and that every measurement takes place in space and time with the orders of magnitudes varying from the inconceivably vast to the infinitesimally small. We can get an approximate idea of the distance of the cosmic regions from which a message can still reach us if we consider that light, which traverses the distance from the Moon to the Earth in a second or so, requires many millions of years to arrive from those regions to our planet. On the other side of the picture, physical science must calculate with spatial and temporal magnitudes, the infinite smallness of which can be realized by the comparison of a head of a pin with our entire planet.

Measurements of the most varied kinds have been consistent in leading to the conclusions that all physical occurrences without exception can be reduced to mechanical or electrical processes, produced by the movements of certain elementary particles, such as electrons, positrons, protons and neutrons; and both the mass and the charge of all of these particles are each expressed by an extremely small but quite definite number. The precision of this number increases with improvements in the accuracy of methods of measurement. These minute numbers, the so-called universal constants, are in a

sense the immutable building blocks of the edifice of theoretic physics.

So now we must continue with the question: What is the real meaning of these constants? Are they, in the last analysis, inventions of the inquiring mind of man, or do they possess a real meaning independent of human intelligence?

The first of these two views is professed by the followers of Positivism, or at least by its most extreme partisans. Their theory is that physical science has no other foundation than the measurements on which its structure is erected, and that a proposition in physics makes any sense only insofar as it can be supported by measurements. But since every measurement presupposes an observer, from the positivistic viewpoint the real substance of a law of physics can never be detached from the observer, and it loses its meaning as soon as one attempts mentally to eliminate the observer and to see something more, something real, behind him and his measurement.

This outlook cannot be challenged from the purely logical viewpoint. And yet, a closer examination must brand this version of it as inadequate and unproductive. For it disregards a circumstance which is of a decisive importance in the extension and progress of scientific knowledge. However much Positivism may regard itself as proceeding without presuppositions, it is nonetheless committed to a fundamental premise if it is not to degenerate into an unintelligible solipsism. This premise is that every physical measurement can be reproduced, so that its outcome depends neither on

the personality of the individual performing the experiment, nor on the place and time of the measurement, nor on any other attendant circumstance. But this simply means that the factor which is decisive for the result of the measurement lies beyond the observer, and that one is therefore necessarily led to questions concerning real causal connections operating independently of the observer.

To be sure, it must be agreed that the positivistic outlook possesses a distinctive value; for it is instrumental to a conceptual clarification of the significance of physical laws, to a separation of that which is empirically proven from that which is not, to an elimination of emotional prejudices nurtured solely by customary views, and it thus helps to clear the road for the onward drive of research. But Positivism lacks the driving force for serving as a leader on this road. True, it is able to eliminate obstacles, but it cannot turn them into productive factors. For its activity is essentially critical, its glance is directed backward. But progress, advancement requires new associations of ideas and new queries, not based on the results of measurements alone, but going beyond them, and toward such things the fundamental attitude of Positivism is one of aloofness.

Therefore, up to quite recently, positivists of all hues have also put up the strongest resistance to the introduction of atomic hypotheses and thereby also to the acceptance of the above mentioned universal constants. This is quite understandable, for the existence of these constants is a palpable proof of

the existence in nature of something real and independent of every human measurement.

Of course, even to-day a consistent positivist could call the universal constants mere inventions which have proved to be uncommonly useful in making possible an accurate and complete description of the most diversified results of measurements. But hardly any real physicist would take such an assertion seriously. The universal constants were not invented for reasons of practical convenience, but have forced themselves upon us irresistibly because of the agreement between the results of all relevant measurements, and—this is the essential thing—we know quite well in advance that all future measurements will lead to these selfsame constants.

To sum it all up, we can say that physical science demands that we admit the existence of a real world independent from us, a world which we can however never recognize directly but can apprehend only through the medium of our sense experiences and of the measurements mediated by them.

If we pursue this principle further, our outlook on the world takes a different form. The subject of the observation, the observing Ego, loses its position at the focus of thought and is relegated to a quite modest place. In fact, how pitifully small, how powerless we human beings must appear to ourselves if we stop to think that the planet Earth on which we live our lives is just a minute, infinitesimal mote of dust; on the other hand how peculiar it must seem that we, tiny creatures on a tiny planet, are nevertheless capable of knowing

though not the essence at least the existence and the dimensions of the basic building blocks of the entire great Cosmos!

But this is still not the end of the wonder of it. Physical research has established as an incontestable fact that these basic building blocks of the Universe do not exist unrelated in isolated groups, but that all of them are mutually interlinked according to one uniform plan. In other words, every process in nature is subject to a universal and up to a point knowable law.

I want to mention at this place just one example: The law of the conservation of energy. There are various forms of energy in nature—kinetic energy, the energy of gravity, heat, electricity, magnetism. All the energies together form the energy supply of the world. The quantity of this energy supply is constant; it cannot be increased or diminished by any process in nature. All changes in nature are in reality simply the transformations of one form of energy into another. For instance, when kinetic energy is lost by friction, an equivalent quantity of thermal energy results.

The law of the conservation of energy is valid in every branch and field of physics, both according to the classical theory and to quantum mechanics. To be sure, there have often been attempts to challenge its precise validity in connection with the processes taking place within a single atom, and to assign to it a mere statistical significance for such processes. But every single experiment thus far undertaken has shown that such attempts are futile, and there is no reason to deny that the law of the conservation of

energy is an absolutely and universally valid law of nature.

Those with positivistic leanings counter frequently with the critical objection that there is nothing extraordinary about the universal validity of such a law. According to them the explanation of the mystery is simply that after all it is man himself who prescribes the laws for nature. And in claiming this, they even cite Immanuel Kant in support of this view.

However, as I have pointed it out, the laws of nature were not invented by man, but external factors forced him to recognize them. An *a priori* approach to the laws of nature, as well as to the universal constants, could make us imagine them quite differently from what they are in reality. But the positivist reference to Kant is based on a gross misunderstanding. Kant did not teach that man actually prescribes laws for nature. He taught simply that whenever man formulates the laws of nature, he always adds something of his own, too. Otherwise how would it be conceivable that according to Kant's own statement, no external impression inspired in him a more profound feeling of respectful humility than the sight of the starry skies? After all, respectful humility is not exactly the attitude which a man is in the habit of assuming toward a rule formulated by himself. Obviously, such sentiment is alien to the mind of a positivist. To him the stars are nothing more than complexes of optical sensations; he considers everything else as just a useful but basically arbitrary and unessential trimming.

But let us now leave Positivism and continue with our own train of thought. The law of the conservation of energy is, after all, not the only law of nature, it is just one among many. While it is true that it is universally valid, it is still not sufficient for predicting every detail of a natural process, since it leaves an endless number of possibilities still open.

But there is another, far broader law, which has the property of giving a specific, unequivocal answer to each and every sensible question concerning the course of a natural process; as far as we can see, this law—like the law of the conservation of energy—possesses an exact validity even for the most modern parts of physics. But what we must regard as the greatest wonder of all, is the fact that the most adequate formulation of this law creates the impression in every unbiased mind that nature is ruled by a rational, purposive will.

Let me illustrate this by a specific example. It is a well known fact that when a ray of light strikes the surface of a transparent body obliquely, such as the surface of water, it is deflected from its original direction after penetrating the surface. The explanation of this deflection is that light travels more slowly in water than in air. Such deflection, or “refraction,” occurs also in the atmosphere, because light travels more slowly in the lower, denser strata of the atmosphere than in its higher layers. Now then, when a light ray emitted by a star reaches the eyes of an observer, its path will show a more or less complicated curve, due to the different degrees of refraction in the various atmospheric layers (unless the star happens to be exactly in the zenith). This

curve is fully determined by the following simple law: Out of all the possible paths leading from the star to the eye of the observer, light will always follow the one which it can cover in the shortest time, allowance being made for the differences in its velocity in different atmospheric layers. Thus, the photons which constitute a ray of light behave like intelligent beings: Out of all the possible curves they always select the one which will take them most quickly to their goal.

This principle permits a large-scale generalization. According to all that we know about the laws relating to the processes taking place in any physical structure, we can characterize in all its details the course of each process by the principle that among all the conceivable processes which can change the state of a given physical structure into another state during a certain time interval, the process which actually takes place is always one for which the integral over that time interval of a certain magnitude, the so-called Lagrange function, has the smallest value. Therefore, if we know the value of the Lagrange function, we can fully specify the course of the process actually taking place.

It is certainly no wonder that the discovery of this law—the so-called least-action principle, after which the elementary quantum of action was later also named,—made its discoverer Leibniz, and soon after him also his follower Maupertuis, so boundlessly enthusiastic; for these scientists believed themselves to have found in it a tangible evidence for a ubiquitous higher reason ruling all nature.

In fact, the least-action principle introduces a completely new idea into the concept of causality: The *causa efficiens*, which operates from the present into the future and makes future situations appear as determined by earlier ones, is joined by the *causa finalis* for which, inversely, the future—namely, a definite goal—serves as the premise from which there can be deduced the development of the processes which lead to this goal.

So long as we confine ourselves to the realm of physics, these alternative points of view are merely different mathematical expressions for one and the same fact, and it would be futile to ask which of the two came nearer to the truth. The choice between them depends solely on practical considerations. The chief advantage of the least-action principle is that it requires no definite frame of reference for its formulation. This principle is therefore excellently adapted for carrying through transformation of coordinates.

But we are now interested in questions of a more general character. It will suffice at this point to note only that the historical development of theoretic research in physics has led in a remarkable way to a formulation of the principle of physical causality which possesses an explicitly teleological character; but at the same time this formulation introduces nothing substantially new or even contradictory into the character of the laws of nature. The issue is simply one of different perspectives of interpretation, both of which are equally well justified by the actual facts. The situation in biology should be no different than we have found it in

physics, although in biology the difference between the two viewpoints has assumed far sharper outlines.

In any case, we may say in summary that according to what exact natural science teaches us, the entire realm of nature, in which we human beings on our tiny mote of a planet play only an infinitesimally small part, is ruled by definite laws which are independent of the existence of thinking human beings; but these laws, insofar as they can at all be comprehended by our senses, can be given a formulation which is adapted for purposeful activity. Thus, natural science exhibits a rational world order to which nature and mankind are subject, but a world order the inner essence of which is and remains unknowable to us, since only our sense data (which can never be completely excluded) supply evidence for it. Nevertheless, the truly prolific results of natural-scientific research justify the conclusion that continuing efforts will at least keep bringing us progressively nearer to the inattainable goal, and they strengthen our inner hope for a constant advancement of our insight into the ways of the omnipotent Reason which rules over Nature.

IV

Having now learned to know the demands which religion on one hand and science on the other hand place on our attitude to the most sublime problems of a generalized world outlook, let us now examine whether and to what extent these different demands can be mutually reconciled. First of all, it is

self-evident that this examination may extend only to those laws in which religion and natural science conflict with each other. For these are wide spheres where they have absolutely nothing to do with each other. Thus, all the problems of ethics are outside of the field of natural science, whereas the dimensions of the universal constants are without relevance for religion.

On the other hand, religion and natural science do have a point of contact in the issue concerning the existence and nature of a supreme power ruling the world, and here the answers given by them are to a certain degree at least comparable. As we have seen, they are by no means mutually contradictory, but are in agreement, first of all, on the point that there exists a rational world order independent from man, and secondly, on the view that the character of this world order can never be directly known but can only be indirectly recognized or suspected. Religion employs in this connection its own characteristic symbols, while natural science uses measurements founded on sense experiences. Thus nothing stands in our way—and our instinctive intellectual striving for a unified world picture demands it—from identifying with each other the two everywhere active and yet mysterious forces: The world order of natural science and the God of religion. Accordingly, the deity which the religious person seeks to bring closer to himself by his palpable symbols, is consubstantial with the power acting in accordance with natural laws for which the sense data of the scientist provide a certain degree of evidence.

However, in spite of this unanimity a fundamental difference must also be observed. To the religious person, God is directly and immediately given. He and His omnipotent Will are the fountainhead of all life and all happenings, both in the mundane world and in the world of the spirit. Even though He cannot be grasped by reason, the religious symbols give a direct view of Him, and He plants His holy message in the souls of those who faithfully entrust themselves to Him. In contrast to this, the natural scientist recognizes as immediately given nothing but the content of his sense experiences and of the measurements based on them. He starts out from this point, on a road of inductive research, to approach as best he can the supreme and eternally unattainable goal of his quest—God and His world order. Therefore, while both religion and natural science require a belief in God for their activities, to the former He is the starting point, to the latter the goal of every thought process. To the former He is the foundation, to the latter the crown of the edifice of every generalized world view.

This difference corresponds to the different roles of religion and natural science in human life. Natural science wants man to learn, religion wants him to act. The only solid foundation for learning is the one supplied by sense perception; the assumption of a regular world order functions here merely as an essential condition for formulating fruitful questions. But this is not the road to be taken for action, for man's volitional decisions cannot wait until cognition has become complete or he has become omniscient. We stand in the midst of life,

and its manifold demands and needs often make it imperative that we reach decisions or translate our mental attitudes into immediate action. Long and tedious reflection cannot enable us to shape our decisions and attitudes properly; only that definite and clear instruction can which we gain from a direct inner link to God. This instruction alone is able to give us the inner firmness and lasting peace of mind which must be regarded as the highest boon in life. And if we ascribe to God, in addition to His omnipotence and omniscience, also the attributes of goodness and love, recourse to Him produces an increased feeling of safety and happiness in the human being thirsting for solace. Against this conception not even the slightest objection can be raised from the point of view of natural science, for as we pointed it out before, questions of ethics are entirely outside of its realm.

No matter where and how far we look, nowhere do we find a contradiction between religion and natural science. On the contrary, we find a complete concordance in the very points of decisive importance. Religion and natural science do not exclude each other, as many contemporaries of ours would believe or fear; they mutually supplement and condition each other. The most immediate proof of the compatibility of religion and natural science, even under the most thorough critical scrutiny, is the historic fact that the very greatest natural scientists of all times—men such as Kepler, Newton, Leibniz—were permeated by a most profound religious attitude. At the dawn of our own era of civilization, the practitioners of natural science were

the custodians of religion at the same time. The oldest of all the applied natural sciences, medicine, was in the hands of the priests, and in the Middle Ages scientific research was still carried on principally in monasteries. Later, as civilization continued to advance and to branch out, the parting of the ways became always more pronounced, corresponding to the different nature of the tasks and pursuits of religion and those of natural science.

For the proper attitude to questions in ethics can no more be gained from a purely rational cognition than can a general *Weltanschauung* ever replace specific knowledge and ability. But the two roads do not diverge; they run parallel to each other, and they intersect at an endlessly removed common goal.

There is no better way to comprehend this properly than to continue one's efforts to obtain a progressively more profound insight into the nature and problems of the natural sciences, on one hand, and of religious faith on the other. It will then appear with ever increasing clarity that even though the methods are different—for science operates predominantly with the intellect, religion predominantly with sentiment—the significance of the work and the direction of progress are nonetheless absolutely identical.

Religion and natural science are fighting a joint battle in an incessant, never relaxing crusade against scepticism and against dogmatism, against disbelief and against superstition, and the rallying cry in this crusade has always been, and always will be: "*On to God!*"