The question of the similarities and differences between theological and scientific activity is an old one. Part of the history of this question has been retold in Part I. At times it has seemed as if theology and science had nothing in common at all. At other times they have been regarded as only partially distinguishable aspects of a single kind of intellectual inquiry.

I. REVISITING AN OLD PROBLEM

Since the rise of the natural sciences in their modern form, and throughout the modern period, this fundamental problem has been shaped by two looming considerations. On the one hand, the natural sciences have proved to be extremely successful in a general way. They have been able to build on previously established results, to make accurate predictions about how the natural world would behave in experiments, and to produce beautiful and fruitful explanations of all manner of natural phenomena. On the other hand, there is an ongoing crisis about the status of religious knowledge. This crisis affects everything from the interpretation of mystical and ordinary religious experiences to assessing the truth of assertions that have traditionally been held to be divinely revealed knowledge.

The contrast between theology and science established by these considerations has long been the obvious starting point for investigating their relations, and the numerous characterizations of it need not be recapitulated here. What is important to note is that theologians and scientists alike have interpreted this basic situation differently. Some have judged the apparent differences between theological and scientific activity to be entirely appropriate and have sought to construe the two spheres as independent of one another. This has been the tactic of those who disclaim there is such a thing as religious knowledge as well as those who, more moderately, see religious knowledge as established on a basis different from knowledge about the natural world. On this view, it was possible to regard theology as "scientific" only in the sense of ordered exposition and elucidation of a deposit of revealed truth, unknowable in detail apart from its being divinely revealed.
Others, again both scientists and theologians, have deplored the apparent chasm between theology and science, and have sought to understand theology as "scientific," in some sense resembling the way that the natural sciences are scientific. These thinkers tend to believe that all human knowledge is obtained and articulated in fundamentally similar ways because of the rational unity of the human beings who do the discovering, and they are convinced that a scientific theology would be methodologically continuous and substantively consonant with natural science.

These two postures taken toward the apparent differences between theology and the natural sciences have helped to make the debate over similarities and differences between theology and science an intense one in the modern period. But the current version of this debate is conditioned by several, highly important, new elements.

First, from the philosophical study of the history and methods of science, we have a better understanding of the complex, social nature of scientific activity, and we have a more nuanced appreciation for the processes of generation and justification of scientific knowledge. These new understandings have reinforced (and actually largely stimulated) the widespread conviction that foundationalist epistemology is a poor model for explaining the workings of the natural sciences. According to foundationalist epistemology, sound arguments are based on indubitable premises and lead logically to assured conclusions. Foundationalist approaches differ in specifying various ways of discovering these unquestionable, foundational premises (through sense data or rational intuition, for example) but all foundational epistemologies affirm an indubitable foundation of some kind.

Suspicion of foundationalist epistemology, especially as a model for scientific activity, appears in the philosophy of science and epistemology of Charles Sanders Peirce and subsequently in John Dewey's writings, and is surely one of the most important contributions of the United States to world philosophy. The view can be traced through Willard Van Orman Quine and beyond in epistemology, and through Imre Lakatos and beyond in the philosophy of science. The consequence for understanding the relations between theology and science is dramatic and well-known: scientific and religious knowledge, and in fact all kinds of human knowledge, are of essentially the same kind. The old foundationalist scenario was especially problematic for theology because it has had a tortured history since the Enlightenment of vainly struggling to explain how its premises were indubitable. So the failure of this scenario as the basis of the scientific method was welcome relief for those theologians haunted by the obvious difficulties of scientific or rational theology.

It now appears that, in science and theology alike, the nature of creative intellectual work is to form hypotheses that are sufficiently well-defined to allow the deduction of testable consequences. Controlled experimentation is the most efficient form of testing, but other avenues of hypothesis-correction exist and come into play in everything from literary criticism to metaphysics, from social ethics to theology. In all forms of inquiry, then, rationality of procedure consists in arguing from relatively secure (but necessarily
falible) knowledge to less secure knowledge, the tentative securing of which would serve to broaden the stock of knowledge and to deepen one's understanding of knowledge already in hand. Thus, while differences remain due to subject matter, natural science and theology now appear to have a great deal in common methodologically.

Second, the material content of several natural sciences has made it evident that, quite apart from the colorful and strange realm of mystical experiences, the natural world is a more mysterious place than early modernity had realized. From the foundations of quantum physics to the cosmic anthropic principle, and in the interplay of contingency and necessity in the biological sciences, the same message is heard by those trying to understand the relation between theology and the natural sciences: the natural world is not a simple, closed network of causal relations, and explaining its wonders is a task to which philosophical and theological understandings may make relevant contributions.

There are other, less crucial influences shaping the current form of the problem of the theology-science relation, but these two are the most prominent. In this atmosphere of seeing theology and science as essentially two instances of a single kind of inquiry, much systematic religious reflection is once again fascinated with the possibilities of understanding itself as "scientific." There are as a result many works articulating continuities between the processes of scientific and religious knowing. But contemporary Western religious reflection is also the recipient of a nineteenth-century heritage that has insisted on the complex, relational, existentially rooted mode by which religious knowledge emerges and is preserved in communities.

Thus, a sharp awareness of difference remains between scientific and religious language, one so strong that, relative to mainstream theology, the science-theology dialogue can sometimes seem painfully out of step, an esoteric specialization dominated by one-sided preoccupation with the cognitive aspects of religious language to the exclusion of its expressive and prescriptive dimensions. This is an indication that differences as well as similarities must be respected and explained in any account of the relation between natural science and theology. It should also not be forgotten that contemporary theological activity is an extremely diverse family of projects, guided by apparently conflicting methodologies and assumptions. The relation between science and theology cannot be the same in the case of all of these theological projects.

These, then, are some of the leading considerations giving shape to the current version of the problem of the relation between theology and the natural sciences. In this situation, it is possible to discern a number of basic similarities and differences to which any account of the relation between Christian theologies and the sciences must do justice. A selection of these is presented here as an introduction to the debate that follows.

II. SIMILARITIES

1. Cognitive content. Scientific and theological statements both have cognitive content, in the sense that they are capable of being true or false; however truth is to be understood. The cognitive aspects, however, differ. Scientific cognitive aspects are commonly held to have a more direct and certain kind of relation to reality, while the cognitive aspects of theological statements are more hypothetical and subject to revision. This difference is reflected in the way scientific and theological statements are accepted as knowledge.

2. Participative character. Science is a participative enterprise, in which the participants are actively engaged in the discovery process. Theology, on the other hand, is more often a received tradition, with the participants more passive in the process of understanding. This difference is reflected in the way scientific and theological statements are accepted as knowledge.

3. Being impacted. Science is often seen as a tool for understanding and intervening in the world, while theology is often seen as a tool for understanding and intervening in the world. This difference is reflected in the way scientific and theological statements are accepted as knowledge.

III. DIFFERENCES

1. Different epistemology. As we noted above, science and theology have different epistemological frameworks. The epistemological framework of science is based on the idea of empirical evidence and the scientific method. The epistemological framework of theology is based on the idea of revelation and scriptural authority. This difference is reflected in the way scientific and theological statements are accepted as knowledge.

As a point of departure, this chapter will focus on the cognitive aspects of theological statements, which have been created by God.
understood. Theological statements, along with their undisputed expressive and exhortative aspects, have a propositional, cognitive component. Scientific statements are better known for their cognitive content, but perhaps in some contexts have other aspects as well. Scientific practice makes a virtue of emphasizing cognitive content exclusively over other possible aspects of scientific statements. Such an exclusive emphasis is natural, given the subject matter of science, which lends itself to fairly exhaustive characterization in propositional, cognitive terms. By contrast, the subject matter of theology is more diffuse and, according to many theologians, partially transcends human reason. This makes focusing exclusively on the cognitive content of theological statements a rather dubious, perhaps misleading, thing to do. With care, however, it can be done.

2. Participation in the structures of human rationality. Whether or not the nonfoundationalist view of human rationality described above is accepted as the most adequate account of the human quest for knowledge, both theological and natural scientific activities are understood to be rational operations of some kind. Both draw upon the imagination, creativity, and extant knowledge of their participants to produce arguments and to test assertions where possible against what is experienced and already accepted as known.

3. Being impacted by the one world. Critical realism is the post-Kantian name for the belief in a reality that causes human experience, exists independently of our experiencing it, and can be understood only in an indirect, mediated way. This is the most common philosophical basis for both theological and scientific discourse. But whether or not this (rather general) metaphysical-epistemological position is held, it is nevertheless the case that theology and science both intend to speak with tolerable accuracy about reality beyond the confines of human mentality.

III. DIFERENCES

1. Different epistemic heritages and warrants. Scientific and theological propositions, as we noted above, can be regarded for some purposes solely in their cognitive aspects. It is possible, therefore, to obtain theological and scientific propositions that have literally identical subjects (say, "The universe is created by God" and "The universe is the result of processes characterized by such-and-such physical laws"). At least in some cases, however, scientific and theological knowledge, even about the same things, is obtained in different ways.

As a poignant example, nineteenth-century theologian Friedrich Schleiermacher regarded statements about God and the world as expressions derived from more fundamental statements about religious self-consciousness. On this view, "The universe is created by God" is the result of a complex process—within a community possessing a
shared history—of theological reflection on the human experience of what has variously been called unconditional dependency, human finitude, or creatureliness. This epistemic heritage—the way it comes to be known—is directly relevant to what may be claimed in regard to the reliability of the theological statement, precisely to the extent that the way we come to believe something (heritage) is used to justify the belief (warrant). For example, if we are not to move glibly from the experience of "creatureliness" to the metaphysical-theological affirmation that God created the world, then it is vital to be assured that we have a viable, indeed the best, interpretation of the experience of "creatureliness."

For many theological assertions, epistemic heritage and warrant are tightly knit. By contrast, in the natural sciences the discovery of an hypothesis and the process of its justification are almost always entirely separable. A scientific hypothesis may be concocted in any way at all, and many are conditioned by unarticulated cultural and personal factors, including religious ones. However, if the hypothesis explains and produces testable consequences, its warrant will stand sufficiently independent of its epistemic heritage to secure a public dimension for it. Correlative to this difference between theology and science is another that is relevant to the warrants for theological and scientific truth claims: scientific communities have an extremely efficient method for establishing widespread agreement, precisely because of the separability of the context of discovery and the process of justification, whereas religious communities find agreement much more difficult to achieve on almost everything.

2. Ethical and existential applicability. Theological statements are usually more readily applicable to existential concerns and ethical issues because of the complex epistemic heritage just described. In fact, theology has traditionally made a virtue of the tight-knit connection between the existential and ethical situation of the theologian and the content of his or her theology, and the theological task has often been defined as properly discharged only when this interconnection is explicitly thematized. By contrast, scientific propositions are less obviously relevant to ethical questions and existential matters. This kind of relevance is generated in a subsequent move, one not intrinsic to the scientific method itself, narrowly understood.

3. Data. A process of inquiry is scientific in the strongest sense when the data and method are of the right sort to allow tests that differentiate between competing theories, in the sense of eventually marking one off as more adequate than the others in such a way as to win assent from the relevant community of inquirers. Many factors can interfere with inquiry of this particularly efficient sort. For example, when sufficient relevant data are not available, speculative hypotheses about such data as exist do not lead to testable deductions. Under such conditions, coherence and other criteria are still available for testing explanatory theories, but controlled experiments are no longer possible. The natural sciences work with the kinds of data that enable experimentation
to distinguish competing theories, though some areas—such as interpretations of quantum mechanics and making sense of the fossil record—are problematic. However, in most areas, theological data appear not to be of the sort that can differentiate the most adequate speculative hypotheses from among the multitude of competing hypotheses. Put differently, direct experimental testing of theological theories (doctrines) is virtually impossible, and indirect testing is difficult to control and interpret, and notoriously unable to compel widespread assent in the community of theological inquirers.

IV. THE PAPERS IN PART II

The aim of Part II is to bring into the open key issues for understanding the differences and similarities between theology and science, some of the most important of which have just been described. To that end, four authors or teams of authors holding interestingly different views of the relations between theology and science engage in a two-round debate. In the first round of the debate, the four positions are laid down. In the second round, some of the authors respond briefly to the other contributions, differentiating their positions from each other. This approach enables the reader to enter more deeply into the issues than would otherwise be possible.

The papers of Nicholas Wolterstorff and Nancey Murphy are especially relevant to discerning methodological continuities between theology and natural science. In "Theology and Science: Listening to Each Other," Wolterstorff argues that we should think about science in terms of the triple distinction between data, theory, and control beliefs. By control beliefs in scientific activity, Wolterstorff means convictions about what sorts of theories count as acceptable. In situations lacking equilibrium among these three components of the process of scientific theory weighing, equilibrium is restored either by adjusting an interpretation of the data, by modifying or discarding a theory, or by altering a control belief. Wolterstorff points out that this same cognitive structure is found in other disciplines, such as ethics, and argues that it offers a good model for the way religious communities deal with their canonical scriptures. Wolterstorff contends that, with such profound cognitive structures in common, it is not plausible to construe theology and science as non-overlapping disciplines, either in terms of methodology or subject matter. On the contrary, conflicts are to be expected, and it is understandable that control beliefs demarcate the arena for many of the most profound conflicts between science and religion.

Murphy's aim in "Postmodern Apologetics, or Why Theologians Must Pay Attention to Science" is to show that relating theology to science is a crucial element of the apologetic task facing Christian theology at the present time. Murphy's understanding of the "apologetic task" is determined by her advocacy of nonfoundationalist epistemology: we ought to seek not indubitable foundations for Christian knowledge, but arguments that connect Christian beliefs into the rest of the web of beliefs. This
approach highlights the spontaneous aspect of the theology-science relation, in which imagination, ingenuity, and readiness to improvise are paramount. To the question of what kinds of relations between theology and science we should look for, therefore, Murphy naturally answers "Any kind we can get!" Using some of the case studies in Part III as examples, Murphy articulates a number of different kinds of relations between theological and scientific propositions, including direct implication, mutual implication of philosophical theories, hypothetic-deductive connections, operation of control beliefs, and complex combinations of these kinds of relations. Whether all of these logical relations are equally useful for justifying Christian beliefs, however, is debatable.

The widespread popular conviction that science and religion are fundamentally different kinds of human activity has its correlates in views of the relation between theology and natural science: they are distinct language games; they deal with separated spheres of reality; the statements of natural science are cognitive whereas theological statements are expressive and exhortative; or theology is the exposition of existentially potent, communally mediated, divinely revealed truth, and natural science is a matter of discovery and evidence. As we have seen, there is something to this conviction of difference between theology and natural science, even if it is not to be explained along any of these lines. In the wake of an antagonistic history, however, most scholarly energy that has engaged the problem in a sustained way has tried to unmask the formerly obscured similarities between the two spheres of activity. Yet it is clear that articulating what is similar between the two activities is only part of the task of understanding their relation. The two collaborative papers in Part II seek to do justice to the differences between theology and natural science, as well as their similarities.

In "Mathematics, Empirical Science, and Religion," theologian Mary Gerhart and physicist Allan Melvin Russell argue that the relation between theology and natural science is analogous to that between natural science and mathematics, in two ways. First, unlike empirical science, mathematics systematically prescinds from statements about the world in order to proceed freely within the domain of demonstrable consistency with postulates that characterize a mathematical system. Analogously, empirical science, unlike theology, prescinds from making empathic allowance for the experience of human beings in order to preserve the possibility of publicly and efficiently verifying and correcting scientific assertions. Second, mathematical advances expand the realm of "computable or otherwise analyzable relations" in a way that opens up new possibilities for scientific description of the world. Analogously, advances in scientific knowledge set the limits on what theology can assert, determine the context within which theological assertions must be formulated, and establish partial criteria for the believability of theological assertions. Gerhart's and Russell's exposition of this analogy helpfully articulates important differences between natural science and theology.

In "Rationality and Christian Self-Conceptions," Philip Clayton and Steven Knapp endeavor to situate the question of the relation between theology and science within a broadly anthropological context; that is to say, in the context of the self-conception and self-identification of the human person. The approach taken is inspired by the philosophical conception of a human being as a rational creature. Nevertheless, it is not a philosophical approach, all the more because it is helpful in clarifying not the content or form of any particular religious self-conception, but the nature of the human person, a religious self-conception understood not in the context of a specific religious tradition but in a generalized context. The second approach, however, is more thoroughly anthropological, in the form of questions.

1. How is Christian theology related to scientific understanding?

2. When are scientific explanations superior to or compete with theological explanations?
broadly anthropological perspective. It is only such a broad-ranging inquiry, they contend, that can exhibit the logical distinctiveness of what it is to have a Christian self-conception, which in turn is the necessary preliminary step to understanding the interaction between theology and anything else (including natural science). The assumption that a person engaging in theological activity possesses a Christian self-conception—axiomatic for Schleiermacher, Barth, Tillich, Rahner, and many other modern theologians—is frequently not granted by contemporary theologians. Nevertheless, insofar as theological reflection about the Christian tradition is regarded as intimately tied to a Christian self-conception, Clayton’s and Knapp’s approach is as helpfully clarifying as it is adventurously general. They argue that “Christianity can be equated neither with scientific hypotheses nor with a set of individual values. Instead, a religious self-conception, at least of the Christian variety, is an interesting tertium quid that evinces important similarities to, and differences from, the kinds of self-conception someone has to have in order to engage in formal scientific inquiry on the one hand, or ordinary practical deliberation on the other.”

The second round of the debate helpfully illuminates these positions. Yet it is clear that divergences remain. Three of the most contentious of these can be noted here in the form of questions.

1. **How is Christian theology to be understood?** The diversity of theological activity is not affirmed clearly enough in this debate, with the result that the contributors may unwittingly leave the impression that theology is a unified intellectual enterprise with just one method. Even so, it possible to ask whether Christian beliefs are in any sense the result of a process of inquiry. It seems that some Christian beliefs are—what Clayton and Knapp call theoretical Christian beliefs—but the sense in which they are explanations and what they are supposed to explain are contested issues that need further clarification.

2. **When are Christians entitled to hold their beliefs?** It seems that establishing connections between Christian beliefs and the rest of our “web of beliefs” constitutes at least a weak form of entitlement. However, it is not obviously the case that any logical connection whatever is an evidential relation that justifies Christian beliefs. Thus, the various senses in which logical relations between Christian beliefs and the wider web of beliefs function as justifications for Christian beliefs need to be distinguished and compared. Clarification is also needed on the question of the extent to which actively seeking critical feedback from beyond the boundaries of the Christian community is an essential criterion for entitlement. Furthermore, clarification is needed on how much weight must be given to the continuity of Christian beliefs with Christian tradition when such beliefs conflict with wider cultural judgments about what is possible in the world. Such clarity is necessary, for example, in decisions about when the scientific worldview should be assumed by theology, and when it should be resisted on the basis
of traditional convictions. Incorporating the function of traditions within a nonfoundationalist interpretation of entitled belief is a topic of intense reflection within philosophy and ethics at present, and promises clarification on each of the issues bearing on entitlement to hold Christian beliefs.

3. How is the apologetic task of Christianity in relation to science to be understood?
Some theologians, of course, deny that there is any task of this sort to be pursued. Some believe apologetics to be a matter of arguing for traditional religious beliefs while critiquing any aspects of the scientific worldview incompatible with them. Others understand the apologetic requirement to be a matter of making sure that Christian theology remains in step with scientific insight, with the understanding that such coherence is indirect confirmation of Christians' entitlement to hold their beliefs. Still others hold that apologetics is a matter of expressing Christian beliefs so as to render them discussible in a broad variety of communal contexts, which is as efficient a way as exists of justifying them. The diversity of approaches to apologetics may to some extent be an indication of the variety of theological projects that Christians undertake, but clarification of this contentious point is also needed.