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Science&Grace

GOD'S REIGN IN THE NATURAL SCIENCES

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Preface

WHY SHOULD ANOTHER BOOK on science and Christianity be written when there are already so many out there? To answer this question we must give some historical explanation from our own experiences and also answer some additional questions. In teaching our students at Covenant College about the relation between science and Christianity, we have found many excellent resources for how science has affected Christianity, and how Christianity has in turn helped to shape science. But we also wanted to inform the students of how our underlying convictions, and in particular our theological convictions, relate to the way we view the world we study and the way we view our own participation in the scientific endeavor. However, we were unable to find a one-volume source that addresses these issues in a way that speaks both to the evangelical mind-set and also to the subtlety of the issues involved without compromising what we hold to be fundamental theological truths. So eventually we set out to write such a book.

Why would this kind of book benefit God's people? It seems to us that in terms of connecting modern science with Christian faith, many Christians think no further than the creation/evolution debate. And while this is an important area for Christian thinking and involvement, science and Christianity issues go much deeper. As God's people we all have responsibilities before God to use the Scriptures to continuously assess each culture in which we live rather than to passively let the culture shape our perspectives. Modern science is a cultural achievement that has demonstrated many successes, mostly for the good of mankind. But modern science also has its down side, and partly as a consequence, in the Postmodern world science has come under suspicion in various ways. Not only has science been knocked off its pedestal of being the source for objective truth in the world, but science is also seen by many as a potent enabler of evil. As Christians

we ought to be grateful for benefits of the science of our age, and we need to oppose its misuse, but we also need to be aware of the potential it holds for setting up "idols of thought" or "idols of the mind." As idols always do, these science-related idols oppose God's gospel of grace in various ways. Some of these ways are more obvious and direct, but many others are quite subtle. Thus a main focus of our book is to suggest ways that God's people can think faithfully about science in terms of the gospel and so avoid idolatry.

What particular readership did we have in mind as we wrote? An author's answer to this question can provide important clues as to the specific usefulness of the book for various kinds of readers. Based on our experiences with Christian college students, we originally set out to address evangelical Christians who have some familiarity with science and Christian faith issues and who are interested in ideas that may help refine their Christian perspective on science. We believe such readers will find the way we frame these issues in the book helpful in stimulating their own thinking. There is plenty here for those who are interested in the move from a Modern to a Postmodern cultural backdrop and what its effects may be on science and the church. And while we do not deal systematically with the specifics of the creation/evolution controversy, plenty of material here finds application in that debate.

But in addition to this original intended readership, as we wrote we began to see a wider audience for whom the book might find some relevance. Because of the breadth of topics touched on here, we deal with many issues that are not limited to their application to science, but are relevant to many areas of a Christian's life before God. For example, in the early chapters our recommendations for ways of thinking about God's relation to His creation should be helpful to many Christians in evoking a greater sense of His wonder and glory as we ponder in new ways His ever-present grace in upholding the universe. And in a later chapter our recommendations for considering our responsibilities as "knowers" will find much wider application than just in the sciences. Likewise our chapter dealing with some of the specifics of Christian vocation in the sciences includes much that can be applied to other callings for God's people. Indeed, any

Christian who has ever wondered what relevance his or her "day job" has to the Kingdom of Christ would almost certainly run into similar issues as raised here in the context of science. What we present here is a strong antidote to the tendency in our day to separate our Sunday religion from our secular work week, as if God is only relevant when we are worshiping on Sunday, and the day-to-day grind of our weekly activities is unrelated to what we profess on Sunday. Readers who have felt this tension between Christian commitment and everyday work will find much to help and much to ponder in these pages.

Many factors have gone into the development of this book. Perhaps first and foremost, both of us are graduates of Covenant College, and from the time of our respective undergraduate days, we each have had a long-term interest in the relation between science and our Christian commitment. After graduate school in elementary particle physics for Don and cellular and molecular biology for Tim, both of us went on to do postdoctoral work in our respective fields before returning to Covenant to teach. Don joined the faculty in 1993 and Tim two years later. We thus first met in 1995, and after a few discussions it became evident that we each had similar interests in terms of working out a more robust and comprehensive understanding of science from a Christian perspective than we already had to that point. We also each had a similar desire to aid students and churches to better understand our dialog with the world concerning these issues and our participation as Christians in the cultural science in the face of the tensions that exist today.

Our first endeavor together was to create a course we called "Science in Perspective," designed to fulfill the core science requirement for those not majoring in science at Covenant. Our idea was to introduce students to the "hot topics" in science in their philosophical, theological, and historical context. We also wanted to present science as the multifaceted, wonderful, and wonder-producing enterprise we found it to be in our scientific work. In practice, science is not a bland, "detached, purely logical" enterprise that mechanically leads to truth, as it is often portrayed. Science is a wholly human enterprise with all the subtleties and foibles of any other human activity, and it

provides many opportunities to bring Christian thinking and creativity to bear on its tasks.

Our major goal in teaching this course was to send our students out with a greater awareness of the subtlety of issues in order to equip them for better service to the church and for more productive dialog with the world. While teaching this course, we became aware of the Templeton Foundation's efforts to encourage a richer dialog between science and religion through promoting the teaching of courses jointly considering science and religion issues. We subsequently won one of the course awards offered by the Templeton Foundation in the Science and Religion Course Program, and this was the beginning of a very interesting chapter in our lives of attending conferences funded by the Templeton Foundation, culminating in our participation in the first Oxford Seminars on Science and Christianity hosted by Alister McGrath and John Roche at Wycliffe Hall, Oxford, for one month each summer from 1999 to 2001, also funded by the Templeton Foundation.

At the same time, and partly in the context of our projects for the Oxford Seminars, we were both pursuing our respective interests in science and Christianity, expressed in papers presented here at Covenant in the spring of 2000, leading to material included in this volume. Tim presented a pair of chapel talks entitled "Science and Grace," while Don presented a paper to the faculty entitled "Toward a Covenant Theology of Science." Don's paper followed up in part on some work presented in his 1996 talk "Scientific Law as Covenant Law" on the occasion of the dedication of Mills Hall, Covenant College's new science building. Tim's work as represented in his talk has helped to shape chapters 6 to 9 of the book, whereas parts of Don's paper informed our introductory chapter and laid the foundation for chapters 4 to 6. While participating in the Oxford seminars, we realized that our respective projects mutually supported and complemented one another, and sometime during the second year, we decided to join forces in the writing of the present work. A final and very helpful experience helping to shape our endeavor occurred in the summer of 2002 when we both participated in the Calvin College workshop, "Natural Science in the Calvinist Tradition," organized by

John Schneider and Davis Young and funded by Fieldstead & Company. This seminar was extremely valuable in helping us shape the material here as we dialogued with a variety of people and perspectives within the Reformed tradition.

Covenant College has afforded us a rich backdrop for pursuing our interests, with its openness to addressing any and all questions wherever they lead, in the context of a confessional commitment to the Bible and the Reformed tradition from its various backgrounds. Thus with the firm commitment that there can be no conflict between the Bible and God's creation, properly interpreted, we find ourselves connected to three distinct strands of the Reformed tradition. Our most direct link is to the Scottish Presbyterian tradition as derived through our denomination's past liaison to Old Princeton, with their strong commitment to sound doctrine, while at the same time taking science seriously. This is combined with the Dutch Reformed tradition with its strong cultural focus, which came in part through Francis Schaeffer and his connection to the college through denominational affiliation and through the L'Abri conferences held here in the late sixties and early seventies. Also a number of faculty members with a Dutch Reformed background have since joined the faculty, providing breadth in this direction. Third, our southern Presbyterian heritage adds emphases on piety, personal holiness, and the need to distinguish ourselves from the world, while at the same time maintaining a gospel immediacy within it. These three strands, with their different emphases on the theological, cultural, and pietistic aspects of genuine Christian faith and practice, have provided rich resources for our work. Thus the Reformed tradition has given us an essential systematic unity, and the diverse emphases of the three strands have helped illuminate the multiple facets of a faithful Christian response to the science of our day.

Although it will be clear to readers that the perspectives we present grow out of our own theological location in the Reformed Christian tradition as expressed above, we have tried to avoid Reformed "jargon" and have emphasized themes that should resonate across a variety of Christian theological traditions. What we present is not intended to be an argument for taking a Reformed perspective

but rather an attempt to flesh out a particular version of that perspective with respect to science. To this end, rather than making primary reference to our confessional heritage at various points, we have framed our discussion by referring directly to Scripture. We do confess though that it seems difficult to us to make sense of all the Scripture we have used in a coherent picture unless God is sovereign over all areas of His creation, as Reformed doctrine has always emphasized, and we invite the reader to consider this prospect.

While it is our hope that our book is unique in its approach and the topics it addresses, the writing process has made us all too aware of what "the Teacher" warned about in Ecclesiastes so long ago: "Of making many books there is no end, and much study wearies the body" (Eccl. 12:12). The number of books relevant for and past opinions related to our subject is astounding, and we could not possibly do justice to all of them. We are also aware that "there is nothing new under the sun" (Eccl. 1:9); there are few genuinely new thoughts, and most ideas of the sort we discuss have likely been expressed by someone in the past. We hope we have faithfully represented the work of others when we were aware of that work. Also there are no doubt many cases where we have presented ideas without reference, when similar ideas have already appeared in past works of which we are yet unaware. If any of our thoughts fall into this category, we apologize and would be delighted to hear of such works and to give credit where it is due in future treatments. Further we are only too aware that our subject matter touches on a vast number of topics, many of which are well outside our fields of direct expertise. Although we have sought to obtain counsel from others who have expertise in these fields in order to fill such gaps, we no doubt have introduced numerous simplifications into such areas. We hope that such shortcomings will not detract from our main goal of edifying the evangelical churches by helping to broaden the horizons of our collective thinking in terms of modern-day science. We trust, by God's grace, whatever the inadequacy of this present effort, that the reader will in some way be blessed by our endeavor. Again we invite those who discern various shortcomings to provide feedback to help us develop our thinking further.

Finally we would like to remark that with two authors writing dif-

ferent parts of the book, the reader may notice the different styles of each author. We have not made a great effort to unify the style even though we each have substantially "bought in" on the contents of the whole manuscript. We have also endeavored to make the chapters reasonably self-contained so that the book need not be read in its entirety to make sense of each chapter. This inevitably has resulted in a certain amount of redundancy and some fairly lengthy chapters. For these things, again, we beg the reader's indulgence.

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Many have helped in immeasurable ways in moving this book along. We first wish to prominently thank Sir John Templeton and the Templeton Foundation, without whom this work would not have come about. While Sir John may not agree with everything we write in these pages, we are indebted to him for the vision that realized that the world would be a better place if a more vigorous dialog were taking place concerning science and religion, and we wholeheartedly agree. His gracious philanthropy has set the stage for a much more nuanced discussion of this important tension in our lives than has been possible before, and to that we are indebted. May our effort add a small token to the ongoing dialog that has the potential to give God a greater glory in our midst. We are also greatly indebted to Covenant College, both for encouraging this type of endeavor and for support along the way: for sabbaticals, which each of us enjoyed during the course of the writing, for summer travel support and occasional course reductions, for development funds for book purchases and other expenses, and intangibly for the heritage that fosters this kind of scholarship.

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Finally, we would like to express some more personal thanks. Tim would like to give special thanks to his wife, Lisa: Lisa, you are the most precious gift God has given me on this earth, and your love and encouragement over these years made completion of this project seem possible. Thanks as well to my children Emilie, Aubrey, Meredith, Joseph, and Caroline for your patience and understanding through what was a much longer process than anticipated. Thanks to my parents, Bob and Elaine Morris, for introducing me to my Lord at a ten-

der age, for giving me a foundation in the Reformed tradition, and for nurturing my interest in the "big questions." I am also deeply grateful to God for the privilege of sitting under faithful preaching of the Word throughout my life. Thanks to those faithful preachers of the gospel who continuously confronted me with the reality and largeness of God's grace: Elmer Dortzbach, Tom Champness, Karl Ellis, Ed Hague, Mark Cushman, Jim Pickett, Mike Higgins, and Randy Nabors. Finally, I'd like to thank Don Petcher for his friendship, his optimism, for never running out of interesting ideas, for his great patience with my "longwinded" drafts, and for his unflagging enthusiasm for this project. I look forward to continuing "adventures with Tim and Don!"

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All quotes from the Bible are from the New International Version unless otherwise specified.

Section**One**

Science and Christian Belief in the Postmodern Context

Do not conform any longer to the pattern of this world, but be transformed by the renewing of your mind. Then you will be able to test and approve what God's will is—his good, pleasing and perfect will.

Romans 12:2

We demolish arguments and every pretension that sets itself up against the knowledge of God, and we take captive every thought to make it obedient to Christ.

2 Corinthians 10:5

From its inception in the Jewish context, Christianity has engaged countless cultures and in consequence countless varieties of ways of thinking about the world. Christians throughout the centuries have endeavored to follow Paul's instructions even as the "patterns of this world" have continuously changed. The history of ideas—the ebb and flow of ways of looking at the world—is thus not only a fascinating topic in its own right, but is extremely practical as Christians seek to "take captive every thought" in each age in each context in which they are called to live. In the context of Western culture, Christianity has engaged its culture under the oversimplified headings of "Premodern" and "Modern"—headings that paper over a great variety in patterns of thought and context. In Premodern Western culture—say, up to A.D. 1500—Christianity engaged both Greek and pagan European culture in various ways, significantly influencing and being influenced by both. As Modern culture grew out of the Premodern, Christianity was a participant in the birth and develop-

ment of the major hallmark of the Modern age, science, and has influenced and been influenced by the scientific mind-set it helped to birth.

We now seem to be living in a time of transition from Modern to Postmodern, and how exactly Christianity will influence and be influenced by this transition remains to be seen. We do indeed live in very interesting times as believers as we seek to avoid the conformation that Paul warns of and be obedient to the commands to be transformed and to demolish godless pretensions. This is challenging. As Western Christians we are moving out of a Christianity mostly embedded in a Western Modern context for the last four hundred years, and in so doing we have "grown up" with modern science and are used to dealing with science in a Modern context. In addition, modern science grew up as Modernism grew—and came to prominence as perhaps the epitome of the Modern way of thinking. Science has never known a non-Modern backdrop for its operation. How exactly both science and Christianity will make this transition to the Postmodern context, both in their own right as well as in their continued relationship to one another, remains to be seen, but it seems to us that all of us living through this transition have responsibilities here, and in many ways this book is intended to inform and encourage believers in taking up these responsibilities.

In this first section of the book we begin to lay foundations for an extended discussion of science and Christian belief in this Postmodern context. In the first chapter, we lay out the context, contrasting the Modernist "warfare" metaphor between science and Christianity with the Postmodern relativistic attitude. We also lay out the problem that we Christians face in reassessing the entire landscape of science and religion in its new context, and we offer some metaphors of our own to aid in the big picture.

In the second chapter we briefly review the beginnings of modern science and then sketch the key realizations that led us as a culture from almost a blind faith in the power of rational and empirical scientific methodology to the Postmodern situation, which calls that faith into question in various ways. Ironically some of the reasons for questioning the extent of the Modern faith in science arise from science itself, and we highlight these. While Christians for the most part

have found a generally Modern picture of things congenial to Christian faith, throughout the Modern period there have been specifically Christian criticisms raised against various aspects of the Modern project.

The third chapter in this section zeros in on various "dissenters" to the Enlightenment hope that science would be able to function in the modern world as the final arbiter of truth. These dissenters, all of whom would be recognized as evangelical Christians of one sort or another in our contemporary context, were critical of central elements of the Modern mind-set. Interestingly these dissenters raise issues that resonate in various ways with current Postmodern critiques of Modernism. This brief overview of the development of modern science and Christian critiques will provide some of the resources for considering our own expressions of Christian beliefs and beliefs about science as we go forward in the twenty-first century increasingly embedded in a Postmodern context.

Chapter One

The Need for a Theology of Science

Trust in the LORD with all your heart and lean not on your own understanding; in all your ways acknowledge him, and he will make your paths straight.

PROVERBS 3:5-6

MODERN SCIENCE WAS BIRTHED in a Western European culture dominated by Christianity, and right up until the nineteenth century most people would have considered it strange to think that there was a basic conflict between science and religion.[1] This situation shifted significantly during the nineteenth century as science came into its own as the signature of the "Modern" period; suddenly, in the view of some, a long-smoldering struggle between science and religion flared into a "hot" war! This conflict thesis continues to be popular to this day, many insisting that there is a basic competition between science and Christianity such that a high regard for one automatically translates into low regard for the other. There is also the widespread perception that the stakes in the conflict are extremely high indeed: either the very foundation of modern civilization on the one hand or the very truth of the Christian faith on the other. In the midst of the "war," however, peace initiatives have often been offered; perhaps the most prominent suggestion over the years has been that science and religion should be considered as just talking about different things. In this view, supposedly, science is limited to the "value-free facts" of nature, and religion is concerned only with human values—thus the two areas occupy separate, non-competing realms. So peace comes, not by conquest, but by simply straightening out the unnecessary confusion of categories.

While many of us at the start of the twenty-first century out of habit continue to view the relations between science and Christianity in the fairly straightforward war or negotiated peace terms, the reality is that the basic underpinnings of war and peace postures have been significantly altered. Developments in the philosophy of science as well as in science itself have increasingly blurred the boundaries between science and religious convictions in such a way that definitively establishing either lines of battle or lines of truce has become difficult. These developments have called into question the idea that science is or even can be a completely objective fact-finding activity carried out in isolation from "nonscientific" influences. While nature "out there" is still the same for everyone, it seems that the kinds of judgments scientists make in the course of their work have various components that do not themselves directly emerge from the logic rules and sensory data of supposedly objective scientific methodology. Science is increasingly seen as a fully human activity, involving a variety of social, cultural, and religious factors that go beyond mere reason and the senses. There seems to be no way to cleanly separate one's science from the whole of one's human experiences and convictions. In essence, the war and peace proposals were firmly planted in the Modernist mentality, which itself is now being called into question.

Yes, we now live in a cultural climate often referred to as "Postmodern." Somehow we have gone beyond the "Modernity" that so emphasized science as the bottom line for providing knowledge, leaving it behind to move on to a new phase of culture. The move from Modernism to Postmodernism is certainly one of the most significant stories of our time, and Christians have been struggling to find faithful ways to respond to this shift.[2] While some have gone too far in the Postmodern direction, most Christians rightly recognize dangers of Postmodern relativism. But many Christians, in their strong rejection of relativism, end up siding with Modernism by default. They find the reaffirmation of an ideologically neutral science a really tempting option, especially in view of the supposed "glory days" of seventeenth- and eighteenth-century natural theology, during which the power of science as an objective enterprise was harnessed in various ways to legitimate Christian belief. But the hope that a Modern sci-

ence "cavalry" will ride to the aid of Christian belief in Postmodern times seems a vain hope indeed. While Christians rightly believe that the Postmodern "anything goes" relativism is on the wrong track, combating Postmodern relativism by simply reaffirming Modernist convictions about scientific objectivism is not the solution.

How should we respond to the developments of the twentieth century? Indeed, most evangelical Christians still feel that they are on a war footing with much of modern science, and the heat of the battle makes it difficult to reflect on a larger picture. Thus there is a great need to reassess the whole lay of the landscape that has brought us into the conflict era in the first place. Our approach in this book will be to step back for a time from the battle lines as they were drawn late in the Modern period.

We Christians, like all humans, inevitably absorb a variety of cultural elements into our worldviews, and the shift in the cultural backdrop in our time from Modern to Postmodern can serve to highlight elements of current "Christian" perspectives on science that upon further examination may turn out to be more reflective of Modern cultural perspectives than of biblical perspectives per se. The shift in our culture to Postmodernism has also forced to the surface many important questions that have long lain unattended and unrecognized in the Modern era and now call for Christian examination. These questions will force us to rediscover forgotten or devalued resources within our own Christian faith. These reassessment tasks call us to wander a bit through regions of history, philosophy, and theology that at first seem to lie far off from the urgency of conflicts on the front lines, but these "detours" are worth taking because they provide the vantage points we need to bring a revitalized Christian perspective to this important area of our cultural life.

Not only can a broad reassessment revitalize Christian understanding of science, but it can also give us something to say to a culture increasingly ambivalent about scientific knowledge. Science in our culture is simultaneously revered, feared, and reviled. The wonder of the human genome project, space probes, new and strange notions of deep space realities, and the marvels of information technology are widely heralded in the popular media. At the same time the

"dark side" of science—drug companies that hide damaging data, the dangers of genetic manipulation and cloning techniques, and the horror of biological warfare—also makes big stories. In addition elements of cynicism and even ridicule tinge cultural attitudes toward science as people sneer at flip-flops in public health recommendations or put their faith and money into "alternative" medical approaches that are not supported by scientific research. A Christian perspective must be able to give an account in the culture for both the power of science as well as its limitations and distortions.

Trees, Roots, and Branches

Setting the stage for our project will require some major shifts in the instinctively Modern way we think about the categories of "science" and "theology" themselves. Some metaphors might be helpful here to illustrate the kind of shift we have in mind. In the Modern landscape right from the beginning, science and theology have been assumed to be two distinct trees of human knowledge. In this Modern mind-set, each tree is rooted in its own distinctive type of soil, each grows by different processes, and each bears its own sort of fruit. In the earliest articulations of a Modern approach to science, the two soils or sources of knowledge were understood to be "two books," the book of Scripture and the book of nature. In this view, the tree rooted in the book of Scripture grew through prayer, faith, and Spirit-guided reflection on the Word, bearing the fruit of Christian doctrine as its contribution to truth. The tree rooted in the book of nature grew by experimentation, reason, and public demonstration, bearing the fruit of scientific truth.

Working out how to best nurture this grove of knowledge has been a major concern of the Modern era. Some Moderns have encouraged certain branches from the two trees to grow toward each other and to intertwine in the belief that, though each tree is independently rooted, scientific knowledge and theological knowledge can and should mutually reinforce one another. Various natural theology proposals follow this pattern. Other Moderns have argued that the science tree is the only one in the end that passes muster as

providing genuine knowledge, and that as the science tree grows and flourishes, the theology tree will wither under the shade of an increasingly complete canopy of scientific explanation. Classic forms of scientific naturalism follow this pattern. Still other Moderns have argued that the theology tree, although also valid, is so different from the science tree that to avoid confusion, it should be moved far away from the science tree, pruned to remove fact-oriented branches, and encouraged to flourish as a forum exploring human meaning and spirituality, while avoiding cross-pollination with the science tree. This is essentially the "peace initiative" mentioned earlier in the chapter, that science and theology address entirely different realms of human experience. More recently others have argued that the way forward would be to cut down the theology tree and to graft a branch from it into the science tree to bring proper scientific grounding and analytical rigor to bear on theological knowledge—to develop a kind of science-based spirituality. This describes the mind-set of a variety of proposals in the last few decades concerning nature-based spiritualities and "natural theism."

Although each approach offers a distinctive pattern for nurturing the trees of human knowledge, they all share the typically Modern assumption that a proper method exists by which humans can stand on the forest floor to act as independent and impartial judges of knowledge. This search for an impersonal objective guarantor of truth has been a major storyline of Modernism. The demise of Modernism was in part brought on by the realization that this search has failed, that humans can't really wield the chainsaws or the pruning shears, from the neutral vantage point of the forest floor because each has his own worldview. It turns out that each human is already inevitably sitting in the branches of some knowledge tree or other.

From Science *and* Theology to a Theology *of* Science

If none of the "two trees" scenarios will work out, then how should we proceed in thinking about the relationship between science and theology? A different tree metaphor may help to communicate the

direction we are recommending in this book. Rather than starting with the separately growing trees of science and theology, we should start with a variety of trees, some with scientific branches emerging from their trunks. These trees are rooted in the most basic human convictions about who or what they ultimately trust—that is, all the trees in the forest are worldview/theological[3] trees. One's basic theology in this sense has to do with who or what he is ultimately living for and working in service of. Every human is trusting, is serving, someone or something, and from such basic heart commitments flow all of our knowing and ultimately all our doing. From a Christian perspective, whatever stands in the place of the God revealed in the Scriptures sets an all-encompassing religious trajectory for one's life, including the science one does and believes is valid. Every human has bought into some theological tree or other, and the science each does will in one way or another be impacted by the sap flowing into the science branch from its respective theological trunk. For Christians, therefore, the important questions do not have to do with how Christian theology will respond to an independently rooted and validated science tree but rather with what *kind* of science should grow from a Christian theological tree. These questions can best be addressed by developing what we call "a theology of science."

Rivers and Streams

But doesn't this kind of picture lead to relativism concerning science? This question perhaps can best be addressed by shifting metaphors. In the Modern mind-set, when one stepped into the scientific river, one left behind all human subjectivities, biases, and unproven assumptions that are a normal feature of ordinary day-to-day life. A thorough scrubbing in the scientific river would cleanse away those things that would distort the true reading of the natural world that is the goal of science. Once in the river and properly washed of biases, starting with the same facts and following the same objective rules of investigation and conclusion making, the judgment of each scientist was supposed to be the same. Thus the Modern picture: All participants leave

behind their particularities and are carried along by a current generated and sustained by the objective rules of science itself.

The demise of Modernism significantly shifts this picture. Science is still a mighty river, and if one is to participate in the common project of science, one must step into the river. But we now know that this river is not able to wash away all biases in favor of a universal and objective scientific methodology. It is rather the flow of a complex cultural enterprise that arises from a confluence of various historical, cultural, and philosophical brooks and streams, each growing out of its own foundational religious commitments, including the stream of Christian theology and practice as well as the ancient Greek tradition. In the providence of God, the cultural project we call science has gradually become a mighty river in which different sciences have always been done and we believe can and should continue to flourish. Rather than different theological trees, in this metaphor we now have different theological tributaries, all flowing into the one large riverbed of science as mingling streams, each contributing its own insights. The constraining riverbed, signifying the "constraints of creation," the real world "out there," by God's grace keeps the whole enterprise of science on track, allowing common work between various streams. But the riverbed is wide enough to continue to hold all the various mingling streams within its boundaries. The various streams are then again clearly revealed when the river gets down to the delta of drawing implications from the commonly held conclusions of the wide river. Various delta channels flow in many directions, indicating a divergence of views concerning the implications of what we are all doing in common. Thus while all the different streams of thought engage together in the common river of cultural science, each will have very different ways of looking at what it is doing, and each may end with different claims when ultimate conclusions are drawn. So by God's grace, these different sciences can do various kinds of productive work together, but are ultimately different sciences in a very real sense. Therefore we Christians can and should work to do a science that arises from our own theology, and we should also contribute to and value the broader flow of cultural science, an understanding that we ourselves ground in our own Christian theological foundation as well.

Some Basic Elements of a Christian Theology of Science

So what exactly do we mean by a theology of science? It should be clear already that we do not mean by this a theology derived from science or a scientific methodological approach applied to theology. Rather we have in mind a view of science shaped by the "theology" that flows out of the basic religious commitments of one's heart, whatever they may be. For the Christian, the theology is derived from Scripture,[4] and the basic heart commitments might be expressed under two themes: an embrace of the gospel and a shunning of idolatry, the latter of which in its essence is anti-gospel. Therefore we will constantly be asking how our scientific understanding and activities are to be shaped by our Christian commitment to embrace the gospel and shun idolatry.

So what do we mean by "gospel"? The word *gospel* of course means "good news"; it is the good news that we in our rebellion as enemies against God have been loved by Him to such an extent that He took upon Himself in Christ the punishment that we deserve in order to restore us back to Him. More specifically, He has cancelled out the certificate of debt that we owed in our sinfulness, replacing our sinful record with a new and perfect record in Christ (Col. 2:13-14), He has given us the ability to serve Him by giving us a new heart (Ezek. 36:26), and He has prepared in advance good works for us to do (Eph. 2:10), and in so doing He has given us a new life. For "he who began a good work in you will carry it on to completion until the day of Christ Jesus" (Phil. 1:6).

In a real sense this brief description gets at the essence of the gospel, but in another sense it is only the tip of the iceberg. There are assumptions behind our description as well as implications that follow. For example, in our brief description, we have assumed that God is our Creator. We have assumed that we, as His creatures, have rebelled against Him and hence fallen from grace; indeed all of creation has participated in this fall. Likewise we have acknowledged that in our redemption in Christ, now we stand in His grace or favor, accepted into His family as servants of the loving Master. We also look

forward to a coming kingdom in which His reign will be more visible, and we will serve forever. By "gospel" insofar as it pertains to science we must have this bigger picture in mind. The fact that the universe is a creation and that it has participated in the Fall with us and that we are redeemed servants all have implications for how we view the study of that creation, which is science. An exploration of this gospel will require that we examine the unity of all things under the rule of God, the relation of God to His creation, the place of humans in creation, the impact of the Fall on creation and on human activity in it, the implications of our new birth in Christ for human knowing and doing, the gospel call to be in the world but not of the world, and the significance of the present and coming kingdom of Christ. A theology of science will entail the exploration of these aspects of the gospel as they are presented in Scripture accompanied by an attempt to explicate the importance of each aspect of the gospel for the way we think about science and the way we participate in our culture in these Postmodern times.

Idolatry directly opposes the gospel. Idolatry at its root is always a denial of the gospel—a prideful placing of our trust in something other than God and His promises to faithfully rule and redeem. In the Old Testament are many words for idol, with various meanings, from man-made objects (Hab. 2:18) to those things that are worthless (Isa. 44:15-17). Shunning idols is also related to faithful covenant-keeping (Deut. 5:8) and to truthfulness (Ps. 24:4). But perhaps the most essential problem is that an idol points to the creature rather than to the Creator (Deut. 5:8), placing something created in the place of God. Thus it provokes God's righteous anger (1 Kings 16:12-13).

The apostle John in the New Testament places idolatry at the center of the cosmic contest between God and Satan:

> *We know that we are children of God, and that the whole world is under the control of the evil one. We know also that the Son of God has come and has given us understanding, so that we may know him who is true. And we are in him who is true—even in his Son Jesus Christ. He is the true God and eternal life. Dear children, keep yourselves from idols. (1 John 5:19-21)*

This passage puts the notion of idolatry in a larger context—the very struggle between the children of God and the children of the evil one—and relates this struggle to understanding, which for believers comes from Jesus Christ Himself. According to this passage, there are two basically distinct ways of looking at the world, one that we are to strive for and the other to be rejected. The one points us to the work and rule of Christ, that is toward His grace, and the other away from Christ. An inappropriate way of looking at science leads to pride; an appropriate way leads to repentance, humility, and dependence on the grace of God. A theology of science will help identify and repudiate scientific "idols of thought" and habits of mind that are idolatry-prone, and thus a faithful theology of science will help us resist the evil one. In this book we hope to give an account of a Christian theology of science rooted in and energized by the power and wonder of the grace of God revealed in Christ. It is our prayer that such an account will further excite and equip God's people to serve Him faithfully both as "producers" and as "consumers" of science in our contemporary culture.

Book Structure

Abraham Kuyper—the nineteenth-century Dutch theologian, scholar, and statesman—once said that in order for a worldview to be robust enough to provide an all-embracing set of principles to address all of life, it should be based on a principle able to provide special insight into three relations: man's relation to God, man's relation to man, and man's relation to the world.[5] All these relations are relevant for us in considering science along with one more: God's relation to the world. Although unintended, it is perhaps not coincidental that these four relations serve as general summaries of the major themes of our book. Thus the reader might understand our task in the book as addressing how Christianity indicates that these relations apply to the task of science.

Section one lays a foundation for our study by introducing issues relating to the Enlightenment hope for science and to the Postmodern move away from that hope, and it also raises various theological issues, by highlighting several historical "dissenters" from the Enlightenment

view. In section two we will begin our study by investigating God's relation to the world and the idols one might avoid by understanding it appropriately. This section focuses primarily on the Trinitarian nature of God's involvement with His creation, the issue of miracles, and the question of what a scientific law is. Then in section three, we examine Christian involvement in science by focusing on the great commandment's directive to love God and neighbor. We explore the implications of this command for God's relation to man as we do our work before Him, for man's relation to the creation as we interact with God's universe in our scientific investigations, and for man's relation to man as we cooperate with others in our culture in scientific tasks.

It may also be helpful to give a quick chapter-by-chapter description. In chapter 2 we introduce the reader to highlights from the founding of modern science and the development of the Modernist picture of science as the pinnacle of objective human knowledge. We then focus on major developments both from science as well as in the culture at large that led to the shift to Postmodernism, and we explore some of the implications of this shift for views of science. In chapter 3, we then present a selection of dissenters from the Modernist view of scientific knowledge. Our dissenters, who raised their objections primarily for theological reasons, come from various ages and Christian traditions, but all would be sympathetic to the evangelical Christian worldview. This chapter allows us to provide important background for the issues we raise in subsequent chapters.

In chapter 4 we emphasize the centrality of the Trinity in creation as well as redemption, and we focus on the importance of an understanding of the purposes of the triune Creator as He brings His creation to its ultimate end, putting all things under Christ's feet. This naturally brings us to the theme of the Covenant of Grace, as foundation for chapter 5. In that chapter we trace the historical development of the mechanistic view of science and explain how this has deeply affected the way we look at God's involvement in the world and how we view miracles—in ways that are not theologically sound. Both these chapters serve as backdrop for chapter 6, where we outline what implications the theological investigations have for our understanding of "scientific laws" and some characteristics we might expect of them.

In chapter 7 we turn our attention to issues surrounding our way of thinking about the nature of the world, of history as God unfolds it, and of our roles as new creatures in Christ in the fulfillment of God's purposes. We make the case that we cannot conduct our science in isolation from our knowledge of who we are in Christ and what the universe is in the ultimate plan of God to reconcile all things to Himself in Christ. In chapter 8 we explore how human knowing should be considered in terms of human responses to God's revealing work, whether in Scripture or in Creation. Pleasing God in our knowing is to be our primary motivation in developing and judging scientific knowledge. Our task in science is to respond faithfully to His revelation in creation, and part of that faithful response is to take seriously the very words of Scripture. In chapter 9 we explore specific actions and activities involving science that should naturally grow out of the being and knowing convictions discussed in the previous two chapters. Our conduct of scientific work should show us to be submissive, attentive, and confident, yet humble stewards of the scientific gifts God has given us.

Chapter 10 addresses how we should conduct our science in the context of the scientific culture in the twenty-first century, given the dominant Christianity-versus-science mind-set of the twentieth century. Evangelical Christians seem to have stored up significant resentment toward the scientific culture, and the dominant voices within the scientific culture strongly protest explicit Christian criticism of scientific concepts. We argue that following God's example of bestowing favor and finding joy in His creation, we are to work for the good of the common human cultural task of science and find joy in it as well. Yet as God also judges sin and corruption in His creation, we must always be mindful that though we are called to be in the scientific cultural world, we are not to be of it. Thus we are to continually examine and repent for our own sinful motivations and corrupted ways of thinking, and we are to humbly but persistently play critical and prophetic roles in the scientific culture as well.

Finally we close with chapter 11 summarizing the present work and pointing toward issues for which our theological treatment of science has ramifications and concerning which further work is needed.

Notes

1: The Need for a Theology of Science

1. Of course there is an immense literature dealing with these historical topics. An extremely valuable overview can be found in John Hedley Brooke, *Science and Religion, Some Historical Perspectives* (Cambridge: Cambridge University Press, 1991).
2. See, e.g., Gene Edward Veith, *Postmodern Times: A Christian Guide to Contemporary Thought and Culture* (Wheaton, Ill.: Crossway Books, 1994); Stanley Grenz, *A Primer on Postmodernism* (Grand Rapids, Mich.: Eerdmans Publishing, 1996) and references therein.
3. There is some disagreement over how exactly to refer to these "deeper convictions"; they could be variously referred to as "philosophical," "metaphysical," "religious," or "theological." Although some helpful insights might be gained by trying to make these distinctions, for our purposes it doesn't really matter what term one uses. The basic point is that each of us has some underlying basic convictions that can properly be considered "religious" in the sense that they have to do with one's disposition toward or against God and His rule and the redemption He brings on the one hand, or what one adopts as eternal and therefore stands in the place of God on the other hand. Our choice of the word *theological* here is based on the affirmation that religious commitments lie at the root of all belief systems. We are thus using the word *theology* in a non-standard way, in *analogy* to Christian theology, as related to the "doctrines" that flow out of whatever one's heart's basic religious commitments are, i.e., the platitudes of one's worldview. Thus for example a "materialist theology" might uphold the eternality of the material world as a basic commitment, whereas the Christian embraces the truth of Scripture and of the gospel. The issue here is that all of us have foundational religious commitments of some kind, and our expressed beliefs or "doctrines" flow out of them, whether consciously or unconsciously. We expect that it will be clear from the context whenever this more general sense of "theology" is meant in the discussion that follows.
4. The direct meaning of the word *theology* is "a study of God." However, since God is not the object of our direct study, but rather, what we know about Him comes from what He has revealed to us in His Word, in the context of Christianity, we take the word *theology* to mean the interpretation and systematization of what He has revealed to us in Scripture. Thus in its wider meaning, theology can refer to whatever the Scriptures teach about a particular subject, such as a theology of the Covenant, a theology of baptism, or a theology of end times. It is in this latter sense that we use the term when we speak of a theology of science. As a cautionary note, however, we would also like to point out that when some speak of a theology of nature, they have an entirely different meaning in mind, closer to the notion of natural theology: learning our theological principles concerning nature as much from the study of nature itself as from the Scriptures. (This was illustrated metaphorically in the Modernist suggestion that the branch of theology should be grafted into the tree of science.) We consider this an inappropriate use of the term. A theology of nature should rather refer to what can be learned about nature from studying the Scriptures. Hence a theology of science would include a theology of nature, properly conceived, along with theological principles concerning the cultural activity of science as well.
5. Abraham Kuyper, *Lectures on Calvinism* (Grand Rapids, Mich.: Eerdmans Publishing, 1931), 19. See also chapter 3.

2: Modern Science in a Postmodern World

1. This term is apparently due to Jürgen Habermas. See, e.g., Stanley Grenz, *A Primer on Postmodernism* (Grand Rapids, Mich.: Eerdmans Publishing, 1996), 3.