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PHYSICS  
OF  
CHRISTIANITY

FRANK J. TIPLER

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*The*  
PHYSICS  
*of*  
CHRISTIANITY

Frank J. Tipler



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First Edition

To God's Chosen People, the Jews,  
who for the first time in 2,000 years  
are advancing Christianity

*I will bless those who bless you, and he who curses you, I will curse; and  
through you will be blessed all the families of the Earth.*

—Genesis 12:3

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## The Virgin Birth of Jesus

Now the Birth of Jesus Christ was on this wise: When as his mother Mary was espoused to Joseph, before they came together, she was found with child of the Holy Ghost. Then Joseph her husband, being a just man, and not willing to make her a public example, was minded to put her away privately. But while he thought on these things, behold, the angel of the Lord appeared unto him in a dream, saying, Joseph, thou son of David, fear not to take unto thee Mary thy wife: for that which is conceived in her is of the Holy Ghost. And she shall bring forth a son, and thou shall call his name JESUS [Savior]: for he shall save his people from their sins. Now all this was done, that it might be fulfilled which was spoken of the Lord by the prophet saying, Behold, a virgin shall be with child, and shall bring forth a son, and they shall call his name Emmanuel, which being interpreted is, God with us.

MATTHEW 1:18-23 (KJV)

And in the sixth month the angel Gabriel was sent from God unto a city of Galilee, named Nazareth, to a virgin espoused to a man whose name was Joseph, of the house of David; and the virgin's name was Mary. And the angel came in unto her, and said, Hail thou that are full of grace, the Lord is with thee: blessed art thou among women. . . . And the angel said unto her, Fear not, Mary: for thou has found favor with God. And, behold, thou shall conceive in thy womb, and bring forth a son, and shall call his name JESUS. . . . Then said Mary unto the angel, How shall this be, seeing I know not a man? And the angel answered

and said unto her, the Holy Ghost shall come upon thee, and the power of the Highest shall overshadow thee: therefore also that holy thing which shall be born of thee shall be called the Son of God.

LUKE 1:26-28, 30-31, 34-35 (KJV)

### Biblical Interpretation and the Virgin Birth

The verse in which Matthew refers to a prophet foreseeing a virgin conceiving a son is a translation of words of the prophet Isaiah (7:14). For centuries, Christians and Jews have debated whether Matthew correctly translated the Hebrew word in Isaiah. The Hebrew word appearing in the “Hebrew Bible” is *'almah*, which is translated in traditional Christian Bibles as “virgin.” However, the usual modern Hebrew word for “virgin” is not *'almah* but *betulah*. The word *'almah* means “young woman” or perhaps “maiden” in modern Hebrew. (By “modern Hebrew” I mean Hebrew as Jews have understood it over the last 1,000 years.) So why do Christian Bibles translate the word in Isaiah 7:14 as “virgin”?

Christians translate the word as “virgin” because Matthew explicitly says it means “virgin.” And Matthew says it means “virgin” because he was using the standard Greek translation of his time, the Septuagint, and the Greek word is *parthenos*, which almost always meant “virgin” (but could mean “maiden”). So since Matthew was using a translation, and we have the original Hebrew Bible, shouldn't we accept the meaning of the latter?

Unfortunately, it's not that simple. We don't actually know which version of the Hebrew Bible was being used by the translators-creators of the Septuagint. According to a supposedly contemporary source (the Letter of Aristeas), the translation was begun in the time of the Greek-Egyptian king Ptolemy II Philadelphus, who reigned from 285 to 246 B.C. The translation was made by seventy-two Jewish scholars (six from each of the twelve tribes of Israel) who were sent from Jerusalem at the request of the king for the purpose of translating the Hebrew Bible. The number of scholars gives the name of the translation: *Septuagint* means “seventy,” and the Septuagint is often simply denoted by LXX, the Roman numeral for seventy. The modern Hebrew Bible, the Masoretic Text

(from the Hebrew word *masoreth*, “tradition”), was begun in the sixth century A.D. and completed in the tenth century. For 600 years it has been the unquestioned version among the Jews. But this final canonical form of the Hebrew Bible goes back earlier: it is a carefully edited version of a canonical Old Testament that was fixed by a synod of Jewish rabbis at the Palestinian town of Jamnia (Jabneh) in the last decade of the first century A.D. The five books of Moses (the Torah)—Genesis, Exodus, Leviticus, Numbers, and Deuteronomy—possibly were chosen as early as 622 B.C.<sup>1</sup> The rest of the Old Testament was probably fixed by 300 B.C.,<sup>2</sup> which is about the time the Septuagint was written.

But even though the oldest versions of the Old Testament that we have today (the Dead Sea Scrolls date from the second and first centuries B.C. and are the oldest)<sup>3</sup> agree very closely with the Masoretic Text, there are some differences. The Samaritans, a community of Jews who claim to be descended from the Palestinian Jews who were not deported to Babylon when Israel was conquered by the Assyrian Empire in 722 B.C. (the Talmud hints that instead they are descended from the peoples the Assyrians brought in to replace the deported Jews), have their own version of the Torah. The Samaritans claim their version goes back to Abishua, the great-grandson of Aaron. The Samaritans’ version of the Torah is unquestionably ancient, and most important, it has been copied and recopied independently of the Masoretic Text. It differs from the Masoretic Text in some 6,000 places, but in some 1,900 of these it agrees with the Septuagint.<sup>4</sup>

So perhaps the Septuagint used by Matthew, and not the Jewish Masoretic Text, is actually closer to the original version of the Old Testament. After all, this translation was made just shortly after the books of the Old Testament were fixed by Jewish tradition. And it should be kept in mind that when the Masoretic Text was selected, it was in the Christian era, just as Jews and Christians began to argue in earnest about the correct interpretation of biblical passages. It is remotely possible that the rabbis of the late first century A.D. chose a version of Isaiah that used *'almah* rather than *betulah*, though I want to emphasize there is no evidence whatsoever that such a version of Isaiah ever existed. Among the Dead Sea Scrolls, for example, there is a complete Isaiah, and *'almah* is used in Isaiah 7:14. But my point is, we don’t know. Whereas we do know that the Septuagint translated whatever word was there as “virgin.”

A more likely possibility is that the meaning of the word *'almah*

changed over the four centuries between the translation of the Septuagint and the setting of the Masoretic Text. Think of the English word *maiden*. The general meaning of *maiden* is “young girl,” but in fact “virgin” is a secondary meaning. After all, a “young girl” is usually a “virgin,” at least if the girl is sufficiently young, and this connection is the reason *maiden* took on the secondary meaning of “virgin.” Which of the two meanings of *maiden* is the correct meaning is to be decided by the context.

The context in which a word is used can change the meaning of a word. Take the English word *weird*. It originally meant “fate.” Centuries ago, an English speaker could say “It was his weird to die young” to mean “It was his fate to die young.” But William Shakespeare wrote a play, *Macbeth*, in which three strange witches foretold the fate of the central character. The fact that there were three witches shows that Shakespeare wanted his audience to think of these witches as the three Norns, the three pagan goddesses of fate, whose names were That Which Was, That Which Is, and That Which Shall Be. Past, Present, and Future. So Shakespeare referred to his witches as the “weird sisters,” indeed another title of the three Norns. Shakespeare was far more widely read than pagan myth, and over time the original meaning of the “weird” sisters was forgotten, but instead the connection with the “strangeness” of Macbeth’s interaction with the three witches was remembered. So *weird* took on the now primary meaning of “very strange,” while the original primary meaning of “fate” was forgotten (but still recorded in the most complete dictionaries).

There is some evidence that in the time of Isaiah’s writing and earlier, *’almah* carried the primary meaning of “virgin.” In the Hebrew Bible, the word *’almah* appears in the singular three times: in Genesis 24:43, where it is used in reference to Rebecca; in Exodus 2:8, where it is used in reference to Moses’ sister; and in Proverbs 30:19, where it appears in the phrase “the way of a man with an *’almah*” (“maid” in the King James Version).<sup>5</sup> In the cases of Rebecca and Moses’ sister, it is clear from the context that they were both unmarried at the time, and presumably virgins. My own interpretation of Proverbs 30:19 would suggest “virgin” is appropriate here too. In Isaiah 7:14 the form of the word *’almah* includes an article, so a more precise translation is not “a virgin/maiden” but rather “*the* virgin.” This of course fits in nicely with the traditional Christian interpretation, but Jewish rabbis considered that the context required the woman to be a contemporary of Isaiah, and

they debated over whom “*the young woman*” could be.<sup>6</sup> According to Christians, *the virgin* could be none other than Mary, the Mother of Jesus.

And of course the Jewish rabbis insist that *'almah* definitely means “young woman” rather than “virgin.” Since the Septuagint says otherwise, I suggest that the word changed from a primary meaning of “virgin” in 300 B.C. to something closer to “young woman” around A.D. 90, when the major rabbis began to engage Christianity in a serious way. For example, in Chapter 57 of Justin Martyr’s *Dialogue with Trypho, a Jew*, written about 130, Trypho indeed argues that the proper translation of the Isaiah passage is not “virgin” but “young woman.” If there were any ambiguity in the meaning of *'almah* in A.D. 90, all Jewish rabbis would have had a strong unconscious motivation to select the meaning that would make nonsense of the Christian claim. Justin Martyr makes precisely this rebuttal in Chapter 71: the Jews, he claims, have changed the correct translation of the Septuagint. Justin Martyr was certainly correct in pointing out that the Septuagint contained books of the Old Testament that the rabbis rejected, for example, the books of the Roman Catholic Old Testament called the Apocrypha. Some of these are 1 Esdras, the Wisdom of Solomon, Ben Sira (Ecclesiasticus), Judith, Tobit, Baruch, and the two books of the Maccabees.<sup>7</sup>

For me, the conclusive proof that *'almah* can still, even in the modern Hebrew Bible, mean “virgin” in the right context is the fact that two major Jewish biblical commentators of the Middle Ages said so. The most famous of all Jewish commentators on the Hebrew Bible was Rabbi Shlomo Itzhaki, better known by his acronym, Rashi, who lived between 1040 and 1105, mostly in the French city of Troyes, a location we shall encounter again when we discuss the legend of the Holy Grail. In the Song of Solomon, known to Jews as the Song of Songs, the word *'almah* appears in verse 1:3 in the plural: *'alamot*. According to Rashi, in this verse, the word means not “young women” but “virgins.”<sup>8</sup> (The King James Version translates the word as “virgins.”) Needless to say, in his commentary on Isaiah, Rashi follows the standard Jewish tradition after A.D. 90 that *'almah* in Isaiah 7:14 means “the young woman.” Another major Jewish rabbi, Gersonides (Levi ben Gershon, who also is known by the acronym Ralbag), who lived from 1288 to 1344, mainly in the south of France, made it very clear in his commentary on the Song of Songs that *'alamot* in verse 1:3 means “virgins”: “And therefore *do*

*the maidens* love him—these maidens being the young girls who had not been with a man.”<sup>9</sup>

If the two greatest medieval Jewish commentators on the Hebrew Bible claim that *'almah* can in the proper context mean “virgin,” then I claim it can. This does not settle the question of whether in the context of Isaiah 7:14 *'almah* is appropriately translated “virgin.” Both Christians and Jews agree that the true meaning of a prophetic passage can often not be understood until the prophecy comes to pass. So I shall now investigate whether the Christian interpretation of Isaiah 7:14 has indeed come to pass. Has a Son been born of a Virgin?

The great German theologian Wolfhart Pannenberg has rejected the Virgin Birth.<sup>10</sup> However, Pannenberg has a solid Trinitarian reason; he believes,

In its context, the legend of Jesus’ virgin birth stands in an irreconcilable contradiction to the Christology of the incarnation of the preexistent Son of God found in Paul and John. For, according to this legend, Jesus first *became* [Pannenberg’s emphasis] God’s Son through Mary’s conception. According to Paul and John, on the contrary, the Son of God was already preexistent and then as a pre-existent being bound himself to the man Jesus.<sup>11</sup>

The problem with the clause “and then as a preexistent being bound himself to the man Jesus” is that it suggests the Adoptionist heresy. Indeed, as I argued in Chapter 4, the Son is preexistent, has existed since “before” time began. Thus, as Pannenberg emphasizes, Jesus did not become God’s Son through Mary’s conception. But if Jesus’ birth were not a virgin birth, then Jesus would have to have had a human biological father. If we assume Mary was an honorable woman, this biological father would have to have been Joseph. In which case Jesus would have had two fathers, Joseph and God. If a man has two fathers, the father who is not the biological father is called the “adopted” father. This would still be true even if we were to imagine that the Son were to unite with the man Jesus at the very instant of conception. As Pannenberg is aware, the Virgin Birth has been used since Luke to establish the Trinitarian Dogma.<sup>12</sup> When Trinitarianism loses authority, the heresy of Adoptionism appears. Adoptionism is intimately connected with the Arian heresy. The Adoptionist heresy claims that Jesus the man was not God the Fa-

ther's "natural" son but was instead an ordinary man "adopted" by God (in most versions of this heresy, at the time of Jesus' baptism by his cousin John the Baptist).

Matthew and Luke claim that Mary was a virgin when Jesus was conceived. Pannenberg considers these passages to be "a legendary tradition that has been incorporated by Luke in his gospel and has been alluded to in Matthew."<sup>13</sup> Pannenberg also argues that the literary form of the Lucan story indicates that it is a legend.<sup>14</sup> Other experts on "form criticism" (a technique of biblical analysis that attempts to interpret the meaning of the words), Raymond Brown, Rene Laurentin, and Manuel Miguens, all disagree with Pannenberg, as do the literary experts C. S. Lewis and Dorothy Sayers.<sup>15</sup>

Form criticism has come under attack by biblical scholars themselves in recent years, as they realized that the conclusions reached depended more on the philosophical and theological presuppositions of the form critics than on the actual texts.<sup>16</sup> The "philosophical" presuppositions were clearly stated by the leading form critic of the 1930s, Rudolf Bultmann: "Myths [like the Virgin Birth] are difficult to believe in these days of electric lights."<sup>17</sup> In other words, the "philosophical" presuppositions were not biblical, or even theological, but physical; form critics based their rejection of the miracles of the Bible on their amateur knowledge of physics! The question of the truth of the Bible stories is a question of physics, and I am a much better physicist than any form critic.

However, I think both sides of the literary argument have ignored facts from the natural sciences that bear on the question of the Virgin Birth of Jesus. First of all, there is the dating of Matthew and Luke. The consensus date range today is A.D. 75–90, after the destruction of Jerusalem in 70, too long after Joseph's and Mary's lifetimes for us to expect the Gospel authors to have had firsthand input from the only ones who would have known. John Robinson's redating of Matthew and Luke to A.D. 40–60<sup>18</sup>—well within Joseph's and Mary's lifetimes—has not been widely accepted. But Acts ends with Paul awaiting trial in Rome, strongly suggesting that Luke completed Acts (and his Gospel, which obviously precedes Acts of the Apostles) before Paul's trial, conviction, and execution. Biblical scholars have nevertheless rejected this implication because they believe there are references in Luke to the destruction of Jerusalem.<sup>19</sup>

On this question I can apply my experience as an astrophysicist. We astronomers are always asked about claims of astrologers to predict the

future, and we have developed criteria to evaluate such claims. We have always found that before the event, an astrologer's "prediction" is very vague, and after the event his or her "prediction" becomes very precise—naturally, because after the event the astrologer knows when the event occurred and all the details of the event. Before 9/11, astrologers "predicted" that terrorists were going to attack some American target eventually. Didn't we all know this before 9/11? After 9/11, astrologers claimed to have "predicted" that the stars showed that jets were going to crash into New York buildings in September 2001. The "prediction" of the destruction of Jerusalem in Luke has all the hallmarks of a prediction made before the fact. That is, Luke's "predictions" are more consistent with being written before A.D. 70 than after. At the very least, we cannot use these passages to conclude that Luke and Matthew were written after 70. So the other evidence that Luke was written before the death of Paul retains its full force, and Robinson's earlier date is more believable than the consensus date.

I might also add that I have become very suspicious of any "consensus" claim. I was once myself part of a scientific "consensus," a consensus in the 1970s which claimed that the universe was not accelerating. This was indeed the consensus of cosmologists in the 1970s. We now have very strong observational evidence that that consensus was wrong. The universe is indeed accelerating. We members of the "scientific consensus" appealed to "the consensus" because we did not have good evidence for our position. I'm older but, I hope, wiser. I want to see evidence, not hear about a "consensus." I'm inclined now to regard the word *consensus* as a synonym for "wrong." As I discussed in Chapter 3, had I not been blinded by the consensus view in cosmology in 1994, I would have predicted the acceleration of the universe. I even then knew that known physics required an acceleration.

It is often claimed that Mark, John, and Paul never mention the Virgin Birth. It is certainly true that the word *virgin* is never used in the New Testament in connection with Jesus' birth except in the nativity narratives in Matthew and Luke. However, there is an astounding omission in all modern discussions of the Virgin Birth: no biblical scholar ever gives an analysis of the ancient theory of human reproduction. This is an exceedingly serious defect in all modern discussions of the Virgin Birth, because it is possible that an ancient reader, who naturally would have known the ancient theory, would have recognized a reference to the Virgin Birth in a biblical passage where a modern reader would not.

I shall argue that this is in fact the case. There are numerous references to the Virgin Birth in Mark, in John, and in the Pauline letters. Only moderns do not see these references, because we are no longer familiar with the reproductive theory of the ancient world. It is no coincidence that doubts about the Virgin Birth first became widespread in the nineteenth century, just when the modern theory of human reproduction was developed.

There were actually at least two major ancient theories of human reproduction, which I can only outline here, and which for our purposes are essentially equivalent. For more extensive discussions of these theories, see Peter Bowler, Michael Boylen, F. J. Cole, Anthony Preus, and especially Julia Stonehouse.<sup>20</sup> It was of course known in the ancient world that children resulted when a man injected a fluid material into the womb of a woman. The question was, What exactly was in the fluid that caused the child to be generated? Both ancient theories rejected our modern notion that the genetic material came equally from the mother and the father. The ancients believed that the genetic "material" came from the father alone. If a child resembled the mother, this was the result of environmental effects. The child was generated in basic essence by the paternal "substance." This is why descent in the ancient world was almost always patrilineal and the child was considered the property of the father: in the ancients' eyes, the child *was* related only to the father. There is a passage in the *Eumenides* by the ancient Greek playwright Aeschylus (lines 657–666) in which the god Apollo defends Orestes from the charge of matricide by arguing that the mother is only a nurse to a child; the genetic material comes solely from the father.

There are numerous biblical passages in which the male material is referred to as "seed," and in the ancient world, this word meant "fertilized seed." Seed, in other words, which has all of the genetic material. The descendants of King David were referred to as "the seed of David," again implying that the genetic material comes entirely from the male. As is well known, this convention is general: "seed of a man" is equivalent to "descent from that man." But this was no mere convention. The language expressed a definite theory of how reproduction operates. Theories differed concerning how the genetic information was coded in the male material. But they all agreed that the genetic material comes only from the father.

Aristotle's theory of genetic coding was the dominant such theory in

the Greek-speaking world, which was the world of Paul and of the Gospel writers. According to Aristotle, the male was the efficient and formal cause of the child, while the female was the material cause. That is, the male started the process (efficient cause) and provided the program-genetic code (formal cause). Aristotle believed that the program of life was imposed on the menses of the woman. The woman provided just the material, just as the soil provides the material for a seed to become a plant. Thus, a child was begotten by a man and merely borne by a woman. Galen (A.D. 129–199) advanced a “two-seed” theory—one seed from the male and one from the female—but even in this theory the genetic material came entirely from the male. Galen’s theory could be viewed as somewhat similar to our sperm and egg theory, but with all the genetic information in the sperm. A major reason why virginity in women before marriage was so important in the ancient world is that the seed-sowing picture was accepted literally. If a woman had sexual intercourse with a man other than her future husband, then the lover would permanently contaminate her womb with his seed, as sowing a field with the seeds of weeds would contaminate the field, at least for a very long time.

Aristotle’s form-imposed-on-matter reproduction theory is expressed in John 1:14—“And the Word was made flesh . . . as of the only begotten of the Father.” In other words, God (the Holy Spirit) imposed His form on the matter in the womb of Mary. And only if Mary were a virgin before this was done can we humans be assured that Jesus really is God’s Son. Only if Mary were a virgin could Jesus legitimately be called God’s Son. In reference to John’s Gospel, we must always remember that the first non-Apostle Church Father to use the explicit phrase “Virgin Birth” was Ignatius of Antioch (d.c. 110), and by tradition he was an auditor of St. John; *auditor* means that he actually heard St. John speak.

Notice that, in the ancient theory of reproduction, Jesus’ preexistence holds automatically if Mary were a virgin. The Form of Jesus comes entirely from God, who naturally existed before the universe was created. Thus, Jesus necessarily was also preexistent, at least in Form. His unimportant material makeup, which came from Mary, did not come into existence before Mary did. But then most of the material making up Jesus came from the food he ate. Both moderns and ancients are agreed that the human form is imposed on the eaten food and not vice versa. Pan-

nenberg and earlier German theologians such as Rudolf Bultmann are wrong about the Virgin Birth being inconsistent with preexistence.<sup>21</sup>

Mark's Gospel opens with "The beginning of the gospel of Jesus Christ, the Son of God." The evidence that Mark intended the phrase "Son of God" to signify the implantation of the Form of God into Mary's virgin womb is in Mark 14:61–64: "Again the high priest asked him [Jesus] . . . 'Art thou the Christ, the Son of the Blessed?' And Jesus said 'I am. . . .' Then the high priest rent his clothes, and saith, 'What need we any further witnesses? Ye have heard the blasphemy.'" But if Jesus were not asserting himself to be the Son of God in the sense that everyone at the time would interpret this claim, why would the high priest consider the claim blasphemous? Conversely, the fact that the claim was considered blasphemous is a strong indication that the high priest was interpreting—and most important, Mark himself was interpreting and intended his readers to interpret—the claim as Jesus' birth from a virgin.

In his letters, Paul refers to Jesus as God's Son forty-one times. He uses different versions of this expression, as is usual in any language. But once one realizes that Paul presupposes the ancient theory of reproduction, one realizes that he presupposes the Virgin Birth. For example, Romans 1:3–4: "Concerning His Son Jesus Christ our Lord, which was made of the seed of David according to the flesh; and declared to be the Son of God with power . . . by the resurrection from the dead." Notice the use of the Galen theory of human descent, as is made clear by Romans 8:3: "God sending His own Son in the likeness of sinful flesh," and of course by Galatians 4:4. The German biblical scholar Adolf Harnack and more recent biblical scholars are quite wrong about the Virgin Birth and the New Testament.<sup>22</sup> Once the ancient theories of human reproduction are understood, references to the Virgin Birth can be seen throughout the New Testament. But it is absolutely essential to understand the ancient reproduction theory to see this. A correct translation from a language has to take into account the scientific presuppositions of the time. And of course, the meaning of a word depends on the date it was written. When I was a boy, calling a man "gay" meant that he was a happy person.

A third mechanism of reproduction—fertilization of eggs by the wind—was occasionally discussed in the ancient world.<sup>23</sup> Augustine and Origen wrote about this "phenomenon" (I put it in quotation marks, because it did not actually exist). It was generally accepted in the ancient

world because it fit so well with Aristotle's theory of forms. Recall that, in both Hebrew and Greek, the words for "spirit" and "air" (or "wind") are almost the same word, which is why passages in the Bible can be translated either as "spirit" or "air/wind." Thus, Genesis 1:2 is sometimes translated as "And the Spirit of God moved upon the face of the waters," and sometimes it translated as "And a mighty wind blew over the face of the waters."

But these arguments based on the literary structure of the New Testament have always seemed to me to be beside the point. A much stronger argument against the Virgin Birth has always been the one put forward by the atheists: if Jesus was virginally conceived, the only one who could have known this was Mary, and why should we believe her? She might not even have known herself. Maybe she was raped while drunk. Furthermore, if there was anything irregular about Jesus' conception, suggesting His father was some man besides Joseph—and we are told in Matthew 1:19 that Joseph himself at first believed this—then Mary would have an enormous motivation to lie. The Jewish Talmud makes the claim that Mary became pregnant by another man before her marriage to Joseph.<sup>24</sup> But the Church Fathers have universally affirmed the Virgin Birth because, in spite of a lack of supporting evidence, it has seemed essential to the Trinitarian Dogma.

In addition, once one omits one central part of the Christian tradition on the basis that it sounds "legendary," where does one stop? Arian heretics such as Isaac Newton—and of course atheists—use similar arguments to justify rejecting the Trinitarian passages in the Gospels and in the Pauline letters as nothing but similar legendary traditions. Newton believed that the great theologian and bishop of Alexandria Athanasius (293–373) was the culprit responsible for imposing the Trinitarian "legend" on the Christian world. Indeed, Athanasius was a very important theologian opposing Arianism. So important is Athanasius's reputation in establishing the traditional Christian belief in the Trinity that a short summary of this doctrine is attributed to him. I've included this Athanasian Creed in the appendix.

Other heretics regard Mark without the Resurrection passages as the only valid Gospel and claim that the Resurrection passages in Matthew, Luke, and John are merely later inventions. These people point out that legends of a God who dies only to be resurrected are quite common in the ancient world. Indeed, they were common, but the Gospel accounts of the Risen Jesus have in my judgment (and Pannenberg's and that of

most other scholars who have studied the matter with open minds) a ring of reality unlike these myths. Similarly, the accounts of the Virgin Birth in Matthew and Luke have the ring of reality, unlike the equally common ancient myths of the conception of a god born of copulation between a god and a human female. Matthew and Luke describe the Virgin Birth as the result of the action of the Holy Spirit, *not* as the result of intercourse between God the Father and Mary. I propose that Christians should first try to develop a theology based on the Gospels and the Pauline letters in the form given to us. We should assume, at least initially, that there are no legends or human inventions involving important Christian dogmas in the New Testament. This is a theological version of my scientific approach as described earlier: no firmly tested physical law is to be set aside without experimental justification.

### Scientific Explanations of the Virgin Birth

I shall now describe a simple mechanism, completely consistent with known physical law, whereby a virgin birth can occur via the action of the Father through the Holy Spirit. In this mechanism, the mind of the virginally conceived Jesus would be in resonance with, and in complete harmony with, the Son from the instant of formation of the mind in the nervous tissue of the embryo. He would be completely human, with the rational mind of a human, but nevertheless be the Son. Furthermore, I shall show that if the Virgin Birth occurred in the manner I propose, the Virgin Birth hypothesis can be verified by direct experiment. The Virgin Birth would no longer rest on Mary's word alone. We would be able to show directly, without reference to human testimony, that Luke and Matthew merely reported the facts as related to them by a completely truthful Mary. A direct experimental confirmation of the Virgin Birth would also support the claim that Matthew and Luke were just reporting the facts when they described the Risen Jesus.

We first have to understand how a virgin birth of a human male can be accomplished using only known molecular biological mechanisms. There is now an enormous scientific literature on virgin birth in vertebrates.<sup>25</sup> Virgin births—more often called *parthenogenesis* in the scientific literature, after the Greek word for “virgin birth”—have been extensively studied in Caucasian rock lizards and also in turkeys.<sup>26</sup> There is one strain of turkeys in which more than 40 percent of all births are

virgin births. Often in these turkeys a haploid egg cell begins to divide without being fertilized by a sperm cell. If at some point early in the cell division process, the chromosomes duplicate so that a diploid cell is formed, a normal turkey is born. This parthenogenetic turkey is always a male, because birds use a WZ sex determination system. In a WZ system, a male results if the two sex chromosomes are the same. Thus, a male bird has two Z chromosomes, and a female has the mixed sex chromosomes WZ. The combination of two W chromosomes is always lethal. We humans, as do all mammals, use an XY sex determination system. A female results if the sex chromosomes are identical XX. A male results if the sex chromosomes are different: XY is the male. The combination of two Y chromosomes is always lethal in humans.

Reptiles use yet another sex determination system. They do not have separate sex chromosomes. Instead, all their chromosomes are *autosomes*, which means that the chromosomes occur in pairs that look the same under the microscope. Sex in reptiles seems not to be genetic, coded in the DNA, but environmental: a reptile is a male or female depending on the average temperature experienced by the egg during development. Warm-blooded animals such as mammals and birds obviously need a different, nontemperature-based system, and we have it. But birds and mammals, including humans, are nevertheless similar to reptiles in that virtually all that the Y chromosome does is instruct male genes on other chromosomes to activate. The Y chromosome itself has no true sex determination genes.

Virgin birth in a snake (python), starting from a diploid cell, has recently been confirmed using DNA analysis, which showed that the daughter snakes had exactly the same DNA as the mother.<sup>27</sup> A haploid virgin birth would yield daughters with only half the DNA as in the mother but with no DNA that is not also in the mother.

It is easy to induce a human oocyte (egg cell) to begin cell division without first being fertilized by a sperm.<sup>28</sup> The oocytes thus induced can be either haploid or diploid. This human oocyte cell division is so easy to induce in the laboratory that many researchers in this field have suggested that virgin births may be quite common in humans, perhaps as common as identical twins, which on the average occur 1 out of every 300 births.<sup>29</sup> This conjecture could be easily tested. One would merely conduct a DNA identity test on female children who are observed to closely resemble their mothers. (Almost all virgin birth children would be expected to be females, since a female has only two X chromosomes,

even though the essential genes to create a male are available in every human female, on other, non-X chromosomes. The extremely rare exception I shall discuss shortly.) Unfortunately, up to the present, no such investigation has been carried out, possibly because of ethical objections. Or it could simply be that most people, even doctors, have not realized how easy it is to test for a virgin birth in a human. And there is a mental barrier to even considering that a virgin birth can occur in a human.

There are many cases in the literature in which a woman claims that she has conceived without having sexual intercourse. More precisely, the woman claims that she merely "fooled around" with her boyfriend but did not allow penetration by his male organ (like the interaction between President Bill Clinton and his aide Monica Lewinsky). There was nevertheless semen on the woman's body, and all doctors hearing this story surmise that male sperm somehow entered the woman and fertilized one of her eggs. However, the sort of sexual stimulation that occurs in these cases is very similar to the stimulation two female lizards give each other in order to induce a virgin birth in each. So it is at least *possible* that the stimulation can on rare occasions induce a virgin birth in a human female.

If the child of a woman who has conceived without sexual intercourse is a female, a twin zygosity test should be routinely performed on mother and daughter to see if they are genetically identical. The now standard test for monozygotic twins (that is, identical twins) uses DNA at five distinct locations in the genome, and the DNA at each of these locations varies enormously from one person to the next.<sup>30</sup> If all the DNA markers are the same, then the odds are about 100 to 1 in favor of the two individuals being twins. If the two individuals were mother and daughter, the odds would be 100 to 1 in favor of a virgin birth. One caveat concerning this test should be pointed out. All probabilities are conditional probabilities, which is to say that the probability, which estimates human ignorance, takes into account all that we actually know about a given situation. In the twin zygosity test, the test assumes that the two people tested are known to be twin siblings of the same gender. But in using the twin zygosity test to test for a virgin birth, we are actually assuming that the two people being tested are mother and daughter. This means that the conditional probability will be different. But the two probabilities are not too different. If we denote by the symbol  $p_i$  the frequency in the general population of the  $i$ th variant of a gene (the

technical term for “variant of a gene” is *allele*), then it can be shown that the probability that two (untyped) siblings have the same allele of a gene is

$$(1/4)(1 + 2(\sum p_i^2) + 2(\sum p_i^2)^2 - \sum p_i^4)$$

where the upper case Greek letter  $\sum$  just means “sum over all frequency numbers  $p_i$ .”<sup>31</sup> As the number of gene variants—the number of alleles—increases, the individual frequencies  $p_i$  get smaller and smaller, and so the probability that two untyped siblings share the same allele approaches  $\frac{1}{4}$ . This is exactly what we would expect, since two siblings on the average share one-quarter of their genes. However, the probability that a parent and child (both untyped) share the same allele is

$$\sum p_i^2$$

which approaches 0 as the number of alleles of the genes gets very large.<sup>32</sup> This formula is very counterintuitive, since a parent and child necessarily share half of their genes. However, a moment’s thought shows the formula makes sense. Siblings both have the same two parents, and so there are many more ways of having the two alleles the same. In the case of parent and child, one parent fixes the gene that the other parent has to provide. As the number of alleles increases, the likelihood that the other parent will provide exactly the same gene as the parent being tested goes to 0.

This means that the odds that a mother-daughter pair will test positive for identity if they take a twin zygosity test are actually greater than the odds for two siblings. More like 1,000 to 1, rather than the odds of 100 to 1 that the company will quote you if you take the test. But let us be conservative and accept the company’s odds.

The odds of 100 to 1 are not sufficient to provide convincing evidence of a virgin birth, but if the twin zygosity test on a mother-daughter pair is positive, a more extensive test should be carried out. A custom-designed DNA twin zygosity test using not five but twenty-five (microsatellite) markers can be performed by any major DNA testing service,<sup>33</sup> and if all of these markers for mother and daughter agree, the odds in favor of a virgin birth would be  $100^5$  (= 10 billion) to 1. This huge number means that the custom-designed test would establish an actual human virgin birth conclusively. The cost of the custom-designed

twin zygosity test should be no more than ten times the cost of the standard test, or about \$2,000. These tests are for normal twin zygosity, which in the case of a virgin birth means that they will give a standard positive only if the virgin birth is diploid. If it is haploid, the test will show a doubling of the DNA at the sites where the daughter's DNA is the same as the mother's, and an absence of DNA at the other sites. The standard test would show half the variability in the daughter as would be in a normal person, and in the case that the test is negative, the lab should be asked if this reduced variability is present.

To perform the standard (and custom-designed) twin zygosity test, one takes DNA samples via cotton swabs of mother and daughter, and mails the samples to the laboratory. The test is painless and noninvasive. The people being tested can take the samples themselves. Here is a list of five recognized DNA laboratories that can perform the standard twin zygosity test, the quoted 2005 cost of the standard test, and their web addresses.

Gene Tree DNA Test Center \$195

<http://www.genetree.com/product/twin-dna-testing.asp>

Proactive Genetics\* \$140 + \$10 shipping

<http://www.proactivegenetics.com/fees.dna>

Affiliated Genetics \$120 + \$10 shipping

<http://www.affiliatedgenetics.com/FSTT.htm>

Beta Paternity \$195

<http://www.betagenetics.com/twin-zygosity.html>

DNA Diagnostics Center\* \$400 + \$70 collection fee

<http://www.dnacenter.com/testing-cost.html>

With human oocytes, again for ethical reasons, no attempt has yet been made to implant these virginally conceived fetuses into wombs. An attempt was made to complete a virgin birth in a marmoset monkey by Vivienne Marshall and her group in 1998, but it was unsuccessful.<sup>34</sup> Because of a peculiarity in a cell structure, the centromeres of primate cells (they are inherited from the father), I myself suspect a primate virgin birth could result only if a diploid oocyte started to divide.<sup>35</sup> Of course,

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\*Will accept samples mailed from virtually any country on Earth. Shipping fees apply to U.S. addresses only. Collection fees, which are higher than shipping, apply if legal custody of the DNA sample is desired. The author receives no money from any of these companies and cannot guarantee the quality of their work. Caveat emptor!

in every virgin birth, all the genetic information has to be already present in the mother. There are at least three ways to generate a male human being from genetic information that comes entirely from the mother. I shall discuss the simplest first and in detail, then briefly summarize two others that have been proposed.<sup>36</sup>

I propose that Jesus was a special type of XX male, a type that is quite rare in humans but extensively studied.<sup>37</sup> Approximately 1 out of every 20,000 human males is an XX male. Such males are normal in behavior and intelligence but have smaller teeth, shorter stature, and smaller testes than normal males. They are usually identified as XX males because they cannot have children and ask doctors to cure the infertility. Normal males are XY, but there are only twenty-eight genes on the Y chromosome, as opposed to thousands on the X chromosome. Of these twenty-eight genes, fifteen are unique to the Y chromosome and thirteen have counterparts on the X chromosome.<sup>38</sup> The genes with counterparts on both the X and the Y chromosomes are called *homologous genes*. An XX male results when a single key gene for maleness on the Y chromosome (the SRY gene) is inserted into an X chromosome. One possibility is that *all* (or at least many) of the Y chromosome genes were inserted into one of Mary's X chromosomes and that, in her, one of the standard mechanisms used to turn off genes was active on these inserted Y genes. (There is an RNA process that can turn off an entire X chromosome. This is the most elegant turnoff mechanism.) Jesus would then have resulted when one of Mary's egg cells started to divide before it became haploid and with the Y genes activated (and, of course, with the extra X genes deactivated). If a sample of Jesus' blood and/or flesh could be obtained, my proposal could easily be tested by carrying out two distinct DNA tests for sex: (1) test for the Y genes and (2) test for two alleles (different gene forms) of X chromosome genes. In other words, a male born of a virgin would have two X chromosome genes for each of its counterpart Y genes. Normal males would have only one X chromosome gene for each Y counterpart gene. This pairing would apply to each of the thirteen genes on the Y chromosome that has an X counterpart.

Such a virgin birth would be improbable. If the measured probability that a single Y gene is inserted into an X chromosome is 1 in 20,000, then the probability that all Y genes are inserted into an X chromosome is 1/20,000 raised to the 28th power, the power corresponding to the number of Y genes. (Assuming that the insertion of each Y gene has

equal probability and that these insertions are independent.) There have been only about 100 billion humans born since behaviorally modern *Homo sapiens* evolved, between 55,000 and 80,000 years ago.<sup>39</sup> The number of humans who have ever lived is roughly computed as follows. In the first 60,000 years of modern human existence, there were roughly 10 million humans living worldwide, with complete replacement every generation, about every 30 years. With 2,000 generations in 60,000 years, this means 20 billion people lived in this period. Over the next 6,000 years, humans had agriculture, which allowed the support of a population of roughly 300 million. With 200 generations in 6,000 years, this means that 30 billion people lived in this period. Finally we come to the modern period, essentially the period of the people now living. There are now 6 billion people in the world. Adding all these numbers gives about 60 billion as the total number of people who have ever lived.

Thus, the virgin birth of such an XX male would be unique in human history even if there were only two such Y genes inserted into an X chromosome. (I assume an upper bound to the rate of virgin birth is 1/300. Then the probability of a virgin birth of a male with 2 Y genes is  $1/[300][20,000][20,000] = 1/120$  billion.) But, as in the case of the Resurrection, if such an event *had* to occur for the universe to evolve into the Omega Point, then the Virgin Birth probability would become 1; that is, certain to occur. In other words, it would be a miracle!

A far more probable Virgin Birth would be for the SRY gene alone to be inserted into an X chromosome of Mary, with the Virgin Birth resulting from either a haploid sex cell undergoing chromosome duplication or resulting from a diploid cell. In the haploid case, there would be an SRY gene inserted in each normal X chromosome. In the diploid case, there would be one SRY gene for every two normal X chromosomes. Both genomes are distinguishable by standard DNA tests from normal males. A normal male would have the normal collection of additional Y genes, whereas an XX male with only the SRY would be missing these genes. The standard DNA test today looks for many Y genes. (The sex determination test that was standard in the mid-1990s, invented by Lucia Casarino and others, searched only for the AMEL-X and AMEL-Y genes.)<sup>40</sup> So the standard DNA sex determination test would be able to distinguish all the various ways an XX male could arise via a virgin birth.

There is a final possibility that we must be aware of when considering the genetic signature of a male virgin birth. The SRY gene does not

itself generate the male organs, as I mentioned. Rather, it induces other genes located on the autosomes to generate those organs.<sup>41</sup> This raises the possibility that the SRY is itself not necessary. And in fact some XX males have recently been studied in which the SRY gene appears to be absent.<sup>42</sup> This case can also be distinguished from a normal XX female and a normal XY male by today's standard DNA test. Once again, the male genes would be present in the DNA but in a different ratio than in a normal male.

The observed acceleration of the universe provides a possible reason why the Virgin Birth and Resurrection necessarily had to occur if the universe is to evolve into the Omega Point. If the acceleration is to stop eventually and be converted into a deceleration and universal collapse, then our descendants must expand into the universe and annihilate baryons via the electroweak tunneling process. We do not know how to do this. We know only that this process is allowed according to the Standard Model and must have operated in the early universe. On the basis of the Standard Model alone, we have no indication of how to annihilate baryons in a practical way. But if the universe is to evolve into the Omega Point, then there must be a practical, small-scale method of annihilating baryons to provide energy before the recollapse of the universe provides gravitational energy, and to provide efficient relativistic rockets, as discussed in Chapter 3.

Suppose the Son became incarnate to provide us this information. Notice that He can do so only by simultaneously providing us with the knowledge that we ourselves one day will be resurrected with bodies in all essentials like the body Jesus had after His Resurrection. Also, we can obtain the necessary information only by believing in Him, believing that He is God, and believing that He rose from the dead. Without such a belief, no one would investigate Jesus for clues of constructing a practical device for annihilating baryons. If He provides us with the essential hints for how to construct such a device, He saves the entire world. Literally, He saves the entire universe from destruction (violation of unitarity when black holes evaporate). "For God sent not his Son into the world to condemn the world, but that the world through him might be saved" (John 3:17). Traditionally, the word *world* has been interpreted to mean "humankind," but with my proposal for the reason for the Incarnation and Virgin Birth, *world* can be interpreted literally.

I further propose that the Virgin Birth was necessary so that Jesus would have a unique body type that could, out of its own nature, gen-

erate electroweak quantum tunneling. On this proposal, Mary, who had the same genes as Jesus, should have been able to accomplish this too, but it is conceivable that only with the male genes activated could this process be fully carried out. (Perhaps Mary was capable of the Assumption but not the Resurrection.) This would solve the problem of why Jesus was a Son and not a Daughter. Why not a Daughter? has always been a problem for Christian theology, though rarely discussed because there was no way of answering it. The theory of the Resurrection and Assumption that I will develop in detail in Chapter 8 may provide one.

If Jesus were an XX male conceived of a virgin in the more complex way just described, with all the genes in the Y chromosome present, we could resolve the two well-known inconsistencies between the genealogies provided by Matthew and Luke.<sup>43</sup> The first inconsistency is the fact that descent is listed in the line of Joseph, who as Matthew and Luke both assert, was not Jesus' biological father. This inconsistency is usually resolved by pointing out that if Joseph acknowledged Jesus as his son (which he did), then according to the Jewish law of the time, Jesus would be considered Joseph's son, and hence "descended" from David if Joseph were so descended.<sup>44</sup> Luke seemed to point out this double meaning of *descent* when he wrote, "And Jesus . . . being (*as was supposed*), the son of Joseph, which was the son of Heli" (Luke 3:23) (my emphasis).

The second inconsistency lies in the fact that the two lists are different, beginning with the father of Joseph (Jacob according to Matthew, but Heli, or Eli, according to Luke). But the Y genes of an XX male must come from some single male ancestor of Mary, or from several of Mary's male ancestors. The Greek philosopher-theologian Justin Martyr, in his *Dialogue with Trypho*, argued that Mary herself was descended from David.<sup>45</sup> Assume she indeed had some male ancestors who were descended from David—in genetic terms, this means that each such man had a Y chromosome identical to David's, since the Y chromosome does not recombine. Then, either once or several times, insertions could have been made from the Y chromosomes of these men into the X chromosome that was to become the container of Jesus' Y genes. If all (or at least most) of the Y genes of David were present in Jesus, he in fact would be descended from David in the male line in the sense that the term *descent* is applied genetically: the male has the Y genes of the male ancestor. Thus, even though Joseph was not the biological father of

Jesus, Jesus could be a male of Davidic descent, and so it would have been appropriate to give Joseph's line of descent from David.

Note that a genealogy giving the gene insertions could have more than one male supplying a Y gene in the same generation. Or the insertions of a Y gene could occur once in several generations. Thus, to list the complete line of descent correctly, a genealogy would have to list more than one male in the same generation. This could be accomplished by providing two mutually inconsistent lists—but inconsistent only if we do not realize that Jesus was an XX male, born of a Virgin. It is suggestive that Matthew (1:17) insisted—even if he had to miscount<sup>46</sup>—that there are 28 generations from David to Jesus, *exactly* the number of genes that the Y chromosome carries. Luke (3:23–31) lists 42 generations from David to Joseph (Mary's generation), inclusive. Could the insertion of 28 genes require 42 generations? Another interesting possibility comes from the fact that Luke (3:23–38) lists 77 generations altogether.<sup>47</sup> It has recently been discovered that although the human Y chromosome has 28 genes, these genes exist in multiple copies, for a total of 77,<sup>48</sup> in which case it might be that the total number of generations in Matthew refers to the number of distinct genes in the Y chromosome (28), and in Luke, the total number of genes in the Y chromosome (77). Or perhaps this is just meaningless numerology, and Matthew and Luke are just recording different family traditions of descent, both of which are incorrect. After all, Luke is giving 77 generations since Adam and Eve, the first humans, whereas, as mentioned earlier, behaviorally modern humans have existed for at least 60,000 years, which would mean more than 2,000 generations since those first modern humans.

But we would have insufficient hints of how to work the electroweak baryon-annihilation process if we did not have a sample of Jesus' blood and flesh to study. So, following the logic of my Christology to the end, I conclude that such a sample must exist.

### The Shroud of Turin

Could it be on the Shroud of Turin? This artifact, pictured in Figure 7.1, a linen cloth with the faint outline of a human figure, is widely believed to be the burial cloth of Jesus.



Figure 7.1. Photograph of the body image on the Turin Shroud.

The radiocarbon dating of the Shroud is known to be incorrect, first because bacterial contamination was not taken into account (bacteria add carbon of a later date than the actual Shroud material and thus make it seem younger than it is),<sup>49</sup> and second, because the Shroud samples tested were apparently from a section that had been partially “repaired.” The chemist Raymond Rogers has done a careful chemical analysis of linen fibers taken from all areas of the Turin Shroud, and he has shown that it is almost certain that the linen used to obtain the radiocarbon date was medieval in origin.<sup>50</sup> That is, the particular sample taken from the Shroud to obtain its age by radiocarbon dating was not manufactured at the same time as the rest of the Shroud. This fact sug-

gests that the linen from the radiocarbon sample was added at a later date, probably to repair the Shroud. The radiocarbon analysis yielded a date between A.D. 1260 and 1390 completely consistent with Rogers's chemical analysis of the linen fibers from the radiocarbon area.

Linen is made from flax, and flax contains a chemical substance called *lignin*. Over time, the lignin will lose its content of another chemical compound called *vanillin*. Thus, one can obtain an estimate of the age of a linen sample by comparing the relative amount of lignin and vanillin. Rogers detected vanillin in the radiocarbon samples but could not detect any vanillin from the samples from the areas of the Shroud. From this, he inferred that the original Shroud material is between 1,300 and 3,000 years old. Rogers also detected alizarin dye in the radiocarbon sample but no such dye in the original Shroud material. The dye was apparently used to make the color of the repair material match the color of the original Shroud (linen turns yellow over time). This particular dye was introduced in Italy in 1291, so the radiocarbon sample cannot be older than this date. Indeed, the central value of the radiocarbon date, 1325, is about three decades after the date of the first use of the dye in Italy.

Bacteria generated an almost completely transparent bioplastic coating of the linen fibers that make up the Shroud. Leoncio Garza-Valdes, the scientist who discovered this coating, removed it and sent two samples of the decontaminated Shroud linen to two different radiocarbon dating laboratories for a redating.<sup>51</sup> Unfortunately, Garza-Valdes was not an expert in the handling of materials for radiocarbon dating analysis, and he inadvertently added some "dead" carbon to the linen sample. "Dead" carbon is carbon that has not been in the atmosphere for millions of years, and so almost all of its carbon 14 has decayed. The carbon in coal and oil is all dead carbon, for example. Adding such carbon makes the sample appear to be much older than it actually is, so Garza-Valdes concluded that his redating experiment was a complete failure. But the chemist Alan Adler has pointed out that if we use standard chemistry to make a "reasonable" estimate about how much dead carbon from the reagent used by Garza-Valdes would be absorbed by the cellulose of the linen, we can obtain an estimate of the actual radiocarbon date of the decontaminated Shroud linen.<sup>52</sup> The corrected date is A.D. 351, a date consistent with the first century to within the accuracy of the "reasonable" estimate. This unofficial radiocarbon redating does not, of course, establish that the true date of the Shroud is the first cen-

tury A.D. It does, however, provide justification for believing that the original radiocarbon dates do *not* rule out the Shroud as genuine.

If the radiocarbon date is ignored, there are quite a few reasons for accepting the Shroud as genuine. The best available popular summary of these arguments can be found in the books of Ian Wilson and Barrie Schwartz.<sup>53</sup> Also in this book is the best popular summary of the evidence for bacterial contamination on the Shroud.<sup>54</sup> But what this book does not answer—what must be answered before the Shroud can be accepted as genuine—is why the radiocarbon date is *exactly* what one would expect it to be if the Turin Shroud were actually a fraud.

A very plausible history of the Shroud from A.D. 30 to the present has been constructed, and I shall outline it a bit later in this chapter. However, the first time the Shroud is agreed by all scholars to have existed is 1355, when a French squire, Geoffrey de Charny of Lirey, in the bishopric of Troyes, petitioned the Pope to display it as the unique burial cloth of Jesus. This French city we have encountered before, as the home of Rashi, the greatest of medieval Jewish commentators on the Bible. De Charny never explained how a completely unimportant person such as he managed to obtain possession of the most important relic in Christendom. Even the people living in the Middle Ages, who were often credulous about relics, were suspicious. A few decades after de Charny's death, the bishop of Troyes denounced the Shroud as a fake and said that he knew the name of the forger, who had confessed. So if the bishop and later skeptics were correct, we would expect the linen of which the Shroud is made to date from the time of the forgery. That is, the middle of the fourteenth century. When the radiocarbon date was discovered to be between 1260 and 1390 (95 percent confidence interval), most scientists (including myself until a few years ago) were convinced that the Shroud had been proven a fraud. If bacterial or other contamination had distorted the date, we would expect the measured radiocarbon date to be some random date between A.D. 30 and the present. It would be an extraordinary and very improbable coincidence if the amount of carbon added to the Shroud were exactly the amount needed to give the date that indicated a fraud.

That is, unless the radiocarbon date were itself a miracle in the sense defined in Chapter 5: an improbable event as computed using past-to-present causation, but an event seen to be inevitable using future-to-past causation. I shall argue that this is the case, but for the nonce, let me merely note that, if the Shroud is indeed genuine, we should not be surprised that one more miracle is associated with it.

There are several ways of using current radiocarbon dating technology to date the Shroud correctly. The obvious way is to remove the bioplastic coating. This is difficult to do, and that is why the cleaning protocols of the three laboratories performing the radiocarbon dating failed to remove the coating. Leoncio Garza-Valdes has informed me that it is possible to use sodium hydroxide to dissolve the linen of the Shroud so that only the bioplastic coating remains.<sup>55</sup> If indeed the linen of the Shroud dissolves, leaving *all* of the bioplastic coating behind, then there is a simple procedure to obtain the actual age. First measure the age of the linen plus the contamination (this is the number we already have).<sup>56</sup> Then measure the age of the contamination alone. This should be easy. Most of the mass of the Shroud must be in the form of contamination if the Shroud is genuine. Calculation shows that between 60 and 90 percent of the total mass would have to be in the contamination if a first-century linen shroud were to be mistakenly dated to the fourteenth century. From the two age measurements, one can compute the true age of the linen cloth, even if one does not know when the linen was contaminated. We would in fact expect the Shroud to have been contaminated almost continuously from the first century to the present if the history defended by Ian Wilson and other Shroud scholars who believe in the Shroud's authenticity is correct.

This proposed history is fascinating. In fact, it is nicely and beautifully illustrated in a seventeenth-century icon acquired by Prince Albert (Queen Victoria's husband) in the nineteenth century and now on display in Hampton Court, a royal palace in Great Britain. The original Shroud in which Jesus was buried was taken at some unknown time (but shortly after his Resurrection) to the city of Edessa (the modern city of Urfa, Turkey), where the king of Edessa from A.D. 13 to 50, Abgar V, venerated it and set it on the walls of the city. A later king of Edessa reverted to paganism and began persecuting Christians and destroying holy relics, so the Shroud was hidden in the city walls. The men and women who had hidden the Shroud apparently were killed in the persecution before they were able to reveal where they had put it.

The Shroud lay hidden for centuries, during which time Christianity became the official religion of the Roman Empire and Edessa became a city of the empire. When the city walls were rebuilt in the sixth century, probably after a major flood in 525, the Shroud was rediscovered. In the seventh century, Edessa was conquered by the Muslims, in whose eyes the Shroud was a barely tolerated infidel relic. In 944 a Byzantine army

lay siege to Edessa and raised the siege only when the Emir of Edessa agreed to give up the Shroud to the besiegers. They took it to the capital of the Byzantine Empire, Constantinople (the modern city of Istanbul, Turkey). There it remained, known as the Mandylion, a relic with a miraculous image of Jesus' face (most of the time, the only part of the Shroud that was displayed was the face), until it disappeared when the soldiers of the Fourth Crusade sacked Constantinople in 1204. The Shroud thus came under the secret ownership of the Knights Templar. It remained in their hands until 1307, when Philip the Fair, king of France, suppressed the Knights Templar on charges of heresy, part of the evidence being that the knights worshiped in secret the image of a bearded man. If this reference to the "image of a bearded man" was to the image of the face of Jesus on the Shroud, and if the Shroud were genuine, then the worship would have been perfectly orthodox, since they would have been worshipping Jesus.

One of the leading Templars to be burned at the stake in 1314 for heresy was the Templar master of Normandy, Geoffrey de Charny. This is a name we have encountered before: the name of the first man generally agreed to have owned the Shroud. Surviving records are insufficient to establish a family relation between the two men of the same name living a generation and about fifty miles apart. But the image supposedly worshiped by the Templars was never found, and had it been found, it would have been the property of the king of France. Hiding the image from the king would have been treason (if not heresy) and punishable by death. If it was the Shroud that the younger Geoffrey de Charny obtained secretly from the older Geoffrey de Charny, then the reluctance of the former to say where he had obtained what he claimed to be the genuine burial cloth of Jesus is understandable, though it does make it impossible to verify the genuineness of the Shroud by records. Another way will have to be used, and I will describe one.

Leoncio Garza-Valdes owns a mummified Egyptian ibis that has been wrapped in linen. It has been shown that the linen is four to seven centuries younger than the tissue of the ibis, and it is observed that the linen wrap has a bioplastic coating.<sup>57</sup> I call upon Dr. Garza-Valdes to test the bioplastic coating theory by removing the linen from the bioplastic coating and thus measuring the true date of the linen by the indirect method I just described. If the dates agree and are the same as the age of the ibis, the bioplastic theory would be confirmed, and the experiment would provide evidence that might persuade the keepers of the

Shroud to conduct the same procedure on it. Garza-Valdes also has (or had) in his possession samples of the linen wrappings of Manchester mummy number 1770 (a human mummy). The radiocarbon date from the bones of the mummy is 1510 B.C., whereas the date of the linen wrappings is A.D. 255.<sup>58</sup> Garza-Valdes has seen a bioplastic coating on the linen wrapping. The linen of this mummy should also be redated by the indirect procedure.

Garza-Valdes, together with Victor and Nancy Tryon, has carried out a DNA test on blood samples taken from the Shroud.<sup>59</sup> The Tryons conducted a simplified standard sex determination test. He looked for, and found, fragments of the amelogenin-X gene, which is located only on the X chromosome, and the amelogenin-Y gene, which is located only on the Y chromosome. Thus, Garza-Valdes concluded that the blood on the Shroud possessed the full XY chromosome pair. However, his data did *not* have a statement of the actual amount of DNA found of the two types of amelogenin. Thus, the presence of the Y form may just be contamination from the huge number of people who have handled the Turin Shroud over the centuries.

Even if this possibility is ignored, Garza-Valdes's experimental result is also consistent with my hypothesis, that Jesus was an XX male with all of the Y genes present on one of the X chromosomes. In all studied cases, an XX male has only one Y gene, the SRY gene, which is responsible for the testes-determining factor, inserted into an X chromosome. But if my hypothesis is correct, then the way to distinguish Jesus' genes from those of the normal XY male is to look for the SRY gene (or any Y gene if we assume Jesus has all the Y genes) and simultaneously conduct a test for two distinct alleles of the most variant of the X-chromosome genes. Human females will have two alleles of the X-chromosome genes because they have two X chromosomes. The X genes will be the same only for those genes that have only one variant, that is, only one allele.

As I mentioned earlier, there are two other hypotheses for how a Virgin Birth could have occurred. One theory, advanced by the geneticist Sam Berry of the University of London, assumes that Mary was an XXY female (Klinefelter's syndrome). All observed XXY females have undeveloped wombs, but under this hypothesis, Mary was on the extreme end of a Gaussian distribution for XXY females, so that her womb was normal. Jesus grew from a cell in which one of Mary's X chromosomes was deleted.<sup>60</sup> Alternatively, Garza-Valdes's own hypothesis, the third

hypothesis, is as follows. A tumor in the form of an undeveloped male embryo was in Mary's womb from her birth. As Garza-Valdes points out, such embryos (at least in the XX variety) have been reported in the medical literature, and he himself had a patient with this abnormality. The embryo in Mary's case would have fertilized one of her eggs, resulting in the Virgin Birth of Jesus.<sup>61</sup>

The Virgin Birth under Garza-Valdes's theory would be a virgin birth in the sense that Mary would have had a child without having sexual intercourse with a man, but it would genetically be a brother-sister mating: the embryo that fertilized Mary was really her undeveloped brother. An incest mating has a genetic signature: since the mother and father are close relatives, they would have many of the same alleles for the same gene, and thus the child of an incest mating shows much less genetic variability. One religious problem with Garza-Valdes's theory is that his form of virgin birth cannot be distinguished from an actual mating of Mary with her brother (if such existed). The charge of brother-sister incest was apparently leveled at Mary in Alexandria early in the Christian era.<sup>62</sup> If a DNA analysis yielded the result indicated by Garza-Valdes's theory, the charge of incest would once again be raised. For this reason I personally find (and I suspect orthodox Christians in general would find) the Garza-Valdes theory morally repulsive. And, of course, it is inconsistent with the assertion that Jesus was conceived by the power of the Holy Spirit. However, we must keep in mind that finding a theory repulsive does not mean that it is not true. Truth must be decided by experiment. The XXY hypothesis would yield a male who genetically looks normal, is morally acceptable, and is consistent with the Holy Spirit assertion.

So these three hypotheses for the Virgin Birth can be distinguished from one other by the appropriate DNA test. The required test will admittedly be difficult to carry out, since, according to Garza-Valdes, bacteria have replaced 95 percent of the blood on the Shroud.<sup>63</sup> But the experiment can be carried out. The test for an XX male would be easier, since it would involve carrying out the two standard tests for maleness: test for the SRY gene (or possibly, any Y gene) and simultaneously test for two alleles of several X-chromosome genes.

Mark Guscini provides strong evidence that the Sudarium of Oviedo, Spain, is the cloth described in John 20:7 as being wrapped around Jesus' head.<sup>64</sup> A DNA test for the three distinct ways of having a male born of a virgin should therefore also be carried out on the Oviedo

Cloth. Photographs of the blood on the Turin Shroud and on the Oviedo Cloth are pictured in Figures 7.2 and 7.3, respectively.

### DNA Test of the Blood on the Turin Shroud and the Oviedo Cloth

In January 1995 a group of Italian researchers, led by Professor Marcello Canale of the Institute of Legal Medicine in Genoa, conducted a DNA analysis of the blood on the Shroud. This group included several workers who had invented the standard DNA test for gender. And their experiment was much more complete than the one conducted by Leoncio Garza-Valdes, since it included detailed information about the amount of DNA obtained. Contamination can thus be quantified.

This group simultaneously tested the blood on the Oviedo Cloth.

I had great difficulty acquiring a copy of their article<sup>65</sup>—Tulane University Library was unable to obtain a copy, and this failure is very unusual—but the Turin Shroud researcher Barrie Schwartz put me in contact with Ian Wilson, who e-mailed me a copy. I was surprised at my difficulty. Normally, the results of a DNA test of the blood on such a famous object would be published in English in a major scientific journal.

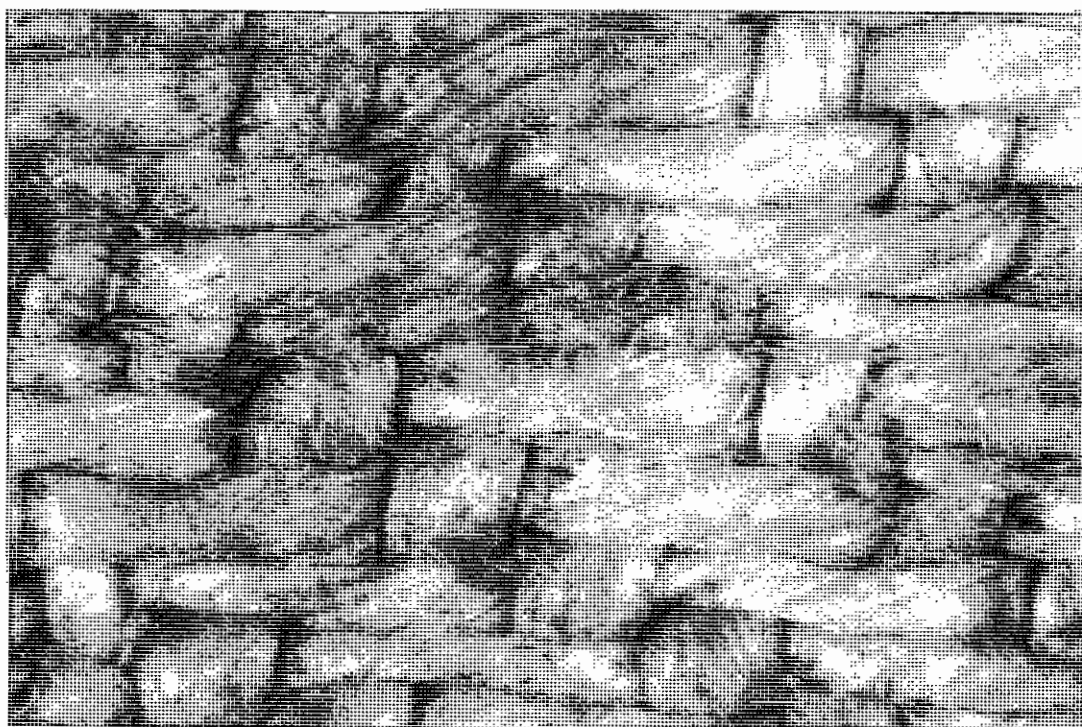


Figure 7.2. Close-up of the bloodstains on the Turin Shroud.

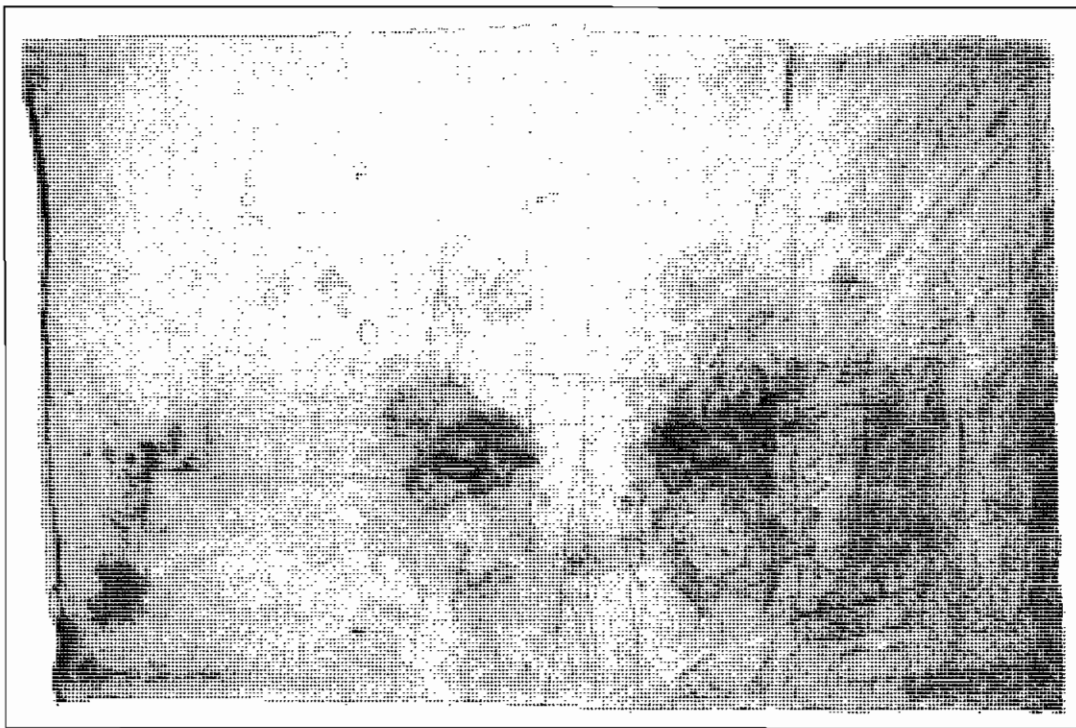


Figure 7.3. Photograph of the bloodstains on the Oviedo Cloth.

For example, the results of the DNA test establishing that Thomas Jefferson fathered children on his slave Sally Hemings were published in *Nature*, the world's leading science journal. English has become the standard language of science, so all scientists today, whatever their nationality, would almost certainly publish important findings in English, if for no other reason than to be sure scientists everywhere would be able to read the article.

Not so the results of this DNA test. The results were published, in Italian, in the very obscure Italian journal devoted to the study of the Turin Shroud. Furthermore, only the raw data were published. That is, the Genoa team published black-and-white Xerox copies of the computer output of the DNA analyzer. This is never, never done. Always, the data are presented in a neat table or figure, and they are accompanied by a discussion of their significance. The Genoa team made no effort to interpret their data. The combination of these four facts—obscure journal, non-English language, raw data only, and no attempt to interpret the data—almost certainly means that the researchers thought the data to be worthless, incapable of interpretation.

But I was able to interpret the data at once. *They are the expected signature of the DNA of a male born in a Virgin Birth!* The data are presented in standard tabular form in Tables 7.1 and 7.2.

Table 7.1

The DNA on the Turin Shroud

Min (peak label)	Size (in base pairs)	Peak Height	Peak Area	Scan Number
77	82.53	21	128	771
85	96.26	41	511	853
90	107.28	27	286	903
105	130.33	28	279	1052
105	131.16	35	255	1057
123	161.61	26	351	1231
129	174.14	20	113	1298
130	174.68	20	110	1301
152	212.37	52	418	1527
153	213.04	48	340	1531
155	216.40	98	1258	1551
157	220.63	55	720	1576
159	225.03	59	686	1599
162	230.04	33	319	1625
165	234.56	57	682	1651

Table 7.2

The DNA on the Oviedo Cloth

Min (peak label)	Size (in base pairs)	Peak Height	Peak Area	Scan Number
75	74.89	65	313	759
93	105.27	55	298	935
127	161.42	65	707	1273
162	221.24	53	472	1627

The standard DNA test for sex is the amelogenin test I mentioned earlier.<sup>66</sup> The Italians performed this test, which gave 106 base pairs for the X form of amelogenin and 112 base pairs for the Y form. There is a phenomenon called *sputtering*, which can cause the actual value obtained to differ by 1 base pair from the expected value.

The Turin Shroud data show 107 (106 + 1) but no trace of a 112 base pair gene. The Oviedo Cloth data show 105 (106 - 1) but no trace of a 112 base pair. The X chromosome is present, but there is no evidence of a Y chromosome. This is the expected signature of the simplest virgin birth, the XX male generated by an SRY inserted into an X chromosome. It is *not* what would be expected of a standard male.

This is the DNA signature of the *simplest* way of generating an XX male. The more complicated proposal for an XX male can be rejected, together with the alternative proposals made by Leoncio Garza-Valdes and Sam Berry.

Other explanations are possible. The DNA analyzed could be entirely contamination from people who later touched the Shroud and the Cloth. But we have witnesses that men touched the two samples also, and it seems incredible that no trace of male contamination would be seen. Also, the Italian researchers were aware of the possibility of contamination, and they took precautions to make sure that they analyzed the DNA of only the blood samples. Another possibility is that the Turin Shroud and Oviedo Cloth are fakes and that the fakers used real blood from males they knew were born of virgins. This possibility, in my opinion, has zero probability.

Nevertheless, there is evidence that can be interpreted as contamination in the DNA from locations other than the X and Y chromosomes. In addition to the sex determination genes, the Italian researchers used what is now called a "first generation multiplex." They looked for alleles of the genes TH01, VWA, FES/FPS, and F13A1. The first two genes have twenty and the second twenty-nine known alleles in the human population.<sup>67</sup> The last two genes are no longer used in standard DNA tests. If the DNA came from only one individual, we would expect to see at most eight different alleles from these four genes, since each person has two copies of each gene. There are fourteen distinct alleles seen in the Turin Shroud data (once the AMEL gene is subtracted), so the most obvious interpretation is that there are six more alleles present than could be from a single individual.

The Italian researchers made a passing remark that this finding indi-

cated contamination. This would be the standard interpretation. However, by hypothesis, this sample is DNA from an XX male, and the signature of such a male is the insertion of DNA into a location where it is not normally found. It is therefore possible that additional insertions could have been made at other locations, resulting in more than two alleles present. If there were contamination from many individuals, we would expect to see more than six additional alleles. There is also the possibility that some DNA strands in the sample were degraded, resulting in the appearance of several alleles where only one was present in the original sample. Unfortunately, the published data do not allow anyone to determine which alleles are present. The genes are coded with colored dyes, so that they appear as different colors in the raw data. But the article in which the data were published was in black and white, and thus this crucial color information did not appear. The essential point is that contamination of the sample with genes other than the AMEL gene would not affect the conclusion that there is no evidence of a Y chromosome present.

Standard DNA tests now (remember that the Italians did their analysis in 1995) include tests for base pair sequences on the SRY gene complex. This test should be carried out before we say that the blood on the Turin Shroud and the Oviedo Cloth is that of a male born of a virgin. We should also keep in mind that there is one reported case of an XX male without the SRY gene. This is possible, since genes on chromosomes outside the X and the Y genetically determine maleness. The genes of the X and Y merely tell these genes to turn on or off.

The Italian data were not what the researchers expected. In my experience as a scientist, a correct result obtained by an experimenter who did not expect that result can be depended on. The DNA data thus support the virgin birth hypothesis. The DNA data supporting a virgin birth also support the hypothesis that both the Turin Shroud and Oviedo Cloth are genuine.

### The Immaculate Conception and the Fall

In principle, it might be possible to show, by DNA analysis of the blood on the Shroud (or the Sudarium, another name for the Oviedo Cloth), not only that Jesus was born of a virgin but that he and his mother were without Original Sin. That is, it might be possible to confirm the Im-

daily life is that it requires cooperation between the worlds of the multiverse. Further, the amount of cooperation required is proportional to the height of the energy barrier, relative to the average energy of each version of the particle. If the barrier is 10 TeV high and each particle has only a single electron volt of energy, then at least 10 trillion particles have to transfer their energy across the worlds to a single particle. The probability of this occurring is exceedingly low under normal circumstances. We see the phenomenon of quantum tunneling—in transistors, for example—only when the height of the barrier is small relative to the energy of each version and only when it is easy to maintain quantum coherence (the possibility of cooperation between the worlds).

I am proposing that the Son and the Father Singularities guided the worlds of the multiverse to concentrate the energy of the particles constituting Jesus in our universe into the Jesus of our universe. In effect, Jesus' dead body, lying in the tomb, would have been enveloped in a sphaleron field. This field would have dematerialized Jesus' body into neutrinos and antineutrinos in a fraction of a second, after which the energy transferred to this world would have been transferred back to the other worlds from whence it came. Reversing this process (by having neutrinos and antineutrinos—almost certainly not the original neutrinos and antineutrinos dematerialized from Jesus' body—materialize into another body) would generate Jesus' Resurrection body.

If a body were to dematerialize via this mechanism inside a linen shroud, it would generate an image just like the image of Jesus seen on the Shroud of Turin. To see this, let us note the key features of the image. First, it is very faint, and in each spot on the Shroud it is limited to the uppermost fibers of a single strand of the linen, as shown in the photograph of a single strand of linen from the Shroud in Figure 8.1. The image is a yellowing of this outermost fiber. Second, the image was formed when the cloth was parallel to the body. That is, the linen was not wrapped around the body when the image was formed. If the cloth had been wrapped around the body when the image was formed, the image would have been distorted. Instead, the image looks like a photograph, which is imprinted on a flat plane. Thus, the image must have been formed when the linen was essentially flat relative to the body. The image-generation mechanism did not affect the linen fibers underneath the blood on the Shroud. Since in addition the blood clots on the Shroud were not deformed, the image-generation mechanism acted without first pulling the linen away from the body in the regions of the

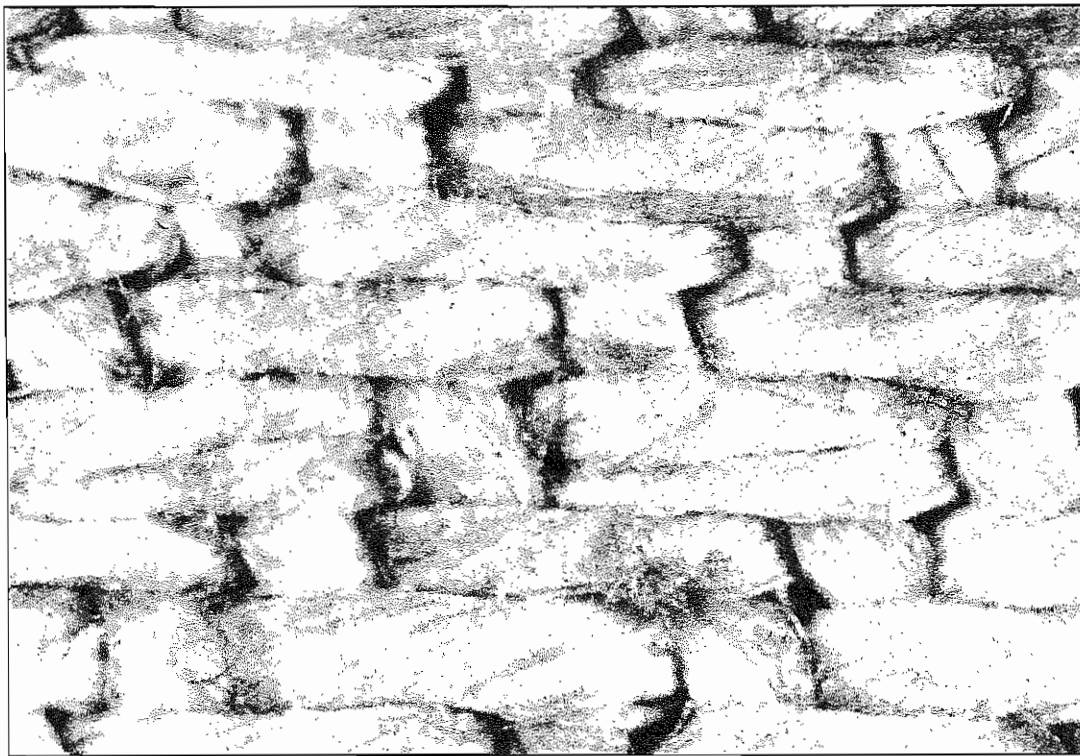


Figure 8.1. Close-up of Turin Shroud body image. The marks are on the very top of the linen fibers.

clotted blood, which would have glued the linen to the body at these places.

But the image is more than a photograph, because it contains three-dimensional information. When a VP-8 analyzer scanned the image, the scan appeared as an undistorted human being in three dimensions. A flat photograph of a human face similarly scanned appears distorted. Alan Adler and John Heller have pointed out that the three-dimensional effect is a consequence of the image contrast on the Shroud being generated by having more fibers yellowed rather than having the same number of fibers become more yellow.<sup>11</sup> The amount of yellowing on each of the image fibers is constant. John Jackson and his coworkers were able to reproduce the features of the Shroud image by putting a bust of a human head that had first been coated with a phosphorescent paint in a tank of water to which ink had been added. When a photograph of this bust was made, it showed the same three-dimensional pattern in the VP-8 analyzer.<sup>12</sup>

The Shroud image could not have been a scorch because it did not fluoresce under ultraviolet, whereas burn marks on the Shroud from a fire in 1532 *did* fluoresce. As a further test, a heated bust of a human

head was placed near a sheet of linen. The heat produced an image on the linen, but the nose—which was the closest to the cloth—was burned almost black while other parts of the face did not appear at all.

Chemical analyses of the Shroud image fibers conducted by John Heller and Alan Adler indicate that the image—the yellowing of the fibers—was the result of a conjugated dicarbonyl group formed out of the cellulose of the linen.<sup>15</sup> They were able to undo the yellowing of an image fiber by applying the powerful reductant diimide to the fiber. Upon application of diimide, the image fiber turned white; that is, the yellowing that had formed the image disappeared. Diimide (the compound  $\text{H-N} = \text{N-H}$ ) reduces molecules by hydrogenation.<sup>14</sup> That is, diimide adds hydrogen atoms to other molecules. In organic chemistry, *reduction* is defined as a process in which hydrogen atoms are added to a molecule. *Oxidation*, the reverse of reduction, is defined as the removal of hydrogen atoms from a molecule. The image fibers appeared under the microscope to be more degraded (or eaten away) than the nonimage fibers. From these two observations together, Heller and Adler concluded that the image had been formed by oxidation—the removal of hydrogen atoms.

Heller and Adler were also able to yellow modern linen fibers by placing the linen in concentrated sulfuric acid.<sup>15</sup> As is well known, concentrated sulfuric acid is not only a strong acid but also a strong dehydrator. A common experiment in high school is to pour concentrated sulfuric acid into sugar. A black mass rises from the container of the acid and sugar. What has happened is that the sulfuric acid has pulled water molecules ( $\text{H}_2\text{O}$ ) out of the sugar (glucose  $\text{C}_6\text{H}_{12}\text{O}_6$ ), leaving the carbon. Heller and Adler discovered that dehydration of linen in an alkaline environment failed to produce a yellowing of the linen. Only dehydration in an acid environment produced a yellowing.

I wrote earlier that neutrinos have so little interaction with matter that the mass of Jesus' body could have been converted into neutrinos without the people nearby being affected by the neutrinos. This is true, but the conversion of an 81-kilogram body entirely into neutrinos would have had an effect on the Shroud, which was placed directly on Jesus' body in the tomb. The neutrinos would have had just enough interaction with the atoms of the Shroud to lift the Shroud, exactly the effect required to explain the observation that the Shroud must have been straightened out away from the body just before the image was formed. But the neutrinos would not have exerted sufficient force to pull the

maculate Conception (Catholic Church dogma since 1854). In the Christian tradition, Original Sin is inherited from our ultimate ancestors. If Original Sin actually exists, then it must in some way be coded in our genetic material, that is, in our DNA. Also according to the Christian tradition, Original Sin originated in the Fall, an act of some kind by our ultimate ancestors. Before the Fall there was no sin. Almost all scientists consider the Fall a fairy tale. I want to argue the contrary. I shall claim that there was a time in Earth's history when no sin or evil existed, that sin came into the Earth's biosphere at a definite time in the past, and that not only we humans but all metazoans are infected by it. A tendency to commit evil acts is indeed in our DNA, and hence it is inherited. But this tendency might not be present in all humans' DNA. A man and a woman *might* not have had the sin behavior genes.

We first have to have a clear conception of "sin" or "evil." In modern English, *sin* refers to an offense against sexual morality. An example would be concupiscence, or excessive sexual desire. But of course *evil* is a more general phenomenon. In the Judeo-Christian tradition, sex itself is good because it was created by God, as asserted in Genesis 1:28 and in Genesis 1:27 (when read in conjunction with Genesis 1:31). The natural goodness of sex is also asserted by Paul in 1 Corinthians 7:38. The claim that sexual relations between man and wife are intrinsically bad is the Gnostic heresy. Instead, Paul in Romans 7:7 argues that covetousness is the foundation of all evil.

But covetousness is not desire per se. It is perfectly correct to desire the happiness of other people, for example. It is also perfectly legitimate to desire to increase one's knowledge. In particular, Eve's desire for knowledge (Genesis 3:6) was not evil. Only the "knowledge" of evil as distinct from "knowledge" of good (Genesis 2:17) is evil. (*Knowledge* is the sense of information coded in the genes.) As the Tenth Commandment (Exodus 20:17) tells us, desire becomes evil only when one desires someone else's property. Then desire becomes "covetousness." The last six Commandments, the Commandments concerning interhuman relations, can be summarized by saying, "Don't take, don't even think of taking, something that belongs to someone else." Don't take away the respect due to your parents, don't take someone's life, don't take someone's mate, don't take someone's property, don't take someone's reputation. Don't even *think* of taking these things. The first four Commandments tell us to love and respect God. Jesus agreed (Matthew

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19:19 and Luke 10:27) that the essence of evil is failing to love God and not respecting others' rights (not loving others as oneself).

I claim that we can summarize these definitions of evil in the following way: All evil acts can ultimately be reduced to a violation of one and only one ethical rule: *Thou shalt not impose thy theories on other living beings by force*. Thus, moral evil is a certain type of interaction between two or more living organisms. Natural evils are of two types: pain (both physical and mental) and death. So a world without evil is a world in which there is no death, no pain, and no force applied by one organism on another.

This statement actually describes the world of the one-celled organisms 2 billion years ago. As emphasized by Lynn Margulis and Dorion Sagan, before the evolution of metazoans, there were no distinct species.<sup>68</sup> All one-celled organisms can exchange genetic information with one another. Furthermore, for each type of microorganism, there were many clones. Since no information was coded except in the genes, these apparently distinct organisms were really "backup" copies of one another. The "individual" was really not a single cell but rather the collection of all clones of that cell. As long as a single cell of the clone existed, the individual existed. Certain lines of cyanobacteria have not changed for over 3.5 billion years. This individual has been alive almost as long as the Earth itself has existed. One-celled organisms have no nervous systems, so they cannot feel pain, either physical or mental. It is not possible to apply force to an organism that cannot feel pain and cannot die.

Applying force—evil—became possible with the evolution of the metazoans. Information was now coded in relationships between the cells, as in the nervous systems of chordates. This information was unique to the individual, not just the clone. It could be destroyed. Death and pain entered the world and, with them, the possibility for moral evil. A metazoan *could* impose its will on other organisms. It could impose its theories on other organisms. One way would be to eat these other organisms. The information coded in the eaten organism would disappear and be replaced by information coded in the eater. This is a simple example of theory imposition. We humans are more memes—ideas, complexes coded in nervous systems—than genes, so we are more familiar with forcible theory replacement of meme than of gene. But both gene and meme replacement are examples of theory replacement.

By the time of the Cambrian Explosion, if not earlier, carnivores had appeared on Earth. Evil had appeared in the world. Genes now coded for behavior that guided the use of biological weapons of the carnivores. The desire to do evil was now hereditary.

We humans ourselves show a marked tendency to want to impose our will on other organisms, both our own species and others. I would suggest that this tendency is genetic, as it certainly is in other meat-eating animals. But we are omnivores: the human per capita murder rate—the killing of members of one's own species—is less than that observed in pure carnivores, such as lions and wolves. So we are not the most violent, the most evil, of animals. We also have no reason to think that this violent tendency is absolutely essential to our survival. Pacifists such as Mahatma Gandhi have insisted that it is not, but even Gandhi occasionally showed a wish to impose his will on others. The genes that generate this tendency are probably universal in the human species.

But if these genes are not essential to human survival, we can imagine that they could be absent from some perhaps unique individuals. The Judeo-Christian tradition holds that the female began the Fall. Since it is absurd to think that the Fall began with a female because females are less able to resist temptation than males (indeed, Genesis 2 does not suggest this), it is more reasonable to interpret the tradition to mean that the gene essential to the evil tendency is on the X chromosome. It may be relevant that the damage of a certain X chromosome gene is known to be responsible for violence in males. But too little is now known about behavioral genetics to say definitely where the evil tendency genes are located. Or, I admit, even if they exist. If they do exist, though, the Christian tradition would claim that these genes would be absent from Jesus' genome.

Since Jesus and Mary would share the same genome on my XX male theory, if the genes are absent from Jesus' genome, they would be absent from Mary's. Jesus would indeed have been conceived immaculately. A DNA search in the Shroud for the X-chromosome gene just mentioned would be a first step. If this gene were indeed involved in our tendency to commit evil, we would expect to see this gene modified from the human norm in the Shroud DNA. In fact, if the evil gene is connected to bone generation, the amelogenin gene, which codes for the generation of teeth, might be entirely absent from Jesus' genome both in its X form and in its Y form. If so, this gene would be absent from the DNA on the Shroud of Turin if this artifact is genuine. If the Christian tradition is

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correct that the Fall affected the entire animal kingdom, we would expect to see a similar evil gene complex present in all animals, presumably in the chromosome coding for sex differentiation. In mammals this is the X chromosome (if both males and females are to be subject to the gene), but in birds it would be the Z chromosome. In reptiles, it would be present in both sex chromosomes, since in reptiles sex is determined by the temperature experienced by a given egg rather than the genes, as described earlier.

If the evil tendency genes were implanted in the genome by eating something, as Genesis 2:16 claims, then the Fall would have occurred near the start of metazoan evolution. As Margulis has shown, ingestion is a common way for one-celled organisms to obtain new genes, and we would expect this capacity to persist only for very early metazoans.<sup>69</sup> If the Fall occurred at the time of the Cambrian Explosion, I would conjecture that the gene is associated with the formation of bony substances, since such materials were used to form weapons in creatures that lived at that time. I find it very intriguing that animals which have been domesticated have more delicate bones than do the lineages from which they originated.<sup>70</sup> This indeed suggests that bony structures are in some way associated with the ability to fight rather than to cooperate.

If a gene for evil exists, there would have to be a reason for it being universal in the metazoan world. If this gene appeared half a billion years ago, why was it not deleted in some lineages? It would not be deleted if it also coded for some characteristic that is completely essential for metazoan life, so that eliminating the gene for evil would also delete a characteristic for metazoan life. This is another reason for suspecting that the gene might be associated with the formation of bone. Reconstruction of the gene complex for bone formation would be too improbable or difficult. We would thus expect the reconstruction of the complex to have occurred only once, that is, in Mary and Jesus.

If an evil gene complex is indeed ubiquitous in the metazoan biosphere, a truly existing Satan would be possible: he is an evil program coded in the biosphere. He is coded sometimes as a gene complex, sometimes as a meme complex, and sometimes as both. (In a meme the information is coded in a nervous system rather than in the genetic system. A meme is thus an idea complex that is passed from one individual to another by means such as vocal communication.) The evil program thus tempts us to impose our theories on others. Jesus, of course, could be tempted only by a meme: he knew about his ability to

impose his will on others by using his dematerialization power, as I shall discuss in the next chapter. Using this power, he could easily have conquered the world. He was tempted to do so, but this would have meant worshipping Satan—accepting evil by carrying it out. This picture of Satan resembles that put forward by C. S. Lewis in his Space Trilogy, and it raises the fascinating possibility that there may be other biospheres, possibly with intelligent life, that never underwent the Fall. The laws of physics require that there are other biospheres with the capability of dematerialization. Perhaps these biospheres never fell. As pointed out by Lewis, the Christian tradition implies that our biosphere is unique in having fallen: Jesus was incarnated only once in the universe.

If Jesus' conception was Immaculate, then it is very appropriate to call Mary *Theotokos*, the Greek word being most accurately translated as "the one who gave birth to the one who is God."<sup>71</sup> An Immaculate Mary would be both completely human and more than human: she would be missing the genetic flaws that induce us to do evil. Since she is not God, she is not entitled to the worship that God (the Father, the Son, or the Holy Spirit) is entitled to. The Catholic Church uses the word *latria* ("adoration") for this form of worship. A mere saint (a normal human with Original Sin but who has more or less managed to overcome this inducement to commit evil) is entitled to reverence, or *dulia*. Mary, being more than a saint but infinitely less than God, is entitled to *hyperdulia*, the prefix *hyper* meaning "reverence to the highest degree."<sup>72</sup> If, as I shall suggest in Chapter 8, Mary's genetic constitution allowed her to be assumed into heaven, then calling her *Theotokos* is doubly appropriate.

In the preceding discussion, I have assumed a normative principle—Thou shalt not impose your ideas on others—to simplify the analysis, but actually all moral rules, including this one, can be derived from facts alone, which ultimately means from physics alone. Coase's Theorem, which won Ronald Coase the Nobel Prize, asserts as much.<sup>73</sup>

If Jesus was indeed an XX male, as the DNA on the Turin Shroud and Oviedo Cloth strongly suggest, then presumably he would share a common characteristic of XX males: not being fertile with normal human females. But we would expect this infertility with normal humans solely on the basis of him (and possibly his mother) being without Original Sin. The genetic basis of Original Sin is so fundamental in normal human beings that he and his mother should be regarded as a new species: humans without Original Sin or, as the story of the Garden of Eden

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makes clear, what we humans were intended to be, not what we actually are. As such, Jesus would indeed be “a lamb without blemish, and without spot” (1 Peter 1:19).

From the biological point of view, we would have in Jesus a speciation event, the appearance of a new species in a single generation. Mary’s parents were normal humans, whereas Jesus and Mary were the new Adam and the new Eve. No Darwinian slow evolutionary change here, but instantaneous speciation. This would explain the fact that the Gospels make no mention of Jesus ever taking a wife, or showing any interest in women as sex objects. So the DNA on the Turin Shroud and the Oviedo Cloth provide an experimental refutation of the claim, made popular in the novel *The Da Vinci Code*, that Jesus married and had children by Mary Magdalene. Jesus’ DNA is simply too different for this to be possible.