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Maimonides' Allegiances to Science and Judaism

In a number of recent studies I have argued that Maimonides (1138-1204) presented the scientific matters in the first four chapters of the *Mishneh Torah* as the most up-to-date account of the structure of the physical and metaphysical universe available to him, and not as an absolute, ultimate account of nature as it really is, was, and always will be.[1] I further showed that while Maimonides affirmed a "whig" view of progress in the sciences, according to which science progressed along a more or less straight line ever upward, he also maintained that the sciences could and most would reach a state of closure or perfection, where there was nothing new to be learned. Two sciences which had not reached perfection in his day, and *never* would, he felt, were astronomy and metaphysics. Further progress in astronomy was, of course, possible, but not beyond a certain limit. In addition I have argued, following Gad Freudenthal and against Tzvi Langermann, that Maimonides adopted a fictionalist, instrumentalist interpretation of the nature of astronomy.[2] In the above cited articles I not only showed that these claims about Maimonides were true, but also why he had to maintain them. In this essay I propose to discuss a problem these positions pose for him.

The problem can be stated briefly: astronomy (in the sense of the physics of the celestial spheres) is an important part of physics (as understood by Maimonides).[3] Physics and metaphysics undergird the *mizvot* (commandments) of the Torah. One cannot truly understand Torah, or even properly obey its commandments,[4] without studying (and, of course, understanding, to the greatest extent possible)

physics and metaphysics. Physics in the guise of astronomy can and likely will change; both physical and metaphysical knowledge is, after a certain point, unavailable to human beings.[5] Does this mean that as we better understand astronomy we better understand Torah?[6] In effect, as we better understand astronomy, does the Torah change, at least from our perspective? As we better understand astronomy, does our fulfillment of the commandments improve?

The eighth of Maimonides' "Thirteen Principles" states that "the Torah is from heaven; to wit, it [must] be believed that the whole of this Torah which is in our hands today is the Torah that was brought down to Moses. . .that all of it is from God. . ."[7] The ninth principle deals with the immutability of the Torah, affirming "that this Torah of Moses, our Teacher, shall not be abrogated nor shall another Torah come from God. . .It may not be added to nor subtracted from—neither from its text nor from its explanation. . ."[8] How can an immutable Torah be based upon foundations which are, at least from our perspective, mutable?[9]

Maimonides' philosophy of science commits him to the idea that sciences progress until they reach closure. His philosophical theology commits him to the idea that the individual commandments of the Torah in some significant sense depend upon the sciences of physics and metaphysics, and that one cannot actually obey these commandments fully and properly until one has perfected oneself as fully as possible in these two disciplines. Maimonides' philosophy of *Halakhah* forces him to maintain that the Torah is static, in the sense that no change in it can occur. My question here is, can he consistently hold all these positions simultaneously? To rephrase the problem, once Maimonides affirmed that *ma'aseh bereshit* (i.e., the account of the creation of the world in the opening chapters of Genesis) and *ma'aseh merkavah* (i.e., the account of Ezekiel's vision of the chariot)[10] are roots and foundations of the Torah in general and of *Halakhah* in particular, can he consistently maintain his allegiance to the notions of dynamic science and static *Halakhah*?

Although this question relates to issues which Maimonides did not directly address, it is still valuable, I am convinced, to lay out the question in some detail, and show what answers were available to Maimonides.

I begin with an oft-cited but little-studied text, Maimonides' commentary to the first mishnah of the second chapter of tractate *Hagigah*. The mishnah states:

> One does not expound upon forbidden sexual relations in the presence of three, nor upon *ma'aseh bereshit* in the presence of

> two, nor upon the *merkavah* in the presence of one, unless that one were wise and understood upon his own. All who look upon four things, it were better had they not come into the world: what is above, what is below, what is in front, and what is behind. All who are not protective of the honor of their master, it were better had they not come into the world.

To my mind, Maimonides' commentary on this passage is a dense and succinct statement of many of the basic themes of his philosophical theology and is worth citing in full. He writes:

> He said that it is forbidden to expound upon the "secrets of forbidden sexual relations"[11] unless those listening be fewer than three, the reason for this being that were one of them to engage the teacher in discussion, the other two could engage in discussion between themselves, lose their concentration [on what the teacher taught] and thus not know the correct law concerning the "secrets of forbidden sexual relations." Given the great desire most humans have for this matter, they will not be sufficiently rigorous if a doubt should arise concerning what they heard from the teacher and they will decide the matter leniently.
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> He said, "nor upon *ma'aseh bereshit* in the presence of two" and certainly not if they be more.[12] They said: "For ask now of the days past [which were before thee, since the day that God created man upon the earth, and from one end of heaven unto the other, whether there hath been any such thing as this great thing is, or hath been heard like it? (Deut. 4:32)]—one asks, two do not ask."[13] We have already explained the reason for this in our Introduction to this composition.[14] It is that it is impossible for the masses to understand those matters, and they are [therefore] only transmitted from one individual to another with great care, for the masses understand very little of them. When a fool hears them, his conviction[15] becomes undermined and he thinks that they contradict the truth, while they are [themselves, in reality] the truth.
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> But one does not expound upon *ma'aseh merkavah* at all, even to one individual unless he is, as it was said, "wise and understood upon his own," i.e., that he arouses himself to understand these matters on his own and does not need to have them explained to him. Rather he is given a hint, and he draws proper inferences on his own. This is the meaning of their statement, "they teach him chapter headings" [*Hagigah* 13a], [by which they mean] that these matters include issues which are impressed upon the souls of perfected human beings, such that when they are explained in [straightforward] language or expressed in parables they lose their meaning and significance.

Listen to what has become clear to me according to my understanding on the basis of which I have studied in the words of the Sages; it is that they call *ma'aseh bereshit* the natural science and inquiry into the beginning of creation. By *ma'asch merkavah* they mean the divine science, it being speech on the generality of existence[16] and on the existence of the Creator, His knowledge, His attributes, that all created things must necessarily have come from Him, the angels, the soul, the intellect which links with humans, and existence after death. Because of the importance of these two sciences, the natural and the divine—and they were justly considered important—they[17] warned against teaching them as the mathematical sciences are taught. It is known that each person by nature desires all the sciences,[18] whether he be an ignoramus or a sage. [It is further known] that it is impossible for a person to begin the study of these sciences, and direct his thought towards them, without the appropriate premises, and without entering the stages of science; they therefore forbade this and warned against it.[19] They sought to frighten one who directed his thought towards "the account of the beginning" without [appropriate] premises, as he said, "all who look upon four things. . ." They [also] sought to restrain one who would direct his thought towards and would examine divine matters with his unaided imagination, without ascending the rungs of the sciences and said, [with reference to such people,] "all who are not protective of the honor of their master [it were better had they not come into the world]."

"It were better had they not come into the world"—its meaning is that such a person is removed from the ranks of humanity, and classifying him in one of the other species of animal would be better for existence[20] than his being a human because he wants to know something in an inappropriate manner and in a way that is unsuited to his nature, for only a person ignorant of the nature of existence would seek to imagine what is above or what is below.[21] When a man empty of all knowledge seeks to use his corrupt imagination in order to know what is above the heavens and below the earth, and imagines [reaching] them to be like ascending to the attic of a house, and also, [to know] what was before the creation of the heavens and what will be after they are no longer, he will certainly be brought to madness and desolation. Examine this wonderful expression, said with divine help, "all who are not protective of the honor of their master," the meaning of this being, all who are not protective of their intellects, for the intellect is the honor of God [*kevod Hashem*]. Since he does not know the value of this matter which was given him, he is abandoned into the hands of his desires, and becomes like an animal.[22] Thus, they said, "who is he who is not protective of the honor of his Master?—he who transgresses secretly" [*Hagigah* 16a; *Kiddushin* 40a]. They said

> elsewhere, "adulterers do not commit adultery until the spirit of madness enters them" [*Midrash Tanhuma*, Naso, 5]. This is the truth, for while one craves any of the desires, the intellect is not perfected.[23]

> This matter is brought up here since above he said "these are the bodies of Torah," and thus here he cited matters which are the principles of "the bodies of Torah." The Talmud forbade teaching them publicly and expressly prohibited it and commanded that an individual teach them to himself and not pass them on to another and derived this [prohibition] from the parabolic statement of Solomon on this matter, "honey and milk are under thy tongue."[24]

This text represents the first place in his writings where Maimonides clearly states that *ma'aseh bereshit* is the rabbinic name for that area of study called by the philosophers, "physics," and *ma'aseh merkavah* is the rabbinic name for that area of study called by the philosophers, "metaphysics". The ancient rabbis, he maintains, understood the true nature of *ma'aseh bereshit* and of *ma'aseh merkavah* and therefore tried to keep them hidden from the multitudes, who might be led astray and damaged were they to study physics and metaphysics improperly.[25]

At the very end of this passage Maimonides adds an apparently innocuous statement concerning the reason that the issue of the study of *ma'aseh bereshit* and *ma'aseh merkavah* is brought up here at all. He explains that the previous mishnah had ended by calling a whole variety of specific laws *gufei Torah* (literally, "bodies of the Torah").[26] Having mentioned "the bodies of Torah," the mishnah went on to cite "matters which are the principles of the bodies of Torah." Here, for the first time, we find Maimonides claiming that physics and metaphysics are the roots or foundations of the bodies of Torah, i.e., of the specific commandments of the Torah.[27]

The claims that *ma'aseh bereshit* and *ma'aseh merkavah* are physics and metaphysics, and that these two sciences represent the deepest level of the Torah upon which the specific laws depend, became, after the completion of the *Commentary on the Mishnah*, a standard trope in Maimonides' writings, and even served as the ideological substrate for the entire *Guide of the Perplexed*. It will be useful to illustrate this point in some detail.

In the *Mishneh Torah* (composed after the *Commentary on the Mishnah* and before the *Guide of the Perplexed*), we again find the equations, *ma'aseh bereshit* = physics and *ma'aseh merkavah* = metaphysics, but less explicitly. The first two chapters of *Hilkhot Yesodei ha-Torah* expressly deal with *ma'aseh merkavah*, while the third and

fourth chapters deal with *ma'aseh bereshit*. The subject matters raised in these four chapters are precisely those of metaphysics and physics.[28] In light of the *Hagigah* commentary cited above, it is hardly surprising that a work devoted to "*gufei Torah*" (the *Mishneh Torah*) should open with a discussion of the "principles of the bodies of the Torah."

In the *Guide of the Perplexed* Maimonides explains that:

> It is not the purpose of this Treatise to make its totality understandable to the vulgar or beginners in speculation, nor to teach those who have not engaged in any study other than the science of the Torah—I mean the legalistic study of the laws [of the Torah]. For the purpose of this Treatise and all those like it is the science of the Torah in its true sense.[29]

This is not the place to go into the question of what Maimonides means by "the science of the Torah in the true sense." We may safely follow the unanimous opinion of his medieval commentators that the reference is to physics and metaphysics.[30]

Physics and metaphysics are expressly called "principles" of the specific commandments of Judaism in the *Hagigah* commentary. It is a safe assumption that in the *Guide of the Perplexed* they are presented as "the science of the Torah in the true sense." Metaphysics is on some important level unknowable;[31] physics (to the extent that it includes astronomy) is mutable. To return, then, once again, to our original question: is there not a problem with an unknowable science and a mutable science serving as "principles" for an immutable body of law?

Maimonides expressly understood various sciences to have progressed to his day, and even expected further progress (at least in astronomy) in succeeding generations.[32] This may be made clearer if we examine Maimonides' attitudes towards Aristotle. In a well-known letter to Samuel ibn Tibbon, Maimonides observes that there is no need for Samuel to study the writings of philosophers who preceded Aristotle because the works of the latter, "are sufficient by themselves and [superior] to all that were written before them. His understanding [Aristotle's], is the extreme limit of human intellect, apart from him upon whom the divine emanation has flowed forth to such an extent that they reach the level of prophecy, there being no level higher."[33] Aristotle, then, reached the pinnacle of non-prophetic human perfection.

We must further note that in *Guide* I:5 (p. 28) Maimonides calls Aristotle, "the chief of the philosophers."[34] Who were these philoso

phers of whom Aristotle is the chief? In his "Letter on Astrology" to the Rabbis of Montpellier, Maimonides writes that the *ḥakhamim*, wise men, of Greece, who were philosophers and "who are genuinely wise,"[55] never dealt with astrology. In his commentary to *Mishnah 'Avodah Zarah* IV:7 Maimonides explains at length that the philosophers never dealt with astrology which, as he explains both there and in *Hilkhot 'Avodah Zarah* 1:1, is the cause and root of idolatry. Aristotle, then, in his own right, nearly reached the level of prophecy; he is "chief" of the philosophers who attained such an understanding of the universe on their own that they rejected astrology because it leads to idolatry. Put simply, Maimonides thought very highly of Aristotle.

But not so highly that he thought that Aristotle could not err on matters of physics and metaphysics; it is well-known that Maimonides at least claimed to reject Aristotle's assertion that the universe was uncreated. It was Maimonides' argument that Aristotle was wrong on his own terms; in thinking that he could prove the eternity of the universe, Aristotle exceeded the legitimate bounds of his science and made unwarranted claims.[56]

But Aristotle could err in other areas as well. Maimonides writes:

> Everything that Aristotle has said about all that exists from beneath the sphere of the moon to the center of the earth is indubitably correct, and no one will deviate from it unless he does not understand it or unless he has preconceived opinions that he wishes to defend or that lead him to a denial of a thing that is manifest. On the other hand, everything that Aristotle expounds with regard to the sphere of the moon and that which is above it, is, except for certain things, something analogous to guessing and conjecturing. All the more does this apply to what he says about the order of the intellects and to some of the opinions regarding the divine that he believes; for the latter contain grave incongruities and perversities that manifestly and clearly appear as such to all the nations that propagate evil, and that he cannot demonstrate (*Guide* II:22, pp. 319-20).

Maimonides emphasizes this point by repeating it:

> I shall repeat here what I have said before [*Guide* II:22]. All that Aristotle states about that which is beneath the sphere of the moon is in accordance with reasoning; these are things that have a known cause, that follow one upon the other, and concerning which it is clear and manifest at what points wisdom and natural providence are effective. However, regarding all that is in the heav-

> ens, man grasps nothing but a small measure of what is mathematical; and you know what is in it (*Guide* II:24, p. 326).

Why was Aristotle mistaken in this fashion? Maimonides explains: "However, as I have let you know, the science of astronomy was not in his [Aristotle's] time what it is today" (*Guide* II:19, p. 308).[37] Mathematical (Ptolemaic) astronomy, while not perfected in Aristotle's time, had ultimately reached or at least come close to perfection; Aristotle had brought the physics of the sublunar world to perfection and closure;[38] Galen had brought anatomy to a state of great perfection.

With respect to the ever greater approximation of truth in the various spheres of philosophy (what we would call "science" today), we just saw that Maimonides maintained that the mathematical sciences were incorrectly understood in Aristotle's day; in his own day they had reached a much higher level of perfection. This is true not only of the mathematical sciences, but also of anatomy: "[Galen] attained enormous success in anatomy, and things became clear to him in his time that were not apparent to anyone else. In addition, the activities and functions of organs, and their physiology, as well as conditions of the pulse which were not clear at the time of Aristotle [were understood and explained by Galen]."[39] Finally, with respect to celestial physics, Maimonides thought that his own knowledge might be superseded: "It is possible that someone else will find a demonstration by means of which the true reality of what is obscure for me will become clear to him" (*Guide* II:24, p. 327). Without getting into the vexed question of when the idea of progress entered Western culture, we can see here that Maimonides admitted the fact of scientific development and even anticipated that science would develop beyond what he himself, or, more accurately, what his generation, had been able to accomplish in it.[40]

Maimonides thought very highly of Aristotle, so highly that he placed him on the scale of human excellence just beneath the prophets. But science had progressed since Aristotle's day, and human beings living in Maimonides' era (close to fifteen hundred years after Aristotle) knew much more than did the Stagirite.

We thus see that for Maimonides, science is dynamic and not static. But, if science changes, what does that do to the "bodies of Torah" which depend, in some sense, upon it?

Not only did Maimonides anticipate "progress" in the sciences, but he was convinced that certain scientific matters were better understood by Aristotle than by the Sages of the Talmud. Since Maimonides appears to agree with Aristotle on these matters, he appears therefore to hold that his own understanding of these scientific matters is superior to that of the Sages. We thus find him stating:

> One of the ancient opinions that is widespread among the philosophers and the general run of people consists in the belief that the motion of the spheres produces very fearful and mighty sounds. . . . This opinion also is generally known in our religious community. Do you not see that the Sages describe the might of the sound produced by the sun when it every day proceeds on its way in the sphere?. . . .Aristotle, however, does not accept this and makes it clear that the heavenly bodies produce no sound. You should not find it blameworthy that the opinion of Aristotle disagrees with that of the Sages. . . .[The Sages themselves] in these astronomical matters preferred the opinion of the sages of the nations of the world to their own. For they explicitly say, "The sages of the world have vanquished [us]." And this is correct. For everyone who argues in speculative matters does this according to the conclusions to which he was led by his speculation. Hence the conclusion whose demonstration is correct is believed (*Guide* II:8, p. 267).

Maimonides makes a similar claim elsewhere in the *Guide*:

> Do not ask me to show that everything they [the Sages] have said concerning astronomical matters conforms to the way things really are. For at that time mathematics were imperfect. They did not speak about this as transmitters of the dicta of the prophets, but rather because in those times they were men of knowledge in those fields or because they had heard these dicta from the men of knowledge who lived in those times (*Guide* III:15, p. 459).[41]

The upshot of these two passages is that Jews (and non-Jews!) in Maimonides' time understood certain aspects of mathematics and astronomy better than did the Sages of the Talmud. Are we to say, then, that Maimonides' understanding of the "foundations of the bodies of the law" was superior to that of (at least some of) the Sages of the Talmud?

It is difficult to ascribe to Maimonides (in an attempt to solve the problem raised in this paper) the view that while the written Torah does not change, the Oral Torah does. For one thing, it ignores his express claim (quoted near the beginning of this paper) to the effect that the Oral Torah is part of the immutable revelation at Sinai. In this connection, it should be remembered that Maimonides, unlike other commentators and decisors, drastically limits the extension of the term "Oral Torah"; for him it refers to a carefully circumscribed subset of what is ordinarily thought of as Oral Torah. According to Maimonides, it denotes "only the divine explanation of Scripture given explicitly at Sinai, which was to remain Oral. Subsequent

intepretation and legislation are not termed Oral Law, though they may be treated as such in certain contexts."[42] Oral Torah is thus no less Sinaitic than the Written Torah, and no more given over to the possibility of change and new understandings. It is, moreover, not correct to see the sciences as part of Oral Torah as opposed to Written Torah; the Genesis account teaches physics[43] and the chariot vision of Ezekiel teaches (what can be taught about) metaphysics.[44] If science changes, we must still conclude that Torah (i.e., the commandments) changes.

But is this truly so? Let us now examine the relationship which Maimonides posits between science and Torah. Maimonides refers to physics and metaphysics (in a mixture of Arabic and Hebrew) as "*uṣul gufei Torah*," the "principles," "roots," or "foundations" of the "*gufei Torah*." What is the relationship which he thought obtained between physics and metaphysics on the one hand, and the specific commandments of the Torah on the other hand? He emphasizes the connection between the two in the *Guide of the Perplexed*:

> Do you not see the following fact? God, may His mention be exalted, wished us to be perfected and the state of our societies to be improved by His laws regarding actions. Now this can come about only after the adoption of intellectual beliefs, the first of which being His apprehension, may He be exalted, according to our capacity. This, in its turn, cannot come about except through divine science, and this divine science [metaphysics] cannot become actual except after a study of natural science [physics] (I: Introduction, p. 9).

In the notes to his translation of the *Guide of the Perplexed* on this passage, Rabbi Kafih suggests that it means that the purpose of the Torah with respect to the commandments (that we be perfected and the state of our societies improved) can only be achieved if we adopt correct beliefs concerning God.[45] This certainly seems to be what Maimonides is trying to say here, but the question of the precise way in which correct knowledge concerning God must precede perfected obedience to the commandments remains unclear.

Terminological considerations do not appear to be helpful. Maimonides uses the term "*uṣul*" in a wide variety of ways, often interchangeably with the term "*qawa'id*," and these various usages do not, I think, help us to understand his precise meaning here.[46]

However, we may, I think, understand Maimonides' point here as follows: the first commandment, "the great principle upon which all depends" (*Hilkhot Yesodei ha-Torah* 1:6), the "foundation of all foun-

dations and pillar of the sciences" (*ibid.* 1:1), is to know (not only believe) that God exists.[47] Monotheism is the central axis around which the entire Torah revolves, denial of which is tantamount to denial of the Torah in its entirety.[48] Although Maimonides never says this explicitly, the consequence of holding a false conception of God is that every time one prays, or perfoms any act of religious devotion, one is actually commiting idolatry.[49]

This being the case, only that person who truly *knows* that God is one and incorporeal can fulfill even the first of the commandments. All religiously obligatory practices are acts of devotion; for them to be done properly, the devotee must *know* that God is one and incorporeal.

This point needs expansion. In an earlier work,[50] I argued that, for Maimonides, obedience to the commandments is the most effective route for human beings to prepare themselves to achieve intellectual perfection. Having achieved that perfection to the greatest extent possible, humans have reached the acme of their fulfillment as human beings, their *hazlaḥah*, or felicity. Jews, however, are commanded to take one further step and imitate God through obedience to the commandments. This fulfillment is, of course, qualitatively different from obedience to the same commandments before one has perfected oneself intellectually to the greatest extent possible. There is no further "reward" for this *Imitatio Dei*; it is a pure act of worship. God performs "loving-kindess, judgment, and righteousness in the world" for no self-benefit, so does the perfected worshipper of God fulfill the commandments, many of which lead to the betterment of society, for no self-benefit, not even the benefit of making oneself more perfected. One is called upon to obey the commandments, on this understanding, in two radically different ways before and after having achieved as much intellectual perfection as one is going to achieve.[51]

Thus far, metaphysics. Knowledge of physics is also a crucial pillar upon which religious observance depends for two reasons: it is a necessary prerequiste for studying metaphysics and it itself leads to knowledge of God to a certain extent. There is nothing which exists, says Maimonides in *Guide* I:34, but God and "the totality of things" made by God. These latter "are indicative of His existence. . . and of what should be affirmed and denied with regard to Him." It is thus the case, Maimonides continues, that

> it is therefore indispensable to consider all beings as they really are so that we may obtain for all the kinds of being true and certain premises that would be useful to us in our researches pertaining to

> the divine science. . . . As for the matters pertaining to the astronomy of the spheres and to natural science, I do not consider that you should have any difficulty in grasping that those are matters necessary for the apprehension of the relation of the world to God's governance as this relation is in truth and not according to imaginings.[52]

Physics (including astronomy) is useful for what we can learn about God through an examination of the created world, for what we can learn about God's relationship to the world (providence), and as a stepping stone to metaphysics.

We are now in a position to answer the question posed at the beginning of this essay. Does better understanding of astronomy result in a different relationship to Torah? In effect, as we better understand astronomy, does the Torah change, at least from our perspective? As we better understand astronomy, does our fulfillment of the commandments improve?

The answers to these questions, I think, are all negative. There are three unrelated reasons for this. First, Maimonides was convinced that Aristotle's description of the sublunar world accurately and adequately accounted for what needed and could be be known in that realm. Terrestrial physics had reached closure. There was no danger of change there. By defining so much of metaphysics as largely unknowable, Maimonides insulated himself from problematic change in that realm as well. That leaves astronomy: unlike physics, it is subject to new knowledge and understanding, and, unlike metaphysics, it is to a considerable extent knowable. But what sort of knowledge? Maimonides' instrumentalist approach to astronomy, according to which we do not actually know anything about the heavenly bodies and their movements in and of themselves, but rely entirely on what today we would call models, largely insulates him from the danger of change there as well. Since we do not claim to have "real" knowledge of astronomical phenomena themselves, new models (necessitated by new developments and understanding) do not involve actual change in our understanding of the universe; that does not really change, only the models we use "to save the phenomena."[53] Change in the science of astronomy should not, therefore, threaten the immutability of the commandments of the Torah.

Second, it must be recalled that even though Maimonides allowed for progress in celestial physics—"It is possible that someone else will find a demonstration by means of which the true reality of what is obscure for me will become clear to him"—he did not actually expect anything more than incremental changes in detail. There is no

doubt that he did not anticipate the kind of revolution ushered in by Copernicus. In this sense, too, even though astronomy is one of the roots or foundations of the commandments, change in our astronomical knowledge represented no real challenge to the immutability of those commandments for Maimonides. This would be true even were Maimonides not a formalist in his approach to astronomy.

Our analysis above of the way in which Maimonides apparently saw the relationship between science and the commandments also provides a solution to our problem. If physics and astronomy are roots and principles of the commandments only in the sense that without them one cannot actually *know* that God exists, is one, and is incorporeal, progress in the sciences represents no threat to the commandments. Maimonides can not credibly be thought to have entertained the idea that science would some day undermine as opposed to support these three claims about God.

Science might undermine other claims about God: those concerning providence, for example, or the creation of the world. Such developments, however, would not undermine our obligation to obey the commandments. Maimonides links the Sabbath to the doctrine of the creation of the universe. Does that mean that if we could show the universe to be uncreated, we would be right in abandoning observance of the Sabbath? Maimonides' answer would be, quite clearly, No.[54] But if we could, theoretically, refute God's existence, unity, and incorporeality, would that undermine our obligation to observe the Sabbath? The answer to that question is clearly, Yes. Commandments, after all, must have commanders. But, clearly, there is no reason to suspect that Maimonides entertained the possibility of such a proof.

In short, as long as science does not refute the existence, unity, and incorporeality of God—and it appears that there is no way it could—progress in the sciences in no way threatens obedience to the commandments: science remains the root of the "bodies of Torah." In fact, I would go further and say that scientific progress, in bringing one closer to the truth, enables one better to observe the commandments.

Maimonides has one overarching allegiance: to truth. His attachments to both science and Judaism did not and could not contradict it.[55]

Notes

1. See "On the Status of the Astronomy and Physics in Maimonides' *Mishneh Torah* and *Guide of the Perplexed*: A Chapter in the History of Science," *British Journal for the History of Science* 24 (1991): 453-63; "Maimonides and Gersonides on Astronomy and Metaphysics," in Samuel Kottek and Fred Rosner, eds., *Moses Maimonides: Physician, Scientist, and Philosopher* (Northvale, 1993), 91-96 and

249-51; "Maimonides on Science in the *Mishneh Torah* -Provisional or Permanent," *Association for Jewish Studies Review* 18 (1993): 169-94, and "Gersonides on the Song of Songs and the Nature of Science," *Journal of Jewish Thought and Philosophy* 4 (1994): 1-21.

2. See Gad Freudenthal, "*Hazlahah Nafshit ve Astronomiah: Milhamto shel ha Ralbag Neged 'Ilmi*," *Da'at* 22 (1989): 55-72 and Y. Tzvi Langermann, "The True Perplexity: The *Guide of the Perplexed*, Part II, Chapter 24," in Joel Kraemer, ed., *Perspectives on Maimonides* (Oxford, 1991), 159-74.
3. This may easily be seen from the contents of *Hil. Yesodei ha-Torah*, chapters 3 and 4. These chapters, Maimonides tells us, are devoted to *ma'aseh bereshit*, which, as we shall see below, Maimonides identifies with physics. The issue is actually a bit more complicated than I allow here, since in most medieval classifications, astronomy is presented as part of mathematics, not as part of physics, although in some accounts it is thought to be that part of mathematics closest to physics. For details, see H. A. Wolfson, "The Classification of Sciences in Mediaeval Jewish Philosophy," in his *Studies in the History and Philosophy of Religion* I (Cambridge, 1973), 493-545. In general, mathematical astronomy in the tradition of the *Almagest* is part of mathematics; celestial physics in the tradition of *De Caelo* is part of physics.
4. On this, see my forthcoming *Must a Jew Believe Anything?* The issue will be taken up again below.
5. For a recent study of this issue, see Herbert A. Davidson, "Maimonides on Metaphysical Knowledge," *Maimonidean Studies* 3 (1992-93): 49-103.
6. This possibility raises complicated questions concerning Maimonides' attitude towards the status and authority of earlier rabbinic figures. See my *Maimonides on the "Decline of the Generations" and the Nature of Rabbinic Authority* (Albany, 1996). I should note that while throughout this essay I speak of "Torah," in most contexts I actually mean "the specific commandments of the Torah."
7. I cite the translation presented in my *Dogma in Medieval Jewish Philosophy* (Oxford, 1986), 14 (with slight emendations).
8. See Kellner, *Dogma*, p. 15.
9. I refer readers who may (mistakenly) think that Maimonides did not hold the commandments of the Torah to be unalterable to Alfred Ivry's recent elegant statement of the issue. He writes that in his *Mishneh Torah*, Maimonides "gave his generation, and those after it, a definitive formulation of Mosaic *cum* rabbinic law, and he considered himself its supreme arbiter." See A. Ivry, "Ismaili Theology and Maimonides' Philosophy," in Daniel Frank, ed., *The Jews of Medieval Islam. Community, Society, and Identity* (Leiden, 1995), 271-99, esp. p. 298. Whatever one may want to say about Maimonides' understanding of how Torah and commandments developed to his day, he surely did not hold that they would change after the publication of the *Mishneh Torah*.
10. Alfred Ivry (in the article cited above in n. 9, p. 283) notes that for Maimonides *ma'aseh merkavah* means revelation. One of the implications of this insight is that on some important level, the content of revelation and the content of metaphysics are the same thing.
11. I use the text of R. Joseph Kafih, *Mishnah 'im Perush ha-Rambam* 2 (Jerusalem, 1963), 376. The term here is *sitrei 'arayot*, on which, see Moshe Idel, "*Sitrei 'Arayot* in Maimonides' Thought," in S. Pines and Y. Yovel, eds., *Maimonides and Philosophy* (Dordrecht, 1986), 139-56.
12. I.e., one may teach *ma'aseh bereshit* to, at most, one student.
13. *Hagigah* 11b. Maimonides is citing the talmudic explanation for the restriction against teaching *ma'aseh bereshit* to more than one student at a time: one person may ask concerning "the days past," not two people.
14. See Vol. 1, pp. 34ff. in Rabbi Kafih's edition. For an English translation of this passage, see Fred Rosner, trans., *Commentary on the Mishnah. Introduction to the Mishnah and Commentary on Tractate Berachoth* (New York, 1975), 111.

15. Rabbi Kafih translates *emunato*, "his faith" (perhaps because Maimonides is here speaking about simple people). The Arabic is a variant of *i'tiqad*, which, when Maimonides translates himself from Arabic to Hebrew (as is the case with the first positive commandment in *Sefer ha-Mizvot* and the first *halakhah* in the *Mishneh Torah*), he renders as some variant of *da'at*, "knowledge" or "understanding".
16. By this I take Maimonides to mean "existence as such."
17. I.e., the Tannaim whose views are cited in *Hagigah* II.1.
18. An obvious reference to the opening sentence of Aristotle's *Metaphysics*.
19. Maimonides is here talking about the need to study the sciences in the proper order. On this issue, see my "Gersonides on the Song of Songs and the Nature of Science," above, n. 1.
20. I.e., for the existing universe.
21. I.e., this person wants to attain knowledge the wrong way, via the imagination, which can only lead to harm. It would be better, therefore, were this person classified with the non-human animals; humans, after all, are distinguished by their intellects.
22. This can only be understood in the context of Maimonides' Aristotelian comprehension of human beings as "rational animals"—humans become such only to the extent that they actualize their intellectual potential to some degree or other. For details, see my *Maimonides on Judaism and the Jewish People* (Albany, 1991), 9-16 and 23-24.
23. This should be understood in the light of Maimonides' stand that moral perfection is a prerequisite for intellectual perfection and that intellectual perfection is not like money in the bank (as Lenn Goodman once wisely observed to me); it is, rather, like vigor or "being in shape". To stay in shape, one must constantly exercise. It is like treading water: if you stop, you sink. Thus, Maimonides has a problem with the notion of a wicked philosopher. For more on the points raised in this note, see my *Maimonides on Human Perfecton* (Atlanta, 1990), 26-28.
24. Song of Songs 4:11. On this, *Hagigah* 13a comments, "The things that are sweeter than honey and milk should be under they tongue," i.e., not taught expressly. My thanks to Y. Tzvi Langermann for his help with the translation of this passage.
25. For a discussion of Maimonides on the proper approach to the study of the sciences, see my "Gersonides on the Song of Song and the Nature of Science," (above, n. 1).
26. There is no doubt that by this expression Maimonides means "specific commandments." This is the sense of the term in the mishnaic text (*Hagigah* 1:8) to which Maimonides is referring here and it is the sense of the term in the two places in which he uses it in the *Mishneh Torah* (*Hil. 'Avodah Zarah* 2:5 and *Hil. Shabbat* 12:8). The term occurs in the Jerusalem Talmud once (*Hagigah* 1:8) and six times in the Babylonian Talmud (*Berakhot* 63a, *Shabbat* 32b, *Hagigah* 10 and 11b, *Hullin* 60b, and *Kritot* 5a). In these passages as well, the sense of the term is clear: specific commandments of the Torah. The Soncino Talmud translates the term as "essentials of the Torah," which is misleading.
27. Isadore Twersky was the first to focus attention on this text. See his *Introduction to the Code of Maimonides (Mishneh Torah)* (New Haven, 1980), 361. Twersky notes that all editions of the Mishnah before that of Rabbi Kafih mistakenly omitted the crucial phrase. See also Rabbi Kafih's notes to his edition/translation.
28. For further details, see my *Maimonides on Judaism and the Jewish People* (above, n. 22), 65-68.
29. *Guide of the Perplexed*, I- Introduction. I cite from the translation of Shlomo Pines (Chicago, 1963), 5. I emended the translation slighdy.
30. For details, see my "The Conception of the Torah as a Deductive Science in Medieval Jewish Thought," *Revue des etudes juives* 146 (1987): 265-79. For an argument to the effect that this interpretation is correct, see my *Maimonides on Judaism*, 68ff.

31. God's existence, unity, and incorporeality are demonstrable, what is unknowable in metaphysics are other positive statements about God.
32. The following paragraphs are based upon the discussion in my *Maimonides on the "Decline of the Generations"*, 76-78.
33. I translate from Y. Shailat's *Iggerot ha-Rambam* 2 (Jerusalem, 1987), 553. On this letter, see Alexander Marx, "Texts By and About Maimonides," *JQR* 25 (1934-5): 374-81; Alfred Ivry, "Islamic and Greek Influences on Maimonides' Philosophy," in *Maimonides and Philosophy* (above, n. 11), 139-56; and Shlomo Pines, "Translator's Introduction," p. lix, in Pines' translation of the *Guide*. For more on this letter and especially on its influence, see Steven Harvey, "Did Maimonides' Letter to Samuel ibn Tibbon Determine Which Philosophers Would be Studied by Later Jewish Thinkers?," *JQR* 83 (1992): 51-70.
34. See also II:23 (p. 332). Jose Faur plays down the significance of these passages, interpreting them so as to diminish Maimonides' admiration for Aristotle. See his *'Iyyunim ba-Mishneh Torah li-ha Rambam* (Jerusalem, 1978), 7. I find Faur's interpretation forced, an estimation reinforced by the fact that Shem Tov ibn Falaquera, Maimonides' great thirteenth century admirer, criticized the Master for his excessive admiration of Aristotle. See Henry Malter, "Shem Tob ben Joseph Palquera II: His 'Treatise of the Dream'," *JQR* 1 (1910-11): 451-501, esp. p. 492.
35. I quote from the translation in Ralph Lerner and Muhsin Mahdi, *Medieval Political Philosophy* (Ithaca, 1972), 230. I have slightly emended the translation.
36. This is the burden of Maimonides' refutation of Aristotle's thesis concerning the eternity of the world in *Guide* II:13-31; see especially chapter 17.
37. Compare also II:3, p. 254. Here we have an example of Maimonides' "whig" interpretation of the history of science.
38. See *Guide* II:22 and 24.
39. See *The Medical Aphorisms of Maimonides*, Vol. 2, trans. and ed. by Fred Rosner and Suessman Muntner (New York, 1971), 205.
40. For more on this point, see the discussion in my "On the Status of the Astronomy and Physics in Maimonides' *Mishneh Torah* and *Guide of the Perplexed*: A Chapter in the History of Science," (above, n. 1).
41. For an analysis of these and similar texts, see my *Maimonides on the "Decline of the Generations" and the Nature of Rabbinic Authority*, 55-59.
42. I quote from Gerald J. Blidstein, "Maimonides on 'Oral Law'," *Jewish Law Annual* 1 (1978): 108-22.
43. See Sara Klein-Braslavi, *Perush ha-Rambam li-Sipur Briat ha-'Olam* (Jerusalem, 1978).
44. Cf. *Guide of the Perplexed* III:1-7.
45. (Jerusalem, 1972), 8.
46. For details, see my *Dogma*, p. 17 and p. 53.
47. *Sefer ha-Mitzvot*, *Mitzvat 'Aseh* 1, *Hil. Yesodei ha Torah* 1:1-6.
48. See *Guide of the Perplexed* III:37, pp. 542 and 545 and, most especially, *Hil. 'Avodah Zarah* 2:4.
49. With respect to prayer, at least, the point is made clearly in *Guide* III:51, p. 620:

> As for someone who thinks and frequently mentions God without knowledge, following a mere imagining or following a belief adopted because of his reliance on the authority of someone else, he is, to my mind, outside the habitation and far away from it and does not in true reality mention or think about God.

Who are those "outside the habitation"? The answer, it appears to me, is on the previous page:

> Those who are within the city, but have turned their backs upon the ruler's habitation, are people who have opinions and are engaged in speculation, but who have adopted incorrect opinions either because of some great error that befell them in the course of their speculation or because of their following the

traditional authority of one who has fallen into error. . . . They are those concerning whom necessity at certain times impels killing them and blotting out the traces of their opinions lest they should lead astray the ways of others.

For Maimonides, prayer requires intention (*kavanah*)—see *Hil. Tefillah* 4:1 and 4:15; Shalom Rosenberg, "Tefillah ve-Hagut Yehudit," in Gabriel H. Cohn, ed., *Ha-Tefillah ba-Yehudit: Hemshekh ve-Hiddush* (Ramat Gan, 1978), 85-130; and Yaakov Blidstein, *Ha-Tefillah bi-Mishnato ha Hilkhatit shel ha-Rambam* (Jerusalem, 1994), 77-122—and prayer without intention is not prayer: one who directs prayer to a false god is thus committing idolatry. I have no proof for my wider claim that performance of *any* act of religious devotion while holding a corporealist conception of God is idolatry, although I am convinced that it is Maimonides' position.

50. *Maimonides on Human Perfection* (Atlanta, 1990).
51. For what is to my mind an important study of the religious life of the perfected worshipper of God, see Ehud Benor, *Worship of the Heart: A Study in Maimonides' Philosophy of Religion* (Albany, 1995).
52. P. 74. Cf. *Hil. Yesodei ha-Torah* 2:1.
53. For the origin of this phrase in Plato, its use by Pierre Duhem to impute to Maimonides an instrumentalist as opposed to realist approach to astronomy, and for the difference between instrumentalism and realism in the philosophy of science (with special reference to Maimonides), see my articles cited above in n. 1.
54. Unless, of course, it could be shown that God had no will. But given the limitations on what we can actually say about God for Maimonides, the possibility of demonstrating that God has no will is, to put it mildly, remote.
55. Earlier versions of this paper were read as lectures at the Boston Colloquium for the Philosophy of Science (March, 1990) and at the Institute for Advanced Studies in Jerusalem (June, 1996). My thanks to Tzvi Langermann and Yizhak Twersky for their invitations. Gad Freudenthal and Kenneth Seeskin were typically generous with insightful and helpful comments and suggestions.