

BERNARD R. GOLDSTEIN

University of Pittsburgh

LEVI BEN GERSON'S ASTROLOGY IN HISTORICAL PERSPECTIVE

0. INTRODUCTION

Levi ben Gerson wrote only one astrological text that survives, but it shows a deep familiarity with the tradition as it was available in Hebrew treatises. This text is a prognostication based on the conjunction of Saturn and Jupiter to take place in March 1345 and, as we learn from the text itself, Levi died in 1344 before completing its composition. There are many reasons why this text is significant; however, before addressing them we will first briefly sketch some aspects of astrology before Levi's time together with a few remarks on the relationship of astrology to astronomy.

1. A BRIEF HISTORY OF ASTROLOGY BEFORE THE TIME OF LEVI BEN GERSON

Although astrologers have tended to make extravagant claims for the antiquity of their subject, we now know that horoscopic astrology was largely a Hellenistic cultural phenomenon with Babylonian antecedents. Astral omens may go back to the end of the third millennium in Babylon (e.g., "If Mars approaches the Scorpion, there will be a breach in the palace of the prince" [Reiner and Pingree 1981, p. 41; cf. Huber 1987]), but the oldest dated horoscope from Babylon that is preserved goes back only to the late fifth century B.C., and there is little information to tell us why this new form of astrology was introduced. The mode of transmission of Babylonian horoscopic astrology to the Hellenistic world remains to be discovered, but it is clear that at some point Hellenistic philosophy was blended with Babylonian techniques. (Note that the oldest surviving dated Greek horoscope derives from the first century, B.C. [Neugebauer-Van Hoesen 1959, p. 161].) It is of considerable interest that horoscopic astrology concentrates on the fate of an individual, whereas the earlier

astral omens primarily concerned the date of the king or the nation [cf. Sachs 1952]. However, there was also a variant of horoscopic astrology that deals with "general", i.e., historical, events, and this is the kind of astrology that appears in Levi's text.

Given the paucity of surviving texts from antiquity and that the discoveries of texts by archeologists are by chance, it is not surprising that many details of the early history of astrology remain obscure. For the same reason it is difficult to determine the relationship between astrology and astronomy in antiquity. The most important ancient astronomical text is Ptolemy's *Almagest* (composed ca. 150 A.D.) where astrology does not enter the discussion at all. Nevertheless, we have another treatise by Ptolemy, generally called the *Tetrabiblos*, which is entirely devoted to astrology. Was Ptolemy motivated by astrological concerns to investigate astronomical questions? He does not speak directly to this issue, but it seems evident that his interest in astronomy far exceeded anything that his astrology demanded (leaving aside the fact that the *Tetrabiblos* was written after the *Almagest* [cf. Neugebauer 1975, p. 897]). Extant texts on astronomy in Greek written prior to Ptolemy are few and far between, and we are not well informed about their authors' views on the relationship between astronomy and astrology if, in fact, they held such views. It is worth emphasizing that one cannot assume such views existed in the absence of specific passages affirming them.

On the origin of astrology we may cite the account by al-Bīrūnī, a Muslim scholar of the eleventh century:

As [people] had no wish for astronomy, disliked it and had a distaste for it, they manifested hostility to it and towards those who [practiced] it. For this reason the ancients came to predict the [future] states of the world by means of propositions [drawn from this art], working out various methods which had the appearance of persuasiveness in order to provide knowledge [of these states] on the basis of [astronomical] influences. [Thus] they differentiated from [astronomy] the art of judicial astrology, and made [people] think that the latter was the fruit of the former, ... knowing, as they did, that the desire of the generality of people to obtain knowledge [of the future] with a view to an increase in welfare and to the avoidance of hurt would turn away from them, [i.e., the astronomers in question] the sharp point of blame and ward off from them the keen edge of calamities ... As [astrology] is not based on [intellectual] necessity, differences of opinion are possible, and the methods used in it have multiplied in various ways. [Pines 1964].

While this story has no factual basis, it is clear from it that al-Bīrūnī was sceptical about the truth of astrology which he calls merely opinion. Yet he wrote extensively on this subject and, indeed, his discussion of astro-

logical principles is often the most lucid one available in any treatise — ancient, medieval, or modern.

When we turn to ancient Jewish texts, we find no evidence in support of horoscopic astrology in the Talmud, but there are references to divination by means of the planets.

Samuel said: A vernal equinox which falls in [the hour of] Jupiter will surely cause trees to break, and a winter solstice which falls in [the hour of] Jupiter will surely dry out the seedlings ... provided that the [previous] New Moon took place in [the hour of] the Moon or in [the hour of] Jupiter. [Babylonian Talmud, *Eruvin* 56a].

This is a limited kind of divination based on the association of a planet with each hour of the day, and with each day of the week [Beller 1988, p. 65], a system that was also in vogue with horoscopic astrologers and which is the source for the names of the days of the week we still use (English: Saturday, Sunday, Monday; French: lundi, mardi, etc.). The same kind of divination is also found in a text known as the *Baraita di-Shmuel I*, possibly written by the Babylonian talmudic sage Samuel (third century, A.D.), and this treatise was available to Abraham Bar Ḥiyya and to Abraham Ibn Ezra in the twelfth century [Beller 1988]. In another early Hebrew text, known as the *Baraita de-Mazzalot* (composed after the completion of the *Talmud* and before the eleventh century), we find astrological doctrines that fully accord with those in Hellenistic texts such as the *Tetrabiblos* [Sarfatti 1965; see also Kiener 1987].

The Islamic world inherited the culture of late antiquity, and much astrological lore was translated from Greek. The late eighth and ninth centuries was a period of great intellectual achievement, and among the scholars in Baghdad was a Jew called Māshā'allāh (d. 815: known in medieval Europe as Messahala) who became a leading authority on astrological matters [cf. Kennedy and Pingree 1971]. One important part of his legacy concerns astrological history, and his influence was felt by medieval authors writing in Arabic, Latin, and Hebrew. Apparently, one of his astrological theories goes back to Sasanian Persian sources, according to which major political and religious changes are indicated by conjunctions of Saturn and Jupiter that recur at intervals of 20 years. Furthermore, after about 240 years the position of the conjunction shifts from one triplicity to another indicating a more significant change, the rise of a new nation or dynasty. A triplicity is a set of 3 zodiacal signs: there are 4 triplicities in all, each one of which is assigned to one of the 4 elements (air, water, earth, and fire: see Appendix). The coming of a prophet is associated with the completion of a cycle of all 4 triplicities, and

this happens about once every 1000 years [cf. Kennedy-Pingree 1971, p. vi].

Among those who were strongly influenced by Māshā'allāh was Abraham Ibn Ezra (d. 1167) whose astrological treatises written in Hebrew were translated into Latin in the late thirteenth century by Henry Bate of Malines. Ibn Ezra stressed, as other astrologers had done, that the rules of astrology are based on "experience" (Heb. *nisayon*), i.e., that the rules are a distillation of correlations between terrestrial events in the past with corresponding celestial phenomena. This claim to "scientific" status for astrology was, to be sure, challenged at the time, but arguments against astrology were not taken to be decisive by many steeped in the intellectual traditions of the day.

Ibn Ezra translated into Hebrew a treatise by Māshā'allāh called *The Book on Eclipses*, which does not survive in the original Arabic [Goldstein 1964]. In the opening chapter an analogy is made between the power of the planets over the four terrestrial realms (*viz.* minerals, plants, animals, and sentient beings) and the power of the magnet to attract iron: this is supposed to mean that astrological influence is a physical phenomenon that can be observed. In order to deal with theological opposition, it is added that "all this takes place according to the commandments of God, through the power and strength of the stars". The text goes on to present a standard classification of the natures of the zodiacal signs and then turns to planetary conjunctions, informing us that a conjunction in an aquatic sign at the time of the vernal equinox indicates much water and rain, whereas a conjunction in a fiery sign indicates much dearth and famine on account of the strong heat and dryness. The text continues, "when an eclipse of the moon takes place in a cold zodiacal sign, it indicates intense coldness", following the pattern in astrology of the arbitrary, but systematic, classification of phenomena. Indeed, it is this characteristic that was attacked by some of the more perceptive medieval critics of astrology, but that has often been ignored by recent opponents of this art. For example, Ibn Qayyim al-Jawziyyah (fourteenth century) argued that since the zodiacal signs must all have the same essence (as the philosophers all agree), the influence of a planet cannot depend on its position in the zodiac, and it is absurd to imagine an abrupt change taking place at a point on the zodiac dividing one nature from another [cf. Livingston 1971, p. 98].

The latter part of Ibn Ezra's text deals with a theory of planetary conjunctions said to govern general events in the future such as the downfall of a kingdom or the coming of a prophet. The significance of the

conjunction is determined by a rather complicated set of rules that depend on the locations of the planets in the zodiac and its various subdivisions, the aspects of the planets (i.e., their relative positions), the place of the ascendant (i.e., the point on the ecliptic that is rising over the horizon at the moment of the conjunction), the nature of the planet that rules the conjunction (e.g., Saturn is malevolent and Jupiter is benevolent), etc. For example, we are told that "if the [planetary] ruler of the horoscope is benevolent, it is an indication of good and the improvement of times; but if it is malevolent, it is an indication of evil, destruction, drought, famine, and war" [Goldstein 1964, p. 212].

In additions to translations of astrological texts from Arabic, Ibn Ezra composed a series of such treatises in Hebrew that circulated quite widely, judging from the impressive number of surviving copies. Some of these Hebrew texts have been published with translation, but sometimes the translator was not familiar with the rules or the terminology of astrology. This is certainly the case with Raphael Levy's English translation of Ibn Ezra's *The Beginning of Wisdom* which appeared in 1939. The Hebrew text, however, is quite clear and provides us with a wealth of astrological lore, much of which bears on the theory of astrological influence on historical events. For example, we are given detailed information on the nature of the zodiacal signs, including the 2 systems of astrological "terms": each zodiacal sign is divided into five terms of unequal length, and each term is ruled by one of the five planets. One set of terms for each sign is ascribed to the Egyptians, and the other to Ptolemy. We are informed that each zodiacal sign rules over certain countries, and also that it is associated with certain professions. Another chapter defines the 12 astrological houses and their properties: this is a division of the zodiac determined by the ascendant at a given moment according to a set of mathematical rules [for the 7 sets of rules for determining the boundaries, or cusps, of the astrological houses, see North 1986]. The astrological houses change from moment to moment according to the daily rotation of the heavens, and they also depend on the geographical latitude for which the horoscope is cast. Each house has a set of properties, e.g., the third house rules over brothers, dreams, wisdom, religion, etc. [Levy 1939, p. 192]. In the chapter on the significance of the planets we are told, for example, that "Mars is hot, scorching dry, harmful, and destructive; it indicates destruction, dearth, conflagrations, rebellion, blood, massacres, wars, disputes", etc. [Levy 1939, p. 197]. Each zodiacal sign is ruled by one of the seven planets (i.e., the five planets visible to the naked eye plus the

Sun and the Moon), and these rulers enter into the discussion of the significance of the horoscope.

Another Jewish scholar of the 12th century who wrote on astrology and astronomy in Hebrew was Abraham Bar Ḥiyya, and he even mentioned the conjunction of 1345 in his *Megillat ha-Megalleh*, a book devoted to messianic speculation. According to Bar Ḥiyya, this conjunction of Saturn and Jupiter, which he predicted for 10 Nisan 5105 A.M. [i.e., 14 Mar. 1345], has messianic significance, and its effect is to begin 13 years later, in 1358, a date that he coordinated with his interpretation of a biblical passage, “From the time the regular offering is abolished, and an appalling abomination is set up — it will be 1290 days...” [Dan. 12:11; Bar Ḥiyya in Millàs i Vallicrosa 1929, p. 246]. The number of days, 1290, is interpreted to mean 1290 years, to be counted from the destruction of the temple in Jerusalem which, following the medieval Jewish tradition, he thought took place in 68 A.D., and this yields 1358 A.D. This date also appears in other contexts, e.g., Moses ben Naḥman, in a commentary on Gen. 2:3 written in the 13th century, engages in messianic speculation concerning the year 1358.

It is well known that Maimonides (d. 1204) was fiercely opposed to astrology, and considered it a form of paganism. While he approved of astronomy which, he argued, was an ancient Jewish science that had been transmitted to the Greeks and subsequently lost among the Jews [*Guide* I.71, trans. Pines 1963, p. 175; cf. Roth 1978], in his view astrology is the religion of the Harranians that Abraham rejected [cf. e.g., *Guide* III.29; trans. Pines 1963, pp. 514-518]. He spoke directly against a theory of astrological history in his *Epistle to Yemen*, as follows:

I note that you are inclined to believe in astrology and in the influence of the past and future conjunctions of the planets upon human affairs. You should dismiss such notions from your thoughts. Cleanse your mind as one cleanses dirty clothes. [Twersky 1972, p. 452].

Moreover, in the same treatise (composed in 1172) he argued against the significance of a specific astrological conjunction:

Furthermore you write that some people have calculated the forthcoming conjunction and have determined that all seven planets will meet in one of the constellations of the Zodiac. This forecast is untrue, for no meeting of the seven planets will occur in the next conjunction, nor in the following ones. For such an event will not happen even in ten thousand years, as is well known to those who are familiar with the astronomical law of equation ... Do not consider a statement true because you find it in a book, for the prevaricator is as little restrained with his pen as with his tongue. [Twersky 1972, p. 454].

As we now know from a Geniza document, Maimonides is referring to predictions based on the "conjunction" of all the planets in Libra that was to take place in 1186 [Goldstein-Pingree 1977, p. 114]. Maimonides indicated that the planets would not all be at exactly the same longitude (required for a true conjunction), but merely within a zodiacal sign (i.e., a 30° arc of the ecliptic), close enough for certain astrological purposes, but of no significance according to this opponent of astrology.

Other new evidence from the Cairo Geniza sheds considerable light on the cultural context in which Maimonides lived, for a series of astrological documents from 12th century demonstrates that astrology was practiced among the Jews in Cairo in ways that do not seem to differ significantly from those of their Muslim neighbors [cf. Goldstein-Pingree 1979, Goldstein-Pingree 1981, and Goldstein-Pingree 1983]. These documents from the Geniza are all written in the Arabic language, but some use Arabic characters while other use Hebrew characters. Astrology was the subject of polemical writings by Muslims as well as by Jews with both supporters and opponents in each community, and so it is wrong to claim that one or the other community accepted or rejected it.

In the Jewish community of southern France in the thirteenth century, astrology was studied along with astronomy by such figures as Levi ben Abraham ben Ḥayyim who included these subjects in his encyclopedia, *Livyat Hen* [see Freudenthal 1989]. As noted by Steinschneider [Malter-Marx 1925, p. 233], Levi ben Abraham ben Ḥayyim was very much indebted to Abraham Ibn Ezra for his astrology. Moreover, of particular interest for us, he cited the passage on the conjunction of 1345 from Bar Ḥiyya, and this indicated an awareness in the Jewish community of the messianic character of this conjunction two generations before Levi ben Gerson.

2. ASTRONOMICAL CONTRIBUTIONS BY LEVI BEN GERSON

In order to appreciate Levi's text on the conjunction of 1345, some knowledge of his contributions to astronomy is necessary. Indeed, astrological interpretation only begins after the astronomical data for the moment in question have been established. Our text contains astronomical information concerning the conjunction of the Sun and the Moon on 4 March 1345, just before the vernal equinox; the lunar eclipse that took place on 18 March 1345, just after the vernal equinox; the conjunction of Saturn and Jupiter on 9 March 1226; and the conjunction of Saturn and

Jupiter on 28 March 1345. In general, Levi computed the positions of all the planets at each of those moments, as well as the astrological houses.

For the Sun and the Moon Levi made use of his own tables, as can be verified by consulting them [ed. Goldstein 1974]. These tables are to be found in Levi's main astronomical work that forms part 1 of book 5 of his *Wars of the Lord* and is preserved in manuscripts separate from the rest of this theological *magnum opus*. This work on astronomy, consisting of 136 chapters that fill about 250 folios in manuscript, is highly original both in form and in content with respect to the Ptolemaic tradition that Levi inherited and criticized. Levi's tables are among his original contributions because they are entirely computed by him and because they depend, in large measure, on new models and new parameters that Levi introduced. Levi was keenly interested in comparing theory with observations, and the observations he made are among the most extensive in the Middle Ages [see Goldstein 1988]. However, for astrological purposes no observations are needed, and the data in our text are all computed (as is to be expected in the case of a prediction). Elsewhere I have also dealt with Levi's invention of new astronomical instruments, and his improvements of others [see Goldstein 1985].

Levi's computation of the astrological houses in our text is non-standard -- it follows what John North has called the "hour lines" method. According to North, Ibn Ezra is the earliest astronomer known to have described this method and Levi is the first astronomer known to have used it [North 1986, pp. 23-25]. In checking Levi's data with a computer program, one finds that Levi's computations are extremely accurate by medieval standards.

For the planets no tables appear in the extant manuscripts, even though they are mentioned in the table of contents. Unfortunately, the chapters towards the end of Levi's *Astronomy* have many gaps, and so far it has not been possible to reconstruct all the details of his planetary theory. Hence, for checking the planetary positions in our text it has been necessary to depend on modern tables in which historical data have been recomputed [cf., e.g., Tuckerman 1964].

3. LEVI BEN GERSON'S PROGNOSTICATION FOR THE CONJUNCTION OF 1345

In our text, uniquely preserved in MS. Cambridge heb. Add. 1563, folios 104b:20-106a:8 [first identified in Touati 1973, p. 58], Levi inter-

preted the conjunction of Saturn and Jupiter, computed to take place on 28 March 1345, according to the rules of astrological history almost all of which can be traced in the works of Abraham Ibn Ezra. Levi cites no source for his interpretations, and the only text mentioned is his own *Wars of the Lord*. Yet there can be no doubt that he was aware of the relevant works of Abraham Ibn Ezra and of Abraham Bar Ḥiyya, authors whom he cited elsewhere.

As we have seen, interest in the conjunction of 1345 in a messianic context was already manifested by Abraham Bar Ḥiyya in the twelfth century and by Levi ben Abraham ben Ḥayyim towards the end of the thirteenth century. Thus, it would not be surprising if, as the date approached, this forthcoming conjunction generated considerable excitement in the Jewish community. In that case, it is also possible that their Christian neighbors, including officials of the papal court in Avignon, became aware of this excitement. We may then ask why and for whom Levi wrote this text. In particular, was it intended for a Jewish audience or a Christian one? We know that Levi was asked to engage in astronomical research at "the request of many great and noble Christians" as he put it [see Goldstein 1974, p. 20], and our text was translated into Latin by his assistant, a Christian cleric, Peter of Alexandria, with the help of Levi's brother, Solomon, shortly after Levi died in 1344. Moreover, in the Latin version we are told that "the comet which we [i.e., Levi] saw ... in the year of Christ 1339 ... signified ... a conflict with the southerners, as we then predicted to our lord, the pope of sacred memory, Pope Benedict XII" [Goldstein-Pingree 1990, p. 32]. While the Christian epithets were no doubt added by the translator, it is clear from this passage that in 1339 Levi was advising the Pope based on astrological considerations.

Our text presents a great deal of astrological detail, but never mentions the coming of the messiah. To be sure, the text was not finished when Levi died, and so one could argue that he intended to discuss the messiah in a section to be written later. However, this seems unlikely for the following reasons: Levi has recalculated the planetary positions, the date, and the time of day of this conjunction, which shows that he did not accept the date in the prediction made by Abraham Bar Ḥiyya. In particular, Levi argued that the effect of the conjunction (based on the astronomical data he presents) will begin to take place in the tenth year (1355), rather than in the thirteenth year (1358), as Bar Ḥiyya had claimed. On the other hand, the date 1358 had messianic significance for Levi, as we learn from his commentary on the Book of Daniel. Hence, for Levi the conjunction of 1345 will have significance for the Gentiles in 1355, whereas the fulfillment

of biblical prophecy concerning the messiah will begin to unfold in 1358. In his comment on Dan. 12:11, Levi adds "it is also evident from this [passage] that this end [i.e., the unfolding of messianic fulfillment] does not take place on account of the configuration of the stars but on account of individual divine providence for the sake of the patriarchs...". Thus, we have an explicit statement by Levi that astrology has nothing to tell us about the coming of the messiah. If Levi were writing for a predominantly Jewish audience, one would expect a clearer expression of his views on the messiah, but if he had been requested to write about the forthcoming conjunction by the Pope (or someone in the papal court), he might well confine himself to those matters which in his view were properly astrological.

In the opening passage of his prognostication, Levi tells us that the decrees of the stars can be changed either by the exercise of individual free will or by divine providence. But Levi seems to think that while few individuals will exercise free will to overcome their native dispositions (which come under the influence of the stars), the Jewish people are the subject of special divine providence. Thus, the decrees of the stars are valid for predictions concerning the generality of mankind (and hence of historical events), even though they cannot be used to predict with certainty the actions of a particular person or the future of the Jewish people [cf. Freudenthal 1987; idem 1990]. Such exclusion from the "Laws of history" is one way to express the chosenness of the Jewish people, and conforms to the ancient dictum: "There is no planet [governing] Israel" [Babylonian Talmud, *Shabbat*, 156a; cf. Beller 1988, p. 65].

Levi tells us that the conjunction of Saturn and Jupiter will take place on 28 March 1345, at 1:17 hours after noon. "On account of Saturn it indicates much disease, senseless enmity, strife, destruction of places, collapse [of buildings], and the sinking of ships in some seas ... The Sun ... will be in the house of its joy and the [zodiacal] sign of its exaltation ... It indicates the arising of a reign led by a leader who will be righteous, just, [turning] from evil, and of prophetic [stature]. Venus will be in the house of kingship, and it is its domicile; it indicates the mightiness of the success of the reign that recently arises". At this point, the Hebrew text adds: "Up to here [is all that] he revealed and he added nothing more, for he [Levi] was beckoned to the Upper Academy, may his soul be bound up in the bond of [everlasting] life" [Goldstein-Pingree 1990, p. 21]. While Levi predicted the coming of a righteous king, it is apparently a gentile king, not the messiah.

4. THE IMPACT OF LEVI'S PROGNOSTICATION IN LATIN

As we have already mentioned, Levi's text was translated into Latin shortly after his death: this version survives in 4 known manuscripts, all of which differ significantly from the Hebrew version. In particular, they add planetary positions as well as some other passages that were almost certainly in Levi's text. Thus, we must consult the Latin along with the Hebrew version to get a clear understanding of Levi's meaning.

Interest is the conjunction of 1345 at the papal court continued after Levi's death, for we learn that in September 1344 the Pope summoned Johannes de Muris and Firminus de Bella Valle to Avignon [Déprez 1899] and, during the winter of 1344-1345, both of them wrote predictions based on the planetary conjunction to take place in March 1345 [see Pruckner 1933]. Neither cites Levi's text, but it may be argued that Johannes de Muris was aware of his Jewish predecessor. The computations by Johannes de Muris do not agree with those by Levi for, as one would expect, they depend on the Alfonsine tables [cf. Poulle 1988]; moreover, the date for the conjunction of Saturn and Jupiter is given by Johannes as 20 (or possibly 21) March 1345, i.e., about a week earlier than Levi's date for the same event. But in his remarks on the significance of this conjunction, Johannes tells us that the Jews expect the coming of the messiah within 10 years from 1345, based on astrological principles. Now, all the Jewish sources I have found indicate that messianic fulfillment was to begin in 1358, and not in 1355. Levi seems to have been unique in finding something of interest to predict for 1355; yet for him it was not a date of messianic significance. It is possible that Jews who know of Levi's text preferred to consider his predictions relevant to the coming of the messiah, despite Levi's views to the contrary, and adjusted their expectations accordingly. Under those circumstances Johannes de Muris might have heard about this version of Levi's views at the papal court in Avignon.

Johannes had a reason not to accept the messianic significance of this conjunction based on the astrological theory of interpreting history. According to Ibn Ezra (who is among the astrological authorities cited by Johannes), only a great conjunction signifies the coming of a prophet or a similar event of great religious significance. A great conjunction takes place when the conjunction of Saturn and Jupiter enters a new triplicity, and the conjunction of 1345 does not satisfy this requirement. Since this fact was already known to Abraham Bar Ḥiyya [Millàs i Vallicrosa 1929, p. 239] and to Levi ["The Middle conjunction took place in the year 1226,

9 March, when Saturn and Jupiter began to be in conjunction in [one of] the airy signs. They were in conjunction at Aquarius 3;36⁰⁰": see Goldstein-Pingree 1990, pp. 15, 42], it seems clear that Jewish interest in this conjunction arose from the interpretation of the Book of Daniel rather than from strictly astrological considerations. This suggests that the discussions of the conjunction of 1345 by Johannes de Muris and Firminus de Bella Valle were motivated, directly or indirectly, by a Jewish tradition.

After the outbreak of the Black Death, this conjunction was seen by a number of authors as having presaged it. However, those who wrote about the conjunction before the plague showed no inclination to interpret it as such and, as we have tried to indicate, their interests in this conjunction were directed to other matters. To be sure, in our text Levi remarks that the lunar eclipse of 18 March 1345 signifies "much disease and killing in the world", but this is virtually a commonplace in astrological predictions; only in retrospect did it assume outstanding importance.

5. CONCLUSION

As we have seen, astrology was practiced by Muslims, Christians, and Jews in the Middle Ages, and they all shared a common legacy that goes back to antiquity. While astrology was attacked for a variety of reasons, many pious adherents of each of the monotheistic faiths found astrology compatible with their religious beliefs. Thus, Levi ben Gerson was able to integrate certain astrological principles into his theology, while keeping his messianic speculations free from astrological considerations.

Levi's interest in astronomy was profound and he was occupied with research in this domain for most of his mature years. From the texts that survive, it would seem that his interest in astrological predictions was much more limited and may have been stimulated by the papal court. The theory of astrological history that Levi applied to the planetary conjunction of 1345 was taken from Ibn Ezra, a noted Jewish scholar of the twelfth century, who depended on still earlier sources. We see, therefore, that Levi followed a long tradition and that he clearly mastered the rules contained in it. Finally, we have reason to believe that Levi's analysis of this planetary conjunction helped to stimulate Christian interest in it, and that in turn this led to the astrological interpretation of the cause for the Black Death.

Acknowledgement. I am grateful to Alan C. Bowen and to Gad Freudenthal for their comments on a draft of this paper.

REFERENCES

- BELLER, E., 1988. "Ancient Jewish Mathematical Astronomy", *Archive for History of the Exact Sciences*, 38: 51-66.
- DÉPREZ, E., 1899. "Une tentative de réforme du calendrier sous Clément VI", *Mélanges d'archéologie et d'histoire de l'École Française de Rome*, 19: 131-143.
- FREUDENTHAL, G., 1987. "Épistémologie, astronomie et astrologie chez Gersonide", *Revue des Études Juives*, 146: 357-365.
- FREUDENTHAL, G., 1989. "Sur la partie astronomique de *Liwyat Hen* de Lévi ben Abraham ben Hayyim", *Revue des Études Juives*, 148: 103-112.
- FREUDENTHAL, G., 1990. "Levi ben Gershom as a scientist: Physics, Astrology and Eschatology", *Proceedings of the Tenth World Congress of Jewish Studies*, C1: 65-72.
- GOLDSTEIN, B.R., 1964. "The Book on Eclipses of Masha'allah", *Physis*, 6: 205-213.
- GOLDSTEIN, B.R., 1974. *The Astronomical Tables of Levi ben Gerson*, New Haven.
- GOLDSTEIN, B.R., 1985. *The Astronomy of Levi ben Gerson (1288-1344)*, New York, Berlin.
- GOLDSTEIN, B.R., 1988. "A New Set of Fourteenth Century Planetary Observations", *Proceedings of the American Philosophical Society*, 132: 371-399.
- GOLDSTEIN, B.R., and PINGREE, D., 1977. "Horoscopes from the Cairo Geniza", *Journal of Near Eastern Studies*, 36: 113-144.
- GOLDSTEIN, B.R., and PINGREE, D., 1979. "Astrological Almanacs from the Cairo Geniza", *Journal of Near Eastern Studies*, 38: 153-175, 231-256.
- GOLDSTEIN, B.R., and PINGREE, D., 1981. "More Horoscopes from the Cairo Geniza", *Proceedings of the American Philosophical Society*, 125: 155-189.
- GOLDSTEIN, B.R., and PINGREE, D., 1983. "Additional Astrological Almanacs from the Cairo Geniza", *Journal of the American Oriental Society*, 103: 673-690.
- GOLDSTEIN, B.R., and PINGREE, D., 1990. "Levi ben Gerson's Prognostication for the Conjunction of 1345", in *Transactions of the American Philosophical Society*, vol. 80.6, Philadelphia.
- HUBER, P., 1987. "Dating by Lunar Eclipse Omens with Speculations on the Birth of Omen Astrology", in *From Ancient Omens to Statistical Mechanics*, J.L. BERGGREN and B.R. GOLDSTEIN (eds.), Copenhagen, pp. 3-13.
- KENNEDY, E.S., and PINGREE, D., 1971. *The Astrological History of Māshā'allāh*, Cambridge, MA.
- KIENER, R.C., 1987. "The Status of Astrology in the Early Kabbalah", in *Proceedings of the Second International Conference on the History of Jewish Mysticism. Jerusalem Studies in Jewish Thought*, 6: 1-42 [English Section].
- LEVY, R., 1939. *The Beginning of Wisdom, An Astrological Treatise by Abraham ibn Ezra*, Baltimore.
- LIVINGSTON, J.W., 1971. "Ibn Qayyim al-Jawziyyah: A Fourteenth Century Defense Against Astrological Divination and Alchemical Transmutation", *Journal of the American Oriental Society*, 91: 96-103.
- MALTER, H. and MARX, A. (eds.), 1925. *Gesammelte Schriften von Moritz Steinschneider*, Berlin.

- MILLAS I VALLICROSA, J. (trans.), 1929. Abraham Bar Hiia: *Meguillat Hamegallè*, Barcelona.
- NEUGEBAUER, O., 1975. *A History of Ancient Mathematical Astronomy*, Berlin, New York.
- NEUGEBAUER, O., and VAN HOESEN, H.B., 1959. *Greek Horoscopes*, Philadelphia.
- NORTH, J., 1986. *Horoscopes and History*, London.
- PINES, S. (trans.), 1963. Maimonides: *The Guide of the Perplexed*, Chicago.
- PINES, S., 1964. "The Semantic Distinction Between the Terms *Astronomy* and *Astrology* According to al-Bīrūnī", *Isis*, 55: 343-349.
- POULLE, E., 1988. "The Alfonsine Tables and Alfonso X of Castille", *Journal of the History of Astronomy*, 19: 97-113.
- PRUCKNER, H., 1933. *Studien zu den astrologischen Schriften des Heinrich von Langenstein (Studien der Bibliothek Warburg 14)*, Leipzig.
- REINER, E., and PINGREE, D., 1981. *Babylonian Planetary Omens: Part 2. Enūma Anu Enlil, Tablets 50-51*, Malibu CA.
- ROTH, N., 1978. "The 'Theft of Philosophy' by the Greeks from the Jews", *Classical Folia*, 32: 53-67.
- SACHS, A., 1952. "Babylonian Horoscopes", *Journal of Cuneiform Studies*, 6: 49-75.
- SARFATTI, G.B., 1965. "An introduction to 'Barayta de-mazzalot'", *Annual of Bar-Ilan University*, 3: 56-82 [in Hebrew with an English summary].
- TOUATI, C., 1973. *La pensée philosophique et théologique de Gersonide*, Paris.
- TUCKERMAN, B., 1964. *Planetary, Lunar, and Solar Positions A.D. 2 to A.D. 1649 at Five-day and Ten-day Intervals*, in *Memoirs of the American Philosophical Society*, vol. 59, Philadelphia.
- TWERSKY, I., 1972. *A Maimonides Reader*, New York, Philadelphia.

APPENDIX: THE FOUR TRIPLICITIES AND THEIR ASSOCIATED ELEMENT

1. Fire: Aries, Leo, Sagittarius
2. Earth: Taurus, Virgo, Capricorn
3. Air: Gemini, Libra, Aquarius
4. Water: Cancer, Scorpio, Pisces

