

LECTURE II. *Babylon and Greece*

The relations of Greek philosophy with oriental theologies form a subject of vast extent, which has long been discussed. In this lecture we do not pretend to solve these problems or even to cover the whole ground which they embrace. Our interest is confined to one particular point, namely, when and how Semitic star-worship came to modify the ancient beliefs of the Hellenes.

Every sidereal cult, properly so called, was originally foreign to the Greeks as to the Romans—a fact which undoubtedly proves that the common ancestors of the Italians and the Hellenes dwelt in a northern land, where the stars were frequently concealed by fogs or obscured by clouds. For them nearly all the constellations remained a nameless and chaotic mass, and the planets were not distinguished from the other stars. Even the sun and the moon, although they were regarded as divinities, like all the powers of nature, occupied but a very secondary place in the Greek religion. Selene does not appear to have obtained anywhere an organised cult, and in the few places where Helios had temples, as for instance in the island of Rhodes, a foreign origin may reasonably be suspected.

Aristophanes characterises the difference between the religion of the Greeks and that of the barbarians by observing that the latter sacrifice to the Sun and the Moon, the former to personal divinities like Hermes. The pre-Hellenic populations very probably shared the worship of "the barbarians" of whom Aristophanes speaks, and survivals are found in popular customs and beliefs. Perhaps, also, certain distant reminiscences of the original naturalism of the Aryan tribes led the common people to regard the stars as living beings. It was a shock to popular belief when Anaxagoras maintained that they were merely bodies in a state of incandescence. But although the piety of the multitude was full of reverence for the great celestial

luminaries, rulers of the day and of the night, the cities did not build temples to them. The cult of these cosmic powers had been eliminated by anthropomorphism.

From the days of Homer the gods are no longer physical agents, but moral—or, if you like, immoral—beings. Resembling men in their passions, they are their superiors in power alone; the close resemblance of their feelings to those of their devotees leads them to mingle intimately in the earthly life of the latter; inspired by a like patriotism they take part with the opposing hosts in the strifes of the cities, of which they are the official protectors; they are the protagonists in all the causes which are espoused by their worshippers. These immortal beings, whose image has been impressed upon the world by an aristocratic epic, are but faintly distinguished from the warrior heroes who worship them, save by the radiance of eternal youth. And sculptors, by investing them with a sovereign grace and a serene majesty, enabled them to elevate and ravish the souls of men by the mere sight of their imperishable beauty. The whole spirit of the Hellenic religion, profoundly human, ideally æsthetic, as poets and artists had fashioned it, was opposed to the deification of celestial bodies, far-off powers, devoid of feeling and of plastic form.

But though the prevalent worship and the city cults turned from the stars to venerate the august company of Olympians, though Apollo in the guise of a radiant youth eclipses the material brilliance of Helios, yet we find that the *philosophers* assign a place of honour to these same luminaries in their pantheon. Their systems, from the days of the Ionian physicists, revive and justify the old naturalistic beliefs, which were never entirely eradicated from the popular creed. Already in the eyes of Pythagoras the heavenly bodies are divine, moved by the ethereal soul which informs the universe and is akin to man's own soul. Plato accuses Anaxagoras of favouring atheism by his daring assertion that the sun is merely an incandescent mass and the moon an earth. Below the supreme eternal Being, who unites in himself every perfection, Plato would have us recognise the stars as "visible gods," which He animates with his own life, and which manifest his power. To the reformer's

mind these celestial gods are infinitely superior to those of the popular religion. This conception of the great idealist, to whom the theology of the ancient and even that of the modern world owes more than to any other thinker, was to be developed by his successors, and in their hands astronomy became almost a sacred science. With no less pious zeal, Plato's rival, Aristotle, defends the dogma of the divinity of the stars: in them, as in the First Cause itself, he sees eternal substances, principles of movement, and therefore divine; and this doctrine, which thus forms an integral part of his metaphysic, was to disseminate itself throughout the ages and throughout the world, wherever the authority of the Master was recognised.

In deifying the celestial bodies, these philosophers may have been influenced by the desire of recommending to the veneration of their disciples beings more pure than those whom mythology represented as the sorry heroes of ridiculous or indecent legends, and to whom fable attributed all sorts of mischievous and shameful deeds. The polemics of the early rationalists had discredited these absurd or odious myths, and the deification of the stars, while saving polytheism, which was practically indestructible, suppressed anthropomorphism, which Xenophanes had already attacked so resolutely. The new sidereal theology has all the appearance of a compromise between popular beliefs and pure monotheism.

The philosophers may also have been led to this view, I readily grant, by the logical development of their own thought: the unceasing movement of these enormous masses showed that they were living beings, and the eternal immutability of their orbits proved that a superior reason directed their everlasting course. The admirable harmony of their relations, the inevitable, as well as the perennial, regularity of their revolutions implied the presence of a divine essence in them.

All this is quite true: practical motives and theoretical reasons may have simultaneously influenced these thinkers. But nevertheless it is impossible to doubt that in their attempts at the reformation of religion they were also inspired by the example which was set by the nations of the Orient. The

Greeks, who owed the fundamental axioms of their uranography to the Babylonians, would not fail to be struck also by the lofty character of a star-worship which had become scientific. The elements of their sidereal theology were, in all probability, derived from external sources together with the rudiments of their astronomy.

Here we touch a question which is very extensive and still very obscure, in spite of the interminable discussions which it has provoked,—or perhaps by reason of these impassioned discussions. The history of the intellectual development of the ancient world offers perhaps no more fundamental problem than that of the influence which Babylonian science exercised on Greece.

Recently, as we have observed, a certain school of Assyriologists has curiously exaggerated the extent of this influence, and the excesses of the "Pan-Babylonists" have provoked a well-founded distrust of those fanciful views which see in Chaldea the mother of all wisdom. But the reality of Hellenic borrowings from Semitic sources remains none the less indisputable. At a distant date Hellas received from the far East a duodecimal or sexagesimal system of measurement, both of time and of objects. The habit of reckoning in terms of twelve hours which we still use to-day, is due to the fact that the Ionians borrowed from the Orientals this method of dividing the day. Besides the acquaintance with early instruments, such as the sun-dial,¹ they owed to the observatories of Mesopotamia the fundamental data of their celestial topography: the ecliptic, the signs of the zodiac, and the majority of the planets. To this first influx of positive knowledge corresponds a first introduction into the Greek systems of the mystic ideas which Orientals attached to them. I will not lay stress on the doubtful traditions which make Pythagoras a disciple of the Chaldeans, but it has proved possible to demonstrate that his system of numbers and geometrical figures, designed to represent certain gods, is in accordance with astrological theories. The dodecagon bears the name of Jupiter because this planet traverses the circle of

¹ Γνώμων, Herod., ii, 109.

the zodiac in twelve years, that is to say, each year it traverses an arc terminated by the angles of the polygon which is inscribed in that circle.



But these first scientific and religious importations are assigned to a period when, as we know, the commercial cities of Ionia threw open their gates to Asiatic influences. It is more important to collect the traces of these Chaldean infiltrations after the Persian wars when Greek thought had achieved its autonomy. Certain facts recently brought to light indicate that the relations, direct or indirect, between the centres of Babylonian learning and of Greek culture, were never at any time entirely broken off.¹

It is known that Meton passes as the inventor of a cycle of nineteen years (*enneakaidekaëteris*) which would establish a periodic agreement between the old lunar year and the solar revolutions, and which replaced the ancient *octaëteris*, or cycle of eight years, up to that time in use. The Golden Number² of our calendars still reminds us how, according to the tradition, this discovery, communicated to the Athenians in the year 432, excited their admiration to such a degree that they caused the calculations of Meton to be engraved in golden characters in the Agora. All this is, however, a fable. Since an *octaëteris* is proved to have been in use at Babylonia, by documents of the sixth century, and an *enneakaidekaëteris* by inscriptions of the fourth century, and this latter may well be much older, it seems difficult to believe that Meton was not prompted by the example which the Orientals set him. This is the more probable because he would appear to have had some superficial acquaintance with astrology, if we may believe that, at the moment of the departure of the fleet for Sicily, his science revealed to

¹ Kugler, *Im Bannkreis Babels*, 1910, p. 116 ss. See for other proofs my paper, *Babylon und die Griechische Astrologie* (Neue Jahrb. f. das klass. Altertum, xxvii), (1911), 1 ss.

² The "Golden Number" of the ecclesiastical calendar indicates the number of any year in the cycle of nineteen years which brings round the phases of the moon at the same dates. The dates of these phases in any year are thus the same as in other years which have the same "Golden Number."

him the disaster which awaited that expedition. It is true that it is always possible to maintain that the Babylonians and the Greeks arrived independently at the same conclusions, or even to go so far as to assert that the former were the imitators of the latter.

But here is a more convincing argument. When the Greeks learned to recognise the five planets known in antiquity, they gave them names derived from their character. Venus, whose brightness Homer had already celebrated, was called "Herald of the Dawn" (*Ἑωσφόρος*) or "Herald of Light" (*Φωσφόρος*) or on the other hand "Vespertine" (*Ἑσπερος*), according as she was considered as the star of the morning or that of the evening (the identity of these two being not yet recognised). Mercury was named the "Twinkling Star" (*Στίλβων*), Mars, because of his red colour, the "Fiery Star" (*Πυρόεις*), Jupiter the "Luminous Star" (*Φαέθων*), Saturn the "Brilliant Star" (*Φαίνων*), or perhaps, taking the word in another sense, the "Indicator." Now, after the fourth century other titles are found to supersede these ancient names, which are gradually ousted from use. The planets become the stars of Hermes, Aphrodite, Ares, Zeus, Kronos, (*Ἑρμοῦ*, *Ἀφροδίτης* κτλ. ἀστήρ). Now this seems due to the fact that in Babylonia these same planets were dedicated respectively to Nebo, Ishtar, Nergal, Marduk, and Ninib. In accordance with the usual procedure of the ancients, the Greeks substituted for these barbarous divinities those of their own deities who bore some resemblance to them. Clearly exotic ideas, the ideas of Semitic star-worship, have come in here, for the ancient mythology of Hellas did not put the stars under the patronage of the Olympians nor establish any connection between them. Thus the names of the planets which we employ to-day, are an English translation of a Latin translation of a Greek translation of a Babylonian nomenclature.

Perhaps some doubt might still remain, if we did not see at the same time some very peculiar beliefs of the sidereal religion of Babylon creeping into the doctrines of the philosophers. It is a well-known fact that this religion formed a triad, Sin, Shamash, and Ishtar. To the god of the Moon, regarded as

the most powerful of the three, and to the Sun had been added Venus, the most brilliant of the planets. These are the three great rulers of the zodiac, and their symbols,—crescents, discs, containing a star of four or six points—appear on the top of the boundary pillars (*kudurru*) from the fourteenth century B.C. Now the same association is found in an extract from Democritus, where the Sun, the Moon, and Venus are distinguished from the other planets.¹ The echo of the same theory extended even to the Romans. Pliny, in a passage which owes its erudition to some Chaldean author of the Hellenistic period,² remarks that Venus is “the rival of the Sun and the Moon,” and he adds that “alone among the stars she shines with such brilliance that her rays cast a shadow,”—a statement which would be absurd in the climate of Rome, but which is strictly correct under the clear sky of Syria.

Another instance of borrowing is still more obvious. To Babylonian astrologers Saturn is the “planet of the Sun,” he is the “Sun of the night,”³ that is to say, according to a system of substitutions, of which there are many examples, Saturn could take in astrological combinations the place of the star of day when the latter had disappeared. Diodorus was well aware of this fact. When explaining (II, 30) that the Chaldeans designate the planets as “the Interpreters” (*ἐρμηνεῖς*), because by their course they reveal to men the will of the gods, he adds: “the star which the Greeks name Kronos they call the ‘star of the Sun,’ because it is the most prominent, and gives the most numerous and most important predictions.”

Now in the *Epinomis* of Plato,—it matters little in this connection whether this be a work of the Master himself in his old age, or whether it was composed by his pupil, Philip of Opus, who after copying the Laws may have added this appendix,—there is an allusion to this peculiar doctrine. In the enumeration of the planets which is there made it is stated that the slowest of them all bears according to some people

¹ Diels, *Doxographi Graeci*, p. 344, 16=*Fragm. der Vorsokratiker*, p. 366, 22.

² Plin., *Nat. Hist.*, II, 36.

³ Jastrow, *Revue d'Assyriologie*, VII, 1910, ss.p. 163

the name of Helios.¹ Moreover, the fact that the writer was acquainted with oriental theories comes out no less clearly from certain expressions of which he makes use in this passage, than from the very object which he has in view. He dreamed of a reconciliation between the cult of Apollo of Delphi, and that of the sidereal gods which the piety of Syria and Egypt had taught to the Greeks. According to him it behoved the Greeks to perfect this worship of the stars, recently introduced into their country, as they had perfected everything which they had received from the barbarians. These phrases, in which Hellenic pride is clearly revealed, while at the same time there slips in a confession of dependence on the foreigner, are highly characteristic. Their whole significance is apparent now that a typical detail has revealed to us what the author's astronomical learning owes to the Chaldeans. Hereafter perhaps it will be proper to attach some importance to a note preserved in a papyrus of Herculaneum,² and due, it seems, to this very Philip of Opus to whom the composition of the *Epinomis* is attributed. It would appear that Plato in his old age received a "Chaldean" guest, who was able to instruct him in the discoveries made by his compatriots.

It seems to me to be beyond doubt that the influence of oriental star-worship upon the *Epinomis* was much more extensive than has hitherto been admitted. It is not from the Pythagoreans that the author borrows, but, as he himself says, from the Syrians. We find set forth or indicated in this brief dialogue the fundamental doctrines, of which we have already seen some expressly attributed to the Chaldeans, while others we shall find developed in the stellar theology of the Roman period.

These doctrines are the idea that science in general is a gift of the gods, and that mathematics in particular were revealed to men by Uranus, considered as a deity, who caused them to be understood by his periodical phenomena; the demonstration

¹ As a matter of fact, certain copyists, not understanding the meaning of this identification, have inserted as a correction "of Kronos," but the reading of the best manuscripts is 'Ηλίου not Κρόνου, as has been observed by Bidez, *Rev. de Philol.*, xxix (1905), p. 319.

² *Academicorum Phil. Ind. Hercul.*, ed. Mekler, p. 13, col. iii, 36.

that, whatever may be the opinion of the vulgar, the stars are animated and divine, and that between these celestial divinities and the earth a hierarchically organised army of airy spirits acts as intermediary; the declaration that the most perfect of the sciences is astronomy, which has become a theology. Man, the author says, attracted by the beauty of the visible world, does not merely conceive the desire of knowing all that his nature allows him to apprehend, he rises to a fervent contemplation of the wondrous spectacle of harmonious movements, which surpass all choruses in majesty and magnificence. This study, in short, is inseparable from virtue; this wisdom secures supreme happiness, and it has as its reward in the next world a life of bliss like that which the pious astronomer has led on earth, but more perfect, a life in which he will be entirely absorbed in the contemplation of celestial splendours, and will attain to supreme felicity.

Truly the *Epinomis* is that which it professes to be: the first gospel preached to Hellenes of the stellar religion of Asia. The ideas which are here set forth will not cease to influence the Platonic school. Thus Xenocrates, to whom astronomy is a sacred science, will develop demonology, and we shall see how an eclectic, Posidonius, will expand and exalt these same conceptions.



But, it will be said, if the Greeks thus bowed to the supremacy of the sidereal theology of the Chaldeans, how was it that astrology was not introduced among them? For from the sixth to the fourth century the whole marvellous development of their philosophy shows that it knows nothing of cosmic fatalism and stellar divination. Speaking generally, this assertion is correct, although certain traces of these speculations are found, as we have seen, in works of the early Pythagoreans, and recently a Chaldean doctrine has been successfully employed to explain a passage of Pindar.¹ Now, about the period when Philip of Opus published or wrote the *Epinomis*, another pupil

¹ Franz Boll, *Neue Jahrb. für das klass. Altertum*, xxi (1908), p. 119.

of Plato, the astronomer Eudoxus of Cnidos, declared: "No credence should be given to the Chaldeans, who predict and mark out the life of every man according to the day of his nativity."¹ Certain modern philologists—who doubtless look upon Greek history as a kind of experiment in a closed vessel, which a providence anxious to exclude every disturbing element conducted for the fullest instruction of the *savants* of the future—certain philologists, I say, have doubted whether Eudoxus in the fourth century could really have known and condemned oriental genethliology. But like Eudoxus, Theophrastus, a little later, spoke of it in his treatise on "Celestial Signs": he regarded with surprise the claim of the Chaldeans to be able to predict from these signs the life and death of individuals, and not merely general phenomena, such as good or bad weather.²

The insatiable curiosity of the Greeks, then, did not ignore astrology, but their sober genius rejected its hazardous doctrines, and their keen critical sense was able to distinguish the scientific data observed by the Babylonians from the erroneous conclusions which they derived from them. It is to their everlasting honour that, amid the tangle of precise observations and superstitious fancies which made up the priestly lore of the East, they discovered and utilised the serious elements, while neglecting the rubbish.

As long as Greece remained Greece, stellar divination gained no hold on the Greek mind, and all attempts to substitute an astronomic theology for their immoral but charming idolatry were destined to certain failure. The efforts of philosophers to impose on their countrymen the worship of "the great visible gods," as Plato terms them, recoiled before the might of a tradition supported by the prestige of art and literature. It was a purely intellectual movement which remained, as it would seem, without serious practical result. It changed neither popular nor official worship. The populace continued to pray "*κατὰ τὰ πάτρια*," after the fashion of their ancestors, to old

¹ Cic., *De Div.*, ii, 42, 87.

² Procl., *In Tim.*, iii, 151, 1 (Diehl). On Theophrastus' translation of the tale of Akichar, see below, p. 38.

protectors of family and city, and the formulary of the old-fashioned liturgies remained unchanged in spite of all the objections which the science of the reformers could raise against it.



But after the conquests of Alexander a great change took place. The ancient ideal of the Greek republic gave way to the conception of universal monarchy. Thenceforth municipal cults disappeared before an international religion. The worship of the stars, common to all the peoples, was strengthened by everything that weakened the particularism of cities. In proportion as the idea of "humanity" spread, men were the more ready to reserve their homage for those celestial powers which extended their blessings to all mankind, and princes who proclaimed themselves the rulers of the world, could not be protected save by cosmopolitan gods.

Thus it was that thinkers agreed more and more in reserving the foremost place for the sidereal deities. Zeno and his disciples proclaimed their might still more clearly than the schools of Plato and Aristotle. Since stoic pantheism represented Reason, which governs all things, as residing in ethereal Fire, the stars in which the supreme Fire manifested itself with the greatest force and brilliance, would necessarily be invested with the loftiest divine qualities. In the same way the prodigious success attained by the doctrine of Euhemerus contributed to the exaltation of their power. This doctrine, we know, regarded the divinities of fable as superior mortals, to whom after death the gratitude or admiration of the multitude had accorded worship. In thus attributing to the Olympians of old no longer merely human form but also human nature, it left to the eternal and incorruptible stars alone the dignity of original gods, and exalted them in proportion as it lowered their rivals of bygone days.

Thus the political condition of the world, just as the tendencies of theology, drew Hellenism towards star-worship. But the interpenetration of the Orient and Greece which took place in this period, hastened this religious evolution in a remarkable

manner. The Stoa, as we shall see, was freely accessible to barbaric influences, and Euhemerus, we are told, drew his inspiration from Egyptian theologoumena. But the decisive agency was the contact which was established in the Seleucid Empire between Hellenic culture and Babylonian civilisation.

The Chaldeans, whom the policy of the kings of Antioch strove to conciliate, entered into close relations with the learned men who came to Asia in the train of their conquerors, and they even proceeded to carry their precepts throughout the land of Greece. A priest of Bel, Berossus, established himself about the year 280 in the island of Cos, and there revealed to his sceptical hearers the contents of the cuneiform writings accumulated in the archives of his country, annals of the ancient kings and astrological treatises. Another Chaldean, Soudines, invited to the court of Attalus I, king of Pergamus, practised there, about the year 238, the methods of divination in vogue in his native land, such as inspection of the liver (*ἡπατοσκοπία*), and he continued to be an authority frequently quoted by the later "mathematici." On the other hand, Greek *savants* of repute, Epigenes of Byzantium, Apollonius of Myndus, Artemidorus of Parium, declared themselves the disciples of these same Chaldeans, and boasted of being instructed in their priestly schools. At the same time centres of Greek science were established in the heart of Mesopotamia, and in the ancient observatories of Bel learners were initiated into the methods and discoveries of the astronomers of Alexandria or Athens. Under the Seleucids and the early Arsacids Babylon was a hellenised city, as is proved by the epigraphical discoveries which have been made there. Of this interpenetration of oriental and occidental learning we can to-day quote some striking proofs. So it has quite recently been shown that a series of prognostications derived from earthquakes, thunderstrokes, or the course of the moon were literally translated from Assyrian texts into the Greek *Brontologia* and *Selenodromia*.¹ But though the reality of the relation between the two sciences and pseudo-

¹ Bezold and Boll, *Reflexe astrol. Keilinschriften bei Griechischen Schriftstellern* (Abhandl. Akad. Heidelberg), 1911.

sciences is uncontested and incontestable, there remains the difficulty of deciding in each case which of the two influenced the other.

Thus it has been maintained that the ancient Babylonians were already acquainted with the precession of the equinoxes,¹ but an examination of cuneiform tablets reveals the very important fact that they were ignorant of it at least up to about the end of the second century B.C. The credit of this discovery clearly belongs, therefore, to Hipparchus of Nicæa (about 161-126) as tradition asserts, and it is to him that the observatories of Mesopotamia owed the knowledge of it. But conversely, thanks to the recent publication of astrological treatises, it is possible to show that certain discoveries hitherto attributed to Hipparchus owe their origin in reality to some genuine Chaldeans. In one exceptional case we can detect a borrowing in the very act and indicate the intermediary who effected the transfer. Perhaps, then, some details will not be deemed superfluous here.²



The part of astronomy in which Babylonians pushed their investigators furthest was probably the determination of the course of the moon, which enabled them to predict the periodic return of eclipses. Undoubtedly this was one of the most ancient studies to which the people of that country directed their energies. Sin, the Moon-god, was in their eyes a more considerable divinity than the Sun, Shamash, himself. Before the duration of the year was known, the phases of the moon served to measure time, and to fix the dates of sacred calendars; moreover, the star of night allowed herself to be observed by the naked eye better than any other, and it was possible to follow almost continuously her winding course in the heavens. The experience, extending over thousands of years, of this priesthood of astrologers, had led them little by little to construct tables,

¹ See above, Lecture I, p. 3.

² See my paper *Babylon und die Griech. Astron.*, p. 6 ss., where the texts are fully given.

which had attained a high degree of precision at the moment when, under Alexander, the Greeks entered into direct relations with them. The remains of these tables have been deciphered and interpreted by F. X. Kugler, and, astonishing to relate, they have revealed to him a mistake which was introduced into, and, perpetuated in, the calculations of modern astronomers. The old notations of the Chaldeans have allowed a correction of the canons of Oppolzer! About the year 200 before our era these learned priests had succeeded in determining in advance not only the dates of the phases and eclipses of the moon, but also the principal phenomena of the five planets.¹ Although in general inclined to depreciate the value of Babylonian science, in opposition to those who have unduly exaggerated it, this most authoritative modern interpreter of it marvels at the aspect of these great tables with their numerous columns regularly arranged, of which the figures dovetail into each other like the cogwheels of a machine, and the arrangement of which is expounded in explanatory notes. "One does not know," he cries, "which to admire the more: the extraordinary accuracy of the periods which is implied by the drawing up of each of the columns of figures, or the ingenuity with which these old masters contrived to combine all the factors to be considered." Even before the cuneiform inscriptions had been deciphered, historians admitted that the Chaldeans had deduced from their empirical observations, amassed from generation to generation, a theory of the motions of the moon which influenced the development of Greek doctrines. Further, an evident proof of this is supplied by the fact that in the *Almagest* Ptolemy² quotes, after Hipparchus, the eclipses of the years 621, 523, 502, 491, 383 B.C., observed at Babylon, and the first of these has been found noted in an Assyrian text. How absolutely the astronomer of Nicæa relied on his oriental predecessors can be ascertained to-day from some figures. Ptolemy attributed to Hipparchus an extremely exact calculation of the lunar periods; but it has been possible to demonstrate that the duration which he assigns to the various

¹ See above, Lecture I, p. 9.

² Ptol., *Syntax.*, v, 14; iv, 8, 11.

months is precisely that which is laid down in the cuneiform tablets, namely:

Mean synodic	month	29	days	12	hours	44'	31.3"
„ sidereal	„	27	„	7	„	43'	14"
„ anomalistic	„	27	„	13	„	18'	34.9"
„ dracontic	„	27	„	5	„	5'	35.8" ¹

Clearly the priority of discovery belongs to the Orientals, as well as that of the inequality of the length of the seasons, of which they were perfectly aware.

But how did these data and these doctrines pass from the banks of the Euphrates to the Greek cities? Who was the intermediary between Hipparchus and the priests of Babylon? Documents recently published have revealed his name. Strabo, speaking of the schools of astronomers called "Chaldean," which existed in various towns of Mesopotamia, adds:² "Mathematicians frequently mention several of them, as Kidenas, Nabourianos, and Soudines." According to Pliny³ the same Kidenas had recognised that Mercury is never more than 23° from the sun. This Kidenas was probably contemporary with Soudines, who lived in the second half of the third century before Christ.

Now the astrologer, Vettius Valens,⁴ who wrote under the Antonines, tells us that he attempted to make for himself a canon of the sun and the moon for the purpose of determining eclipses, but, as time failed him, "he resolved to make use of Hipparchus for the sun, and Soudines, Kidenas and Apollonius for the moon . . . putting in their proper places the equinoxes and solstices at the eighth degree of the signs of the zodiac." Further, a passage in an anonymous commentary on Ptolemy⁵ represents Kidenas as the inventor of an ecliptic period of 251

¹ The durations calculated by modern astronomers are:

- (1) 29 days 12 hours 44' 2.9"
- (2) 27 „ 7 „ 43' 11.5"
- (3) 27 „ 13 „ 18' 39.3"
- (4) 27 „ 5 „ 5' 36"

² Strab., xvi, 1, 6, p. 639 C.

³ Plin., *Nat. Hist.*, ii, 39.

⁴ Vett. Val., *Anthol.*, ix, 11, p. 353, 22, ed. Kroll.

⁵ Published, *Cat. Codd. Astr.* VIII, part ii, p. 125.

lunations (synodic months) and 269 anomalistic revolutions, the authorship of which was usually attributed to Hipparchus. It appears from this treatise that Hipparchus did not adopt simultaneously, as was believed, two ecliptic periods, one large, of 4267 lunations and 4573 anomalistic revolutions, and one small, one seventeenth of the former, consisting of 251 lunations and 269 anomalistic revolutions, but that he borrowed this latter from Kidenas and appears merely to have multiplied it by 17 in order to make it correspond to a nearly exact number of years, say 4612 sidereal revolutions (345 years) *minus* $7\frac{1}{2}^{\circ}$.

Now on a lunar table engraved in the second century in cuneiform characters on 18 columns, a masterpiece of accuracy, can be read the signature *Ki-din-nu*, and though ordinary scribes add their father's name, *Ki-din-nu* is without any addition: he is the astronomer whom every one knew.

Schiaparelli had already suspected the identity of this personage with the Kidenas of the Greeks. Kugler has definitely proved it,¹ for the equivalence of 251 synodic and 269 anomalistic months, which Ptolemy's commentator attributes to him, is found precisely stated in this table of Kidinnu, and further the same table places the equinoxes and the solstices at the 8th degree of the signs of the zodiac, as did Valens, who quotes the canons of Kidenas. To Hipparchus, on the contrary, the commencement of spring is the 0° of the Ram, but the Roman calendars usually adopted the 8th degree in conformity with the ancient usage of Babylon.

Kidenas or Kidinnu, then, belongs to that group of hellenised Chaldeans of whom Berossus is the most illustrious representative, and who in the third century before our era devoted themselves to the task of rendering accessible to the Greeks the treasures of knowledge which were contained in the cuneiform documents amassed in the libraries of their native land. On these traditional data he based the hypothesis of a new ecliptic period more correct than that of his Chaldean predecessors, which was employed by Hipparchus and afterwards by Ptolemy. The very quotations which are made from his works by Western writers prove that he had them translated into

¹ Kugler, *Im Bannkreis Babels*, 1910, p. 122.

Greek and that he thus enriched Hellenic astronomy with these lunar canons, to which the observations taken at Babylon, extending over a long period of centuries, had given an admirable precision.



Thus we see critical researches gradually determining the extent of the debt which Greece owes to Babylon, and substituting palpable realities for the huge and shadowy phantoms which wandered in the pre-historic twilight. The influence of the old oriental civilisation was not exercised solely on the domain of science, but also of literature. Prof. Diels of Berlin has recently pointed out¹ how the often satirical tales, in which trees and plants appear, belong to a class of fables popularised in Assyria before they were repeated by Callimachus in his *Iambics* and by the successors of Æsop. Further, the recent discovery of an Aramaic manuscript of the fifth century at Elephantine has enabled us to show how the romance of Akichar passed from the banks of the Euphrates to the Jewish communities of Palestine and Egypt (to which it furnished the motive of the book of Tobit) and reached Greece, where Theophrastus adopted it and immortalised the wise Akicharos. But above all, Babylon was to the men of old the mother of astronomy, as of star-worship. It is in this department more than all others that it is possible to show how the Greeks profited from the learned theories which had been formulated, and from the positive data which had been slowly accumulated by these ancient priests of Mesopotamia

*Longa per assiduam complexi saecula curam.*²

The constructive logic of the Greeks, combining with the patient labours of the indigenous race, produced in those days on the banks of the Euphrates an intellectual movement, too little known, which would perhaps have attained to the glory of Alexandrine science, if it had not been lamentably arrested in the latter half of the second century by the ravages of the

¹ Diels, *Orientalische Fabeln im Griechischen Gewande* (Internation. Wochenschrift f. Wiss., 6 Aug., 1910).

² Manil., i, 54.

Parthian invasion and the sack of Babylon. The Chaldeans themselves, emancipated from tradition, discussed freely the principles of the universe, and of the rival sects, which then sprang up at Borsippa, Orchoe, and elsewhere, some went so far as to reject as mendacious the very astrology which had been elaborated by their ancestors.¹ The most remarkable representative of this rationalistic movement is Seleucus of Seleucia, who may be either a Greek emigrant or a hellenised native. Giving up the firmament of primitive cosmogonies, he opened the infinite spaces of a limitless universe to the courses of the stars. Recurring to a bold hypothesis of Aristarchus of Samos, and advancing new arguments in its support, he showed that the sun is the centre of the world, and that the earth has a double motion, revolving round the sun and spinning on its own axis; at the same time he offered a better explanation than any one had previously propounded of the movement of the tides, which no doubt he had observed in the Persian Gulf, by referring them to the phases of the moon. Copernicus, who by the formulation of his heliocentric theory produced "the greatest revolution in the history of knowledge," seems to have been ignorant even of the name of his distant forerunner.

But the scientific rationalism of this Galileo of antiquity was destined to be condemned. It was opposed by the force of a thousand-year-old tradition, the anxious superstition of the mob, the haughty convictions and temporal interests of a powerful sacerdotal caste. The future belonged to a compromise, which, while respecting those ancient beliefs to which the majority of mankind was invincibly attached, would satisfy the demands of a more comprehensive intelligence. This conciliatory formula was discovered by stoicism. Everywhere it devoted itself to the task of justifying popular worships, sacred narratives, and ritual observances. In Greece, it was able without much difficulty to come to terms with cults more formalistic than doctrinal, more civic than moral, in which no authority demanded assent to definite dogmas. A system of accommodating allegories could readily put on gods or myths a physical, ethical, or psychological interpretation, which

¹ Strab., xvi, 1, 6.

reconciled them with the cosmology or ethics of the Porch. In the East, where more theological religions always implied a more definite conception of the world, the task appeared much less easy. Yet certain profound affinities reconciled stoicism with Chaldean doctrines. Whether these did or did not contribute to the development of the ideas of Zeno, they offer a singular analogy to his pantheism, which represented ethereal Fire as the primordial principle and regarded the stars as the purest manifestation of its power. Stoicism conceived the world as a great organism, the "sympathetic" forces of which acted and re-acted necessarily upon one another, and was bound in consequence to attribute a predominating influence to the celestial bodies, the greatest and the most powerful of all in nature, and its *Εἰμαρμένη* or Destiny, connected with the infinite succession of causes, readily agreed also with the determinism of the Chaldeans, founded, as it was, upon the regularity of the sidereal movements. Thus it was that this philosophy made remarkable conquests not only in Syria but as far as Mesopotamia. I recall only the fact that one of the masters of the Porch, the successor of Zeno of Tarsus at Athens, was Diogenes of Babylon (*circa* 240-150) and that, later on, another distinguished Stoic, Archidemus, founded a famous school at Babylon itself (second century B.C.). We know too little of their theories to determine what place was held in them by the beliefs of the country of their origin or of their adoption. We only perceive the result of this movement of ideas which was to lead to the entry of astrology and star-worship into the philosophy of Zeno. For us the person who almost alone represents this fusion of East and West is Posidonius of Apamea, of whom we shall speak in our next lecture,¹ but the preparations for this fusion were undoubtedly made by his predecessors. It is remarkable that the great astronomer, Hipparchus, whose scientific theories, as we have just seen, are directly influenced by Chaldean learning, was also a convinced supporter of one of the leading doctrines of stellar religion. "Hipparchus," says Pliny,² "will never receive all

¹ See below, Lecture III, p. 47.

² Plin., *Nat. Hist.*, ii, 26, 95.

the praise he deserves, since no one has better established the relationship between man and the stars, or shown more clearly that our souls are particles of heavenly fire." In this passage we see affirmed as early as the second century before our era a conception, the development of which we follow in the sidereal mysticism of the Roman period.¹

Hipparchus saw the ruin of the country where was born that science which he illumined. Invaded by the Parthians about the year 140 B.C., recaptured by Antiochus VII of Syria in 130, reconquered soon afterwards by King Phraates, Mesopotamia was terribly ravaged for more than a quarter of a century. Babylon, sacked and burned in 125, never recovered her former splendour: a progressive decay brought on her a death by slow consumption. The new Iranian princes evinced no solicitude for the culture of Semitic priests. The vast brick-built temples, when the hand of the restorer was withdrawn, crumbled into dust, one by one were extinguished the lights of a civilisation which extended backwards for forty centuries, and of the famous cities of Sumer and Accad there survived little but the name. The last astronomical tablet in cuneiform characters with which we are acquainted, is dated 8 B.C., and Strabo,² speaking of Babylon about the same period, applies to it a verse from a comic poet: "a mighty desert—such is the mighty town."

Henceforth it is far from their native land, in Syria, in Egypt, and in the West, that we must follow the development of the religious ideas derived from the Chaldea of antiquity.

¹ See below, Lecture V.

² Strab., xvi, 1, 5: *Ἐρημία μεγάλη ὅστιν ἡ Μεγάλη πόλις.*