

# ASTRONOMY AND ASTROLOGY.

## THE DEVELOPMENT OF ASTROLOGY.

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FROM the earliest times down to the last two centuries no very clear distinction was made between astronomy and astrology. The former was often designated "natural" astrology, dealing with the movements and appearances of the heavenly bodies; the latter was called "judicial" astrology, and dealt with rules for determining their supposed influences upon terrestrial affairs, the destinies of individuals, especially of those "highly placed" in office. There seems little reason to doubt that it was a desire to know the nature of this supposed influence, especially as affecting themselves personally, that led to the patronage of the science by rulers. Astrologers were attached to the courts of the principal princes of Europe during the Middle Ages, and such astronomical work as they were allowed to perform was often undertaken with this end in view. "Astronomy would starve," exclaimed Kepler on one occasion, "were it not for her harum-scarum daughter Astrology." He himself, the illustrious discoverer of the three great laws of planetary motion, "Imperial Astronomer and Mathematician" to the Emperor Rudolph, was obliged to eke out his irregularly paid stipend by the money he earned from casting horoscopes and "fortune telling by the stars." Lord Bacon sometimes, though with little justice, considered the father of the inductive method, was a believer in a form of astrology, though he suggested that inquiry was necessary to determine the "just rules of the *Astrologia Sana*." In Shakespeare we find references to the belief in the influence of the stars on human fortunes. In "Henry IV." we find Glendower saying: "At my nativity the front of heaven was full of fiery shapes of burning cressets." Chaucer alludes to the evil effects produced by Saturn:

. . . . .quot Saturn,  
My course, that hath so wide for to turn,  
Hath more power than wot any man;  
Mine is the drenching in the sea so wan,  
Mine is the prison in the dark coat,  
Mine is the strangling and hanging by the throat,  
The murmur and the churls rebelling."  
Each planet had assigned to it a particular metal and a distinctive color, often, no doubt, suggested by its hue.  
"Sol gold is, and Luna silver we threpe,  
Mars iron, Mercury (quick-) silver we clepe;  
Saturn lead, and Jupiter is tin,  
And Venus copper, by my faderkin."  
(*"Canon's Yeoman's Tale,"* Chaucer.)

The colors, by a more or less obvious analogy, were thus assigned to the sun and planets: Yellow to the sun, azure blue to Mercury, red to Mars, black to Saturn, etc. The mediæval astrologers also assigned colors to the twelve signs of the zodiac, and particular districts were ruled over by each sign; thus Aries ruled over England, France, and Denmark; Taurus over Ireland, Holland, and Persia. The sign Gemini, in particular, was regarded as especially associated with the fortunes (or misfortunes) of London, and, accordingly, the plague, the great fire of London, and the building of London Bridge, were all associated with the position of this sign.

Lilly, the astrologer, is credited with having predicted the occurrence of the plague of 1665 and the

great fire of 1666, which latter occurred at the time when part of the sign Gemini was in the ascendant of London. He was questioned by the House of Commons committee appointed to inquire into the cause of the fire, and declared that he had discovered by his art that such an event was to happen, but disclaimed any knowledge as to its date or cause. It is not difficult to understand how some of the influences assigned to the heavenly bodies came to be attributed to them. Thus the sun, from his very evident influence on all terrestrial phenomena, and the moon, from her tidal action, being known to be potent factors, the idea naturally arose that others of the heavenly bodies might have powers as great as, or even greater than, these two over man's destiny. The fiery red color of Mars seemed naturally to associate this planet with "wars and rumors of wars," the dull luster and slow movements of Saturn as naturally indicated misfortune and "Saturnine influence," while the brilliancy of Jupiter and Venus led to their being considered fortunate planets. Mercury, too, always close to the sun and difficult to detect from his rapid motions, betokened volatile and choleric temperament. Yet how the astrologers came to devise the elaborate system by which every planet and each sign has its special influence is by no means easy to say.

In Whewell's opinion the sun, moon, and planets being identified with the gods and goddesses of the Greek and Roman mythology (still surviving in the names of the days of the week), the characters assigned to these deities were transferred to the stars bearing their names. Others there are who, with equal probability, consider that these mythological beliefs were suggested by astrological ideas, the character of Mars from the red color of the planet of that name, the swift-footed Mercury (messenger of the gods) from the rapid movements of the planet, and the supremacy of Jupiter from the greater brightness of that star, and so forth. Nevertheless, though the belief in astrology was very general until quite recent times, there were always clear-minded thinkers who shook themselves free from the popular superstition. Shakespeare, in "King Lear," says: "This is the excellent foppery of the world, that when we are sick in fortune we make guilty of our disasters the sun, moon, and stars, as if we were villains by necessity, fools by heavenly compulsion, knaves, thieves, and treacherous by spherical predominance," etc.

In earlier times Cicero (*De Div. II.*) reasoned with sound judgment against the belief in astrology. The Emperor Vespasian, when told that his courtiers were discussing the prodigy of the appearance of a comet, said: "This hairy star does not concern me, it menaces rather the King of the Parthians; for he is hairy, but I am bald." Similarly Henry IV. of France, speaking of the astrologers who had foretold his death, is said to have exclaimed: "They will be right some day, and the public will remember the one prediction that has come true better than all the rest that have proved false." Bayle has well said: "The more we study man the more it appears that pride is his ruling passion, and that he affects grandeur even in his misery. Mean and perishable creature that he is, he has been able to persuade himself that he cannot die

without disturbing the course of Nature and obliging the heavens to put themselves to fresh expense to light his funeral pomp. Foolish and ridiculous vanity! If we had a just idea of the universe we should soon comprehend that the death or birth of a prince is so insignificant a matter compared to the whole of Nature that it is not an event to stir the heavens."

Yet other writers from time to time allude to the fancies of the astrologers, and though it seems wonderful how so extraordinary a mass of unsupported conjectures and absurd notions can ever have been seriously regarded as science, still we must not look upon the work of these early zealots as altogether vain and wasted.

Just as the fruitless search for the elixir of life and the philosopher's stone by the old alchemists (themselves often astrologers also) laid the foundations of the modern science of chemistry, so by the watchings of the early astrologers was accumulated the material whereon their successors have built the mighty superstructure of modern astronomy. Though it is, and probably will remain, far beyond our power to predict the future course of human affairs, yet the astronomer can determine the future positions of the planets of our system for many ages to come with a precision greater than that of many actual observations. Halley's comet, whose return we have just witnessed, has been detected almost in the position assigned by calculation, after an absence of seventy-four years (of invisibility), during which time it has receded to a distance of more than three thousand millions of miles from the sun. The past and future history of the earth's path round the sun is known for a million of years on either side of the present time. From the observations of the early Chaldean astrologers, and their records of eclipses, the theory of the moon's motion has been, and is being, perfected.

So long as the earth was regarded as the center of the universe, and the sun and stars merely secondary orbs of no great size moving round it, there seemed little to wonder at in men's faith in the teachings of astrology, though even then one might ask how the special influences assigned to the various heavenly bodies, were ascertained to belong to them with such minuteness.

If a man's future career depended only on the position of the heavenly bodies at the time and place of his birth, how did it happen that of two persons both born at the same time and place, one became a beggar, the other a monarch? How different, for instance, the careers of the twin brothers Jacob and Esau, and how different their temperaments! When we consider the earth as it really is, a small planet moving round its central sun together with its fellows, some approaching it in size, others greatly surpassing it, and that there have since been discovered two great planets and a number of moons quite unknown to the early astrologers, it seems hard to conceive our planet to be of such importance that all these other bodies merely exist for its benefit or, rather, for that of its inhabitants. Our sun, too, though all important to us, is only a "cadet" among the hosts of heaven, and there are stars probably as far surpassing it in magnitude as itself surpasses the earth.—Knowledge.

### GIGANTIC ABYSS IN THE GREAT NEBULA IN ORION

By EDGAR LUCIEN LARKIN.

THE beneficent patron of astronomy, Mr. John D. Hooker of Los Angeles, Cal., now has on display some wonderful photographs. These were made in the Mount Wilson Observatory, and are of the central regions of the Orion nebula. The original negatives have been greatly enlarged on transparencies. All these are now set in movable frames in an ingenious mechanism for display. Each plate is set in front of sixteen incandescent electric lamps arranged in a square whose dimensions are the same as those of the photograph to be shown, about fifteen inches on a side. The room is darkened, the observer stands before the apparatus at distances of from ten to twenty feet. When the sixteen lamps are lighted, a marvelous effect is obtained. The central portion of the Huyghenian region in the nebula of Orion is the opening of a colossal cavern in the primordial stellar floor. In these pictures the nebula is no longer a flat surface. One peers within cosmic deeps; looks into a chasm before which all powers of imagination are submerged, and feasts the eye with supernal splendors. Every ap-

pearance is that of looking in at a door, and to the rear of the cave, deep within glittering nebulousity. The impression made is that the rear walls of this cavern are at an inconceivable distance back from the opening. Mr. Hooker has had all the adjacent regions separately photographed, and shows these in succession round and about the cavern's mouth. Then he again puts this on magnificent display. The impression that one is peering into an abyss is confirmed and strengthened. This chasm as seen in these pictures is the most beautiful object in the possession of man. Pillars, columns, walls, façades, bulwarks, stalactites, and stalagmites are within deeps of deeps. These glow and shine superbly with pearly light.

The nebula has no parallax capable of being measured. Adjacent stars have been observed, those having proper motion and those in revolution around their common centers of gravity. Mass, times, and motions have been made use of to deduce parallaxes. These range between the one three-hundredth and one two-hundredth of one second of arc. To be within bounds, let estimates of the cave's dimensions be made on the basis of one two-hundredth. Then the nebula, if at the same distance of the neighboring stars, at once becomes of colossal magnitude. None is able to be-

gin to think of the dimensions. The central region of the nebula may be taken as of the angular diameter of the moon, or half of one degree. The ragged, torn, and twisted edges of the openings as shown in Mr. Hooker's transparencies for purposes of computation, here will be taken as inclosing a space whose diameter is one-fourth degree or 15 min. Go to the cavern's mouth, turn, and look this way or toward the sun. It would look in a great telescope like the point of a fine needle, or a tiny piece of diamond dust. The earth could not reveal its existence; nor the distance from the earth to the sun, a line 93,000,000 miles in length, viewed from a point at a right angle. It would fill an angle of one two-hundredth part of a second. Then 1 second would have a real length of 18,600,000,000 miles; 1 min. of 1,116,000,000,000 miles; and 15 min. of 16,740,000,000,000, the diameter of this stupendous opening in the stellar floor. The judgment of the eye in this perspective is that the rear of the chasm is three times more distant than the width of the mouth. If so—it actually is and more—then the star-pointed wall is 51,000,000,000,000 miles beyond the open door. This is the distance of the star Sirius. Hundreds of thousands of solar systems like ours could enter and have an abundance of space for free motion.