

of the sky, he endeavored to do the same for the surface of the earth, by marking the position of towns and other places by lines of latitude and longitude. He was the first to construct tables of the sun and moon.

In the midst of such a brilliant constellation of geometers, astronomers, physicists, conspicuously shines forth Ptolemy, the author of the great work, "Syntaxis," "a Treatise on the Mathematical Construction of the Heavens." It maintained its ground for nearly fifteen hundred years, and indeed was only displaced by the immortal "Principia" of Newton. It commences with the doctrine that the earth is globular and fixed in space, it describes the construction of a table of chords, and instruments for observing the solstices, it deduces the obliquity of the ecliptic, it finds terrestrial latitudes by the gnomon, describes climates, shows how ordinary may be converted into sidereal time, gives reasons for preferring the tropical to the sidereal year, furnishes the solar theory on the principle of the sun's orbit being a simple eccentric, explains the equation of time, advances to the discussion of the motions of the moon, treats of the first inequality, of her eclipses, and the motion of her nodes. It then gives Ptolemy's own great discovery—that which has made his name immortal—the discovery of the moon's evection or second inequality, reducing it to the epicyclic theory. It attempts the determination of the distances of the sun and moon from the earth—with, however, only partial success. It considers the precession of the equinoxes, the discovery of Hipparchus, the full period of which is twenty-five thousand years. It gives a catalogue of 1,022 stars, treats of the nature of the milky-way, and discusses in the most masterly manner the motions of the planets. This point constitutes another of Ptolemy's claims to

scientific fame. His determination of the planetary orbits was accomplished by comparing his own observations with those of former astronomers, among them the observations of Timocharis on the planet Venus.

In the Museum of Alexandria, Ctesibius invented the fire-engine. His pupil, Hero, improved it by giving it two cylinders. There, too, the first steam-engine worked. This also was the invention of Hero, and was a reaction engine, on the principle of the eolipile. The silence of the halls of Serapis was broken by the water-clocks of Ctesibius and Apollonius, which drop by drop measured time. When the Roman calendar had fallen into such confusion that it had become absolutely necessary to rectify it, Julius Cæsar brought Sosigenes the astronomer from Alexandria. By his advice the lunar year was abolished, the civil year regulated entirely by the sun, and the Julian calendar introduced.

The Macedonian rulers of Egypt have been blamed for the manner in which they dealt with the religious sentiment of their time. They prostituted it to the purpose of state-craft, finding in it a means of governing their lower classes. To the intelligent they gave philosophy.

But doubtless they defended this policy by the experience gathered in those great campaigns which had made the Greeks the foremost nation of the world. They had seen the mythological conceptions of their ancestral country dwindle into fables; the wonders with which the old poets adorned the Mediterranean had been discovered to be baseless illusions. From Olympus its divinities had disappeared; indeed, Olympus itself had proved to be a phantom of the imagination. Hades had lost its terrors; no place could be found for it.

From the woods and grottoes and rivers of Asia Minor the local gods and goddesses had departed; even their devotees began to doubt whether they had ever been there. If still the Syrian damsels lamented, in their amorous ditties, the fate of Adonis, it was only as a recollection, not as a reality. Again and again had Persia changed her national faith. For the revelation of Zoroaster she had substituted Dualism; then under new political influences she had adopted Magianism. She had worshiped fire, and kept her altars burning on mountain-tops. She had adored the sun. When Alexander came, she was fast falling into pantheism.

On a country to which in its political extremity the indigenous gods have been found unable to give any protection, a change of faith is impending. The venerable divinities of Egypt, to whose glory obelisks had been raised and temples dedicated, had again and again submitted to the sword of a foreign conqueror. In the land of the Pyramids, the Colossi, the Sphinx, the images of the gods had ceased to represent living realities. They had ceased to be objects of faith. Others of more recent birth were needful, and Serapis confronted Osiris. In the shops and streets of Alexandria there were thousands of Jews who had forgotten the God that had made his habitation behind the veil of the temple.

Tradition, revelation, time, all had lost their influence. The traditions of European mythology, the revelations of Asia, the time-consecrated dogmas of Egypt, all had passed or were fast passing away. And the Ptolemies recognized how ephemeral are forms of faith.

But the Ptolemies also recognized that there is something more durable than forms of faith, which, like the organic forms of geological ages, once gone, are clean gone forever, and have no restoration, no return. They

recognized that within this world of transient delusions and unrealities there is a world of eternal truth.

That world is not to be discovered through the vain traditions that have brought down to us the opinions of men who lived in the morning of civilization, nor in the dreams of mystics who thought that they were inspired. It is to be discovered by the investigations of geometry, and by the practical interrogation of Nature. These confer on humanity solid, and innumerable, and inestimable blessings.

The day will never come when any one of the propositions of Euclid will be denied; no one henceforth will call in question the globular shape of the earth, as recognized by Eratosthenes; the world will not permit the great physical inventions and discoveries made in Alexandria and Syracuse to be forgotten. The names of Hipparchus, of Apollonius, of Ptolemy, of Archimedes, will be mentioned with reverence by men of every religious profession, as long as there are men to speak.

The Museum of Alexandria was thus the birthplace of modern science. It is true that, long before its establishment, astronomical observations had been made in China and Mesopotamia; the mathematics also had been cultivated with a certain degree of success in India. But in none of these countries had investigation assumed a connected and consistent form; in none was physical experimentation resorted to. The characteristic feature of Alexandrian, as of modern science, is, that it did not restrict itself to observation, but relied on a practical interrogation of Nature.

CHAPTER II.

THE ORIGIN OF CHRISTIANITY.—ITS TRANSFORMATION ON
 ATTAINING IMPERIAL POWER.—ITS RELATIONS TO SCI-
 ENCE.

Religious condition of the Roman Republic.—The adoption of imperialism leads to monotheism.—Christianity spreads over the Roman Empire.—The circumstances under which it attained imperial power make its union with Paganism a political necessity.—Tertullian's description of its doctrines and practices.—Debasement effect of the policy of Constantine on it.—Its alliance with the civil power.—Its incompatibility with science.—Destruction of the Alexandrian Library and prohibition of philosophy.—Exposition of the Augustinian philosophy and Patristic science generally.—The Scriptures made the standard of science.

IN a political sense, Christianity is the bequest of the Roman Empire to the world.

At the epoch of the transition of Rome from the republican to the imperial form of government, all the independent nationalities around the Mediterranean Sea had been brought under the control of that central power. The conquest that had befallen them in succession had been by no means a disaster. The perpetual wars they had maintained with each other came to an end; the miseries their conflicts had engendered were exchanged for universal peace.

Not only as a token of the conquest she had made, but also as a gratification to her pride, the conquering

republic brought the gods of the vanquished peoples to Rome. With disdainful toleration, she permitted the worship of them all. That paramount authority exercised by each divinity in his original seat disappeared at once in the crowd of gods and goddesses among whom he had been brought. Already, as we have seen, through geographical discoveries and philosophical criticism, faith in the religion of the old days had been profoundly shaken. It was, by this policy of Rome, brought to an end.

The kings of all the conquered provinces had vanished; in their stead one emperor had come. The gods also had disappeared. Considering the connection which in all ages has existed between political and religious ideas, it was then not at all strange that polytheism should manifest a tendency to pass into monotheism. Accordingly, divine honors were paid at first to the deceased and at length to the living emperor.

The facility with which gods were thus called into existence had a powerful moral effect. The manufacture of a new one cast ridicule on the origin of the old. Incarnation in the East and apotheosis in the West were fast filling Olympus with divinities. In the East, gods descended from heaven, and were made incarnate in men; in the West, men ascended from earth, and took their seat among the gods. It was not the importation of Greek skepticism that made Rome skeptical. The excesses of religion itself sapped the foundations of faith.

Not with equal rapidity did all classes of the population adopt monotheistic views. The merchants and lawyers and soldiers, who by the nature of their pursuits are more familiar with the vicissitudes of life, and have larger intellectual views, were the first to be affected, the land laborers and farmers the last.

When the empire in a military and political sense had reached its culmination, in a religious and social aspect it had attained its height of immorality. It had become thoroughly epicurean; its maxim was, that life should be made a feast, that virtue is only the seasoning of pleasure, and temperance the means of prolonging it. Dining-rooms glittering with gold and incrustated with gems, slaves in superb apparel, the fascinations of female society where all the women were dissolute, magnificent baths, theatres, gladiators, such were the objects of Roman desire. The conquerors of the world had discovered that the only thing worth worshiping is Force. By it all things might be secured, all that toil and trade had laboriously obtained. The confiscation of goods and lands, the taxation of provinces, were the reward of successful warfare; and the emperor was the symbol of force. There was a social splendor, but it was the phosphorescent corruption of the ancient Mediterranean world.

In one of the Eastern provinces, Syria, some persons in very humble life had associated themselves together for benevolent and religious purposes. The doctrines they held were in harmony with that sentiment of universal brotherhood arising from the coalescence of the conquered kingdoms. They were doctrines inculcated by Jesus.

The Jewish people at that time entertained a belief, founded on old traditions, that a deliverer would arise among them, who would restore them to their ancient splendor. The disciples of Jesus regarded him as this long-expected Messiah. But the priesthood, believing that the doctrines he taught were prejudicial to their interests, denounced him to the Roman governor, who, to satisfy their clamors, reluctantly delivered him over to death.

His doctrines of benevolence and human brotherhood outlasted that event. The disciples, instead of scattering, organized. They associated themselves on a principle of communism, each throwing into the common stock whatever property he possessed, and all his gains. The widows and orphans of the community were thus supported, the poor and the sick sustained. From this germ was developed a new, and as the events proved, all-powerful society—the Church; new, for nothing of the kind had existed in antiquity; powerful, for the local churches, at first isolated, soon began to confederate for their common interest. Through this organization Christianity achieved all her political triumphs.

As we have said, the military domination of Rome had brought about universal peace, and had generated a sentiment of brotherhood among the vanquished nations. Things were, therefore, propitious for the rapid diffusion of the newly-established—the Christian—principle throughout the empire. It spread from Syria through all Asia Minor, and successively reached Cyprus, Greece, Italy, eventually extending westward as far as Gaul and Britain.

Its propagation was hastened by missionaries who made it known in all directions. None of the ancient classical philosophies had ever taken advantage of such a means.

Political conditions determined the boundaries of the new religion. Its limits were eventually those of the Roman Empire; Rome, doubtfully the place of death of Peter, not Jerusalem, indisputably the place of the death of our Savior, became the religious capital. It was better to have possession of the imperial seven-hilled city, than of Gethsemane and Calvary with all their holy souvenirs.