JOHN WILLIAM DRAPER

HISTORY OF THE CONFLICT BETWEEN RELIGION AND SCIENCE

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Table of Contents

PREFACE.

Table of Contents

WHOEVER has had an opportunity of becoming acquainted with the mental condition of the intelligent classes in Europe and America, must have perceived that there is a great and rapidly-increasing departure from the public religious faith, and that, while among the more frank this divergence is not concealed, there is a far more extensive and far more dangerous secession, private and unacknowledged.

So wide-spread and so powerful is this secession, that it can neither be treated with contempt nor with punishment. It cannot be extinguished by derision, by vituperation, or by force. The time is rapidly approaching when it will give rise to serious political results.

Ecclesiastical spirit no longer inspires the policy of the world. Military fervor in behalf of faith has disappeared. Its only souvenirs are the marble effigies of crusading knights, reposing in the silent crypts of churches on their tombs.

That a crisis is impending is shown by the attitude of the great powers toward the papacy. The papacy represents the ideas and aspirations of two-thirds of the population of Europe. It insists on a political supremacy in accordance with its claims to a divine origin and mission, and a restoration of the mediaeval order of things, loudly declaring that it will accept no reconciliation with modern civilization.

The antagonism we thus witness between Religion and Science is the continuation of a struggle that commenced

when Christianity began to attain political power. A divine revelation must necessarily be intolerant of contradiction; it must repudiate all improvement in itself, and view with disdain that arising from the progressive intellectual development of man. But our opinions on every subject are continually liable to modification, from the irresistible advance of human knowledge.

Can we exaggerate the importance of a contention in which every thoughtful person must take part whether he will or not? In a matter so solemn as that of religion, all men, whose temporal interests are not involved in existing institutions, earnestly desire to find the truth. They seek information as to the subjects in dispute, and as to the conduct of the disputants.

The history of Science is not a mere record of isolated discoveries; it is a narrative of the conflict of two contending powers, the expansive force of the human intellect on one side, and the compression arising from traditionary faith and human interests on the other.

No one has hitherto treated the subject from this point of view. Yet from this point it presents itself to us as a living issue—in fact, as the most important of all living issues.

A few years ago, it was the politic and therefore the proper course to abstain from all allusion to this controversy, and to keep it as far as possible in the background. The tranquillity of society depends so much on the stability of its religious convictions, that no one can be justified in wantonly disturbing them. But faith is in its nature unchangeable, stationary; Science is in its nature progressive; and eventually a divergence between them,

impossible to conceal, must take place. It then becomes the duty of those whose lives have made them familiar with both modes of thought, to present modestly, but firmly, their views; to compare the antagonistic pretensions calmly, impartially, philosophically. History shows that, if this be not done, social misfortunes, disastrous and enduring, will ensue. When the old mythological religion of Europe broke down under the weight of its own inconsistencies, neither the Roman emperors nor the philosophers of those times did any thing adequate for the guidance of public opinion. They left religious affairs to take their chance, and accordingly those affairs fell into the hands of ignorant and infuriated ecclesiastics, parasites, eunuchs, and slaves.

The intellectual night which settled on Europe, in consequence of that great neglect of duty, is passing away; we live in the daybreak of better things. Society is anxiously expecting light, to see in what direction it is drifting. It plainly discerns that the track along which the voyage of civilization has thus far been made, has been left; and that a new departure, on all unknown sea, has been taken.

Though deeply impressed with such thoughts, I should not have presumed to write this book, or to intrude on the public the ideas it presents, had I not made the facts with which it deals a subject of long and earnest meditation. And I have gathered a strong incentive to undertake this duty from the circumstance that a "History of the Intellectual Development of Europe," published by me several years ago, which has passed through many editions in America, and has been reprinted in numerous European languages,

English, French, German, Russian, Polish, Servian, etc., is everywhere received with favor.

In collecting and arranging the materials for the volumes I published under the title of "A History of the American Civil War," a work of very great labor, I had become accustomed to the comparison of conflicting statements, the adjustment of conflicting claims. The approval with which that book has been received by the American public, a critical judge of the events considered, has inspired me with additional confidence. I had also devoted much attention to the experimental investigation of natural phenomena, and had published many well-known memoirs on such subjects. And perhaps no one can give himself to these pursuits, and spend a large part of his life in the public teaching of science, without partaking of that love of impartiality and truth which Philosophy incites. She inspires us with a desire to dedicate our days to the good of our race, so that in the fading light of life's evening we may not, on looking back, be forced to acknowledge how unsubstantial and useless are the objects that we have pursued.

Though I have spared no pains in the composition of this book, I am very sensible how unequal it is to the subject, to do justice to which a knowledge of science, history, theology, politics, is required; every page should be alive with intelligence and glistening with facts. But then I have remembered that this is only as it were the preface, or forerunner, of a body of literature, which the events and wants of our times will call forth. We have come to the brink of a great intellectual change. Much of the frivolous reading of the present will be supplanted by a thoughtful and

austere literature, vivified by endangered interests, and made fervid by ecclesiastical passion.

What I have sought to do is, to present a clear and impartial statement of the views and acts of the two contending parties. In one sense I have tried to identify myself with each, so as to comprehend thoroughly their motives; but in another and higher sense I have endeavored to stand aloof, and relate with impartiality their actions.

I therefore trust that those, who may be disposed to criticise this book, will bear in mind that its object is not to advocate the views and pretensions of either party, but to explain clearly, and without shrinking those of both. In the management of each chapter I have usually set forth the orthodox view first, and then followed it with that of its opponents.

In thus treating the subject it has not been necessary to pay much regard to more moderate or intermediate opinions, for, though they may be intrinsically of great value, in conflicts of this kind it is not with the moderates but with the extremists that the impartial reader is mainly concerned. Their movements determine the issue.

For this reason I have had little to say respecting the two great Christian confessions, the Protestant and Greek Churches. As to the latter, it has never, since the restoration of science, arrayed itself in opposition to the advancement of knowledge. On the contrary, it has always met it with welcome. It has observed a reverential attitude to truth, from whatever quarter it might come. Recognizing the apparent discrepancies between its interpretations of revealed truth and the discoveries of science, it has always

expected that satisfactory explanations and reconciliations would ensue, and in this it has not been disappointed. It would have been well for modern civilization if the Roman Church had done the same.

In speaking of Christianity, reference is generally made to the Roman Church, partly because its adherents compose the majority of Christendom, partly because its demands are the most pretentious, and partly because it has commonly sought to enforce those demands by the civil power. None of the Protestant Churches has ever occupied a position so imperious—none has ever had such wide-spread political influence. For the most part they have been averse to constraint, and except in very few instances their opposition has not passed beyond the exciting of theological odium.

As to Science, she has never sought to ally herself to civil power. She has never attempted to throw odium or inflict social ruin on any human being. She has never subjected any one to mental torment, physical torture, least of all to death, for the purpose of upholding or promoting her ideas. She presents herself unstained by cruelties and crimes. But in the Vatican—we have only to recall the Inquisition—the hands that are now raised in appeals to the Most Merciful are crimsoned. They have been steeped in blood!

There are two modes of historical composition, the artistic and the scientific. The former implies that men give origin to events; it therefore selects some prominent individual, pictures him under a fanciful form, and makes him the hero of a romance. The latter, insisting that human affairs present an unbroken chain, in which each fact is the

offspring of some preceding fact, and the parent of some subsequent fact, declares that men do not control events, but that events control men. The former gives origin to compositions, which, however much they may interest or delight us, are but a grade above novels; the latter is austere, perhaps even repulsive, for it sternly impresses us with a conviction of the irresistible dominion of law, and the insignificance of human exertions. In a subject so solemn as that to which this book is devoted, the romantic and the popular are altogether out of place. He who presumes to treat of it must fix his eyes steadfastly on that chain of destiny which universal history displays; he must turn with disdain from the phantom impostures of pontiffs and statesmen and kings.

If any thing were needed to show us the untrustworthiness of artistic historical compositions, our personal experience would furnish it. How often do our most intimate friends fail to perceive the real motives of our every-day actions; how frequently they misinterpret our intentions! If this be the case in what is passing before our eyes, may we not be satisfied that it is impossible to comprehend justly the doings of persons who lived many years ago, and whom we have never seen.

In selecting and arranging the topics now to be presented, I have been guided in part by "the Confession" of the late Vatican Council, and in part by the order of events in history. Not without interest will the reader remark that the subjects offer themselves to us now as they did to the old philosophers of Greece. We still deal with the same questions about which they disputed. What is God? What is

the soul? What is the world? How is it governed? Have we any standard or criterion of truth? And the thoughtful reader will earnestly ask, "Are our solutions of these problems any better than theirs?"

The general argument of this book, then, is as follows:

I first direct attention to the origin of modern science as distinguished from ancient, by depending on observation, experiment, and mathematical discussion, instead of mere speculation, and shall show that it was a consequence of the Macedonian campaigns, which brought Asia and Europe into contact. A brief sketch of those campaigns, and of the Museum of Alexandria, illustrates its character.

Then with brevity I recall the well-known origin of Christianity, and show its advance to the attainment of imperial power, the transformation it underwent by its incorporation with paganism, the existing religion of the Roman Empire. A clear conception of its incompatibility with science caused it to suppress forcibly the Schools of Alexandria. It was constrained to this by the political necessities of its position.

The parties to the conflict thus placed, I next relate the story of their first open struggle; it is the first or Southern Reformation. The point in dispute had respect to the nature of God. It involved the rise of Mohammedanism. Its result was, that much of Asia and Africa, with the historic cities Jerusalem, Alexandria, and Carthage, were wrenched from Christendom, and the doctrine of the Unity of God established in the larger portion of what had been the Roman Empire.

This political event was followed by the restoration of science, the establishment of colleges, schools, libraries, throughout the dominions of the Arabians. Those conquerors, pressing forward rapidly in their intellectual development, rejected the anthropomorphic ideas of the nature of God remaining in their popular belief, and accepted other more philosophical ones, akin to those that had long previously been attained to in India. The result of this was a second conflict, that respecting the nature of the soul. Under the designation of Averroism, there came into prominence the theories of Emanation and Absorption. At the close of the middle ages the Inquisition succeeded in excluding those doctrines from Europe, and now the Vatican Council has formally and solemnly anathematized them.

Meantime, through the cultivation of astronomy, geography, and other sciences, correct views had been gained as to the position and relations of the earth, and as to the structure of the world; and since Religion, resting itself on what was assumed to be the proper interpretation of the Scriptures, insisted that the earth is the central and most important part of the universe, a third conflict broke out. In this Galileo led the way on the part of Science. Its issue was the overthrow of the Church on the question in dispute. Subsequently a subordinate controversy arose respecting the age of the world, the Church insisting that it is only about six thousand years old. In this she was again overthrown The light of history and of science had been gradually spreading over Europe. In the sixteenth century the prestige of Roman Christianity was greatly diminished by the intellectual reverses it had experienced, and also by

its political and moral condition. It was clearly seen by many pious men that Religion was not accountable for the false position in which she was found, but that the misfortune was directly traceable to the alliance she had of old contracted with Roman paganism. The obvious remedy, therefore, was a return to primitive purity. Thus arose the fourth conflict, known to us as the Reformation—the second or Northern Reformation. The special form it assumed was a contest respecting the standard or criterion of truth, whether it is to be found in the Church or in the Bible. The determination of this involved a settlement of the rights of reason, or intellectual freedom. Luther, who is the conspicuous man of the epoch, carried into effect his intention with no inconsiderable success; and at the close of the struggle it was found that Northern Europe was lost to Roman Christianity.

We are now in the midst of a controversy respecting the mode of government of the world, whether it be by incessant divine intervention, or by the operation of primordial and unchangeable law. The intellectual movement of Christendom has reached that point which Arabism had attained to in the tenth and eleventh centuries; and doctrines which were then discussed are presenting themselves again for review; such are those of Evolution, Creation, Development.

Offered under these general titles, I think it will be found that all the essential points of this great controversy are included. By grouping under these comprehensive heads the facts to be considered, and dealing with each group

separately, we shall doubtless acquire clear views of their inter-connection and their historical succession.

I have treated of these conflicts as nearly as I conveniently could in their proper chronological order, and, for the sake of completeness, have added chapters on—

An examination of what Latin Christianity has done for modern civilization.

A corresponding examination of what Science has done.

The attitude of Roman Christianity in the impending conflict, as defined by the Vatican Council.

The attention of many truth-seeking persons has been so exclusively given to the details of sectarian dissensions, that the long strife, to the history of which these pages are devoted, is popularly but little known. Having tried to keep steadfastly in view the determination to write this work in an impartial spirit, to speak with respect of the contending parties, but never to conceal the truth, I commit it to the considerate judgment of the thoughtful reader.

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HISTORY OF THE CONFLICT BETWEEN RELIGION AND SCIENCE.

Table of Contents

CHAPTER I.

Table of Contents

THE ORIGIN OF SCIENCE.

Religious condition of the Greeks in the fourth century before Christ.—Their invasion of the Persian Empire brings them in contact with new aspects of Nature, and familiarizes them with new religious systems.—The military, engineering, and scientific activity, stimulated by the Macedonian campaigns, leads to the establishment in Alexandria of an institute, the Museum, for the cultivation of knowledge by experiment, observation, and mathematical
discussion.—It is the origin of Science.

GREEK MYTHOLOGY. No spectacle can be presented to the thoughtful mind more solemn, more mournful, than that of the dying of an ancient religion, which in its day has given consolation to many generations of men.

Four centuries before the birth of Christ, Greece was fast outgrowing her ancient faith. Her philosophers, in their studies of the world, had been profoundly impressed with the contrast between the majesty of the operations of Nature and the worthlessness of the divinities of Olympus. Her historians, considering the orderly course of political affairs, the manifest uniformity in the acts of men, and that there was no event occurring before their eyes for which they could not find an obvious cause in some preceding event, began to suspect that the miracles and celestial interventions, with which the old annals were filled, were only fictions. They demanded, when the age of the

supernatural had ceased, why oracles had become mute, and why there were now no more prodigies in the world.

Traditions, descending from immemorial antiquity, and formerly accepted by pious men as unquestionable truths, had filled the islands of the Mediterranean and the conterminous countries with supernatural wonders—enchantresses, sorcerers, giants, ogres, harpies, gorgons, centaurs, cyclops. The azure vault was the floor of heaven; there Zeus, surrounded by the gods with their wives and mistresses, held his court, engaged in pursuits like those of men, and not refraining from acts of human passion and crime.

A sea-coast broken by numerous indentations, an archipelago with some of the most lovely islands in the world, inspired the Greeks with a taste for maritime life, for geographical discovery, and colonization. Their ships wandered all over the Black and Mediterranean Seas. The time-honored wonders that had been glorified in the "Odyssey," and sacred in public faith, were found to have no existence. As a better knowledge of Nature was obtained, the sky was shown to be an illusion; it was discovered that there is no Olympus, nothing above but space and stars. With the vanishing of their habitation, the gods disappeared, both those of the Ionian type of Homer and those of the Doric of Hesiod.

EFFECTS OF DISCOVERY AND CRITICISM. But this did not take place without resistance. At first, the public, and particularly its religious portion, denounced the rising doubts as atheism. They despoiled some of the offenders of their goods, exiled others; some they put to death. They

asserted that what had been believed by pious men in the old times, and had stood the test of ages, must necessarily be true. Then, as the opposing evidence became irresistible, they were content to admit that these marvels were allegories under which the wisdom of the ancients had concealed many sacred and mysterious things. They tried to reconcile, what now in their misgivings they feared might be myths, with their advancing intellectual state. But their efforts were in vain, for there are predestined phases through which on such an occasion public opinion must pass. What it has received with veneration it begins to doubt, then it offers new interpretations, then subsides into dissent, and ends with a rejection of the whole as a mere fable.

In their secession the philosophers and historians were followed by the poets. Euripides incurred the odium of heresy. Aeschylus narrowly escaped being stoned to death for blasphemy. But the frantic efforts of those who are interested in supporting delusions must always end in defeat. The demoralization resistlessly extended through every branch of literature, until at length it reached the common people.

THE PERSIAN EMPIRE. Greek philosophical criticism had lent its aid to Greek philosophical discovery in this destruction of the national faith. It sustained by many arguments the wide-spreading unbelief. It compared the doctrines of the different schools with each other, and showed from their contradictions that man has no criterion of truth; that, since his ideas of what is good and what is evil differ according to the country in which he lives, they

can have no foundation in Nature, but must be altogether the result of education; that right and wrong are nothing more than fictions created by society for its own purposes. In Athens, some of the more advanced classes had reached such a pass that they not only denied the unseen, the supernatural, they even affirmed that the world is only a day-dream, a phantasm, and that nothing at all exists.

The topographical configuration of Greece gave an impress to her political condition. It divided her people into distinct communities having conflicting interests, and made them incapable of centralization. Incessant domestic wars between the rival states checked her advancement. She was poor, her leading men had become corrupt. They were ever ready to barter patriotic considerations for foreign gold, to sell themselves for Persian bribes. Possessing a perception of the beautiful as manifested in sculpture and architecture to a degree never attained elsewhere either before or since, Greece had lost a practical appreciation of the Good and the True.

While European Greece, full of ideas of liberty and independence, rejected the sovereignty of Persia, Asiatic Greece acknowledged it without reluctance. At that time the Persian Empire in territorial extent was equal to half of modern Europe. It touched the waters of the Mediterranean, the Aegean, the Black, the Caspian, the Indian, the Persian, the Red Seas. Through its territories there flowed six of the grandest rivers in the world—the Euphrates, the Tigris, the Indus, the Jaxartes, the Oxus, the Nile, each more than a thousand miles in length. Its surface reached from thirteen hundred feet below the sea-level to twenty thousand feet

above. It yielded, therefore, every agricultural product. Its mineral wealth was boundless. It inherited the prestige of the Median, the Babylonian, the Assyrian, the Chaldean Empires, whose annals reached back through more than twenty centuries.

THE PERSIAN EMPIRE. Persia had always looked upon European Greece as politically insignificant, for it had scarcely half the territorial extent of one of her satrapies. Her expeditions for compelling its obedience had, however, taught her the military qualities of its people. In her forces were incorporated Greek mercenaries, esteemed the very best of her troops. She did not hesitate sometimes to give the command of her armies to Greek generals, of her fleets to Greek captains. In the political convulsions through which she had passed, Greek soldiers had often been used by her contending chiefs. These military operations were attended by a momentous result. They revealed, to the quick eye of these warlike mercenaries, the political weakness of the empire and the possibility of reaching its centre. After the death of Cyrus on the battle-field of Cunaxa, it was demonstrated, by the immortal retreat of the ten thousand under Xenophon, that a Greek army could force its way to and from the heart of Persia.

That reverence for the military abilities of Asiatic generals, so profoundly impressed on the Greeks by such engineering exploits as the bridging of the Hellespont, and the cutting of the isthmus at Mount Athos by Xerxes, had been obliterated at Salamis, Platea, Mycale. To plunder rich Persian provinces had become an irresistible temptation. Such was the expedition of Agesilaus, the Spartan king,

whose brilliant successes were, however, checked by the Persian government resorting to its time-proved policy of bribing the neighbors of Sparta to attack her. "I have been conquered by thirty thousand Persian archers," bitterly exclaimed Agesilaus, as he re-embarked, alluding to the Persian coin, the Daric, which was stamped with the image of an archer.

THE INVASION OF PERSIA BY GREECE. At length Philip, the King of Macedon, projected a renewal of these attempts, under a far more formidable organization, and with a grander object. He managed to have himself appointed captain-general of all Greece not for the purpose of a mere foray into the Asiatic satrapies, but for the overthrow of the Persian dynasty in the very centre of its power. Assassinated while his preparations were incomplete, he was succeeded by his son Alexander, then a youth. A general assembly of Greeks at Corinth had unanimously elected him in his father's stead. There were some disturbances in Illyria; Alexander had to march his army as far north as the Danube to quell them. During his absence the Thebans with some others conspired against him. On his return he took Thebes by assault. He massacred six thousand of its inhabitants, sold thirty thousand for slaves, and utterly demolished the city. The military wisdom of this severity was apparent in his Asiatic campaign. He was not troubled by any revolt in his rear.

THE MACEDONIAN CAMPAIGN. In the spring B.C. 334 Alexander crossed the Hellespont into Asia. His army consisted of thirty-four thousand foot and four thousand horse. He had with him only seventy talents in money. He

marched directly on the Persian army, which, vastly exceeding him in strength, was holding the line of the Granicus. He forced the passage of the river, routed the enemy, and the possession of all Asia Minor, with its treasures, was the fruit of the victory. The remainder of that year he spent in the military organization of the conquered provinces. Meantime Darius, the Persian king, had advanced an army of six hundred thousand men to prevent the passage of the Macedonians into Syria. In a battle that ensued among the mountain-defiles at Issus, the Persians were again overthrown. So great was the slaughter that Alexander, and Ptolemy, one of his generals, crossed over a ravine choked with dead bodies. It was estimated that the Persian loss was not less than ninety thousand foot and ten thousand horse. The royal pavilion fell into the conqueror's hands, and with it the wife and several of the children of Darius. Syria was thus added to the Greek conquests. In Damascus were found many of the concubines of Darius and his chief officers, together with a vast treasure.

Before venturing into the plains of Mesopotamia for the final struggle, Alexander, to secure his rear and preserve his communications with the sea, marched southward down the Mediterranean coast, reducing the cities in his way. In his speech before the council of war after Issus, he told his generals that they must not pursue Darius with Tyre unsubdued, and Persia in possession of Egypt and Cyprus, for, if Persia should regain her seaports, she would transfer the war into Greece, and that it was absolutely necessary for him to be sovereign at sea. With Cyprus and Egypt in his possession he felt no solicitude about Greece. The siege of

Tyre cost him more than half a year. In revenge for this delay, he crucified, it is said, two thousand of his prisoners. Jerusalem voluntarily surrendered, and therefore was treated leniently: but the passage of the Macedonian army into Egypt being obstructed at Gaza, the Persian governor of which, Betis, made a most obstinate defense, that place, after a siege of two months, was carried by assault, ten thousand of its men were massacred, and the rest, with their wives and children, sold into slavery. Betis himself was dragged alive round the city at the chariot-wheels of the conqueror. There was now no further obstacle. The Egyptians, who detested the Persian rule, received their invader with open arms. He organized the country in his own interest, intrusting all its military commands to Macedonian officers, and leaving the civil government in the hands of native Egyptians.

CONQUEST OF EGYPT. While preparations for the final campaign were being made, he undertook a journey to the temple of Jupiter Ammon, which was situated in an oasis of the Libyan Desert, at a distance of two hundred miles. The oracle declared him to be a son of that god who, under the form of a serpent, had beguiled Olympias, his mother. Immaculate conceptions and celestial descents were so currently received in those days, that whoever had greatly distinguished himself in the affairs of men was thought to be of supernatural lineage. Even in Rome, centuries later, no one could with safety have denied that the city owed its founder, Romulus, to an accidental meeting of the god Mars with the virgin Rhea Sylvia, as she went with her pitcher for water to the spring. The Egyptian disciples of Plato would

have looked with anger on those who rejected the legend that Perictione, the mother of that great philosopher, a pure virgin, had suffered an immaculate conception through the influences of Apollo, and that the god had declared to Ariston, to whom she was betrothed, the parentage of the child. When Alexander issued his letters, orders, and decrees, styling himself "King Alexander, the son of Jupiter Ammon," they came to the inhabitants of Egypt and Syria with an authority that now can hardly be realized. The free-thinking Greeks, however, put on such a supernatural pedigree its proper value. Olympias, who, of course, better than all others knew the facts of the case, used jestingly to say, that "she wished Alexander would cease from incessantly embroiling her with Jupiter's wife." Arrian, the historian of the Macedonian expedition, observes, "I cannot condemn him for endeavoring to draw his subjects into the belief of his divine origin, nor can I be induced to think it any great crime, for it is very reasonable to imagine that he intended no more by it than merely to procure the greater authority among his soldiers."

GREEK CONQUEST OF PERSIA. All things being thus secured in his rear, Alexander, having returned into Syria, directed the march of his army, now consisting of fifty thousand veterans, eastward. After crossing the Euphrates, he kept close to the Masian hills, to avoid the intense heat of the more southerly Mesopotamian plains; more abundant forage could also thus be procured for the cavalry. On the left bank of the Tigris, near Arbela, he encountered the great army of eleven hundred thousand men brought up by Darius from Babylon. The death of the Persian monarch,

which soon followed the defeat he suffered, left the Macedonian general master of all the countries from the Danube to the Indus. Eventually he extended his conquest to the Ganges. The treasures he seized are almost beyond belief. At Susa alone he found—so Arrian says—fifty thousand talents in money.

EVENTS OF THE CAMPAIGNS. The modern military student cannot look upon these wonderful campaigns without admiration. The passage of the Hellespont; the forcing of the Granicus; the winter spent in a political organization of conquered Asia Minor; the march of the right wing and centre of the army along the Syrian Mediterranean coast; the engineering difficulties overcome at the siege of Tyre; the storming of Gaza; the isolation of Persia from Greece; the absolute exclusion of her navy from the Mediterranean; the check on all her attempts at intriguing with or bribing Athenians or Spartans, heretofore so often resorted to with success; the submission of Egypt; another winter spent in the political organization of that venerable country; the convergence of the whole army from the Black and Red Seas toward the nitre-covered plains of Mesopotamia in the ensuing spring; the passage of the Euphrates fringed with its weeping-willows at the broken bridge of Thapsacus; the crossing of the Tigris; the nocturnal reconnaissance before the great and memorable battle of Arbela; the oblique movement on the field; the piercing of the enemy's centre—a manoeuvre destined to be repeated many centuries subsequently at Austerlitz; the energetic pursuit of the Persian monarch; these are exploits not surpassed by any soldier of later times.

A prodigious stimulus was thus given to Greek intellectual activity. There were men who had marched with the Macedonian army from the Danube to the Nile, from the Nile to the Ganges. They had felt the hyperborean blasts of the countries beyond the Black Sea, the simooms and sand-tempests of the Egyptian deserts. They had seen the Pyramids which had already stood for twenty centuries, the hieroglyph-covered obelisks of Luxor, avenues of silent and mysterious sphinxes, colossi of monarchs who reigned in the morning of the world. In the halls of Esar-haddon they had stood before the thrones of grim old Assyrian kings, guarded by winged bulls. In Babylon there still remained its walls, once more than sixty miles in compass, and, after the ravages of three centuries and three conquerors, still more than eighty feet in height; there were still the ruins of the temple of cloud encompassed Bel, on its top was planted the observatory wherein the weird Chaldean astronomers had held nocturnal communion with the stars; still there were vestiges of the two palaces with their hanging gardens in which were great trees growing in mid-air, and the wreck of the hydraulic machinery that had supplied them with water from the river. Into the artificial lake with its vast apparatus of aqueducts and sluices the melted snows of the Armenian mountains found their way, and were confined in their course through the city by the embankments of the Euphrates. Most wonderful of all, perhaps, was the tunnel under the river-bed.

EFFECT ON THE GREEK ARMY. If Chaldea, Assyria, Babylon, presented stupendous and venerable antiquities reaching far back into the night of time, Persia was not

without her wonders of a later date. The pillared halls of Persepolis were filled with miracles of art—carvings, sculptures, enamels, alabaster libraries, obelisks, sphinxes, colossal bulls. Ecbatana, the cool summer retreat of the Persian kings, was defended by seven encircling walls of hewn and polished blocks, the interior ones in succession of increasing height, and of different colors, in astrological accordance with the seven planets. The palace was roofed with silver tiles, its beams were plated with gold. At midnight, in its halls the sunlight was rivaled by many a row of naphtha cressets. A paradise—that luxury of the monarchs of the East—was planted in the midst of the city. The Persian Empire, from the Hellespont to the Indus, was truly the garden of the world.

EFFECTS ON THE GREEK ARMY. I have devoted a few pages to the story of these marvelous campaigns, for the military talent they fostered led to the establishment of the mathematical and practical schools of Alexandria, the true origin of science. We trace back all our exact knowledge to the Macedonian campaigns. Humboldt has well observed that an introduction to new and grand objects of Nature enlarges the human mind. The soldiers of Alexander and the hosts of his camp-followers encountered at every march unexpected and picturesque scenery. Of all men, the Greeks were the most observant, the most readily and profoundly impressed. Here there were interminable sandy plains, there mountains whose peaks were lost above the clouds. In the deserts were mirages, on the hill-sides shadows of fleeting clouds sweeping over the forests. They were in a land of amber-colored date-palms and cypresses, of tamarisks,

green myrtles, and oleanders. At Arbela they had fought against Indian elephants; in the thickets of the Caspian they had roused from his lair the lurking royal tiger. They had seen animals which, compared with those of Europe, were not only strange, but colossal—the rhinoceros, the hippopotamus, the camel, the crocodiles of the Nile and the Ganges. They had encountered men of many complexions and many costumes: the swarthy Syrian, the olive-colored Persian, the black African. Even of Alexander himself it is related that on his death-bed he caused his admiral, Nearchus, to sit by his side, and found consolation in listening to the adventures of that sailor—the story of his voyage from the Indus up the Persian Gulf. The conqueror had seen with astonishment the ebbing and flowing of the tides. He had built ships for the exploration of the Caspian, supposing that it and the Black Sea might be gulfs of a great ocean, such as Nearchus had discovered the Persian and Red Seas to be. He had formed a resolution that his fleet should attempt the circumnavigation of Africa, and come into the Mediterranean through the Pillars of Hercules—a feat which, it was affirmed, had once been accomplished by the Pharaohs.

INTELLECTUAL CONDITION OF PERSIA. Not only her greatest soldiers, but also her greatest philosophers, found in the conquered empire much that might excite the admiration of Greece. Callisthenes obtained in Babylon a series of Chaldean astronomical observations ranging back through 1,903 years; these he sent to Aristotle. Perhaps, since they were on burnt bricks, duplicates of them may be recovered by modern research in the clay libraries of the

Assyrian kings. Ptolemy, the Egyptian astronomer, possessed a Babylonian record of eclipses, going back 747 years before our era. Long-continued and close observations were necessary, before some of these astronomical results that have reached our times could have been ascertained. Thus the Babylonians had fixed the length of a tropical year within twenty-five seconds of the truth; their estimate of the sidereal year was barely two minutes in excess. They had detected the precession of the equinoxes. They knew the causes of eclipses, and, by the aid of their cycle called Saros, could predict them. Their estimate of the value of that cycle, which is more than 6,585 days, was within nineteen and a half minutes of the truth.

INTELLECTUAL CONDITION OF PERSIA. Such facts furnish incontrovertible proof of the patience and skill with which astronomy had been cultivated in Mesopotamia, and that, with very inadequate instrumental means, it had reached no inconsiderable perfection. These old observers had made a catalogue of the stars, had divided the zodiac into twelve signs; they had parted the day into twelve hours, the night into twelve. They had, as Aristotle says, for a long time devoted themselves to observations of star-occultations by the moon. They had correct views of the structure of the solar system, and knew the order of the emplacement of the planets. They constructed sundials, clepsydras, astrolabes, gnomons.

Not without interest do we still look on specimens of their method of printing. Upon a revolving roller they engraved, in cuneiform letters, their records, and, running this over plastic clay formed into blocks, produced ineffaceable

proofs. From their tile-libraries we are still to reap a literary and historical harvest. They were not without some knowledge of optics. The convex lens found at Nimroud shows that they were not unacquainted with magnifying instruments. In arithmetic they had detected the value of position in the digits, though they missed the grand Indian invention of the cipher.

What a spectacle for the conquering Greeks, who, up to this time, had neither experimented nor observed! They had contented themselves with mere meditation and useless speculation.

ITS RELIGIOUS CONDITION. But Greek intellectual development, due thus in part to a more extended view of Nature, was powerfully aided by the knowledge then acquired of the religion of the conquered country. The idolatry of Greece had always been a horror to Persia, who, in her invasions, had never failed to destroy the temples and insult the fanes of the bestial gods. The impunity with which these sacrileges had been perpetrated had made a profound impression, and did no little to undermine Hellenic faith. But now the worshiper of the vile Olympian divinities, whose obscene lives must have been shocking to every pious man, was brought in contact with a grand, a solemn, a consistent religious system having its foundation on a philosophical basis. Persia, as is the case with all empires of long duration, had passed through many changes of religion. She had followed the Monotheism of Zoroaster; had then accepted Dualism, and exchanged that for Magianism. At the time of the Macedonian expedition, she recognized one universal Intelligence, the Creator, Preserver, and