The Open Court

A MONTHLY MAGAZINE

Devoted to the Science of Religion, the Religion of Science, and the Extension of the Religious Parliament Idea

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JOHN WESLEY POWELL.

BY MRS. M. D. LINCOLN (BESSIE BEECH.)

I. BOYHOOD AND YOUTH.

JOHN WESLEY POWELL was born of English parents at Mount Morris, New York, on the 24th of March, 1834. His father, Joseph Powell, while in England, had been a preacher of the Wesleyan Church, and after reaching America he continued to preach. A diligent reader, a terse speaker, a sound thinker; honest, precise, and devout, the stern morality which he taught in the pulpit was exemplified in all his social relations and particularly in the government of his household. The severity of the father's discipline was, however, softened by the gentle influence of the mother. Remarkable alike for her womanly graces and rare gifts of mind, she shone like an angel of light in the home, planning a thousand pleasures for her children and judiciously managing her domestic affairs while her husband itinerated through the country on his ministerial labors.

Even as a child young Powell evinced his investigating tendencies. He instinctively gathered every curious shell and pebble within his reach, and read a lesson in every leaf and flower. Yet, judging from the interest he took in his Biblical studies, it would have been more reasonable to predict for him future eminence as an ecclesiastic than the brilliant career as a scientist upon which he was destined to enter. He early committed to memory the entire Gospels of Matthew, Mark, Luke, and John, much to the delight of his father. When he was about seven years of age, the family moved from Mount Morris to Jackson, Ohio. At this time the Anti-Slavery agitation was extending over the country, and in it the father took an active part. Associated with him in this work

were Doctor Isham, Mr. Montgomery, and Mr. Crookham, residents of the same place. He was also on intimate terms with other men identified with the movement throughout the State, and the boy frequently saw Professors Finney and Williams, then of Oberlin College, Salmon P. Chase, afterwards Chief Justice of the United States, Joshua R. Giddings, and other distinguished abolitionists. To the people of southern Ohio, many of whom had originally emigrated from Virginia and other slave States, anti-slavery sentiments were extremely obnoxious. For several years an aggressive agitation was kept up; meetings were held in various portions of the State, and pamphlets in the interest of the cause were published and distributed. At one time *Wesley's Thoughts on Slavery* were issued in pamphlet form and widely circulated by a coterie of men living in Jackson. This publication led to a great uproar in the town, and four of the leading agitators were mobbed, and soon afterwards one of the professors of Oberlin College was assaulted on the street while on his way to the Powell residence. These years constituted a very exciting epoch in the boy's life. He was now old enough to appreciate the character of his father's course, and keenly felt the terrorism in which the family was constantly held.

But these circumstances led to events which profoundly influenced his subsequent life. A short distance from Jackson, on a large farm, lived Mr. Crookham, a man of some means. He had a grown family, in which were several sons who took charge of the farm and relieved their father of the cares of business. He was now an old man, and reputed to be a great scholar. To John he seemed a man of miraculous wisdom. He had built for himself two large log-houses, connected by a shed. In one he had his library, museum, and laboratory; the other was arranged as a school-house, and in this he taught gratuitously such young men as desired instruction.

As the son of an abolitionist it was at one period difficult for John to attend the village school. The boys considered that he had no rights which they were bound to respect, and his mother came to the conclusion that it was not safe for him to go to the school any longer. About this time Mr. Crookham came to see his father and mother, and the kind old gentleman proposed that John should come and study with him in his log school-house. The lad was shy and embarrassed, and it was quite a while before Mr. Crookham, although a constant visitor in the family for several years, could overcome his timidity. At last, addressing Mr. Powell, he

said; "Great Britain,[1] I will take the boy and make a scholar of him." To this the father consented, and that day completed the arrangements for his guardianship of the lad until the excitement should subside.

There were but three or four other pupils and their attendance was rather irregular; all but John were grown men. Mr. Crookham devoted himself largely to his own studies, especially those in natural history. With him there were no "set" lessons; he gave his pupils books to read and occasionally talked with them and asked them questions.

Within a few months, matters became quiet in the village and John returned to the common school, but Mr. Crookham took great pains to direct his reading. He brought him *Hume's History of England* and other historical works and talked with him on the subjects of which they treated. While giving him no books in natural history, he made him quite familiar with a few plants, insects, and birds, and also with some minerals, and by frequent conversations upon these various subjects, interested him in the characteristics of plants and animals, and the properties of minerals, and at the same time taught him many of the elementary facts of chemistry.

Mr. Crookham, who was a large-framed, corpulent man, often asked John to read to him, but such readings were usually interrupted by his own explanations and by general conversations, which so thoroughly illuminated the subject in hand that the boy, in his youthful imagination, came to regard his tutor as a giant of learning and benevolence. Sometimes he took John into the woods, where every step seemed to suggest something of interest. He would sit down on a rock, stump, or log and describe to his pupil what he had found. Naturally, as the youth grew into manhood, he looked back with great pleasure to those days, also with wonder that a man so absorbed in his books should have taken such interest in a boy so young. The old gentleman's warm friendship for the parents was not the only influence which stimulated this devotion. He saw in his protégé that genius which the father failed to discover, and watched its development with affectionate anxiety.

John's father and mother were Methodists; Mr. Crookham was a Calvinist. For hours the boy would listen to their conversations on religious subjects, and in this way acquired a good many ideas,—rather large ones, too, for one of his age,—on a variety of theological questions. He came to understand that his mother

[1] Mr. Crookham always called John's father "Great Britain."

was not so entirely orthodox as his father; her opinions were perhaps slightly tinted with Swedenborgian mysticism. Be that as it may, her theology seemed to his boyish perceptions a great deal better than that of his father or Mr. Crookham. When the two were discussing their relative opinions, it was John's habit to wait for and expect his mother's final exposition of the subject. He thoroughly believed that she knew exactly the truth, and he used to wonder why the men argued over these matters so long, and why they did not at the outset ask his mother to explain to them just what was right.

One day the old Calvinist came puffing up the steps of neighbor Powell's house, walked through the sitting-room, and sitting down in the kitchen where John's mother was busy, asked for "Great Britain." He was evidently greatly agitated, and after a time explained that some rowdies had burned his school-house, library, and cabinet, and that all was lost. He seemed not to care so greatly on his own account, but to mourn chiefly because the means with which to teach his "youngsters" had been destroyed. After that he came more frequently to his father's house, and if possible took more minute direction of the boy's studies. Although by reason of the latter's extreme youth, it was scarcely to be expected that he should have made great advance in natural history, yet the two or three years thus spent under the guidance of Mr. Crookham were of real importance in giving to his thoughts that inclination which carried him eventually and permanently into the profession of science and of letters.

During these years, it had been the father's ambition to place his family in such a position that they could live comfortably, and to devote himself exclusively to the ministry. Finally, when John was twelve years old, Mr. Powell moved further west, making the journey across northern Indiana, through Chicago, to Walworth County, Wisconsin. This was accomplished with an emigrant wagon loaded with household goods, and two carriages, one of the latter being driven by John. His father had previously bought some land, but upon reaching it decided not to settle on it, but to purchase a partly improved farm. The next summer he commenced preaching regularly, leaving the Methodist Church, however, and joining the Wesleyan, on account of his anti-slavery sentiments. He knew nothing about farming, did not work on the farm, and took no part in its management. All this devolved upon John, and, aided by two or three farm employees, the schoolboy

became a farmer, with all the responsibilities of the position, heavy indeed for a lad of his years.

The farm was in burr-oak woods, and but a small tract was cultivated the first year. During the second winter a large area was cleared and fenced, and in the course of a few years about sixty acres of land were brought under cultivation. John worked continuously summer and winter: clearing the land, sodding, ditching, ploughing, planting, building, adding an annex to the house and making the barn larger, constituted only a small part of the work planned or executed. He labored through the long days and studied far into the night, eagerly perusing all the books he could procure.

Following the plough did not suit him. While he turned the soil, his thoughts were far away amid the rocks and woods of his old home, where Mr. Crookham first opened the volume of Nature to his wondering eyes. Yet he toiled faithfully. His home was fifty miles from what was then called Southport (now Kenosha), and sixty miles from Racine, and these places were the markets of the country. In the late fall and early winter months his time was usually occupied in hauling wheat to one or the other of these towns. With the money obtained from the sale of grain he had to make the purchases for the family,—groceries, clothing, lumber, and such other things as were needed on the farm. It was a five or six days' journey, and from twelve to fifteen trips were made each year. Those were the pioneer days of our country, when oxen drew the plough and hauled the produce of the farms to market. Southern Wisconsin was at that time a great wheat-producing region, and all farmers in the country were on the road during the fall and winter. He did not then realise how perilous was the promiscuous company of travellers in his goings to and from the market towns in these years of his life. He was associated with hardy, jovial, and often very hilarious frontiersmen, and there were temptations on the road and in the city to which a country boy might have readily yielded. But there were circumstances which protected him from the bad influences by which he was surrounded. He had a sense of great responsibility, especially so because the family purse was in his custody. His father and mother so completely trusted him that they never asked him to account for his transactions.

In one of the earlier years of his pioneer life, he fell in company with one William Wheeler, several years his senior, who took great interest in him, and whom the boy, recognising as a supe-

rior, soon came to regard with sincere esteem and affection. Mr. Wheeler said nothing about morality, but his general conduct and noble example were such as to make a deep impression on the lad. He was far superior in education to his young companion,—had at one time been in college and now occupied himself very much in reading, letting his team follow the others while he poured over some entertaining volume. John was quick to follow his example. His wagon-box became a receptacle for books, and while his reading was desultory, it was nevertheless valuable. Histories and biographies pleased him the most. On these trips he re-read Hume's History of England, Gibbon's Rome, a history of the United States, and finally Dick's philosophy and some works in Mental Philosophy. He never read a work of fiction or a volume of poetry, although his mother had frequently urged him to read Milton. Now he became interested in Bunyan's Pilgrim's Progress, and no matter what other books he selected for companions on these long journeys, that one was sure to be found in his wagon-box, for he could read it when he was tired of all others. He never, by the way, considered Bunyan a work of fiction.

In the winter of 1850, when he was sixteen years old, his discontent with farm work impelled him to leave home, and he went to Janesville, determined to attend school. Janesville was about twenty miles distant, and he walked the first day to a farmhouse within about two miles of the town. He had but a few cents in his pocket, and stopping at the farmhouse to stay over night, he asked for work. The farmer engaged him for two weeks, and at the end of that time, with six dollars in his pocket, John proceeded to Janesville and visited the school. He returned to the outskirts of the town and made arrangements with a farmer to work nights and mornings for his board, stipulating that he should have his time during school hours for study.

The family lived in a log house. John's business was to feed and water the cattle and sheep, and to care for them generally; and, at night, after his work was done in the farmyard, he sat by the chimney-side rocking the cradle and studying his books by the fire-light as best he could. The next year Joseph Powell sold the farm at South Grove and moved to another on Bonus Prairie, in Boone county, Illinois.

In the fall of 1852, when John was eighteen, it was decided by his mother that he should commence his school life. The first thing to be done was to earn the necessary money. Early in the month of October he put the farm in as good shape as possible and turned

it over to his younger brother, W. B. Powell, and commenced studying at home. For six weeks his school was in the garret, where he remained almost day and night, studying grammar, arithmetic, and geography. He then set out for the southern part of Wisconsin, about thirty miles distant, and had no difficulty in securing engagement as a teacher. The school engaged, the next task was to procure the necessary certificate of proficiency. One day in the latter part of November he went to the township superintendent to be examined. A feeling of dread possessed him lest he should fail on examination.

As he approached the Superintendent's house a fierce wind blew the snow in his face. All aglow with the excitement of a walk of twenty miles in a sharp gale, he knocked at the door. The lady of the house, with a cheerful reassuring voice, invited him in, but he had to wait two or three hours for the return of the Superintendent. At last he came, and insisted that John, now the dignified School-Master, Mr. Powell, should stay all night. As the family sat together at the supper table, the Superintendent conversed with the young man about the school he was to teach, and about various subjects that would engage his attention, in so kind and skilful a way, that during the evening he drew out such knowledge as his visitor possessed without giving him an idea that he was passing the dreaded ordeal. Just before going to bed, and greatly to the surprise of his visitor, he filled out a certificate, signed it and handed it to the young man. The superintendent was a man of fine culture; his advice was always good, and during the winter he gave the young teacher much valuable aid.

The school over which Powell was to preside was on the north side of Jefferson Prairie, and a little stone school-house was his first college. At least half of his pupils were older than himself, and several of them were quite as far advanced in their studies. This compelled him to work very hard, and certainly no pupil in the school made such progress as did he. He provided himself with several school arithmetics and worked through them all. He studied elementary algebra, and took the class about half as far as he went himself. He read three or four grammars, and made decided progress in geography, and on this subject gave a lecture one night in the week to the most advanced pupils. The other young people of the neighborhood, as well as pupils from adjoining towns, came to these lectures. For this work Powell prepared himself by systematic study and vigorous consultation of books of ref-

erence; he also made excellent use of his limited knowledge of history, weaving it deftly into his account of the lands of the world.

By contract the teacher was to "board around," but one of the trustees, Mr. Little, took Mr. Powell to his home and insisted that he should stay the greater part of his time with him. His wife had been a New England school-teacher, and she had what seemed to the young man a marvellous library. She took great interest in his geographic work and always kept him supplied with abundant material from which to prepare his lectures, and he always gave her an outline of his discourse before delivering it in public.

In the following summer (1853) he worked on a farm at Bonus Prairie. In the meantime his father became interested in the founding of a school at Wheaton, Illinois, under the auspices of the Wesleyan Methodists. Near the village he bought a small tract of land of forty acres, on which stood a little farmhouse. He had also bought five acres of land close by the new building erected for college purpose, and was himself one of the trustees of the college. Early in the fall John's mother and sister journeyed with him from Bonus Prairie to Wheaton. On reaching that place he had the little frame moved from the forty-acre lot to the five-acre lot near the village, a distance of about half a mile, and with the help of two or three men it was soon fitted up in comfortable style for the winter. Here John studied and taught until summer, when he returned to the farm.

Early in the fall of 1854 he went south to Macon County, and taught a County school, and the following spring went into business with his brother-in-law, Mr. Davis, who had married his eldest sister. A nursery and stock farm, the latter for sheep, was the business venture in which he engaged, hoping that at the end of two or three years he would make sufficient money to enable him to take a college course.

When the news of his undertaking reached his father, and with it the alarming statement that John had run into debt, he wrote his son a very bitter letter, saying that he considered the debts which he had assumed to be dishonorable and that his course in the matter was not a whit better than highway robbery. His mother also wrote advising him to withdraw from the business, although she treated the matter with leniency. The combined opposition of his parents made him relinquish the enterprise, and he then fully determined never to commence again until he had completed a course of study. Accordingly he went to Decatur and rented a little house with a single room, which had previously been

used as a shoe-shop. In this humble tenement he boarded himself, purchasing bread, milk, and such other things as did not need cooking; and occasionally his sister, who lived in the country, would send him a joint of meat ready for the table, or would in other ways add to his little store.

On going to Wheaton, he expected that the school would furnish all the educational facilities needed, but as it was just organised he soon found himself in advance of any of its classes. He then formed the resolution of studying by himself. The persevering and indomitable student may not have judiciously selected his studies; but his work in algebra, geometry, and trigonometry was successful and satisfactory. His studies in mental and moral philosophy and his general reading in history were less profitable, perhaps; but his progress in Latin compensated for the deficiency.

During the winter of 1856 he taught school in Clinton, De Witt County, Illinois, and received sixty dollars per month. At the little stone school-house he had received fourteen dollars per month, and in the school near Decatur, thirty dollars per month, and his increased salary of sixty dollars per month seemed to him a large amount. The next year he attended classes in Jacksonville College, Illinois, studying Latin and Greek, reviewing trigonometry and attending lectures in chemistry.

His father had always desired that his son should go to Oberlin, and at last in deference to that strongly expressed wish, he entered Oberlin College in 1857. Being far advanced in the scientific branches of study, he now devoted himself chiefly to Greek and Latin, studying botany also during the spring term. There was no winter school at Oberlin at that time, as the faculty believed the interests of the pupils were subserved by a vacation which would enable them to teach during the winter months. Consequently Mr. Powell returned to Wheaton, entered school there, and remained a year. During all this time his studies had been irregular, but he was in a position where he could graduate in any western college by a few months' application.

For several years he had given all his attention to botany and zoölogy. He had an herbarium of many thousand plants, and a large collection of lacustrine river and land shells, and quite a large cabinet of the reptiles found in Illinois, Iowa, and Michigan. One spring day he went through the village of Wheaton with a basket containing some glass fruit-cans, to be used as specimen jars, on his way to the woods for the purpose of collecting snakes. As he passed a group of men they asked him where he was going. His

reply was that he needed another rattlesnake in his collection. As it happened he found a rattlesnake that day, and on his return through the village at night, with the live reptile in a glass jar, he chanced to meet the same gentlemen with whom he had been talking in the morning. This mere accident led to a curious and rather fabulous story, to the effect that he was acquainted with the homes of all the animals, knew their habits, and could at any time find any animal he desired. This reputation clung to him for years; the incident got into the country papers and was repeated until the story became greatly exaggerated. When last repeated, the young naturalist learned for the first time that he had appropriated the upper story of his father's house for a museum, and had it full of all sorts of reptiles; and that he could go to the woods and fields any day and find any reptile, mammal, or bird that pleased his fancy, and that he lived in a house full of them and was constantly employed in studying their habits. To be sure he had a large collection, and was very familiar with it; but the story was much larger than the collection.

About this time he was probably more interested in mollusks than in any other department of natural history. He had a very large collection made by himself from the Great Lakes, the small interior lakes of Wisconsin and Illinois, the Mississippi River, and from most of the rivers of Iowa, Illinois, Missouri, Indiana, and Kentucky, besides a good representation of the land shells of all that region of country. His greatest difficulty was in obtaining books to enable him to identify species. There were many specimens which he was never able properly to identify, but he gave them names according to the locality where they were collected, and from the characteristics of the shells. He had collected some fossils, also, and had studied minerals sufficiently to become familiar with the use of the blow-pipe.

During the summer of this year he continued his travels, especially along the Ohio River and across to the lakes, and then through Michigan. In the fall he went to the Iron Mountain region, south of St. Louis, Missouri, for the purpose of collecting minerals. He found the country so interesting that he continued his stay in the field until he barely had the funds necessary to take him to St. Louis, where he hoped to earn enough to pay his expenses home. Not finding work at once, he pawned his watch and went to Decatur where he had previously lived. Later he engaged to teach at Hennepin, Illinois, and continued teaching for six months, receiving one hundred dollars per month.

It was his intention at the time to earn a sum of money sufficient to enable him to study in some Eastern college one or two years and graduate, but when the spring time came the old fascination for natural history studies predominated, and he made geology a specialty.

The town of Hennepin standing on a bluff of the Illinois River, was of itself a study. The underlying country for miles around was a deep accumulation of drift-like material. A great valley or basin had been filled and the carboniferous rocks which came near the surface were here marked to the depth of about two hundred feet. During the winter Powell became greatly interested in this body of drift material and the peculiar characteristics of the country, and early in the spring he commenced a more thorough examination of it and the adjacent county of La Salle. He devoted several weeks to this work, and then extended his examination farther and farther away, up and down the valley of the Illinois, and finally through the valley of the Mississippi and along the Des Moines River in Iowa and thence into southern Wisconsin.

His geological studies interested him deeply, and he continued out late in the fall. On returning to Hennepin he decided to teach again and postpone for another year his trip to the East. During these scientific trips he had formed the acquaintance of many scholars interested in natural history and geology, and was elected Secretary of the Illinois Natural History Society. In this capacity, and through the kindness of many devoted friends, he was enabled to journey, by rail or boat, for several years, without expense; and being a good walker, his expenses as a travelling student were always trivial. He could sleep at night on the ground under a tree with impunity, for he had perfect health and was an athlete.

Thus young Powell's student days were not all passed in the school-room, though he had diligently applied himself to study under the direction of various teachers. Much of his study was made privately, as he was impelled by a desire to acquire material for successful instruction. The teacher thus became the more careful student. To a large extent his school-room was in the forest and the field, on the prairie and the mountain, and along the river bank and the lake shore; for he early became a student of nature, and studied in the solitudes of nature.

[TO BE CONTINUED.]

MAJOR POWELL, THE CHIEF.

BY THE EDITOR.

MAJOR John Wesley Powell received *honoris causa* the doctor's degree of the University of Heidelberg, which is a rare distinction ranging high above the title of doctor that is conferred to applicants on the ground of a thesis and a due examination called the *rigororum*. The doctor's degree *honoris causa* is given only to men of extraordinary merit when they have acquired sufficient fame no longer to be in need of titles. The philosophical faculty of Heidelberg so correctly and pointedly stated the reason for conferring the honorary degree of doctor upon Major Powell, that we here reproduce an English translation of that portion of his diploma. It reads as follows:

"We, the Senior Dean and other professors of the Faculty of Philosophy in the Karl Rupert University, duly certify by this diploma bearing our seal that we have conferred the rights and privileges of a doctor of philosophy, *honoris causa*, upon that most learned and distinguished man, John W. Powell, of Illinois, heretofore chief of the public institution of ethnography, now of geology, in the United States of America, who, laboriously and wisely studying and measuring the vast and spacious regions of his own country with others, has scientifically observed and expounded the structure, form, and origin of the earth; and who has so associated with himself and brought together into one institution a great number of the most distinguished geologists of his country that they have materially advanced or solved, not less wonderfully than speedily, very difficult and profound questions in mineralogy, petrography, geology, and paleontology; they have studied under his auspices as chief, thereby causing these things not only to be most skilfully brought together in various works, but also to be communicated with the greatest liberality to all students of these subjects in Europe."

Major Powell was not only a scientist but also a chief; he was an organiser, and it is his spirit even to-day after he has passed away that pervades the institutions which with him and partly through him were called into existence. Yet while he was a born leader, he was never domineering but always amiable and considerate. He appeared to the younger generation that grew up under the influence of his powerful personality, not as their teacher or master, but their senior friend, and they in their turn learned to look up to him with love and confidence as to a father or elder brother.

MITHRAISM AND THE RELIGIONS OF THE EMPIRE.[1]

BY PROFESSOR FRANZ CUMONT.

THE Acts of the Oriental martyrs bear eloquent testimony to the intolerance of the national clergy of the Persia of the Sassanids; and the Magi of the ancient empire, if they were not persecutors, at least constituted an exclusive caste, and possibly even a privileged race. The priests of Mithra afford no evidence of having assumed a like attitude. Like the Judaism of Alexandria, Mazdaism had been softened in Asia Minor by the Hellenic civilisation. Transported into a strange world, it was compelled to accommodate itself to the usages and ideas there prevailing; and the favor with which it was received encouraged it to persevere in its policy of conciliation. The Iranian gods who accompanied Mithra in his peregrinations were worshipped in the Occident under Greek and Latin names; the Avestan *yazatas* assumed there the guise of the immortals enthroned on Olympus, and these facts are in themselves sufficient to prove that far from exhibiting hostility toward the ancient Græco-Roman beliefs, the Asiatic religion sought to accommodate itself to them, in appearance at least. A pious mystic could, without renouncing his faith, dedicate a votive inscription to the Capitolian triad,—Jupiter, Juno, and Minerva; he merely invested these divine names with a different meaning from their ordinary acceptation. If the injunction to refrain from participating in other Mysteries, which is said to have been imposed upon Mithraic initiates, was ever obeyed it was not long able to withstand the syncretic tendencies of imperial paganism. For in the fourth century the "Fathers of the Fathers" were found performing the highest offices of the priesthood, in temples of all sorts.

Everywhere the sect knew how to adapt itself with consum-

[1] Extracted by the author from his *Textes et Monuments figurés relatifs aux Mystères de Mithra* (Brussels: H. Lamertin). Translated by T. J. McCormack.

mate skill to the environment in which it lived. In the valley of the Danube it exercised on the indigenous cult an influence that presupposes a prolonged contact between them. In the region of the Rhine, the Celtic divinities were honored in the crypts of the Persian god, or at least in conjunction with them. Thus, the Mazdean theology, according to the country in which it flourished, was colored with variable tints, the precise gradations of which it is now impossible for us to follow. But these dogmatic shadings merely diversified the subordinate details of the religion, and never imperilled its fundamental unity. There is not the slightest evidence that these deviations of a flexible doctrine provoked heresies. The concessions which it made were matters of pure form. In reality, Mithraism having arrived in the Occident in its full maturity, and even showing signs of decrepitude, no longer assimilated the elements that it borrowed from the surrounding life. The only influences that profoundly modified its character were those to which it was subjected in its youth amidst the populations of Asia.

The close relations in which Mithra stood to certain gods of this country is not only explained by the natural affinity which united all Oriental immigrants in opposition to the paganism of Greece and Rome. The ancient religious hostility of the Egyptians and Persians persisted even in Rome under the emperors, and the Iranian Mysteries appear to have been separated from those of Isis by secret rivalry if not by open opposition. On the other hand, they associated readily with the Syrian cults that had emigrated with them from Asia and Europe. Their doctrines, thoroughly imbued with Chaldæan theories, must have presented a striking resemblance to that of the Semitic religions. Jupiter Dolichenus, who was worshipped simultaneously with Mithra in Commagene, the land of his origin, and who like the latter remained a preëminently military divinity, is found by his side in all the countries of the Occident. At Carnuntum in Pannonia, a mithræum and a *dolichenum* adjoined each other. Baal, the lord of the heavens, was readily identified with Ormadz, who had become Jupiter-Cælus, and Mithra was easily likened to the solar god of the Syrians. Even the rites of the two liturgies appear to have offered some resemblances.

As in Commagene, so also in Phrygia, Mazdaism had sought a common ground of understanding with the religion of the country. In the union of Mithra and Anâhita the counterpart was found of the intimacy between the great indigenous divinities Attis and Cybele, and this harmony between the two sacred couples persisted

in Italy. The most ancient mithræum known to us was contiguous to the *metroon* of Ostia, and we have every reason to believe that the worship of the Iranian god and that of the Phrygian goddess were conducted in intimate communion with each other throughout the entire extent of the empire. Despite the profound differences of their character, political reasons drew them together. In conciliating the priests of the *Mater Magna*, the sectaries of Mithra obtained the support of a powerful and officially recognised clergy, and so shared in some measure in the protection afforded it by the State. Further, since men only were permitted to take part in the secret ceremonies of the Persian liturgy, other Mysteries to which women were admitted must have formed some species of alliance with the former, to make them complete. The Great Mother succeeded thus to the place of Anâhita; she had her *Matres* or "Mothers," as Mithra had his "Fathers"; and her initiates were known among one another as "Sisters," just as the votaries of her associate called one another "Brothers."

This alliance, fruitful generally in its results, was especially profitable to the ancient cult of Pessinus, now naturalised at Rome. The loud pomp of its festivals was a poor mask of the vacuity of its doctrines, which no longer satisfied the aspirations of its devotees. Its gross theology was elevated by the adoption of certain Mazdean beliefs. There can be scarcely any doubt that the practice of the taurobolium, with the ideas of purification and immortality appertaining to it, had passed under the Antonines from the temples of Anâhita into those of the *Mater Magna*. The barbarous custom of allowing the blood of a victim slaughtered on a latticed platform to fall down upon the mystic lying in a ditch below, was probably practised in Asia from time immemorial. According to a wide-spread notion among primitive peoples, the blood is the vehicle of the vital energy, and the person who poured it upon his body and moistened his tongue with it believed that he was thereby endowed with the courage and strength of the slaughtered animal. This sacred bath appears to have been administered in Cappadocia in a great number of sanctuaries, and especially in those of Mâ, the great indigenous divinity, and in those of Anâhita. These goddesses, to whom the bull was consecrated, had been generally likened by the Greeks to their Artemis Tauropolos, and the ritualistic baptism practised in their cult received the name of *tauropolium* (ταυροπόλιον), which was transformed by the popular etymology into *taurobolium* (ταυροβόλιον). But under the influence of the Mazdean beliefs regarding the future life, a more profound significance was

attributed to this baptism of blood. In taking it the devotees no longer imagined they acquired the strength of the bull; it was no longer a renewal of physical strength that the life-sustaining liquid was now thought to communicate, but a renewal, temporary and even perpetual, of the human soul.[1]

When, under the empire, the *taurobolium* was introduced into Italy, it was not quite certain at the outset what Latin name should be given the goddess in whose honor it was celebrated. Some saw in her a celestial Venus; others compared her to Minerva, because of her warlike character. But the priests of Cybele soon introduced the ceremony into their liturgy,—evidently with the complicity of the official authorities, for nothing in the ritual of this recognised cult could be modified without the authorisation of the quindecemvirs. Even the emperors are known to have granted privileges to those who performed this hideous sacrifice for their salvation, though their motives for this special favor are not clearly apparent. The efficacy which was attributed to this bloody purification, the eternal new birth that was expected of it, resembled the hopes which the mystics of Mithra attached to the immolation of the mythical bull.[2] The similarity of these doctrines is quite naturally explained by the identity of their origin. The taurobolium, like many rites of the Oriental cults, is a survival of a savage past which a spiritualistic theology had adapted to moral ends. It is a characteristic fact that the first immolations of this kind that we know to have been performed by the clergy of the Phrygian goddess took place at Ostia, where the *metroon*, as we saw above, adjoined a Mithraic crypt.

The symbolism of the Mysteries certainly saw in the *Magna Mater* the nourishing Earth which the Heavens yearly fecundated. So the Græco-Roman divinities which they adopted changed in character on entering their dogmatic system. Now, these gods were identified with the Mazdean heroes, and the barbaric legends then celebrated the new exploits which they had performed. Again, they were considered as the agents that produced the various transformations of the universe. Then, in the centre of this pantheon, which had again become naturalistic, as it was at its origin, was placed the Sun, for he was the supreme lord that governed the movements of all the planets and even the revolutions of the heavens themselves,—the one who diffused with his light and his heat

1 These pages summarise the conclusions of a study entitled *Le taurobole et le culte de Bellone*, published in the *Revue d'histoire et de littérature religieuses*.

2 See *The Open Court* for October, 1902, p. 609.

all of life here below. This conception, astronomical in its origin, predominated more and more according as Mithra entered into more intimate relations with Greek thought and became a more faithful subject of the Roman state.

The worship of the Sun, the outcome of a sentiment of recognition for its daily benefactions, augmented by the observation of its tremendous rôle in the cosmic system, was the logical upshot of paganism. When critical thought sought to explain the sacred traditions and discovered in the popular gods the forces and elements of nature, it was obliged perforce to accord a predominant place to the star on which the very existence of our globe depended. "Before religion reached the point where it proclaimed that God should be sought in the Absolute and the Ideal, that is to say, outside the world, one cult only was reasonable and scientific and that was the cult of the Sun."[1] From the time of Plato and Aristotle Greek philosophy regarded the celestial bodies as animate and divine creatures; Stoicism furnished new arguments in favor of this opinion; while Neo-Pythagorism and Neo-Platonism insisted still more emphatically on the sacred character of the luminary which is the ever-present image of the intelligible God. These beliefs, approved by the thinkers, were widely diffused by literature, and particularly by the works in which romantic fiction served to envelop genuinely theological teachings.

If heliolatry was in accord with the philosophical doctrines of the day, it was not less in conformity with its political tendencies. We have essayed to show the connection which existed between the worship of the emperors and that of the *Sol invictus*. When the Cæsars of the third century pretended to be gods descended from heaven to the earth, the justification of their imaginary claims had as its corollary the establishment of a public worship of the divinity from whom they believed themselves the emanations. Heliogabalus had claimed for his Baal of Emesa the supremacy over the entire pagan pantheon. The eccentricities and violences of this unbalanced man resulted in the lamentable wreck of his undertaking; but it answered to the needs of the time and was soon taken up again with better success. Near the Flaminian Way, to the east of the Field of Mars, Aurelian consecrated a colossal edifice to the tutelary god that had granted him victory in Syria. The religion of state that he constituted must not be confounded with Mithraism. Its imposing temple, its ostentatious ceremonies, its quadrennial games, its pontifical clergy, remind us of the great

[1] Renan, *Lettre à Berthelot* (*Dialogues et fragments philosophiques*), p. 168.

sanctuaries of the Orient and not of the dim caves in which the Mysteries were celebrated. Nevertheless, the *Sol invictus*, whom the emperor had intended to honor with a pomp hitherto unheard of, could well be claimed as their own by the followers of Mithra.

The imperial policy gave the first place in the official religion to the Sun, of which the Sovereign was the emanation, just as in the Chaldæan speculations propagated by the Mithraists the royal planet held sway over the other stars. On both sides, the growing tendency was to see in the brilliant star that illuminated the universe the only God, or at least the sensible image of the only God, and to establish in the heavens a monotheism in imitation of the monarchy that ruled on earth. Macrobius (400 A. D.), in his *Saturnalia*, has learnedly set forth that the gods were ultimately reducible to a single Being considered under different aspects, and that the multiple names by which they were worshipped were the equivalent of that of Helios (the Sun). The theologian Vettius Agorius Pretextat who defended this radical syncrasy was not only one of the highest dignitaries of the empire, but one of the last chiefs of the Persian Mysteries.

Mithraism, at least in the fourth century, had therefore as its end and aim the union of all gods and all myths in a vast synthesis, —the foundation of a new religion in harmony with the prevailing philosophy and political constitution of the empire. This religion would have been as far removed from the ancient Iranian Mazdaism as from Græco-Roman paganism, which accorded the sidereal powers a minimal place only. It had in a measure traced idolatry back to its origin, and discovered in the myths that obscured its comprehension the deification of nature. Breaking with the Roman principle of the nationality of worship, it would have established the universal domination of Mithra, identified with the invincible Sun. Its adherents hoped, by concentrating all their devotion upon a single object, to impart new cohesion to the disintegrated beliefs. Solar pantheism was the last refuge of conservative spirits, now menaced by a revolutionary propaganda that aimed at the annihilation of the entire ancient order of things.

At the time when this pagan monotheism sought to establish its ascendency in Rome, the struggle between the Mithraic Mysteries and Christianity had long begun. The propagation of the two religions had been almost contemporaneously conducted, and their diffusion had taken place under analogous conditions. Both from the Orient, they had spread because of the same general reasons, viz., the political unity and the moral anarchy of the empire.

Their diffusion had been accomplished with like rapidity, and toward the close of the second century they both numbered adherents in the most distant parts of the Roman world. The sectaries of Mithra might justly lay claim to the hyperbolic utterance of Tertullian: "*Hesterni sumus et vestra omnia implevimus.*" If we consider the number of the monuments that the Persian religion has left us, one may easily ask whether in the epoch of the Severi its adepts were not more numerous than the disciples of Christ. Another point of resemblance between the two antagonistic creeds was that at the outset they drew their proselytes chiefly from the inferior classes of society; their propaganda was at the origin essentially popular; unlike the philosophical sects, they addressed their endeavors less to cultivated minds than to the masses, and consequently appealed more to sentiment than to reason.

But by the side of these resemblances considerable differences are to be remarked in the methods of procedure of the two adversaries. The initial conquests of Christianity were favored by the Jewish diaspora, and it first spread in the countries inhabited by Israelitic colonies. It was therefore chiefly in the countries washed by the Mediterranean that its communities developed. They did not extend their field of action outside the cities, and their multiplication is due in great part to missions undertaken with the express purpose of "instructing the nations." The extension of Mithraism, on the other hand, was essentially a natural product of social and political factors; namely, of the importation of slaves, the transportation of troops, and the transfer of public functionaries. It was in government circles and in the army that it counted its greatest numbers of votaries,—that is, in circles where very few Christians could be found because of their aversion to official paganism. Outside of Italy, it spread principally along the frontiers and simultaneously gained a foothold in the cities and in the country. It found its strongest points of support in the Danubian provinces and in Germany, whereas Christianity made most rapid progress in Asia Minor and Syria. The spheres of the two religious powers, therefore, were not coincident, and they could accordingly long grow and develop without coming directly into conflict. It was in the valley of the Rhone, in Africa, and especially in the city of Rome, where the two competitors were most firmly established, that the rivalry, during the third century, became particularly brisk between the bands of Mithra's worshippers and the disciples of Christ.

The struggle between the two rival religions was the more

stubborn as their characters were the more alike. The adepts of both formed secret conventicles, closely united, the members of which gave themselves the name of "Brothers."[1] The rites which they practised offered numerous analogies. The sectaries of the Persian god, like the Christians, purified themselves by baptism; received, by a species of confirmation, the power necessary to combat the spirits of evil; and ardently expected from a Lord's Supper salvation of body and soul. Like the latter, they also held Sunday sacred, and celebrated the birth of the Sun on the 25th of December, the same day on which Christmas has always been celebrated, at least since the fourth century. They both preached a categorical system of ethics, regarded asceticism as meritorious, and counted among their principal virtues abstinence and continence, renunciation and self-control. Their concepts of the world and of the destiny of man were similar. They both admitted the existence of a Heaven inhabited by beatified ones, situate in the upper regions, and that of a Hell peopled by demons, situate in the bowels of the earth. They both placed a Flood at the beginning of history; they both assigned as the source of their traditions a primitive revelation; they both, finally, believed in the immortality of the soul, in a last judgment, and in a resurrection of the dead, consequent upon a final conflagration of the universe.

We have seen that the theology of the Mysteries made of Mithra a "mediator" equivalent to the Alexandrian Logos. Like him, Christ also was a μεσίτης, an intermediary between his celestial father and men, and like him he also was one of a Trinity. These resemblances were certainly not the only ones that pagan exegesis established between the two religions, and the figure of the tauroctonous god reluctantly immolating his victim, that he might create and save the human race, was certainly compared to the picture of the Redeemer sacrificing his own person for the salvation of the world.

On the other hand, the ecclesiastical writers, reviving a metaphor of the prophet Malachi, contrasted the "Sun of justice" with the "invincible Sun," and consented to see in the dazzling orb which illuminated men a symbol of Christ, "the light of the world." Should we be astonished if the multitudes of devotees failed always to observe the subtle distinctions of the doctors, and if in obedience to a pagan custom they rendered to the radiant star of day the

[1] I may remark that even the expression "dearest brothers" had already been used by the sectaries of Jupiter Dolichenus (CIL, VI, 406 = 30758: *fratres carissimos et conlegas hon[estissimos]*) and probably also in the Mithraic associations.

homage which orthodoxy reserved for God? In the fifth century, not only heretics, but even faithful followers, were still wont to bow their heads towards its dazzling disk as it rose above the horizon, and to murmur the prayer, "Have mercy upon us."

The resemblances between the two hostile churches were so striking as to impress even the minds of antiquity. From the third century, the Greek philosophers were wont to draw parallels between the Persian Mysteries and Christianity which were evidently entirely in favor of the former. The Apologists also dwelt on the analogies between the two religions, and explained them as a Satanic travesty of the holiest rites of their religion. If the polemical works of the Mithraists had been preserved, we should doubtless have heard the same accusation hurled back upon their Christian adversaries.

We cannot presume to unravel to-day a question which divided contemporaries and which shall doubtless forever remain insoluble. We are too imperfectly acquainted with the dogmas and liturgies of Roman Mazdaism, as well as with the development of primitive Christianity, to say definitely what mutual influences were operative in their simultaneous evolution. But be this as it may, resemblances do not necessarily suppose an imitation. Many correspondences between the Mithraic doctrine and the Catholic faith are explicable by their common Oriental origin. Nevertheless, certain ideas and certain ceremonies must necessarily have passed from the one cult to the other; but in the majority of cases we rather suspect this transference than clearly perceive it.

Apparently the attempt was made to discern in the legend of the Iranian hero the counterpart of the life of Jesus, and the disciples of the Magi probably drew a direct contrast between the Mithraic worship of the shepherds, the Mithraic communion and ascension, and those of the Gospels. The rock of generation, which had given birth to the genius of light, was even compared to the immovable rock, emblem of Christ, upon which the Church was founded; and the crypt in which the bull had perished was made the counterpart of that in which Christ was born at Bethlehem.[1] But this strained parallelism could result in nothing but a carica-

[1] M. Jean Réville (*Etudes publiées en hommage à la faculté de théologie de Montauban*, 1901, pp. 339 et seq.) thinks that the Gospel story of the birth of Christ and the adoration of the Magi was suggested by the Mithraic legend; but he remarks that we have no proof of the supposition. So also M. A. Dieterich in a recent article (*Zeitschr. f. Neutest. Wiss.*, 1902, p. 190), in which he has endeavored not without ingenuity to explain the formation of the legend of the Magi kings, admits that the worship of the shepherds was introduced into Christian tradition from Mazdaism. But I must remark that the Mazdean beliefs regarding the advent of Mithra into the world have strangely varied. (Cf. *T. et M.*, t. I., pp. 160 et seq.)

ture. It was a strong source of inferiority for Mazdaism that it believed in only a mythical redeemer. That unfailing wellspring of religious emotion supplied by the Gospel and the Passion of the God sacrificed on the cross, never flowed for the disciples of Mithra.

On the other hand, the orthodox and heretical liturgies of Christianity, which gradually sprang up during the first centuries of our era, could find abundant inspiration in the Mithraic Mysteries, which of all the pagan religions offered the most affinity with Christian institutions. We do not know whether the ritual of the sacraments and the hopes attaching to them suffered alteration through the influence of Mazdean dogmas and practises. Perhaps the custom of invoking the Sun three times each day,—at dawn, at noon, and at dusk,—was reproduced in the daily prayers of the Church, and it appears certain that the commemoration of the Nativity was set for the 25th of December, because it was at the

Fig 1. Bas-Relief of Mayence.
Mithra drawing his bow; and the god of the winds.

winter solstice that the rebirth of the invincible god,[1] the *Natalis Invicti*, was celebrated. In adopting this date, which was universally distinguished by sacred festivities, the ecclesiastical authority purified in some measure the profane usages which it could not suppress.

The only domain in which we can ascertain in detail the extent to which Christianity imitated Mithraism is that of art. The Mithraic sculpture, which had been first developed, furnished the ancient Christian marble-cutters with a large number of models, which they adopted or adapted. For example, they drew inspiration from the figure of Mithra causing the waters of the well of life to leap forth by the blows of his arrows,[2] to create the figure of Moses smiting with his rod the rock of Horeb (Fig. 1). Faithful

1 See *Open Court* for November, p. 680.

2 See *Open Court* for October, p. 605.

to an inveterate tradition, they even reproduced the figures of cosmic divinities, like the Heavens and the Winds, the worship of which the new faith had expressly proscribed; and we find on the sarcophagi, in miniatures, and even on the portals of the Romance Churches, evidences of the influence exerted by the imposing compositions that adorned the sacred grottoes of Mithra.[1]

It would be wrong, however, to exaggerate the significance of these likenesses. If Christianity and Mithraism offered profound resemblances, the principal of which were the belief in the purification of souls and the hope of a beatific resurrection, differences no less essential separated them. The most important was the contrast of their relations to Roman paganism. The Mazdean Mysteries sought to conciliate paganism by a succession of adaptations and compromises; they sought to establish monotheism while not combating polytheism, whereas the Church was, in point of principle, if not always in practise, the unrelenting antagonist of idolatry in any form. The attitude of Mithraism was apparently the wisest; it gave to the Persian religion greater elasticity and powers of adaptation, and it attracted toward the tauroctonous god all who stood in dread of a painful rupture with ancient traditions and contemporaneous society. The preference must therefore have been given by many to dogmas that satisfied their aspirations for greater purity and a better world, without compelling them to detest the faith of their fathers and the state of which they were citizens. As the Church grew in power despite its persecutors, this policy of compromise first assured to Mithraism much tolerance and afterwards even the favor of the public authorities. But it also prevented it from freeing itself of the gross and ridiculous superstitions which complicated its ritual and its theology; it involved it, in spite of its austerity, in an equivocal alliance with the orgiastic cult of the beloved of Attis; and it compelled it to drag the entire weight of a chimerical and odious past. If Romanised Mazdaism had triumphed, it would not only have assured the perpetuity of all the aberrations of pagan mysticism, but would also have rescued from oblivion the erroneous doctrine of physics on which its dogmatism reposed. The Christian doctrine, which broke with the cults of nature, remained unconsciously exempt from these impure associations, and its liberation from every compromising attachment assured it an immense superiority. Its negative value, its struggle against deeply-rooted prejudices, gained for it as many souls as the positive hopes which it promised. It performed the

[1] See next *Open Court*.

miraculous feat of triumphing over the ancient world in spite of legislation and the imperial policy, and the Mithraic Mysteries were promptly abolished the moment the protection of the State was withdrawn and transformed into hostility.

Mithraism reached the apogee of its power toward the middle of the third century, and it appeared for a moment as if the world was on the eve of becoming Mithraic. But the first invasions of the barbarians, and especially the definitive loss of Dacia (275 A. D.), soon after followed by that of the Agri Decumates, administered a terrible blow to the Mazdean sect, which was most powerful in the periphery of the *orbis Romanus*. In all Pannonia, and as far as Virunum, on the frontiers of Italy, its temples were sacked. By way of compensation, the authorities, menaced by the rapid progress of Christianity, renewed their support to the most redoubtable adversary that they could oppose to it. In the universal downfall the army was the only institution that remained standing, and the Cæsars created by the legions were bound perforce to seek their support in the favored religion of their soldiers. In 273 A. D., Aurelian founded by the side of the Mysteries of the tauroctonous god a public religion, which he richly endowed, in honor of the *Sol invictus*. Diocletian, whose court with its complicated hierarchy, its prostrations before its lord, and its crowds of eunuchs, was, by the admission of contemporaries, an imitation of the court of the Sassanids, was naturally inclined to adopt doctrines of Persian origin, which flattered his despotic instincts. The emperor and the princes whom he had associated with himself, meeting in conference at Carnuntum in 307 A. D., restored there one of the temples of the celestial protector of their newly organised empire.[1] The Christians believed, not without some appearance of reason, that the Mithraic clergy were the instigators of the great persecution of Galerius. In the Roman empire as in Iran, a vaguely monistic heliolatry appeared on the verge of becoming the sole, intolerant religion of state. But the conversion of Constantine shattered the hopes which the policy of his predecessors had held out to the worshippers of the sun. Although he did not persecute the beliefs which he himself had shared,[2] they ceased to constitute a recognised cult and were tolerated only. His successors were determinedly hostile. To latent defiance succeeded open persecution. Christian polemics no longer restricted its attacks to ridiculing the legends and practises of the Mazdean Mysteries, nor even to taunt-

[1] See *The Open Court* for August, p. 451.

[2] Cf. Preger, *Konstantinos-Helios* (Hermes, XXXVI), 1901, p. 457.

ing them for having as their founders the irreconcilable enemies of Rome; it now stridently demanded the total destruction of idolatry, and its exhortations were promptly carried into effect. When a rhetorician[1] tells us that under Constantius no one longer dared to look at the rising or setting sun, that even farmers and sailors refrained from observing the stars, and tremblingly held their eyes fixed upon the ground, we have in these emphatic declarations a magnified echo of the fears that then filled all pagan hearts.

The proclamation of Julian the Apostate (331–363 A. D.) suddenly inaugurated an unexpected turn in affairs. A philosopher, seated on the throne by the armies of Gaul, Julian had cherished from childhood a secret devotion for Helios. He was firmly convinced that this god had rescued him from the perils that menaced his youth; he believed that he was entrusted by him with a divine mission, and regarded himself as his servitor, or rather as his spiritual son. He dedicated to this celestial "king" a discourse in which the ardor of his faith transforms in places a cold theological dissertation into an inflamed dithyrambic, and the fervor of his devotion for the star that he worshipped never waned to the moment of his death.

The young prince had been presumably drawn to the Mysteries by his superstitious predilection for the supernatural. Before his accession, perhaps even from youth, he had been introduced secretly into a Mithraic conventicle by the philosopher Maximus of Ephesus. The ceremonies of initiation must have made a deep impression on his feelings. He imagined himself thenceforward under the special patronage of Mithra, in this life and in that to come. As soon as he had cast aside his mask and openly proclaimed himself a pagan, he called Maximus to his side, and doubtless had recourse to extraordinary ablutions and purifications to wipe out the stains which he had contracted in receiving the baptism and the communion of the Christians. Scarcely had he ascended the throne (361 A. D.) than he made haste to introduce the Persian cult at Constantinople; and almost simultaneously the first taurobolia were celebrated at Athens.

On all sides the sectaries of the Magi lifted their heads. At Alexandria the patriarch George, attempting to erect a church on the ruins of a mithræum, provoked a sanguinary riot. Arrested by the magistrates, he was torn from his prison and cruelly slain by the populace on the 24th of December, 361, the eve of the *Natalis*

[1] Mamert., *Grat. actio in Julian.*, c. 23.

Invicti. The emperor contented himself with addressing a paternal remonstrance to the city of Serapis.

But the Apostate soon met his death in the historic expedition against the Persians, to which he had possibly been drawn by the secret desire to conquer the land which had given him his faith and by the assurance that his tutelary god would accept his homage rather than that of his enemies. Thus perished this spasmodic attempt at reaction, and Christianity, now definitively victor, addressed itself to the task of extirpating the erroneous doctrine that had caused it so much anxiety. Even before the emperors had forbidden the exercise of idolatry, their edicts against astrology and magic furnished an indirect means of attacking the clergy and disciples of Mithra. In 371 A. D., a number of persons who cultivated occult practises were implicated in a pretended conspiracy and put to death. The mystagogue Maximus himself perished as the victim of an accusation of this kind.

It was not long before the imperial government legislated formally and directly against the disgraced sect. In the provinces, popular uprisings frequently anticipated the interference of the magistrates. Mobs sacked the temples and committed them to the flames, with the complicity of the authorities. The ruins of the mithræums bear witness to the violence of their devastating fury. Even at Rome, in 377 A. D., the prefect Gracchus, seeking the privilege of baptism, offered as a pledge of the sincerity of his conversion the "smashing, shattering, and shivering,"[1] of a Mithraic crypt, with all the statues that it contained. Frequently, in order to protect their grottoes from pillage, the priests walled up the entrances, or conveyed their sacred images to well-protected hiding-places, convinced that the tempest that had burst upon them was momentary only, and that after their days of trial their god would cause again to shine forth the light of final triumph. On the other hand, the Christians, in order to render places contaminated by the presence of a dead body ever afterward unfit for worship, sometimes slew the refractory priests of Mithra and buried them in the ruins of their sanctuaries, now forever profaned (Fig. 2).

The hope of restoration was especially tenacious at Rome, which remained the capital of paganism. The aristocracy, still faithful to the traditions of their ancestors, supported the religion with their wealth and prestige. Its members loved to deck themselves with the titles of "Father and Herald of Mithra Invincible," and multiplied the offerings and the foundations. They redoubled

[1] St. Jerome, *Epist. 107 ad Lætam* (*T. et M.*, t. II, p. 18); *subvertit, fregit, excussit*,

their generosity toward him when Gratian in 382 A. D. despoiled their temples of their wealth. A great lord recounts to us in poor verses how he had restored a splendid crypt erected by his grandfather near the Flaminian Way, boasting that he was able to dispense with public subsidies of any kind.[1] The usurpation of Eugenius appeared for a moment to bring on the expected resurrection. The prefect of the prætorium, Nicomachus Flavianus, celebrated solemn taurobolia and renewed in a sacred cave the Mysteries of the "associate god" (*deum comitem*) of the pretender. But the victory of Theodosius, 394 A. D., shattered once and for all the hopes of the belated partisans and the ancient Mazdean belief.

A few clandestine conventicles may, with stubborn persistence, have been held in the subterranean retreats of the palaces. The

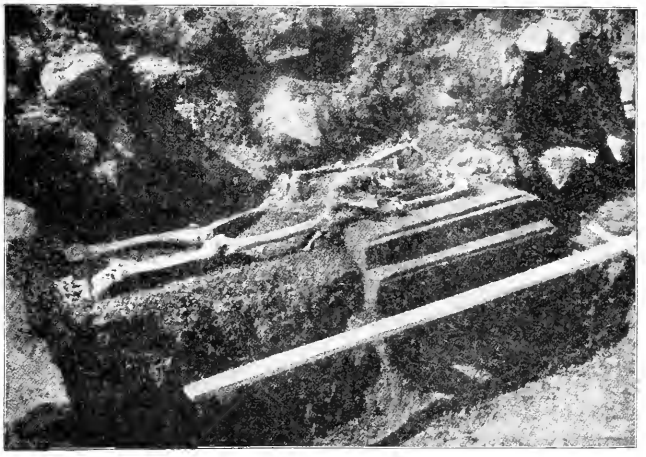


Fig. 2. CHAINED SKELETON.
Discovered in the ruins of a temple at Saarburg.

cult of the Persian god possibly existed as late as the fifth century in certain remote cantons of the Alps and the Vosges. For example, devotion to the Mithraic rites long persisted in the tribe of the Anauni, masters of a flourishing valley, of which a narrow defile closed the mouth. But little by little its last disciples in the Latin countries abandoned a religion tainted with moral as well as political decadence. It maintained its ground with greater tenacity in the Orient, the land of its birth. Driven out of the rest of the empire, it found a refuge in the countries of its origin, where its light only slowly flickered out.

[1] CIL, VI, 774 (*T. et M.*, t. II, p. 94, n°. 13).

Nevertheless, the conceptions which Mithraism had diffused throughout the empire during a period of three centuries were not destined to perish with it. Some of them, even those most characteristic of it, such as its ideas concerning Hell, the efficacy of the sacraments, and the resurrection of the flesh, were accepted even by its adversaries; and in disseminating them it had simply accelerated their universal domination. Certain of its sacred practices continued to exist also in the ritual of Christian festivals and in popular usage. Its fundamental dogmas, however, were irreconcilable with orthodox Christianity, outside of which only they could maintain their hold. Its theory of sidereal influences, alternately condemned and tolerated, was carried down by astrology to the threshold of modern times; but it was to a religion more powerful than this false science that the Persian Mysteries were destined to bequeath, along with their hatred of the Church, their cardinal ideas and their influence over the masses.

Manichæism, although the work of a man and not the product of a long evolution, was connected with these Mysteries by numerous affinities. The tradition according to which its original founders had conversed in Persia with the priests of Mithra, may be inexact in form, but it involves nevertheless a profound truth. Both religions had been formed in the Orient from a mixture of ancient Babylonian mythology with the Persian dualism, and had afterwards absorbed Hellenic elements. The sect of Manichæus spread throughout the empire during the fourth century, at the moment when Mithraism was expiring, and it was called to assume the latter's succession. Mystics whom the polemics of the church against paganism had shaken but not converted were enraptured with the new conciliatory faith which suffered both Zoroaster and Christ to be simultaneously worshipped. The wide diffusion which the Mazdean beliefs with their taint of Chaldæism had enjoyed, prepared the minds of the empire for the reception of the new heresy. The latter found its ways made smooth for it, and this is the secret of its sudden expansion. Thus renewed, the Mithraic doctrines were destined to withstand for centuries all persecutions, and rising again in a new form in the Middle Ages to shake once more the ancient Roman world.

SKETCH OF THE HISTORY OF THERMOMETRY.[1]

BY DR. ERNST MACH.

[CONTINUED.]

BOYLE, in 1661, and Mariotte, in 1676, enunciated the experimental law that the product of the volume of a given mass of gas at constant temperature by the pressure which it exerts on unit of surface is constant. If a mass of air of volume V be subjected to a pressure P, it will assume, on the pressure's increasing to $P' = nP$, the volume $V' = \frac{V}{n}$; whence $PV = nP\frac{V}{n} = P'V'$. If we represent the V's as abscissas and the corresponding P's as ordi-

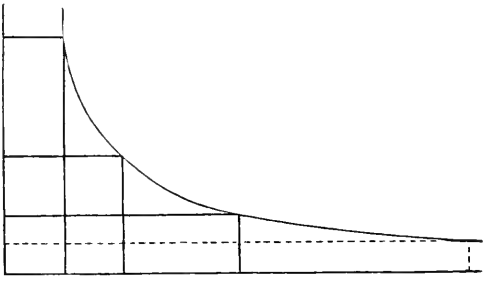


Fig. 9.

nates, the areas of the rectangles formed by the P's and Vs will in all cases be equal. The equation $PV = a\ constant$ gives as its graph an equilateral hyperbola, which is the visualisation of Boyle's Law. (See Fig. 9.)

The experiments which led to this law are very simple. In a glass siphon-tube having a closed limb at a and an open limb at b (Fig. 10), a quantity of air v is introduced and shut off from the outside air by mercury. The pressure on the enclosed air is given

[1] Translated from Mach's *Principien der Wärmelehre* by Thomas J. McCormack.

by the height of the mercury-barometer *plus* the difference of level *mn* of the two surfaces of the liquid, and can be altered at will by altering the height of the mercury column.

Experiments in verification of Boyle's law (which Boyle himself did not regard as absolutely accurate) were carried out through a wide range of pressures and for many different gases by Oerstedt and Schwendsen, Depretz, Pouillet, Arago and Dulong, and Mendelejeff,—but most accurately by Régnault,[1] and through the widest range of pressures by Amagat.[2]

Fig. 10.

If the pressure in the apparatus represented in Fig. 10 be doubled, the volume v of the gas will be diminished one half; if it be doubled again, it will be diminished one fourth. The errors in the readings increase greatly as the volume decreases, and to eliminate them Régnault resorted to an ingenious expedient. At *a* he attached a stop-cock through which air could be introduced under varying pressure; the volume of the enclosed air v could thus be always kept the same and subsequently compressed to $\frac{v}{2}$ by lengthening the column of mercury *mn*. With such an arrangement the measurements were always of like exactitude.

It appears that to reduce unit of volume under a pressure of one meter of mercury $\frac{1}{20}$, it is requisite in the case of air, carbonic acid gas, and hydrogen to increase the pressure to respectively 19.7198, 16.7054, and 20.2687 meters of mercury. The product PV, therefore, for high pressures, decreases for air and carbonic acid gas and increases for hydrogen. The two first-named gases are therefore more compressible and the last-named less compressible than Boyle's Law requires.

Amagat conducted his experiments in a shaft 400 meters deep and increased the pressure to 327 meters of mercury. He found that as the pressure increases the volume of PV first decreases, and after passing through a minimum again increases. With nitrogen, for $P=20.740$ meters of mercury, $PV=50989$; for $P=50$ meters, $PV=50800$, approximately a minimum; and for $P=327.388$ meters, $PV=65428$. Similar minima are furnished by other gases. Hydrogen showed no minimum, although Amagat suspected the existence of one at a slight pressure.

We shall not discuss here the attempts that have been made

[1] *Mémoires de l'Académie*, Vol. XXI.

[2] *Annales de chimie et de physique*, Fifth Series, Vol. XIX. (1880).

by Van der Waals, E. and U. Dühring, and others to explain these phenomena by the molecular theory. It will be sufficient for us to remark that while Boyle's Law is not absolutely exact, it nevertheless holds very approximately through a wide range of pressures for many gases.

It was necessary to adduce the foregoing facts for the reason that the behavior of gases with respect to pressure is of importance in the consideration of their behavior with respect to heat,—a subject which was first minutely investigated by Gay-Lussac.[1] This inquirer makes mention of the researches of Amontons, and also employs the observations of Lahire (1708) and Stancari, from which the necessity of thoroughly drying the gases clearly appeared. Gay-Lussac's procedure was as follows. A perfectly dry cylinder closed by a stop-cock is filled with gas and plunged into a bath of boiling water. After the superfluous gas has been expelled, the cock is closed and the cylinder cooled in melting ice. On opening the cock under water, a part of the cylinder fills with water. By weighing the cylinder thus partly filled with water, afterwards completely filled with water, and again when empty, we obtain the coefficient of expansion of the gas from the melting-point of ice to the boiling-point of water. At 0° C. temperature 100 volumes of air, hydrogen, and nitrogen give respectively 137.5, 137.48, 137.49 volumes at 100° C. Also for other gases, and even for vapor of ether, Gay-Lussac obtained approximately the same coefficient of expansion, viz., 0.375. He states that, fifteen years before, Charles (1787) knew of the equality of the thermal dilatation of gases; but Charles had published nothing on the subject. Dalton[2] likewise had occupied himself with this question earlier than Gay-Lussac, and had both remarked the equality of the thermal dilatation of gases and given 0.376 as the coefficient of expansion.

For the comparison of different gases, Gay-Lussac also used two perfectly similar graduated glass receivers dipped a slight distance apart in mercury (Fig. 11). When like volumes of different gases were introduced into these receivers under like pressures and at like temperatures, both always appeared to be filled to the same marks of division.

In another investigation, Gay-Lussac[3] employed a vessel shaped somewhat like a thermometer and having a horizontal tube in which the air was shut off from the atmosphere by a drop of

[1] *Annales de chimie*, first series, Vol. XLIII. (1802).

[2] *Nicholson's Journal*, Vol. V. (1801).

[3] Biot, *Traité de physique*, Vol. I., p. 182, Paris, 1816.

mercury, the vessel being heated simultaneously with mercury-thermometers. Between the melting-point of ice and the boiling-point of water the dilatation of the air is very nearly proportional to the indications of the mercury-thermometer.

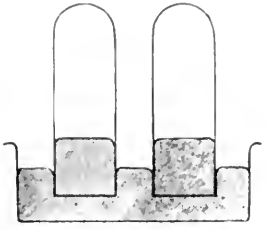


Fig. 11.

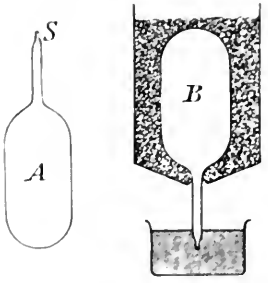


Fig. 12.

The experiments above described were subsequently performed on a larger scale and with closer attention to sources of error, by Rudberg,[1] Magnus,[2] Régnault,[3] Jolly,[4] and others. Two methods are principally employed. The first consists (Fig. 12) in heating a glass vessel *A* to the temperature of boiling, repeatedly exhausting it, and then filling it with air that has passed over chloride of calcium. While still at boiling temperature, the tip *S* is hermetically sealed, the barometer noted, the vessel inverted and encased (*B*) in melting ice, with the tip under mercury. When cool, the tip is broken off, and the mercury rises into the vessel; the difference of level of the mercury within and without the tube is then noted, and the apparatus weighed the required number of times. It is the method of Gay-Lussac with the requisite refinements.

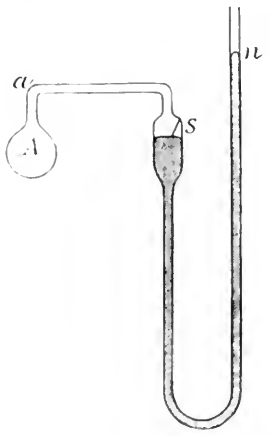


Fig. 13.

The second method (Fig. 13) consists in plunging a vessel *A* full of dry air as far as the bend of the tube *a*, first in a bath of melting ice and then in steam from boiling water, while simultaneously so regulating the height of the mercury column at *n* that the inside surface of the mercury constantly grazes the glass spicule *s*. The volume of the air is thus kept constant, and what is really

1 *Poggendorfs Annalen*, 41, 44.
2 *Poggendorfs Annalen*, 45,
3 *Mémoires de l'Acad.*, Vol. XXI.
4 *Poggendorfs Annalen, Jubelband.*

measured is the *increment of the expansive force* of the gas when heated.

If a volume of gas v under a constant pressure p be raised from 0° to 100° C., it will expand to the volume $v(1+\alpha)$, where α is called the *coefficient of expansion*. If the gas as it now is at 100° C. were compressed back to its original volume, it would exert, according to Boyle's Law, a pressure p', where $vp' = v(1+\alpha)p$. Whence it follows that $p' = p(1+\alpha)$. If Boyle's Law held *exactly*, α would likewise be the *coefficient of the increment of expansive force*, or, more briefly, *the coefficient of expansive force*. But as the law in question is not absolutely exact, the two coefficients are not identical. Calling the coefficient of expansion α and the coefficient of expansive force β, the values of these coefficients for the interval from 0° to 100° C. for a pressure of about one atmosphere are, according to Régnault:

	α	β
Hydrogen	0.36613	0.36678
Air	0.36706	0.36645
Carbonic Acid Gas	0.37099	0.36871

The coefficients of expansion increase slightly, according to Régnault, with the increase of the density of the gas. It further appears that the coefficients of expansion of gases which deviate widely from Boyle's Law decrease slightly as the temperature measured by the air-thermometer rises.

Gay-Lussac has shown that between 0° and 100° C. the *expansion* of gases is *proportional* to the indications of the mercury-thermometer. Designating the degrees of the mercury-thermometer by t and the $\frac{1}{100}$ part of the coefficient of expansion as above determined by α, we shall have, at constant pressure, $v = v_0(1+\alpha t)$, and at constant volume $p = p_0(1+\alpha t)$, where v_0, p_0, v, p, respectively represent the volume and pressure of the gases at 0° and t°, and where the coefficients of expansion and expansive force are assumed to be the same. Each of these equations expresses Gay-Lussac's Law.[1]

Boyle's Law and Gay-Lussac's Law are usually combined. For a given mass of gas the product p_0v_0 at the definite temperature 0° has a constant value. If the temperature be increased to t° C. and the volume kept constant, the pressure will increase to $p' = p_0(1+\alpha t)$; wherefore $p'v_0 = p_0v_0(1+\alpha t)$. And if the pressure p and the volume v at t° be altered at will, the product will be $pv = p'v_0$.

[1] In this country and in England, Gay-Lussac's Law is usually called Charles's Law.—*Tr.*

Whence $pv = p_0 v_0 (1 + \alpha t)$. This last law is called the combined Law of Boyle and Gay-Lussac.

Boyle's Law was visualised by an equilateral hyperbola. The proportional increase of the volume or the pressure of a gas with its temperature may be represented, conformably to Gay-Lussac's Law, by a straight line (Fig. 14). Remembering that α is very approximately equal to $\frac{1}{273}$, we may say that for every increase of 1° Celsius the volume or pressure increases $\frac{1}{273}$ of its value at 0°, and that there is likewise a corresponding decrease for every degree Celsius. This increase may be conceived *without limit*. By taking away $\frac{1}{273}$ 273 times, we reach the pressure 0 or the volume 0. If therefore the gas acted in strict conformity with the Law of Boyle and Gay-Lussac *without limit*, then at −273° Celsius of the mercury-thermometer it would exert *no* pressure whatever and would present Amontons's "degree of greatest cold." The temperature −273° C. has accordingly been called the *absolute zero*, and the temperature reckoned from this point in degrees Celsius (viz., $T = 273 + t$) the *absolute temperature*.

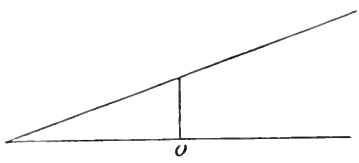


Fig. 14.

Even if this view of the matter be not taken seriously,—and we shall see later that there are grave objections to it,—still the presentation of the facts is simplified by it. Writing the Law of Boyle and Gay-Lussac

$$pv = p_0 v_0 (1 + \alpha t) = p_0 v_0 \alpha \left(\frac{1}{\alpha} + t \right) = p_0 v_0 \alpha T,$$

and considering that $p_0 v_0 \alpha$ is a constant, we have

$$\frac{pv}{T} = const.,$$

the simplified expression of the law.

The Law of Boyle and Gay-Lussac likewise admits of geometric representation. Conceive laid (Fig. 15) in the plane of the paper, a large number of long, similar, slender tubes filled with equal quantities of the same kind of gas. These tubes are made fast at one extremity to OT and closed at the other by moveable pistons. The first tube, at OV, has a temperature 0° C., the next a temperature of 1° C., the next 2° C., etc., so that the temperature increases uniformly from O to T. We now conceive the pistons to be all gradually pushed inwards, mercury columns measuring the

pressure p erected over each position of the pistons at right angles to the plane of their action, and through the upper extremities of these columns a surface laid. The surface so obtained is imaged in Fig. 16, and is merely a synthesis of the graphs of Fig. 9 and Fig. 14. Every section of the surface parallel to the plane TOP is a straight line, conforming to Gay-Lussac's Law. Every section parallel to POV is an equilateral hyperbola, conforming to Boyle's Law. The surface as an aggregate furnishes a complete synoptic view of the pressures exerted by the *same* gaseous mass at any volume and at any temperature whatsoever.

The laws in question are in part also fulfilled for vapors. According to Biot,[1] J. A. Deluc[2] appears to have been the first to frame anything like a correct view of the deportment of vapors.

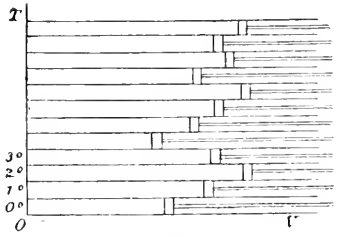


Fig. 15.

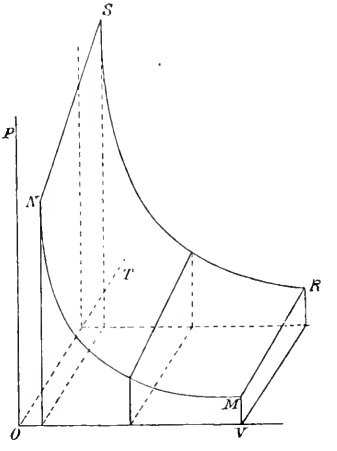


Fig. 16.

H. B. Saussure[3] knew from observation that the maximum quantity of vapor which a given space can contain depends not on the nature or density of the gas filling the space, but solely on the temperature. Doubtless this suggested to Dalton[4] the idea of inquiring whether water really was *absorbed* by gases, as was then generally supposed. He caused the liquid to be vaporised in the Torricellian vacuum, and obtained for a given temperature the *same* pressure as in air. *Air*, therefore, played no part in vaporisation. Priestley's discovery, that gases of widely differing specific gravities diffused into one another uniformly, combined with that just men-

[1] Biot, *Traité de physique*, Paris, 1816. [2] *Idées sur la météorologie*, Paris, 1787.
[3] *Essai sur l'hygrometrie*, Neuchatel, 1783.
[4] *On the Constitution of Mixed Gases, etc.*, *Mem. Manchest. Soc.*, V., 1801.

tioned, led Dalton to the conception that in a mixture of gases and vapors occupying a given space *every portion behaved as if it alone were present.* Dalton's way of expressing this fact was by saying that the particles of a gas or vapor could exert pressure only on particles of its own kind.

The discovery that gases behave toward one another precisely as *void spaces*,[1] is one of the most important and fruitful that Dalton

JOHN DALTON (1766–1844).

ever made. The way to it had been prepared by the observations above mentioned, and in reality it furnishes nothing but a lucid conceptual expression of the facts, such as science in the Newtonian sense requires. But the preponderance of the speculative

1 *Manchester Memoirs*, Vol. V., 1801, p. 535. Compare Henry, *Life of Dalton*, p. 32. Dalton says: "and consequently [the particles] arrange themselves just the same as in a void space."

element and of a bent for capricious theorising in Dalton, which becomes so fateful in the researches to be discussed further on, makes its appearance here also. Dalton cannot refrain from introducing along with his statement of the facts an entirely redundant conception, which impairs the clearness of his ideas and diverts attention from the main point. This is the "pressure of the particles of different gases on one another."[1] This hypothetical conception, which can never be made the subject of experimental verification, certainly does not impart clearness to the *directly observable* fact; on the contrary, it involved its author in unnecessary controversies.

Gay-Lussac[2] showed, by the experiment represented in Fig. 11, that vapor of ether at a temperature *above the boiling-point* of ether behaved exactly as air did on changes of temperature. The observations of Saussure and Dalton adduced in the preceding paragraphs, together with that just mentioned, indicate that vapors may occur in two states, viz., as *saturated* and as *non-saturated* or *superheated* vapors.

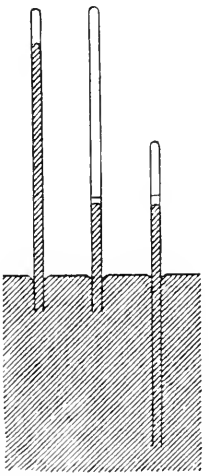


Fig. 17.

The phenomena involved may be clearly illustrated by an experiment which presents in rapid and lucid succession the different cases, before considered separately. We perform (Fig. 17) the Torricellian experiment, and introduce into the vacuum of the Torricellian tube a small quantity of ether. A portion of the ether vaporises immediately, and the mercury column is depressed by the pressure of the vapor, say, at 20° C., a distance of 435 *mm.* If the temperature in the barometer tube be raised by a water bath, say to 30° C., the column will show a depression of 637 *mm*; whilst in a bath of melting ice it will show only 182 *mm.* The pressure of vapors, therefore, increases with the temperature. If the tube containing the ether be plunged deeper into the mercury, so as to diminish the space occupied by the vapor, the height of the surface of the mercury in the tube will still not be altered. The pressure of the vapor, therefore, remains the same. But it will be noticed that the quantity of liquid ether has slightly increased and that

[1] The passage reads: "When two elastic fluids, denoted by A and B, are mixed together, there is no mutual repulsion amongst their particles; that is, the particles of A do not repel those of B, as they do one another. Consequently, the pressure or whole weight upon any one particle arises solely from those of its own kind."

[2] *Ann. de chim. et de phys.*, XLIII (1802), p. 172.

therefore a portion of the vapor has been liquefied. As the tube is withdrawn the quantity of liquid ether diminishes and the pressure again is the same.

A small quantity of air introduced into the Torricellian vacuum also causes a depression of the barometer column,—say 200 *mm.* If the tube be now plunged in until the air space is reduced one half, the depression according to Boyle's Law will be 400 *mm.* In precisely the same manner vapor of ether behaves, conformably to Gay-Lussac's observation, provided the quantity of ether introduced into the tube is so small that *all* the ether vaporises and a still greater quantity *could* vaporise. For example, when at 20° C. a depression of only 200 *mm* is generated by the inclosed ether, the tube contains no liquid ether. Diminishing the Torricellian vacuum one half doubles the depression. The depression may be increased by further immersion to 435 *mm.* But still further immersion of the tube no longer augments the depression, and liquid ether now makes its appearance.

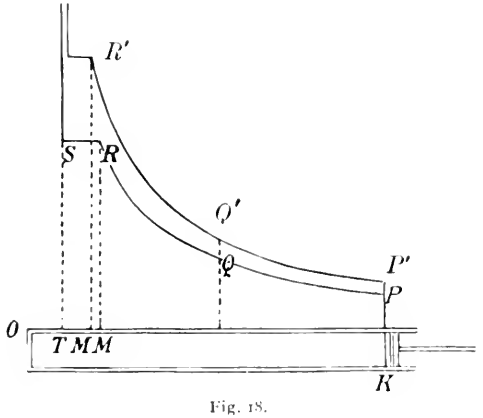


Fig. 18.

The preceding observations relative to vapors may be epitomised by a simple illustration. A long tube closed at O contains an adequate quantity of rarefied vapor. If the piston K be gradually pushed in and mercury columns measuring the pressures be erected at every point over which the piston passes, the extremities of these columns will all lie in the hyperbola PQR. But from a definite position M of the piston on, the increase of pressure ceases, and liquefaction takes place. If at the position T of the piston nothing but liquid remains in the tube, then a very great increase of pressure follows on the slightest further movement of the piston. Repeating this experiment at a higher temperature, we obtain increases of pressure corresponding to Gay-Lussac's Law and the coefficient of expansive force (0.00367), as the curve $P'Q'R$ indicates. The liquefaction of vapors begins only at higher pressures and greater densities.

Vapors of sufficiently small density approximately fulfil, ac-

cordingly, the Law of Boyle and Gay-Lussac. Such vapors are called *non-saturated* or *superheated* vapors. If the concentration of the vapors is continued, they reach a *maximum* of *pressure and density* which cannot be exceeded for any given temperature, as every further diminution of the vapor space causes a partial liquefaction of the vapor. Vapors at the maximum of pressure are called *saturated* vapors. Given enough liquid and sufficient time and this maximum of pressure will always establish itself in a closed space.

The relationship between temperature and the pressure of saturated vapors has been investigated for different vapors by many inquirers. The methods they employed are reducible to two fundamental types. The first consists in introducing the liquid to be investigated into the Torricellian vacuum and in placing the latter in a bath of definite temperature. The amount of depression with respect to the height of the barometer column gives the pressure of the vapor. If the open end of a siphon barometer, which has been exhausted and charged with the liquid, be hermetically sealed and placed in a bath of given temperature, the mercury column will indicate the pressure of the vapor independently of that of the atmosphere.

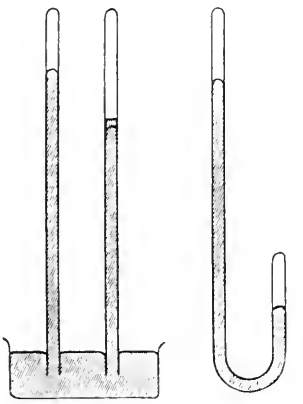


Fig. 19.

This procedure is only a modification of the preceding one. The method here employed is commonly called the *static* method.

Vapors are being constantly generated at the free surface of liquids. For a liquid to *boil*, that is, for bubbles of the vapor to form in its interior, expand, rise to the surface and *burst*, it is necessary that the pressure of the hot vapor in these bubbles should at least be in equilibrium with that of the atmosphere. The *temperature of boiling* is therefore that temperature at which the pressure of the saturated vapor (the maximum pressure) is equal to the pressure of the atmosphere. If a liquid, therefore, be *boiled* under the receiver of an air-pump, by means of which the air-pressure can be raised or lowered at will, (being kept constant by the cooling and re-liquefaction of the generated vapors,) the temperature at which the liquid boils will give the temperature for which the air-pressure produced is the maximum pressure of the vapor. Thus, in Figure 20, *B* is a large glass balloon connected with an air-pump, by which the air-pressures are regulated. In *G* the liquid is boiled

and the vapors generated, while in the bent tube *R*, which can be cooled, they are re-liquefied. This method is commonly called the *dynamical* method.

Experiments were conducted according to these methods by Ziegler (1759), Bétancourt (1792), G. G. Schmidt (1797), Watt,[1] Dalton[2] (1801), Noe (1818), Gay-Lussac[3] (1816), Dulong and Arago (1830), Magnus[4] (1844), Regnault[5] (1847), and others.

For the same temperature the maximum pressure varies greatly with the liquid, and it also increases rapidly with the temperature.

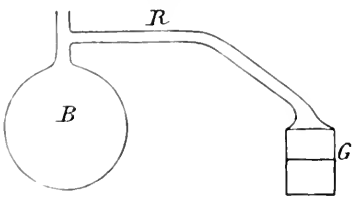


Fig. 20.

Even Dalton *sought* a universal law for the dependence of maximum pressures on temperature, and his investigations were continued in recent times by E. and U. Dühring and others. The purpose and scope of our work preclude our discussing these researches.

The most extensive investigations, owing to their practical importance for the operation of steam engines, were conducted with *water-vapor*. Régnault found the following relationship between temperatures and maximum pressures, expressed in millimeters of mercury:

°C.	*mm.*	°C.	*mm.*
0.00	4.54	111.74	1131.60
52.16	102.82	131.35	2094.69
100.74	777.09	148.26	3359.54

It will be seen from this extract from Regnault's table that the pressure of water-vapor from 0° to 100° C. increases by about one atmosphere; while from 100° to 150° it increases by more than three atmospheres. The rapid rise of the curve of pressures on increase of temperature, as represented in the graphed illustrations which Regnault furnished, renders this relationship even more striking.

A more extended extract from this table in the vicinity of the vaporous pressure of 760 *mm* is of value in ascertaining the influence of atmospheric pressure in the determination of the boiling-point on thermometers.

[TO BE CONTINUED.]

1 Brewster's *Encyclopädie*, (1810–1830). 2 *Mem. Manchest. Soc.*, V., 1801.
3 Biot, *Traité de physique*, Paris, 1816. 4 *Poggendorfs Annalen*, LXI.
5 *Mémoires de l'Acad.*, Vol. XXI.

MISCELLANEOUS.

RUDOLF VIRCHOW.

(1821–1902.)

In the recent death of Rudolf Virchow at the age of eighty-one, Germany has lost the most commanding figure of her scientific world. Virchow's activity embraced every field connected with the science of man, and his influence in social, political, and cultural domains generally perhaps exceeded that of any other scientific man of his generation. He was involved in the political troubles of 1848, having been removed from his position by the Prussian government; he was a member of the city council of Berlin in 1859; a representative in the Prussian House of Commons in 1862, a staunch champion of the *National-Verein*, founder of the *Fortschrittspartei*, etc., etc.; frequently he crossed swords with Bismarck in animated parliamentary debates, and from his pen flowed the famous word, *Kulturkampf*, which became the shibboleth of the most significant struggle in modern German politics.

Yet all this, and vastly more besides, was only Virchow's avocation. His real work lay in the sciences of medicine, anatomy, pathology, and anthropology. Born in Schivelbein, Pomerania, October 13, 1821, he first became famous as a professor of the so-called Würzburg school of medicine. He afterwards returned to Berlin, where he was to remain, and where he founded the famous Pathological Institute. The science of pathological anatomy as it is to-day owes in nearly all its parts its fundamental conformation to him, and the impress that he left on the science of medicine at large was no less deep. Physical anthropology and prehistoric archæology, especially in Germany, received immense aid from his researches and it is perhaps in this field that his name is widest known to the general scientific public. But his greatest achievement was the foundation of *cellular pathology*, and to his view of the nature of the animal cell we shall briefly refer, before proceeding to his well-known and often misinterpreted attitude toward the theory of evolution.

According to Virchow, every cell is born of a cell. Cells change in the organism, and may therefore be said to be variable; they possess, as Virchow phrased it, *mutability*. "From his point of view the whole question of the origin of species centers in the problem of the relation between the mutability of the organism and the mutability of the cell. The comparison of the forms of organisms and organs may form the starting-point of researches on variability, but the study of the variations of the whole organism or organ must be based on the study of the variations of the constituent cells, since the physiological changes of the whole body depend upon the correlated physiological changes that take place in the cells. Without a

knowledge of the processes that take place in varying cells, it is impossible to determine whether a deviation from the normal form is due to secondary causes that affect during their period of development organs already formed, or whether it is due to primary deviations which develop before the first formation of the varying organ. Two questions, therefore, arise: the first, whether secondary deviations may become hereditary. For this no convincing proof has been found. The second question is, whether primary variations do occur, and if so, whether they are hereditary."[1]

Now, cellular research, Virchow claims, has given no satisfactory answer to these questions, and since problems concerning the origin of species and the forms of organisms must be determined by investigations concerning the mutability and general function of cells, therefore Virchow regarded any *definite* theory with regard to the descent of man as *speculation* and not as an assured scientific result. His attitude was one of extreme scientific reserve and caution; he withheld judgment; he did not disbelieve in evolution; he took the same stand in the interpretation of the Neanderthal skull, which he considered an individual variation, claiming it would be absurd to construct an entire race from a single cranium. He was hypercritical and conservative to a degree in science, and his attitude on these momentous questions contrasts strangely with his impetuous progressiveness and liberalism in politics. Broad and encyclopædic as his attainments were, he brought the spirit of the specialist to this problem and demanded that it should be solved by the specialist's criteria.

Virchow's position has been so admirably summarised by Clifford in his essay on the great scientist's famous address made in 1877 on "The Liberty of Science in the Modern State," that we cannot refrain from quoting it. Clifford says:[2]

"He [Virchow] recalled the early days of the Association, when it had to meet in secret for fear of the authorities; and he warned his colleagues that their present liberty was not a secure possession, that a reaction was possible, and that they should endeavor to make sure of the ground by a wise moderation, by a putting forward of those things which are established in the sight of all men, rather than of individual opinions. He divided scientific doctrines into those which are actually proved and perfectly determined, which we may give out as real science in the strictest sense of the word; and those which are still to be proved, but which, in the meantime, may be taught with a certain amount of probability, in order to fill up gaps in our knowledge. Doctrines of the former class must be completely admitted into the scientific treasure of the nation, and must become part of the nation itself; they must modify the whole method of thinking. For an example of such a doctrine he took the great increase in our knowledge of the eye and its working which has come to us in recent times, and the doctrine of perception founded upon it. Things so well known as this, he said, must be taught to children in the schools. 'If the theory of descent is as certain as Professor Haeckel thinks it is, then we must demand its admission into the school, and this demand is a necessary one.' And this, even although there is danger of an alliance between socialism and the doctrine of evolution.

"But, he went on to say, there are parts of the evolution theory which are not yet established scientific doctrines in the sense that they ought to be taught dogmatically in schools. Of these he specially named two: the spontaneous gene-

[1] Quoted from an article by Dr. Boas in *Science* for Sept. 19, 1902.

[2] "Virchow on the Teaching of Science," in *Lectures and Essays*, Macmillan, New York and London, second edition, p. 418.

ration of living matter out of inorganic bodies, without the presence of previously living matter; and the descent of man from some non-human vertebrate animal. These, he said, are problems; we may think it ever so probable that living matter has been formed out of non-living matter, and that man has descended from an ape-like ancestor; we may fully expect that evidence will shortly be forthcoming to establish these statements; but meanwhile we must not teach them as known and established scientific facts. We ought to say, 'Do not take this for established truth, be prepared to find that it is otherwise; only for the moment we are of opinion that *it may be true*.'"

Professor Clifford, then, in a thoroughgoing review of the situation discusses the nature of the evidence for the descent of man and shows it to be of equal validity with that on which the so-called "actually assured" results of science rest. The strength of this evidence is not apparent to infantile minds, and therefore it cannot, of its own nature, be taught to others than advanced pupils; but the *facts* can be taught to children in the schools, and if that be done the demonstration will arise later inevitably and of itself.

To us, of thirty years later, the discussion appears belated. But not so the question of the spontaneous generation of life, the adversaries of which have recently again reared aloft their grim-visaged heads. "Life from life, and from life only," is their cry. The eternity and indestructibility of life they have placed on the same footing with that of energy and matter. And the recent experiments on the viability of bacteria in very low degrees of cold and in very high degrees of heat have furnished them with unexpected straws of support. Yet Clifford's trenchant remarks still hold. "We can only get out of spontaneous generation," he says, "by the supposition made by Sir W. Thompson, in jest or earnest, that some piece of living matter came to the earth from outside, perhaps with a meteorite. I wish to treat all hypotheses with respect, and to have no preferences which are not entirely founded on reason; and yet, whenever I contemplate this

'simpler protoplastic shape
Which came down in a fire-escape,'

an internal monitor, of which I can give no rational account, invariably whispers 'Fiddlesticks!'"

* * *

A propos of Clifford's essay on Virchow and his discussion of the ancestry of hoofed animals and the wiles of the devil in "salting" the geological strata with fossils to deceive mankind, we cannot omit repeating a little pleasantry recorded by him of a meeting of the great French naturalist Cuvier with his Satanic Majesty. The Devil is said to have appeared to Cuvier and threatened to eat him. "Horns? Hoofs?" said Cuvier. "Graminivorous. Can't eat me." "All flesh is grass," replied the Devil, with that fatal habit of misapplying Scripture which has always clung to him.

* * *

We have merely indicated the salient features of Virchow's illustrious career. It would be impossible for us to enter here into the details of his life, or to make more than the merest reference to his myriad social and scientific achievements. His was one of the most versatile minds of the last century; he was one of the dictators of its scientific opinion; and, not least of all, he was a shining example of the devotion of a man of pure science to the welfare of his city and nation. His life was destined to great length and fullest fruition.

THOMAS J. MCCORMACK.

THE NEW ENCYCLOPÆDIA OF THE BIBLE.

We devoted considerable space in our August number of 1901 to the story of the inception and character of the great critical Encyclopædia of the Bible[1] edited by Cheyne and Black and conceived by the late Prof W. Robertson Smith, the author of the chief Biblical articles in the *Encyclopædia Britannica*. We have now to chronicle the appearance of the third volume of this latest and crowning achievement of British Scriptural scholarship. The material covers the letters from L to P (including 1209 columns of fine print). The contributors are forty-nine in number, and while they come mostly from Great Britain and Germany, still Holland, Switzerland, and America are not unrepresented. This international character of the undertaking is a certain guarantee of its sound critical and progressive spirit. These volumes have brought the bewilderingly vast material, historical, archæological, geographical, critical, and what not, now offered by Oriental research, up to the "high level of the most recent scholarship," and so constitute a work of reference that supersedes or supplements existing English literature in this field, and that no modern student of the Bible therefore can afford to be without.

But the work is not a collection of disjointed information about the Bible,—not a dictionary; it is "a survey of the contents of the Bible, as illuminated by criticism—a criticism which identifies the cause of religion with that of historical truth, and, without neglecting the historical and archæological setting of religion, loves best to trace the growth of high conceptions, the flashing forth of new intuitions, and the development of noble personalities, under local and temporal conditions that may often be, to human eyes, most adverse."

We quote below, and in full, one of the interesting articles of the work, showing the outspoken critical and historical spirit in which delicate Biblical questions are treated and offering also much valuable information on an important subject. We naturally omit the cross-references to the other articles of the *Encyclopædia*, which form a very essential feature of the work as a whole.

NATURE-WORSHIP IN THE PROGRESS OF RELIGION.

The earliest stage of the development of religious ideas about nature is that in which man conceives natural objects as animated by a demonic life; the second, that in which these objects and localities are regarded as inhabited by a divinity or frequented by it; the third, that "in which they are the visible symbols wherein the presence of a god is graciously manifested, and, finally, to the rejection of the symbol as incompatible with the conception of a god whose invisible presence fills earth and heaven.

"The first of these stages had been left behind by the religion of Israel long before our knowledge of it begins; but innumerable customs of social life and ritual observance that had their root and reason in animistic beliefs survived even to the latest times, and doubtless the beliefs themselves lingered as more or less obscure superstitions among certain classes of the people, as they do to the present day among the peasantry in Christian Europe.

[1] *Encyclopædia Biblica*. A Critical Dictionary of the Literary, Political, and Religious History, the Archæology, Geography, and Natural History of the Bible. Edited by the Rev. T. K. Cheyne, M. A., D. D., and J. Sutherland Black, M. A., LL D. New York: The Macmillan Company. London: Adam and Charles Black. 1902. Vol. III., *L* to *P*, pages, xv, 650.

"It is obvious that the nature of the object itself determined how far it could be carried along by the advancing religious conceptions. A holy mountain, for example, most easily became the abode of a god, whose power was manifested in storm and lightning, or in the beneficent rain-clouds which gathered around its top; a cave near the summit might be in a special sense his dwelling-place. A natural rock which had been revered as the seat of a numen might become a rock-altar or a *massebah*, in which a deity no longer bound to the spot received the sacrifices of his worshippers and answered their requests; and might even finally be understood by higher spirits as only the symbol of the divine presence. On the other hand, the sacred tree was not so easily dissociated from its own life; its spirit might be very potent in its sphere, but it was to the end a tree-spirit, even if some greater name was given it. Consequently, the beliefs and customs connected with trees and with vegetation generally have been left behind in the progress of religion and often put under its ban, though nowhere extirpated by it.

HOLY TREES IN ISRAEL.

"We find this true in the Old Testament. The mountains and the sacred wells and springs which once had, as in some instances we can still perceive, their own numina, have been taken possession of by Yahwè, and become his holy places, seats of his worship; no traces of a distinctive cultus have been preserved; the rocks, so far as they have a religious association at all, are his altars or memorial stones.

"Sacred trees, too, are found at the sanctuaries of Yahwè; at Beersheba, by the holy wells, was a tamarisk which Abraham planted with religious rites (Gen. xxi. 33); at Hebron Abraham built an altar at the *'elon Mamre* (xiii. 18), where he dwelt (xiv. 13); beneath the tree Yahwè appeared to him in theophany (xviii. 1 ff.). At the *'elon morè* at Shechem Yahwè appeared to Abraham (Gen. xii. 6 f.); under the *'elah* at the same place Jacob buried the idols and amulets of his Aramæan household (Gen. xxxv. 4); there Joshua erected a *massebah* beneath the *'elah* which is in the sanctuary of Yahwè (Josh. xxiv. 26); by the same tree Abimelech was made king (Judg. ix. 6); near Shechem stood also an *'elon me'onenim* (Judg. ix. 37); the tomb of Deborah was under a tree near Bethel named *'allon bakkuth* Gen. xxxv. 8); beneath the *'elah* at Ophrah the angel of Yahwè appeared to Gideon, who built an altar on the spot (Judg. vi. 11, 19, 24). Compare also the place-names, Elim (Ex. xvi. 1), Elath (2 K. xiv. 22), Elon (Judg. xxii. 11); see also Judg. iv. 5, 1 S. xiv. 2, xxii. 6, xxxi. 13 (1. Ch. x. 12). The words אֵלָה, אַיִל (*'elah*, *'allah*), אֵלוֹן (*'elon*, *'allon*), ordinarily mean 'holy tree' (cp. Is. i. 29); the substitutions made in the Targums and by Jerome (i. e., Jerome's Jewish teachers) show how keenly this was felt at a late time. The etymological connection of the word with אֵל (*el*), 'numen, god,' is very probable. The names *'elon morè*, *'elon me 'onenim*, point to tree oracles; and though these names, like many of the others, are probably of Canaanite origin, we may observe that David takes an omen from the sound of a marching in the tops of the *baka* trees (2. S. v. 24).

SURVIVALS IN CULT AND CUSTOM.

"Of an actual tree cult we have no evidence in the Old Testament, the prophetic irony directed against the veneration of stocks (אֲשֵׁרָה) and stones more probably referring to *'aserahs* or wooden idols. But the places of worship 'under every luxuriant tree' had at least originally a deeper reason than that 'the shade was good' (Hos. iv. 13); and we shall probably not err if we see in beliefs which in many

other parts of the world have been associated with the powers of tree-spirits and the life of vegetation at least one root of the sexual license which at these sanctuaries was indulged in in the name of religion. Doubtless the custom existed, which still prevails in Syria as in many other countries, of hanging upon the trees bits of clothing, ornaments, and other things which keep up the connection between the man to whom they belonged and the spirit of the tree. At least one law —the three years *'orlah* of fruit-trees when they begin to bear (Lev. xix. 23-25)— perpetuates a parallel between the life of tree and man which was once more than an analogy. The prohibition of mixed plantations (*kil' ayim*, Dt. xxii. 9) is probably another instance of the same kind. The prohibition of reaping the corner of a field (Lev. xix. 9, xxiii. 22), though now a charitable motive is attached to it, had primitively a very different reason: the corner was left to the grain-spirit. That the first sheaf of the harvest, the first cakes made of the new grain, were originally not an offering to the God of the land, but a sacrament of the corn-spirit, is shown by similar evidence.

"If all this belongs to an age which to the Israelites was prehistoric, the gardens of Adonis (Is. xvii. 10) and the women's mourning for Tammuz (Ezek. viii. 14) show that in mythologised, and doubtless foreign, forms, the great drama of plant life—the blooming spring, the untimely death under the fierce midsummer sun, and the resurrection of the new year, maintained its power over the Israelites as well as their neighbors.

WATER LIBATION.

"The holy wells and springs in Palestine, like the mountains, were taken possession of by Yahwè when he supplanted the baals in their old haunts. No trace remains in the Old Testament of distinctive rites or restrictions connected with sacred waters such as we know in abundance among the neighbors of the Israelites. But one ceremony was observed annually in the temple, at the Feast of Tabernacles, which must be briefly mentioned here. At this season water was drawn from Siloam, carried, amid the blare of trumpets, into the temple precincts through a gate called for this reason the water-gate, and poured upon the altar, running down through a drain into the subterranean receptable. The reason for the rite is given in another place: 'The Holy One, Blessed is he! said, Pour out water before me at the Feast, in order that the rains of the year may be blessed to you.' The libation was thus an old rain charm, a piece of mimetic magic. A very similar ceremony at Hierapolis is described by Lucian.

WORSHIP OF THE SUN AND MOON.

"The heavenly bodies, especially the sun, moon, and (five) planets, appeared to the ancients to be living beings, and since their influence on human welfare was manifest and great they were adored as deities (see Wisd. xiii. 2 ff.). The relative prominence of these gods in religion and mythology differs widely among peoples upon the same plane of culture and even of the same stock; they had a different significance to the settled population of Babylonia from that which they had for the Arab nomad, and besides this economic reason there are doubtless historical causes for the diversity which are in great part concealed from us.

"That the Israelite nomads showed in some way their veneration of the sun is most probable; but there is no reason to believe that sun-worship was an important part of their religion. In Palestine the names of several cities bear witness to the fact that they were seats of the worship of the sun (Shemesh). The best

known of these is Beth-shemesh—now 'Ain Shems—in the Judæan lowland, just across the valley from Zorah, the home of Samson, whose own name shows that Israelites participated in the cult of their Canaanite neighbors, and perhaps appropriated elements of a solar myth. It may be questioned whether the worship of the sun at these places was of native Canaanite origin, or is to be ascribed to Babylonian influence, such as we recognise in the case of the names Beth-anath and, probably, Beth-dagon. If we may judge from the evidence of Phœnician names, the worship of the sun had no such place in the religion of Canaan as Shamash had in that of the Babylonians and Assyrians, and it seems more likely that the god whose cult gives a distinctive name to certain places was a foreign deity. These considerations lend some additional probability to Budde's surmise that the southern beth-shemesh is the place designated in the Amarna Tablets, no. 183, l. 14 ff., as Bît-Ninib in the district of Jerusalem. The name of the city of Jericho—the most natural etymology of which derives it from יָרֵחַ, moon—may indicate that it was a seat of moon-worship; but we have no other evidence of the fact. The names of the Desert of Sin and the holy mountain Sinai bear witness to the fact that the region was a centre of the cult of the moon-god Sin, who was zealously worshipped in Syria (Harran), Babylonia, and southern Arabia; in later times Greek and Latin writers as well as Nabatæan inscriptions attest the worship of the moon by the population of Arabia Petræa; the appearance of the new moon is still greeted by the Bedouins, as it was by Canaanites and Israelites in Old Testament times. The religious observance of the new moon with festal rejoicings and sacrifices belongs originally to a lunar cult; but, as in many other cases, this festival and its rites were taken up into the religion of Yahwè—the national religion absorbing the nature religion. Whether the Canaanite Astarte-worship was associated with the planet Venus we do not certainly know; the worship of the Queen of Heaven in the seventh century was evidently regarded as a new and foreign cult.

"The opinion, formerly widely entertained and not yet everywhere abandoned, that the Canaanite worship of Baal and Astarte was primitive sun- and moon-worship, is without foundation; the identification—so far as it took place in the sphere of religion at all—is late and influenced by foreign philosophy.

WORSHIP OF THE STARS.

"If the evidence of the worship of the heavenly bodies in Israel in older times is thus scanty and indirect, the case is otherwise in the seventh and sixth centuries. Jeremiah predicts that the bones of all classes in Jerusalem shall be exhumed and spread out before 'the sun and the moon and the whole host of heaven whom they have loved and served and followed and consulted and prostrated themselves to' (Jer. viii. 2). The deuteronomic law pronounces the penalty of death against the man or woman who worships the sun or the moon or the host of heaven (xvii. 3); cp. also Dt. iv. 15, 19. The introduction of this cult in Jerusalem is ascribed to Manasseh, who built altars for all the host of heaven in the two courts of the temple (2 K. xxi. 3, 5); the apparatus of this worship, with other heathenish paraphernalia, was destroyed by Josiah in his reformation (621 B. C.) and the priests put out of the way (2 K. xxiii. 4 f.). The altars of the astral cults were under the open sky, frequently upon the flat roofs of houses (Jer. xix. 13, Zeph. i. 5); probably the altars on the roof—the 'upper story' of Ahaz—(2 K. xxiii. 12), apparently an addition to the temple, were of this sort. Sacrifices were burnt upon them (2 K. xxiii. 5). The heavenly bodies needed no idol, they were visible gods; and

although various symbols of the sun are found in Assyria as well as Egypt, it is not certain that there were such in Jerusalem. Horses dedicated to the sun were stabled at one of the entrances to the temple, apparently in an annex on the western side (2 K. xxiii. 11), and with them chariots of the sun. The horses, animals sacred to the sun (Bochart, i. 141 ff., ed. Rosenm.), were not kept for sacrifice but, harnessed to the chariots, were driven in procession; according to the Jewish commentators, driven out (toward the East) to meet the sun at his rising. These horses were probably, as elsewhere, white. The rite, one of those imitative acts of cultus which have their ultimate origin in mimetic magic, probably came to the Jews from Assyria, though the special sacredness of the horse to the sun seems rather to be of Iranian origin. Another rite is described by Ezekiel (viii. 16): in the inner court of the temple, at the very door of the *ναός*, between the prostyle and the great altar, men were standing with their backs to the sanctuary of Yahwè and their faces to the East, protrasting themselves eastward to the sun. The words in the next verse, translated in the Revised Version 'they put the branch to their nose,' have been thought to refer to another feature of the ritual, similar to the use of the bunch of twigs called *baresma*, held by the Persians before the mouth when at prayer; not only this interpretation, however, but the connection of the words with the sun-worship of v. 16, is uncertain. The throwing of kisses to the sun and moon is alluded to in Job (xxxi. 26–28) as a superstitious custom; it corresponds to the actual kissing of an idol (1 K. xix. 18, Hos. xiii. 2).

THE HOST OF HEAVEN AND THE TWELVE SIGNS.

"In the references to this worship, beside sun and moon, two other names appear which require a word of comment. One of these *seba hâs-samâim* (צְבָא הַשָּׁמַיִם), 'the host of heaven' (𝔊 in Dt. *ὁ κόσμος τοῦ οὐρανοῦ*, elsewhere *δύναμις*, *στρατιά*; Vg. *militia*), is a collective term, sometimes apparently including the sun and moon, sometimes designating the other heavenly bodies; see Dt. iv. 19, 'the sun and moon and stars—all the host of heaven.' The word 'host' (*saba*) is the common Hebrew word for army; the stars, conceived as living beings, not only by their number (Jer. xxxiii. 22), but also by their orderly movement as though under command, resembled an army in the field. In at least one old passage, the phrase 'the host of heaven' designates the beings (cp. 'a certain spirit,' v. 21) who form Yahwè's court and execute his will (1 K. xxii. 19 ff., Micaiah's vision; cp. also Josh. v. 13 f.). It is unnecessary to suppose that the author's conception here is essentially different from that implied in the more common use of the phrase, as though in the latter the stars were meant as merely astronomical bodies and in the former 'angels'; unnecessary, therefore, to seek a remote connection between senses which only our modern ideas have separated. The 'host of heaven' are the ministers of Yahwè.

"The other word, *mazzaloth*, occurs only in 2 K. xxiii. 5 (מַזָּלוֹת, 𝔊 *μαζουρωθ*, Vg. *duodecim signa*, Pesh. *manzlatha*, Tg. מַזְּלָתָא), and—if the words are rightly identified—in Job xxxviii. 32 (מַזָּרוֹת), and is variously understood of the signs of the zodiac (so Jerome above), or the planets. It appears to be a loan-word from Assyr. *manzaltu*, 'station, abode,' and points to the origin of the religion.

HISTORY.

"The worship of the 'sun and moon and the whole host of heaven' came in under Assyrian influence in the seventh century; it flourished under Manasseh; was temporarily suppressed, with other foreign religions, by Josiah in 621; but

sprang up again after his death, and continued in full vigor down to the fall of the kingdom of Judah in 586; nor did that catastrophe extinguish it. We cannot doubt that astrological divination, if not the worship of the heavenly bodies, was one of the strongest temptations of heathenism to the Jews in Babylonia (see Is. xlvii. 13, cp. Dan. ii. 2, etc.).

"The development of theological monotheism involved the assertion of Yahwè's supremacy over the heavenly bodies: he created them, he leads out their host in its full number, calls them all by name, so great is his power not one of them dares be missing (Is. xl. 26, cp. xlv. 12, Gen. i. 14 ff., Neh. ix. 6). They are not mere luminaries set in the sky, but superhuman beings; it is by Yahwè's ordinance that the nations worship them (Dt. iv. 19 f., cp. xxxii. 8 ⑤, Jubilees, xv. 31 f.); the final judgment falls no less upon the high host on high, who guide and govern the nations in history, than on the kings of the earth on earth; they shall together be shut up in prison (Is. xxiv. 21–23; Enoch xviii. 13–16, xxi. 1–6; Rev. ix. 1 f., 11; cp. Dan. viii. 10 f.).

"Philo is therefore in accord not only with Greek thinkers but with the Old Testament in representing the stars as intelligent living beings; they are of a 'divine and happy and blessed nature,' nay, 'manifest and perceptible gods'—expressions which, as he means them, are not incompatible with his monotheism. The Essenes are said to have observed certain religious customs which imply peculiar veneration for the sun; but whatever may have been the origin of the practices, it may be assumed that they had found in them some symbolical meaning in harmony with the fundamental dogma of their Judaism." *μ.*

SECRECY IN RELIGION.

To the Editor of The Open Court:

The interesting contribution of the Countess E. Martinengo-Cesaresco in the September *Open Court* refers to a condition of Oriental reticence in the presence of aliens of other cults, of which there is a parallel in the existence of a like secrecy in the Far East. Even in the company of compatriots the initiates do not utter the sacred Mantra, or make Mudra manipulations openly. Especially is this so in the esoteric sects, such as the Shin-gon, and the Tendai,—especially in the higher classes of the Order of Yama-bushi, of which there are two branches. The chief monastery of the Shingon branch is at the former imperial retreat of Daigo, "Sam-bo In" (Three Treasures, Tri-ratna), near the Yamashina railway station beyond Kioto. That of the Tendai—now connected with Mii-dera at Otsu—is at the north-east suburb of Kioto, named "Sho-go In," formerly the residence of an imperial prince. The rites are esoteric and do not materially diverge. The writer has been initiated.

In the Tendai and Shingon ritual, on special occasions, the Gayatri—in an esoteric form—occupies a prominent place; the A-a-a-a, U-m-m-m-m, being joined in by the assembled Bonzes, and heard by the votaries who are railed off at a distance from the high altar. The chief abbot performs the secret manipulations facing the altar, with his hands concealed from the gaze of the laity, and reciting (or reading) the litanies meanwhile in a subdued voice, or silently moving the lips.

Circumambulation, the clanging of cymbals, and in special ceremonies the blowing of a conch, form a feature.

At the temples in the mountains, the rendezvous of periodical pilgrimage and assemblies of the Order, there are secret ceremonies for adepts and initiates, the

commonalty of lay pilgrims seeing but little of what takes place, the celebrants of the rites being screened off.

The incantations, exorcisms, and ancient rites are imitated by charlatans who impose upon the credulous for sordid motives, but the Order does not sanction such practices. C. PFOUNDES.

FILIAL PIETY IN CHINA.

While sauntering through the Pan-American Exposition, my eye caught a little Chinese store in which among other Chinese curios were displayed wall pendants, ornamental mottos designed to be hung up as decorations in the sitting rooms of the Celestials. Being interested in the subject, I secured copies of them, and since they are characteristic of the spirit of Chinese moralism, I take pleasure in reproducing them here for the benefit of our readers.

The paper and art work are crude enough to allow the assumption that the prints must be very cheap in China, and are designed not for the rich but for the common people. They may cost in Peking or Hong Kong not more than one or two cents apiece. Evidently they serve two purposes: first of ornament and secondly of instruction.

The Chinese are a moralising people, even more so than we; while we dislike abstract moralising, they delight in it, and do not tire of impressing upon their children the praiseworthiness of filial devotion.

Filial devotion is in Chinese *hsiao;* the character consists of two symbols showing a child supporting an old man, and filial piety is supposed to be the basis of all virtue. The moral relations are regarded as mere varieties of *hsiao;* and the original significance of the word, which means chiefly the devotional attitude of a child toward his parents, includes such relations as the obedience of the subject to his ruler, of the wife to her husband, of the younger brother to his elder brother, and of any one's relations to his superiors, including especially man's relation to heaven or the Lord on high, to God.

The Chinese ornament their rooms, not as we do with pictures of beauty, but with moral sayings; and the two here reproduced are typical of the national character of the Chinese. The former of the two pendants, literally translated, reads:

父子協力山成玉

"When father | and son | combine | their efforts | mountains | are changed | into gems."

The saying, however, is not an admonition to parents to keep in harmony with their sons but to sons to be obedient to their parents.

The second pendant means:

兄弟同心土變金

"When elder brother | and younger brother (or briefly, when brothers' | are harmonious | in their hearts | the earth | will be changed | into an Eldorado." [1]

It will be noticed that the letters are pictures containing figures and Chinese characters; and we have here the Chinese peculiarity of utilising their script for illustrations which represent scenes from well-known Chinese stories of filial devotion; all of them being taken from a famous book called *Twenty-four Stories of Filial Devotion.* These stories are known to every Chinaman, for they form the most important text-book of their moral education.

[1] Literally, gold.

fu
[When] father

hsiung
[When] elder brothers

tze
[and] sons

ti
[and] younger brothers

hsieh
combine

t'ung
[are] harmonious

li
[their] efforts

hsin
[in their] hearts

shan
mountains

t'u
the earth

ch'êng
are fashioned

pien
is changed

yü
into gems.

chin
into an Eldorado (gold).

CHINESE WALL PENDANTS

The first character (*fu*, meaning father) represents Wang Ngai, who lived during the Wei dynasty (220–364 A.D.). His mother while living was much afraid of thunderstorms. The picture shows him bringing offerings to her grave and protecting it against the fury of the thundergod, who is seen hovering above him in the air. (No. 805*a*, p. 242.[1])

The inscription of the second character (*tze*, meaning "son") reads in one place "Tai Son's aged mother" and in another "Tan Hsiang's daughter weeping over a sweet melon."

The third character (*hsieh*=combine) pictures a child standing before an old gentleman. The inscription reads: "Keeping in his bag a crab apple he showed his devotion to his parent." It refers to the story of Luh Sü. When a boy of six years he visited Yen Yü who gave him crab apples to eat but noticed that the child kept one in his bag for his mother.[2]

The fourth character (*li*, meaning "strength") illustrates the story of Hwang Hiang who, as a boy of seven, after his mother's death devoted himself unweariedly to his father's comfort. In summer he fanned his pillow, in winter he kept it warm. (No. 217, pp. 69—70.)

The fifth character (*shan*, meaning "mountain") represents Kiang Keh, a Chinese Anchises, about 490 A. D. Once he rescued his mother during a disturbance of the peace by carrying her many miles on his shoulders. Behind the fugitives in the center of the character rages the spirit of rebellion and on the right-hand corner is seen a deserted house. (No. 255, p. 80.)

The sixth character (*ch'êng*, meaning "fashioning, shaping, transforming into") illustrates the story of Wu Meng who exposes himself to the bites of mosquitoes lest his mother be stung by them. The picture of the hero of the story lying naked on a couch is quite indistinct in the reproduction, but the comfort of his mother, reclining in an easy chair finds an artful expression. (No. 808, p. 260.)

The last character (*yü*) of the first series is remarkable in so far as it represents the only instance of a woman's being praised for filial devotion. It represents Ts'ui She who nursed at her own breast her toothless old mother-in-law who was incapable of taking other nourishment. (No. 791*a*, p. 238.)

The first character of the second pendant (*hsiung*, meaning "elder brother") relates to Wang Siang, whose stepmother felt an appetite for fresh fish in winter. He went out on the river, lay down on the ice, warming it with his own body, and caught a couple of carp, which he presented to her. (No. 816, p. 241.)

The next character (*ti*, younger brother) shows the famous Emperor Yao in the center and before him his successor Shun, the pattern of filial as well as royal virtues. The elephant, one of the animals that helped him plow the fields, is visible above Shun on the right-hand side. William Frederick Mayers in his *Chinese Reader's Manual* (No. 617, p. 189) says about him:

"Tradition is extremely discordant with reference to his origin and descent. According to the Main Records of the five Emperors, his personal name was Ch'ung Hwa, and he was the son of Ku Sow, a reputed descendant of the emperor Chwan Hü. (He had also the designation Yü, which is by some referred to a region in modern Ho-nan, but by others to the territory of Yü Yao, in modern Chekiang, with one or the other of which it is sought to connect him.) His father, Ku Sow (lit. the 'blind old man') on the death of Shun's mother, took a second wife, by whom he had a son named Siang; and preferring the offspring of his second union

[1] The numbers and pages in parentheses refer to Mayers's *Chinese Reader's Manual*.

[2] Luh Süh is mentioned by Meyer *Ch. R. M.*, No. 443.

to his eldest son, he repeatedly sought to put the latter to death. Shun, however, while escaping this fate, in no wise lessened his dutiful conduct toward his father and stepmother, or his fraternal regard for Siang. He occupied himself in ploughing at Li Shan, where his filial piety was rewarded by beasts and birds who spontaneously came to drag his plough and to weed his fields. He fished in the Lui Lake and made pottery on the banks of the Yellow River. Still his parents and his brother sought to compass his death; but although they endeavoured to make him perish by setting fire to his house and by causing him to descend a deep well, he was always miraculously preserved. In his 20th year, he attracted by his filial piety the notice of the wise and virtuous Yao, who bestowed upon him his two daughters in marriage, and disinherited his son Chu of Tan, in order to make Shun his successor upon the throne. In the 71st year of his reign (B. C. 2287, cf. T. K.), Yao associated his protégé with him in the government of the empire, to which the latter succeeded on the death of Yao in B. C. 2258."

The character *t'ung* which means "agree" refers to Meng Tsung of the third century A. D. whose mother loved to eat bamboo shoots. While he was sorrowing because they do not sprout in winter, the miracle happened that in spite of the frost the bamboos began to put forth their sprouts, and so he was enabled to fulfil his mother's desire. (No. 499, p. 155.) The picture shows a table on which the dish of bamboo sprouts is served, the face of his mother hovering above it. On the right hand Meng Tsung sits sorrowing; the left-hand stroke is a sprouting bamboo stick.

Yen-Tze, the hero of the next story, depicted in the character "heart," is said to have ministered to his mother's preference for the milk of the doe by disguising himself in a deer skin and mingling with a herd of deer in the forest, where he succeeded in milking a doe and in spite of robbers, represented as attacking him on either side, he carried his mother's favorite food safely home in a pail. (No. 916, p. 276.)

The character *t'u*, "earth," depicts the touching story of the sacrifice of Yang Hiang, who saw a tiger approaching his father and threw himself between him and the beast. (No. 882, p. 266.) In the reproduction it is difficult to recognise the crouching tiger, which forms the stroke through the character.

The last but one character (*pien*, meaning "changes") refers to Min Sun, a disciple of Confucius. Mayers says: "His stepmother, it is recorded, having two children of her own, used him ill and clothed him only in the leaves of plants. When this was discovered by his father, the latter became wroth, and would have put away the harsh stepmother, but Min Sun entreated him saying: 'It is better that one son should suffer from cold than three children be motherless!' His magnanimous conduct so impressed the mind of his stepmother that she became filled with affection toward him." (No. 503, p. 156.)

The last character (*chin*, meaning "gold") bears the inscription "With mulberries he shows his filial devotion to his mother." It illustrates the story of Ts'ai Shun who during the famine caused by the rebellion of Wang Meng (25 A. D) picked wild mulberries in the woods and brought the black ones to his mother while he was satisfied with the unripe yellow ones. The picture shows a robber watching the boy. In China even criminals have a respect for the devotion of children to their parents. So in recognition of his filial piety the robber made him a present with rice and meat.

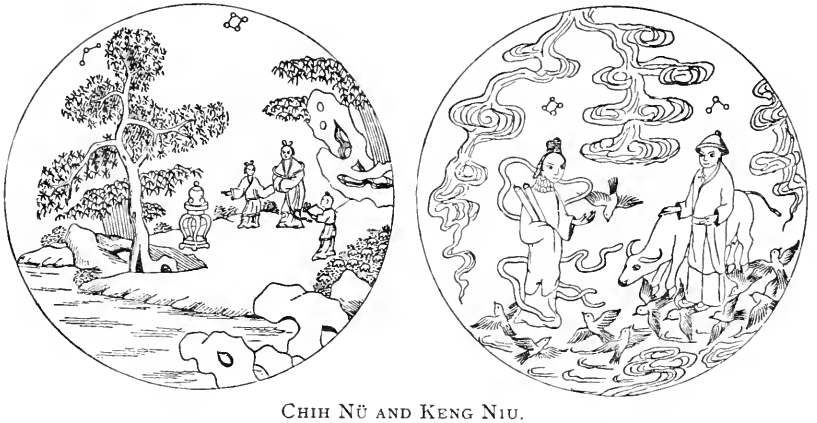
Hokusai, the painter of the poor, one of the most remarkable artists of Japan,

illustrated the twenty-four filial stories in pictures which in crude woodcut reproductions are well known all over the country of the rising sun.

They represent (beginning always with the picture in the right-hand corner and proceeding downward)

1. Shun, the person mentioned above destined to become the son-in-law of and successor to Emperor Yao, assisted in plowing by an elephant

2. Tseng Shen, Confucius' disciple. The picture illustrates a miraculous event. When gathering fuel in the woods his mother, anxious to see him, bit her finger and such was the sympathy between the two that he was aware of his mother's desire and at once appeared in her presence. (No. 739, p. 223.)
3. Wen Ti, natural son of Kao Tsu, founder of the Han dynasty, succeeded to the throne after the usurpation by the Empress Dowager in 179 B. C. When his mother fell sick he never left her apartment for three years and did not even take the time to change his apparel. He is also famous as a most humane monarch.
4. Min Sun, maltreated by his stepmother, has been mentioned above. (No. 503, p. 156.)
5. Chung Yeo, another disciple of Confucius, famous for his martial accomplishments, who died a hero's death in the suppression of a rebellion. He used to say: "In the days when I was poor I carried rice upon my back for the support of those who gave me birth; and now, for all that I would gladly do so again, I cannot recall them to life!" (No. 91, p. 29—30.)



CHIH NÜ AND KENG NIU.

A Chinese fairy tale of the Star Vega. A native illustration from Williams's *Middle Kingdom*.

6. Tung Yung was too poor to give his father a decent burial. So he bonded himself for 10,000 pieces of cash to perform the funeral rites with all propriety. "When returning to his home, he met a woman who offered herself as his wife, and who repaid the loan he had incurred with 300 webs of cloth. The pair lived happily together for a month, when the woman disclosed the fact that she was no other than the star Chih Nü,[1] who had been sent down by the Lord of Heaven her father to recompense an act of filial piety; and saying this she vanished from his sight." (No. 691, p. 210.)

The story of Chih Nü is one of the prettiest fairy-tales of China, which is briefly thus: The sun-god had a daughter Chih Nü (star Vega=α in Lyre) who excelled by her skill in weaving and her industrial habits. To recompense her he had her married to Keng Niu the herdsman (constellation Aquila), who herded his

[1] The Spinning damsel, which is α of Lyre.

cattle in the silver stream of Heaven (the milky way). As soon as married, Chih Nü changed her habits for the worse; she forsook the loom and gave herself up to merry making and idleness. Thereupon her father decided to separate the lovers

by the stream and placed them each one on one side of the milky way, allowing the husband to meet his wife over a bridge of many thousand magpies only once a year, on the seventh day of the seventh month, which is a holy day in China and Japan even now

Our picture shows Chih Nü vanishing from Tung Yung's sight.

7. The story of Yen-Tze, who while dressed in a deer skin, is here pictured as meeting a robber. (No. 916, p. 276.)
8. Kiang Keh asking the robber chief's permission to allow him to carry away his mother. (No. 255, p. 80.)
9. Luh Sü (who lived in the first century of the Christian era), was liberated by his jailer, when imprisoned for complicity in a conspiracy, on account of the devotion he showed toward his mother. (No. 443, p. 140.)
10. The story of Ts'ui She, nursing her husband's mother.
11. Wu Meng (No. 868, p. 260), exposing himself to mosquitoes.
12. Wang Siang, thawing the ice to catch carp.
13. The story of Kwoh K'ü, who "is said to have lived in the second century A. D., and to have had an aged mother to support, beside his own wife and children. Finding that he had not food sufficient for all, he proposed to his wife that they should bury their infant child in order to have the more for their mother's wants; and this devotedness was rewarded by his discovering, while engaged in digging a pit for this purpose, a bar of solid gold which placed him above the reach of poverty, and upon which were inscribed the words: 'A gift from Heaven to Kwoh K'ü; let none deprive him of it!'" (No. 303, p. 95.)
14. Yang Hiang offering himself to the tiger. (No. 882, p. 266.)
15. Cho Show-ch'ang searched fifty years for his mother who had been divorced from his father. Having succeeded in his purpose he served her the rest of her life. (No. 81, p. 26—27.)
16. Yü K'ien-low, ministering unto his sick father. (No. 950, p. 286.)
17. Lao Lai-Tze plays like a child with his parents who suffer from senile childishness.
18. The same story is told of Ts'ai Shun as of Tsêng Shên viz., that he was recalled from a distance by a sensation of pain which visited him when his mother bit her own finger. During the troubles ensuing upon Wang Mang's usurpation, A.D. 25, when a state of famine prevailed, he nourished his mother with wild berries, retaining only the unripe ones for his own sustenance. On her death, while mourning beside her coffin, he was called away by attendants who exclaimed that the house was on fire; but he refused to leave the spot, and his dwelling remained unharmed. As his mother had been greatly alarmed, in her lifetime, whenever thunder was heard, he made it his duty, after death, to repair to her grave during thunderstorms, and to cry out: "Be not afraid, mother, I am here!' (No. 752, p. 226.)

Our illustration depicts him meeting a hunter in the woods who gives him a piece of venison.

19. Huang Hiang, fanning his father's bed.
20. Kiang She in conjunction with his wife devoted himself to waiting upon his aged mother, in order to gratify whose fancy he went daily a long distance to draw drinking water from a river and to obtain fish for her table. This devotedness was rewarded by a miracle. A spring burst forth close by his dwelling, and a pair of carp were daily produced from it to supply his mother's wants. (No. 256, p. 81.)
21. Wang Ngai comforting the spirit of his mother in a thunderstorm.
22. Ting Lan. "Flourished under the Han dynasty. After his mother's

death he preserved a wooden effigy representing her figure, to which he offered the same forms of respect and duty as he had observed toward his parent during life. One day, while he was absent from home, his neigh-

bour Chang Shuh, came to borrow some household article, whereupon his wife inquired by the divining-slips whether the effigy would lend it, and received a negative reply. Hereupon the neighbour angrily struck the

wooden figure. When Ting Lan returned to his home he saw an expression of displeasure on the features of his mother's effigy, and on learning from his wife what had passed, he took a stick and beat the aggressor severely.

When he was apprehended for this deed the figure was seen to shed tears, and the facts thus becoming known he received high honours from the State." (No. 670, p. 204.)

23. Meng Sung reaping bamboo shoots for his mother in winter.
24. Hwang T'ing-Kien (a celebrated poet of the Sung dynasty), performs menial services in ministering to his parents. (No. 226, p. 73.)

Some of the stories seem silly to us: a pickax would have done better service in breaking the ice than the method of thawing it up with one's own body and catching cold; a mosquito-net would have proved more useful than feeding the insects with the blood of a devoted child, etc Moreover the stolidity of parents in accepting sacrifices of children with equanimity and as a matter of course is to our sense of propriety nothing short of criminal. Still, it will be wise for us whose habits of life suffer from the opposite extreme, viz., irreverence for authority or tradition in any form, to recognise that all of them are pervaded with a noble spirit of respect for parents, which though exaggerated is none the less touching and ought to command our admiration. P. C.

THE SUPPOSED POEM OF ROBERT BURNS.

The *Universalist Leader* of Boston republished the poem "Words o' Cheer" attributed to Robert Burns, which appeared in the September *Open Court*, and one of its readers has supplied the following information as to its origin.

SIR:

I find on page 1366 of the *Leader* information called for in regard to the poem "Words o' Cheer." I am not really one of your Scotch friends, but I can tell you where I got it years ago. It is taken from Lizzie Doten's *Poems from the Inner Life*, published by the *Banner of Light* in 1871 It is an inspiration poem given while in trance, purporting to come from Robert Burns. The poem consists of thirteen verses. Whoever sent it to *The Open Court* broke right into the middle of it; had they copied the whole of it you would have known *how* it got here, and *where* it came from at that late date. I am in possession of the book and have heard the lady deliver her poems impromtu myself The likeness of her poems to Shakespeare is equally good. The poem, as printed in the *Leader*, differs a word or two here and there. Probably the one who is passing the poem along wishes you or someone else to acknowledge its merits before giving the source from whence it sprung. The first half of the poem is a "dead give away."

MRS. E. A. MONTAGUE.

MILFORD, MASS., 32 Fruit St.

* * *

Mr. Andrew W. Cross, of Riverside, Cal., writes us to the same effect; adding, however, that the language is not that of Burns.

"SOME FACTORS IN THE RISING OF THE NEGRO."

A NEGRO'S VIEW OF THE QUESTION.

To the Editor of The Open Court.

Speculation as to the specific possibilities of an undeveloped person or race cannot be indulged in with any degree of impunity by those who expect to remain within the pale of common sense. Nobody pays much attention nowadays to the Jew's estimate of the Gentiles, or the Greek's and Roman's estimate of the capabilities of barbarians.

A little more than half a century ago it was generally believed in Europe and America that the black man was incapable of social improvement and that nature or God had produced him merely to serve the white man as a slave. Calhoun is said to have exclaimed: "Show me a Negro who can conjugate a Greek verb, and I will concede to him the right of human brotherhood!" And thus the divine right of the white man to the labor and liberty of the Negro seemed as divinely ordained and as securely established as the ancient and sacred right of man to rule over woman.

But the passion for absolute supremacy among individuals and groups of individuals, after causing countless millions to mourn from time immemorial, is slowly though surely being transmuted from a gross, brutal, and sanguinary impulse to a bridled and humane rivalry for intellectual, moral, and spiritual excellence.

It is a fact that—

> "Dogma and Descent, potential twin,
> Which erst could rein submissive millions in,
> Are now spent forces on the eddying surge
> Of thought enfranchised. Agencies emerge
> Unhampered by the incubus of dread
> Which cramped men's hearts and clogged their onward tread.
> Dynasty, Prescription! spectral in these days
> When Science points to Thought its surest ways,
> And men who scorn obedience when not free
> Demand the logic of Authority!
> The day of manhood to the world is here,
> And ancient homage waxes faint and drear.
>
> "Vision of rapture! See Salvation's plan
> 'Tis serving God through ceaseless toil for man!"

And while it is true that here and there and now and then among civilised men the claim of "divine rights" is still set up by the arrogant and belated, nevertheless the sweep of social evolution has acquired such tremendous momentum consequent upon the development of a higher social consciousness nowadays, that no careful student of the times need be hoodwinked by such paltry eddies in the mighty and irresistible current of human progress. There never was so much tolerance and sympathy at any one time among mankind. Never in the history of the world, so far as we know, have there existed so many contemporaneous civilised nations of any magnitude and fighting power as to-day. In fact, international law as a result of international tolerance and sympathy seems not very far from evolving an international tribunal and the very much longed-for *international arbitration*. The Christian sects, though legion in number, do not persecute each other, and Mussulman missionary effort among Christians in England does not excite a Chinese-like Boxer rising in that country. Monarchy and Democracy and the myriad political creeds exist side by side. Science and Religion, like the rest, and with no less degree of aggressive ardor, are compelled to respect the rights of each other. And in the industrial world, feudalism and Negro slavery have passed away. That the institution of feudalism and Negro slavery had respectively outlived their social and economic utility does not detract from the validity of the fact that the human mind had become so possessed of the incubus of sympathy and liberty that the black man's freedom came to him not only as an economic necessity in the British dominions and as a military expedient in the United States, but as a moral necessity of Christendom all the world over.

No phenomenon is isolated. Every fact in the universe is in some way related

to every other fact. Surely, the spirit of the Reformation was incarnate in the American revolution, and also in the anti-slavery agitation of Great Britain and the United States. Is there naught in common between Martin Luther, Oliver Cromwell, and John Brown? And so we find that sympathy and tolerance for those who differed from us in opinion or belief, was extended to sympathy and tolerance for those who differed from us in race, color, or sex.

It is true that in Europe the Jew has few rights which the Christian thinks himself bound to respect, and that the Negro in the Southern States of America has few, if any, rights which the white man feels himself bound to respect; yet men have ceased to cry out very vehemently against the competition of women in the industrial and intellectual walks of life, and are rather seeking to coöperate with them; the American laborer is forced to say *comrade* to his competitor of foreign birth and alien tongue if the dignity of labor is to be upheld; the rich and cultured are waking up to their duty to the mass of ignorant and poor people; the virtuous are lifting the fallen; and the best and fullest education is no longer the monopoly of the rich or privileged classes.

When we consider that even in war the sick and helpless are cared for by the strong and healthy; that the foreign missionary enterprise of Christendom constitutes a firm and enormous ladder reaching from the depths of barbarism to the heights of civilisation; that our systems of railroads and steamboats, of telegraph and newspapers, of free libraries and free education, are the heralds of the ultimate comparative annihilation of distance and ignorance;—when we consider these facts it is easy to see that the present status of humanity is the most tolerant, the most integrated, and the most sympathetic known to history. With the growth of social self consciousness has come the revelation of man's relations to man in spite of differences in the abstract or the concrete, in the subjective or the objective. In fact, the transcendental cosmic consciousness of Krishna, the Buddha, the Christ, Spinoza, and Walt Whitman, is to-day the gospel of science or Monism, and is consequently permeating the masses and destined to imbue them with the sweet spirit of the Masters, leading on to universal harmony and universal good.

In this whirligig of things social, man is learning that his neighbor is part of himself, that the black man and the white man are neighbors and consequently parts of each other; that man is part of the universe and the universe is part of man; and that in virtue of such facts it is to man's highest interest that he be in harmony with all his relations and thus avoid hurting himself. The relation of the slum to the mansion is the relation of barbarism to civilisation. Neither wealth nor civilisation is safe while the majority of men are poverty-stricken and barbarous.

There is a spirit abroad that looks grudgingly upon the higher education of the poor, and of the Negro especially. It was claimed that the poor child ought to be taught to work; but the wave of industrial education or the gospel of labor has engulfed the children of the rich also. Men are learning the dignity and pedagogic value of manual work. But some say that because it took the Anglo-Saxon a thousand years to acquire culture and refinement, the Negro ought to be made to travel at the same slow pace, or his progress will not be real. Such people do not ask themselves *why* the Anglo-Saxon was forced to move so slowly, and whether the *conditions* for human development have changed any since the granting of Magna Charta or not. While the Negro was toiling for the material advancement of the white man, the white man was toiling for the intellectual advancement of the Negro. How compensatory it all is!

But there are still others who contend that the race problem should not be interfered with; that things will come right of themselves without our trying to force matters; that the force of social evolution will eventually right the wrongs; that the *vis medicatrix naturæ* will cure the lesion. Yet the science of surgery and therapeutics disproves such a contention. A man may die for lack of proper aid, and a man may recover from a malady rapidly if his treatment is scientifically correct, or slowly or not at all if the treatment is antagonistic to the operation of the *vis medicatrix naturæ*. We may coöperate with the trend of the evolutionary forces, or we may oppose them. It should not be forgotten that evolution may proceed in spite of us and in virtue of us. In the main, humanity has bleedingly struggled up to its present status through the conflict of its passions, and appetites, and desires. Humanity as an evolving unit may truly sing:

"By the light of burning martyr fires
Christ's bleeding feet I track,
Toiling up new Calvaries ever
With the cross that turns not back."

It is for us of the present age of knowledge wittingly to harmonise our lives and the lives of our children with the mighty forces which are compelling us onward. The white man and the black man must learn respectively that one cannot hurt or neglect the other with impunity. This higher consciousness brings a knowledge of more relations and consequently of more responsibilities. We cannot escape if we neglect to ennoble ourselves by ennobling our neighbors. In the light of our higher consciousness and wider vision may the guilt of strangling a soul because of difference in color, birth, or sex, be the least of our sins!

JOSEPH JEFFREY, M. D.

BOOK REVIEWS.

An instructive work on the industrial and commercial changes which have distinguished the last ten years of the world's progress is Brooks Adams's book *The New Empire*. Mr. Adams's point of view is economic. His subject is "markets"; the territory tributary to a market, when considerable, being called a State, and when vast, an Empire. The market is an outgrowth of trade and spreads along the lines of converging trade routes. He has presented us, therefore, with a history of the changing fortunes of the trade routes of the world, from the earliest times to the fall of Pekin. The goal of history, in Mr. Adams's view, is the economic supremacy of the United States. The book is pleasantly and vigorously written, and contains several maps illustrating commercial development, which will be welcome to the student. (New York: The Macmillan Company. London: Macmillan & Co., Ltd. 1902. Pages, xxxvii, 243. Price, $1.50 net.)

The most important phases of the social workings of our large cities has been treated in Charles Zueblin's book *American Municipal Progress*. The sub-title describes the work as "Chapters in Municipal Sociology," which is defined as the investigation of "the means of satisfying communal wants through public activities." Purely administrative progress has been excluded, viz., the police and judicial departments, as well also as charities, churches, and institutions of vice. The subjects considered are: Transportation; Public Works; Sanitation; Public Schools; Public Libraries; Public Buildings; Parks and Boulevards; Public

Recreation; and Public Control, Ownership, and Operation. (New York: The Macmillan Company. London: Macmillan & Co., Ltd. 1902. Pages, v, 380. Price, $1.25 net.)

The Fall of Nineveh has found its historical novelist in Josiah M. Ward. *Come with Me to Babylon* is the entreating title of the work, the illustrations of which aim boldly at Ninevitical grandeur but fall sadly short of it. The text is exuberant, almost tropical in character, and on the score of richness of portrayal the reader will have no cause to complain. (New York: Frederick A. Stokes & Co.)

"Historical materialism" and "the materialistic interpretation of history" are terms which have often, but wrongly, been applied to the doctrine that the existence of man depends upon his ability to sustain himself, that consequently the economic life is the fundamental condition of all life, and that therefore to economic causes "must be traced in last instance those transformations in the structure of society which themselves condition the relations of social classes and the various manifestations of social life." In a new book entitled *The Economic Interpretation of History*, Dr. Edwin R. A. Seligman, Professor in Columbia University, New York, has attempted to explain the genesis and development of this doctrine, to study some of the applications of it made by recent thinkers, to examine the objections advanced against it, and to estimate its true import and value for modern science. The essay is brief and gives a clear survey of the development of economic studies and their bearing on political history, its appreciation of Karl Marx's work being especially prominent. (New York: The Columbia University Press. The Macmillan Company, Agents. 1902. Pages, ix, 166. Price, $1.50.)

The Rev. Joseph H. Crooker of Ann Arbor is now publishing in the *Springfield Republican* a series of essays on the place of Jesus in history. He is stirred by the following considerations: "It is clear enough, as all freely admit, that the name, 'Jesus,' has played a mighty part in the world's history for nearly two thousand years, but many fear that, in spite of all this, the discoveries of recent years have cast so many doubts upon the accuracy of the Gospels that we cannot longer be sure that any such person ever lived. Or if he lived, his career is too shadowy to be helpful, and his teaching too uncertain to be authoritative. There is a terrible dread gripping at the hearts of Christians. It is the fear that we may soon have to give up our loved Master, and put him among the fair but unsubstantial creations of human fancy. At least, it is feared that the character of the man who lived under that name is so far removed into the realm of poetry and so completely surrounded with uncertainty, that he can no longer be to us a real historical person to love as a friend and revere as a teacher."

We can anticipate the answer to this state of uncertainty by the following sentences which conclude the first installment: "The Gospels, when allowed to shine in their own light, which is the light of love, lend themselves to a new and higher ministry. We ought to handle them rationally, but reverently, for increase of inner life. These pages fire our hearts with ennobling motives, the less we go to them for dogma and the more we use them for communion with one who went about doing good, and who, in so doing, showed us the true way of life."

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