

north with the Latin and Celtic races of the south and west of Europe. From the mingling of the German and Roman speech, came the Romance languages of the present time, the Spanish, Italian and French. Latin however remained in written language; hence the continuance of Roman forms and names.

The changes incident to the migrations and conquests of the Teutonic tribes affected especially the country of the Western Empire; the Eastern, Greek, or Byzantine Empire continued under the rule of various princes until the time of Justinian, A. D. 527, who finally gained possession of Italy: his famous general, Belisarius, captured Carthage, and Justinian, a Christian Emperor, now "reigned over old and new Rome."

Different religions, in early as in later times, exerted an influence in matters of science and learning, some times for the better, at other times for the worse.

Much has been said concerning the influence of the mediæval Christian church on the progress of medical science. Professor Puschman of Vienna writes clearly concerning the conditions affecting the advance of medical science in the Middle Ages,¹ and attributes the want of progress in medical science, under the influence of the Christian church during this time, in part at least, to a tendency to under-rate the value of what is material in nature, and to regard the human body as impure, worthless, and unworthy to be the subject-matter of study. It would fain concern itself only with the moral culture of mankind; and its failure in these times was in a measure due to the fact that all of the physical part in nature was ignored. There had been a degeneration from the complete and perfect ideal and teaching of the Divine Author of Christianity. It is true, however, that the adherence to the theurgic theory of disease, demonism, and the belief in the cure by exorcism of evil spirits, as it existed in the Christian church of these times, was an inheritance of what belonged to antiquity, and was of pagan origin. There is little excuse, however, for the fact that the remains of some of this mediæval ignorance is allowed to maintain an existence in modern times; this indeed, in the light of the civilization and the means of education in the latter part of the nineteenth century. This continuance of existence can only be accounted for by the fact that the germinal material, from which have grown the superstitions of all times has too often found a natural lodgment in the human mind,

Medicine and Science of the Middle Ages. A Brief Outline.

By FRANKLIN STAPLES, M. D., WINONA, MINN.

Part First—MEDIÆVAL TIMES AND CONDITIONS.

THE period designated as the Dark and Middle Ages, extending from the fall of Rome (A. D. 476) to the discovery of America by Columbus (1492), while it is properly marked as the time of darkness and decline of learning, has its importance in history as the period of transition from ancient to modern civilization. This period of a thousand years, succeeding the decline of the last universal empire, was the time of the formation, not only of modern nations, but of modern intellectual life and institutions. The coming of various barbarian hordes,¹ so called, into possession of the provinces which had constituted the Western Roman Empire, resulted at length in the amalgamation of the Teutonic tribes of the

¹ Prominent among the ancient German or Teutonic tribes, were the Goths (Ostrogoths-East Goths,) (Visigoths-West Goths,) the Vandals, the Franks, the Lombards, the Saxons, the Angles, and the Scandinavians.

¹ History of Medical Education, p. 136.

and that much of the fruits thereof have endured. But, as belonging to the other side of this account, it is observed that the science of medicine has to thank the church for the establishment of hospitals and other benevolent institutions in this period of intellectual darkness, and that by this means not only was the cause of humanity served, but the work of the healing art was aided.

While it was not in the way of the religious teaching of the time to readily advance beyond the ancient theurgic doctrine of disease and its treatment, other conditions and circumstances are mentioned as impeding the development of the sciences. Among these were the constant wars between hostile tribes, the want of law and order, with the consequent insecurity of property, and pestilences which at times depopulated whole countries. Moreover and above all was the fact, that the people who from different sources had come into possession of different parts of the Roman empire, were themselves far inferior to the Romans in their time of strength, and infinitely below the ancient Greeks in all things that pertain to human culture and the means of education, and time was required for development, for intellectual growth and improvement. The time of the revival of learning was then in the future.

MEDICAL CHARITIES.

While it is true, that in the days of the Roman Republic hospitals were maintained by individuals for the purpose of protecting property which was held in the form of slaves, it remained for the influence of christianity in the 4th century to effect the establishment of hospitals for charitable purposes. The Emperor Constantine had closed the Aesclepieia and other pagan temples about A. D. 335, and Helena, the mother of Constantine, was active in founding institutions for the care of the sick at Constantinople, Jerusalem and other cities. A hospital was founded at Antioch during or shortly after the reign of the Emperor Julian (331-363.) The famous "Basilides" hospital was established at Cæsarea as early as A. D. 378.¹ These hospitals were conducted by the monks and nuns of these times, and the practice of medicine therein is said to have consisted in religious observances and the use of harmless remedies of monastic gardens. (Baas.) Different estimates have been made as to the character of christianity at the time of Constantine and of Constantine himself as its representative, yet it appears as shown above,

that, under the influence of his government just at the beginning of the Middle Ages, the establishment of benevolent institutions for the relief of human suffering began.

MOHAMMED AND THE SARACENS.

The rise of the Saracens or Arabs, (Moslems) was early in the seventh century, and was identified with the life and work of the reformer, Mohammed, who appeared in Arabia at this time and taught a new religion. This religion, its conquests and outcome, is given briefly as follows: "Its substance was: 'There is but one God, and Mohammed is his prophet.' Converts were made by force of arms. Paradise, said Mohammed, 'will be found in the shadow of the crossing of swords.' The only choice given the vanquished was the Koran, tribute, or death. Before the close of his stormy life (A. D. 639), the green-robed warrior prophet had subdued the scattered tribes of Arabia, destroyed their idols, and united the people in one nation." The Moslem Caliphs were the successors of Mohammed. Concerning the extent of the Arab domain it is said that, "exactly a century after the death of Mohammed the Saracen rule reached from the Indus to the Pyrenees. No empire of antiquity had such an extent. Only Greek fire on the east and German valor on the west had prevented the Moslem power from girdling the Mediterranean." (Barnes' History.)

While the religion of Mohammed, the creed of Islam, differed in character and means of extension from the Christian religion, yet, like the latter and like that of the Jews, it was a monotheism, and in this was a great advance from the polytheism of the ancients. A discriminating modern writer, in favorable comment on Mohammedanism, credits the Koran and the Saracenic culture of the Middle Ages with elevating a barbarous people by driving out debasing superstitions and says: "It strikes directly and with an incomparable vigor against the idolatry, sorcery, human sacrifices, intemperance and squalor, that are their besetting sins, and makes them realize that they work beneath the eye of a strict and holy master, whose judgment day they cannot escape."¹

This brief account of the character of the changes and of the general condition of the Middle Ages, although incomplete, may in some degree aid in understanding the character and progress of the science and medicine of these times.

Concerning the general character of medi-

¹Handerson, in Baas' History, p. 213, n.

¹ Prof. J. T. Bixby, in the Arena, March, 1896.

cine at this period, it has been truly said: "If the medicine of the ancients was pre-eminently a medicine of philosophic thought, and modern medicine is a science of thoughtful observation, that of the Middle Ages was the pupil of authority and faith; clinging slavishly, on the one hand, to the works of the Ancients, on the other, striving after and instituting works of Christian charity."¹ In the Eastern Empire especially, the ancient Greek language continued, and in it were preserved the literary treasures and some of the science of antiquity.

The following are among the authors whose works to some extent kept in use: Pliny, Hippocrates in some of his books, Dioscorides, Cælius Aurelius, Celsus, Marcellus Empiricus, and Lucius Apuleius. Later came the works of Oribasius, Alexander of Tralles, and Paulus Ægineta, in the 5th, 6th, and 7th centuries, respectively.

THE COMPILERS.

An important work of certain physicians and writers of the Middle Ages was that of compiling, and thereby aiding in the preservation of valuable works of ancient authors. The last of the great pagan physicians, who before this time had done the most important work of this kind, was Oribasius of Pergamus (A. D. 326-403). He is mentioned as the first and greatest of the compilers. He was a physician to the Emperor Julian, and it was claimed by this monarch that the work of the physician Oribasius was done by his direction. He made extracts from all ancient Greek authors to such an extent that his work was made to constitute seventy volumes. In these compilations he introduced much material of his own. He wrote on dietetics and gymnastics, and taught the use of urethral and vaginal injections in venereal diseases. The use and application of bandages, views on diseases of the liver and on the treatment of sterility are given in his writings. Seventeen of the books of Oribasius are still preserved. We have also an edition in four volumes in French, edited by Bussemaker and Daremberg, published in Paris 1861-62.

Ætius of Amida.—After the fall of Rome the first important medical writer was Ætius of Amida (about 502-575), Amida was a city on the Tigris in Mesopotamia, now Diarbakir. Ætius studied in Alexandria, but spent the greater part of his life at Byzantium. He had an important position at the Byzantine Court under Justinian I. Oribasius is mentioned as the last of the great pagan physicians and Ætius as the first important Chris-

tian writer on medicine. In point of fact, there were nearly two centuries between their lives. The works of Ætius were sixteen books, largely compilations from ancient authors. His works were valuable, in that by them a record was preserved of much that would otherwise have perished. His own teachings were a strange mixture of superstitions combined with the use of drugs. He had obtained in Egypt a knowledge of pharmaceutical preparations largely for external application, as well as concerning the use of charms and amulets in the cure of diseases.

Alexander of Tralles (525-605), (Tralles, a city of Lydia).—Alexander belonged to a family of physicians and scientists. His father and father's father were physicians, and a brother was a distinguished Greek architect. The merits of Alexander, while favorably mentioned by all, have been differently estimated by different writers. He has been called an "eclectic of the highest type." This, with the meaning implied, was a high commendation. He has been regarded as a follower of Galen, and is mentioned as one whose originality of thought and practice recalled to remembrance once more the mighty past of Greek medical science.¹ He emphasized the importance of studying individual cases, and cautioned against being led into error by too great reliance upon general system in medicine. On the other hand the following mention of Alexander appears in an English work on medical history (Withington): "He is an eclectic in his superstition as in his science, and introduces charms taken from Homer, Orpheus, the Persian Magi, and from other sources. The following is an amulet for quartan ague: 'Take a live beetle, put him in a red rag and hang him around the patient's neck, a green lizard together with the patient's nail parings may be used instead of the beetle.' For epilepsy, 'take a nail from a wrecked ship, make it into a bracket, and set therein the bone from a stag's heart taken from the body whilst alive; put it on the left arm; you will be astonished at the result.'" Alexander indeed apologizes for these absurdities by saying that the patients must be relieved by all possible means. Occasion for excuses like these for absurd and unworthy practices have not been wholly confined to the dark ages.

Theophilus (P'hilotheus, Philaretus, about 630) was a physician to the Emperor Heraclius. The name and appellations of this dis-

¹ Puschmann's History, p. 152. (Prof. Puschmann edited the text-book of Alexander of Tralles, the Special Pathology of Internal Diseases, published in Vienna in 1878.)

¹ J. H. Bass, in History of Medicine, page 198.

tinguished man are indicative of his character. His military title was "Protospatharius, or Colonel of the Guard. He has been called one of the most popular physicians and medical authors of the Middle Ages. His work on anatomy was a compilation from Galen and Rufus. "This," says Dunglison, "seems to have been dictated by piety, in order to demonstrate the wisdom of God in the organization of the human frame." He wrote treatises on fever, on the urine, and on the pulse. Stephen of Athens was a pupil of Theophilus. He wrote commentaries on the aphorisms of Hippocrates and treatises on alchemy and astrology, and by his works acquired the title of philosopher. His works are given as theoretical rather than practical and were not free from absurdities.

The most distinguished of the Byzantine physicians was Paul of Aëgina, (about 625-694). The exact date of his birth is unknown. His early life, however, was spent in the time of the Emperor Heraclius. He studied at Alexandria, but spent a large part of his life in Asia Minor. He traveled much, was a teacher of medicine (iatrosophist) and enjoyed a wide reputation. His works appeared as an *Epitome of Medicine and Surgery* in seven books, and covered the field of minor surgery, herniology, syphilography, gynecology, ophthalmology, pharmacology and pathology. His military surgery is given as "very complete, clear, and suited to the weapons of the period." (Baas from Frolich).

In his treatise on ophthalmology are given: "Crocodiles dung in the opacity of the cornea, bed-bug's and frog's blood in trichiasis, etc., (Magnus). The use of such remedies was in keeping with the practice of these times. The difference in comparative merit of the theoretical writings and what appears to have been the practice of Paul of Aëgina and others of his time, may be explained by the fact, that most of their writings were extracts and compilations from the earlier Greek authors, while the practice more nearly conformed to the intelligence and spirit of the times in which they lived. Yet in contrast with this representation of practice, the following appears: He was the first to consider the contractibility of the iris in cataract, in the diagnosis of this disease from amaurosis, and observes that pterygium often returns after the operation for removal (Magnus). In his work on refracture in cases of bad union, he favors pressure and straightening of the callus, and describes machines for straightening in cases of crooked growth. Notice of this appears in Baas' History, with

much concerning surgical procedures then practiced, in part at least, as in modern times; the author of which observes: "From the foregoing we may infer that Paul must have been one of the most capable, if not the most important of surgeons among the Greeks, and certainly the most daring operator among them. His appearance in this department of the healing art, and particularly at this time, seems the most surprising, since for centuries before him, surgeons had made shift with an apparently inoffensive surgery of plasters and salves rather than to resort to operative measures."

In the further medical history of this period appears with others the names of Meletius, a monk who wrote on medicine in the eighth century, whose work, an "*Epitome of Medicine*," is given by Marx as one "which begins with a creed and ends with the culinary art;" of Michael Psellus, who in the eleventh century wrote on the healing power of precious stones, etc.; also of Simeon Stethi, whose work on the *Virtue of Aliments* was an enumeration of Arabian medicines, such as camphor, musk, balsam, hashish, etc.; and of John Actuarius, who in the twelfth century wrote well for the times, on *materia medica*, and whose "*Therapeutics*" has been noticed as a good abstract of Galenico-Arabic medicine. A worthy writer has said: "With Actuarius, Græco-Christian medicine bids adieu to history more honorably than was to be expected from the past and future political, physical, moral, and intellectual wretchedness of the Eastern Empire."

A brief account of the works of a few other mediæval physicians, of the Jews and the Nestorians in mediæval medicine, of the beginning of barber surgery, and of mediæval medicine in England, may have place in another writing.

**Medicine and Science of the Middle Ages.
A Brief Outline.**

By FRANKLIN STAPLES, M. D., Winona, Minn.

Part Second.—I. MONASTIC MEDICINE.

In the times of change and confusion in Europe during the early part of the Middle Ages, some knowledge of medicine was preserved in the monasteries of the Christian church which had been established in different parts of Italy, France and Spain, and many works of ancient Greek and Roman authors were here saved from destruction. The sup-

porters of these institutions, while they were slow in coming to a knowledge of the principles of scientific medicine, retaining and practicing, as they did, a strange mixture of magic and superstition with the remains of ancient science, were abundant in their provisions for the care of the sick. According to the historian Eusebius,¹ the Church in Rome in the third century did much to support the impotent and disabled. Saints Paula and Fabiola, widows at Rome, as said by St. Jerome, devoted their lives and wealth to the care of the suffering and helpless. The former distributed immense alms and built a hospital, also a monastery for St. Jerome and his monks; and the latter founded the first Christian infirmary at Rome, at the end of the 4th century. A great hospital was founded at Cæsarea in A. D. 397 by St. Basil the Great, which was named after him, Basilides. So numerous were the dwellings here constructed for the poor and the sick, that the Basilides Hospital is said to have resembled a town. The administration is given as excellent; special physicians and attendants being employed in the service. In this institution St. Gregory of Nazianzus said, "Disease became a school of wisdom, and misery was changed into happiness." (Berdoe.) There was a hospital at Edessa in A. D. 375, containing three hundred beds. Here was also a school of medicine founded at an early period; but falling under the influence of the Nestorians, it was broken up in 431, and afterwards revived under Bishop Ibas. This school had many excellent teachers, and in connection with the hospital the pupils were instructed in the details of medical practice. (Handerson.)

In Italy, Gaul and Spain during this period, many asylums for the sick and destitute were maintained.

The Benedictine monks, first in the abbey of Monte Casino, Italy, made the study and practice of medicine a part of their religious duties. The Abbey of Monte Casino was famous as the place of the origin of the order of the Benedictines. It was located about fifty miles N. W. of the city of Naples on the site of an ancient temple of Apollo. Here in the sixth century Benedict of Nursia established the monastery and became the founder of the Order bearing his name. Instruction in medicine was not at first here contemplated or permitted, but in time medical works of considerable importance appeared; and it is stated, that in the 10th century Monte Casino had acquired a great reputation as a school of

medicine, and was frequented for the purpose of medical study by monks from every quarter of the world.

The name of Aurelius Cassiodorus (485-573,) the private secretary of Theodoric the Goth, appeared in connection with the practice of medicine at Monte Casino. Upon entering the Order he urged upon his associates the importance of the study of medicine. Before him the cure of diseases was attempted only by means of religious observances, prayers, and conjurations. Cassiodorus recommended the study of the works of Hippocrates, Galen, Dioscorides, Cælius Aurelianus, and other Greek authors, whose works had been translated into Latin. Notwithstanding the miraculous cures reported to have been done by St. Benedict, he taught the treatment of disease by means other than that of exorcism of evil spirits. Medicinal herbs were cultivated and used in treatment, and certain surgical operations were performed. Concerning the story that St. Benedict himself performed lithotomy upon Henry II, Emperor of Bavaria, during his sleep, and placed the stone in the emperor's hand to be discovered by him on waking, Dr. Baas remarks: "We may infer, that, in this instance at all events, a magnificent pious fraud was practiced."

The principal medical works originating at Monte Casino were those of Constantine the African (1818-1887,) a native of Carthage, who was a Christian physician and possessed considerable learning for the time in which he lived. In his studies he visited Cairo in his native country, traveled to Bagdad, Babylon and India, and was for a time a teacher at Salerno; but he wrote several medical works and made his translations of Greek and Arabian authors in the cloisters of Monte Casino. The literary character of the works of Constantine has been criticised; but, says Handerson, we can scarcely expect classic Latinity in the eleventh century, and the works of Constantine were highly esteemed during the Middle Ages, winning for their author the title of "*Orientalis et Occidentis Magister*." We must at least assign to Constantine the credit of reviving in the west the study of Hippocrates and Galen; and it is generally understood that he was the first to introduce into Europe a knowledge of Arabian Medicine also.¹ Daremberg gives less importance to the works of Constantine, and claims that it was more than a century after his time that Arabian medicine was substituted in the school of Salerno, as in the west generally, for the Græco-Latin.²

The monastery of St. Gall, in Switzerland.

¹Eusebius Pamphill, the eminent writer of the 4th century, was a native of Palestine, and was bishop of Cæsarea from about 314 A. D. to the time of his death.

¹Sketch of Medieval Medicine.—Handerson.

²L'Ecole de Salerno.—Daremberg.

had a botanical garden, a pharmacy, apartments for the sick and a house for the physician. Monastic schools existed at Paris, Fulda, Wurzburg, Metz, Lyons, Cremona, Pavia, Florence and other places.

The emperor Charlemagne in the ninth century attempted educational reforms, established academies throughout the empire, and required that every monastery which he founded should support a school. In the Capitulary of Thionville (805) he ordained that medicine should be taught under the name of physic. As said Dr. Baas, "How far the Arabian schools and the Roman higher schools served as patrons and a stimulus in this matter, it is not easy to determine. That both exercised some influence seems probable when we remember that Charlemagne had dealings with the Arabians, and frequently built upon Roman foundations."

The Othos in the 10th century were able to accomplish more in the way of educational advancement than did the Frankish emperor of the 9th century.

Concerning the tendency to demonism, (the spiritualistic theory of disease and its treatment) in the monastic medicine of the Middle Ages, which is well known, it can be said that this was largely an inheritance from a more ancient civilization; and, moreover, that the enduring nature of religious delusions of this kind has been such that they have not wholly disappeared in the light of the higher knowledge of the present day.

II. THE JEWS IN MEDIÆVAL MEDICINE.

The history of the Jews in the healing art began during the life of Moses in the land of the Pharaohs, and continued during the time of the Jews in Palestine, as appears in the Old Testament scriptures, the Talmud and in profane history. The destruction of Jerusalem by the Romans under Titus, A. D. 70, the time of the "Dispersion," marked the close of the Jewish era. The occurrence of this event was four centuries before the beginning of the Dark Ages; yet there remained during this period, and have continued in modern times among the remnants of this scattered people, men who have kept abreast with the times in the progress of medicine.

The general character of the Jewish medicine in the early and middle Ages has been given in a word as follows:

"The theurgic medicine of the Jews was from the first higher than that of other Oriental nations, in that it was monotheistic. They believed in one God, the invisible one. They were not of themselves idolaters. They

believed that diseases were inflicted upon men as punishments.

In what pertained to personal and social purity, as well as in what related to public hygiene, the Jews, by their laws and government, were above the Egyptians. Their rules in regard to marriage of relatives were important, and punishments for violations of the law concerning sexual relations were severe. They had strict regulations regarding the kind of animals whose flesh should be used for food; also concerning the method of slaughter and of the preparation of the flesh for food, which observances have continued among the Jewish people in modern times.

Although the medicine of the Jews in the latter part of their national existence had advanced in scientific thought and methods, yet in all it was a mixture of ancient pseudo-philosophy with the germ of more complete science which was yet to come. Jewish Rabbis were practitioners and teachers of medicine, and, before and after the destruction of Jerusalem, had their disciples in the country from the Euphrates to the region of the Nile. The writings of some of the Rabbis afforded evidence of the possession of considerable knowledge of anatomy.

Dr. Edward Berdoe, of London, in his "History of the Healing Art," writes favorably of the influence of Jewish medicine as follows: "In the Middle Ages the Jews rendered the greatest service to the healing art, and had a large share in the scientific work connected with the Arab dominion in Spain. The great names of Moses Maimonides and Eben Ezra attest the dignity of Jewish intellectual life in the Dark Ages." Maimonides was a Jewish rabbi and philosopher, was born at Cordova, in Spain, about 1135, was a favored student of Averroes. He was in Egypt, and at about 1165 was physician to the Sultan Saladin. He wrote numerous and important works.

Professor Puschmann, of Vienna, in his "History of Medical Education," closes his chapter on the Jews with these words: "Jewish doctors and philosophers exercised a beneficial influence upon the scientific development of medicinal science, especially in the Middle Ages, and have at every period maintained a prominent position in this domain of knowledge."

MEDICINE AND SCIENCE OF THE MIDDLE AGES.

By FRANKLIN STAPLES, M. D., WINONA, MINN.

Part Third—THE SCHOOL OF SALERNUM.

In mediæval times, perhaps as early as the 7th century, there arose a school of medicine at Salerno in lower Italy. The exact time of the beginning of this school and who were its founders is unknown. It proved to be one of the centers of medicine which maintained an existence during the dark ages, and served to preserve to some extent the medicine of earlier times. The ancient town of Salerno was situated near the present city of Salerno, the site being still marked by the ruins of a mediæval citadel. The town was founded by the Romans about B. C. 200, and in the time of the Roman Empire was a municipality of considerable importance. Because of its excellent situation, its climate and other means of attraction, it became a favorite health-resort; and it is claimed that for this reason it became a place of residence for physicians. The fact, that among the Romans all physicians might be teachers, is mentioned as in some way an explanation of the foundation here of a school of medicine.

Gibbon, the historian of the "Decline of the Roman Empire," gives the place of the School of Salerno in history as follows: "The treasures of Grecian medicine has been communicated to the Arabian colonies of Africa, Spain, and Sicily; and in the intercourse of peace and war, a spark of knowledge had been kindled and cherished at Salerno, an illustrious city in which the men were honest and women were beautiful. A school, the first that arose in the darkness of Europe, was consecrated to the healing art: the conscience of the monks and bishops was reconciled to that salutary and lucrative profession; and a crowd of patients, of the most eminent

rank and most distant climates, invited or visited the physicians of Salerno. They were protected by the Norman conquerors; and Guiscard, though bred in arms, could discern the merit and value of a philosopher. After a pilgrimage of thirty-nine years, Constantine, an African Christian, returned from Bagdad, a master of the language and learning of the Arabians; and Salerno was enriched by the practice and lessons, and the writings of the pupil of Avicenna." The mention here of the names of Robert Guiscard the Norman commander, who, in his conquests in Italy, favored Salerno and in return received its benefits; of Constantine the African, who represented Monte Casino and the Benedictines; of Avicenna the Arabian scholar, and the school at Bagdad, as having a part in preserving the culture of the Greeks in the time of intellectual darkness, all is suggestive of history, the making of which Salerno had its part. The author here quoted is careful to substantiate the truth of his assertion concerning "honest men and beautiful women" at Salerno, by adding the following Latin verse from Appulus:

"Urbs Latii est hac delitiosior urbe,
Frugibus, arboribus, vinoque redundat, et unda
Non tibi poma, nuces, non pulchra palatia desunt,
Non species muliebris abest probitasque virorum."

The character of the school of Salerno at this mediæval period of the prevalence of monastic medicine, shortly before the general extension of the Arabian schools, whether at any time it was or was not under monastic control, has been a matter of dispute. Notwithstanding that there was a Benedictine monastery established here at an early day, and that the Emperor Charlemagne here founded a school A. D. 802, yet the school at Salerno has not been by most writers classed as at any time a monastic institution. It is understood that, while at the time of Constantine the African, who was for a time at Salerno, the Benedictines of Monte Casino exerted an important influence in the school, yet at no time was a single ecclesiastical control in any way complete. A recent writer sums up concerning the school of Salerno as follows: "All that can with certainty be said, is that a school or collection of schools gradually grew up, in which especially medicine, but also in a subordinate degree, law and philosophy were taught. In the 9th century Salernitan physicians were spoken of, and the city was known as *Civitas Hippocratica*.¹ A little later we find great and royal personages resorting to Salerno

¹ "*Civitas Hippocratica*" is given by Henderson as the motto on the seal of Salerno, who speaks of this as bearing ample witness to her unwavering devotion to "the Father of Medicine."

for the restoration of their health, among whom was William of Normandy, afterwards the Conqueror. The number of students of medicine must have been considerable, and in a corresponding degree the number of teachers. Among the latter many were married, and their wives and daughters appear also in the list of professors. The most noted female professor was the celebrated Trotula, in the 11th century. The Jewish element appears to have been important among the students, and possibly among the professors. The reputation of the school was great until about the beginning of the 13th century, when the introduction of Arab medicine was gradually fatal to it. The founding of the University of Naples, and the rising of Montpellier also contributed to its decline."¹

The period of the greatest importance of the school of Salerno as a school of medicine was during the 10th and the 11th centuries. Its importance at this time may be inferred from the fact, that from the fall of the Western Empire in the 5th century, to the coming of Arabian science and literature at about the beginning of the 11th century, the time has been designated as the pre-Arabian or *Salernitan* period. Besides, the prominence of this mediæval school of medicine in its time, has given its name a place even in the literature of modern times. Longfellow in his Golden Legend alludes to Salerno, and makes Prince Henry exclaim, "Even the doctors of Salern send me back word they discern no cure for a malady like this." (Allusion is also made to ancient Egyptian medicine in this poem.) At about the middle of the 13th century the school began to decline, but maintained a nominal existence until finally put to an end by decree of the French government under Napoleon, in 1811.

Concerning the principal points in this account of the school of Salerno most writers have agreed in the main; concerning much else, however, that has appeared in history, there is less certainty. The claim as credited to the ancient chronicles of the city, that the school was founded by four masters, viz. Abdallah the Arab, Eli the Jew, Pontus the Greek, and Salernus the Latin, and that each lectured to the pupils in his own tongue, is regarded by Withington as "clearly mythical,"² while the story of the existence of the early Salernitan Jewish doctors, Joseph and Joshua, is more favorably considered. Before the time of Constantine the African

(1018-85) at Salerno, we find the names of Gariopontus (about 1050), the Greek author of a medical compendium which is said to have combined the doctrines of the Methodists with the practical teachings of Galen, Alexander of Tralles, and of Paulus Ægenita; also of the elder and younger Platearius, the son being the author of a practical work on treatment; and of the two physicians named Cophos, one of whom was the author of "*De Anatome Porci*." Anatomy was here taught by dissection of swine. The viscera of the pig, says Cophos, resembles man internally, just as the monkey resembles him externally, (Withington). It is given as the custom of the School of Salerno, and of other institutions established in these times, to study anatomy in the works of Galen or on pigs and dogs, animals which at this era were exclusively dissected, (Dunghlison.) Nicholas Praepositus was prominent in Salerno in the first half of the 12th century. His work, "*Antidotarium*," and the work of Matthew Platearius are mentioned as the pharmacopeias of the Middle Ages. In the former work is given in Latin verse a table of apothecaries' weights, which in part corresponds to that in use at the present time. As extracted from the Latin poem it reads: 20 grana, 1 scrupulus; 3 scrupuli, 1 drachma; 2½ drachmæ, 1 hexagium; 6 hexagia, 1 unica, 12 unica, 1 libra, 2½ libra; 1 sextarius.

In the work of Platearius, called *Circa Instans*, he gives mercury as used in ointments for scabies, pediculi capitis, and eruptions on the face, and observes that its fumes are highly injurious, and may cause paralysis. Mumia is given as an astringent in hemorrhages and dysentery, and as an application for healing ulcers. This substance was obtained from ancient tombs.

Roger (Ruggiero) of Palermo (about 1210).—Of this Italian physician, Baas' History has the following: "He studied, and was for a long time a professor at Salerno; borrowed his surgery from Albucasis or Paul of Ægina. He was acquainted with trepanning of the sternum, stitching the intestines over a hollow cylinder, etc. Dr. Henderson observes in a note; "Rogers' surgery formed the real basis of the mediæval surgery of Italy, and was honored with commentaries by later writers."

Many other names of physicians and writers appear as having had some connection with the school of Salerno during the 11th and 12th centuries, the record of whose works must be omitted in this brief account. Mention must be made, however, of the

¹ Encyc. Brit., Art. Medicine.

² Withington, Medical History of the Earliest Times, p. 136.

women physicians of Salernum (*Mulieres Salernitanæ*), who appear to have had a part as teachers and writers of medicine. The name Trotula (*Trotta-Trocta*) was that of a physician at Salernum at about the middle of the 11th century. The name is also given as Trotula de Ruggieri, which appellation connects her with the noble family of Roger. But even the existence of the physician Trotula has been a matter of question. Malagaigue expressed the belief that the name applied only to a book or to books of some unknown author, rather than to a person; while Daremberg and DeRenzi furnished evidence of the personality of Trotula, making her a practicing physician and medical writer at Salernum; and the former represents her as probably the wife of the elder Platearius. The work of Trotula was entitled "Diseases of Woman, before, during and after Labor." In the work is given directions for perineorrhaphy, and much concerning general pathology.

Other "Ladies of Salernum" are mentioned. A colleague of Trotula, named Abella, wrote a treatise, "*De Natura Seminis Humani*." Others were Costanza Calenda, a daughter of the president of the school, distinguished for her beauty and talents. Mercuriadis and Rebecca Guarna were physicians of the 15th century. They wrote chiefly on midwifery and diseases of women.

Suggestions concerning the character of the practice of the women of Salernum are given by Dr. Handerson, who says: "Certain practices of the females of Salernum, whether physicians or not, we may mention on the same authority." (Daremberg.) "They themselves ate, and made their husbands eat, asses' dung fried in a frying-pan, to combat sterility. They also ate the stuffed heart of a sow in order to forget deceased friends. An ointment adapted to the cure of melancholy was prepared with the plant betony, collected about the third hour of Ascension Day while repeating a 'Pater Noster.' The delightful union of scientific knowledge with the facetious playfulness so charming to their sex, exhibited in offering to their unsuspecting beaux bouquets of roses powdered with euphorbium, and enjoying the irrepressible sternutations of their innocent victims, cannot fail to increase our respect and admiration for these learned ladies of mediæval times."

Two works, important for their time, originated in the school of Salernum in the 11th century. One was the "Compendium Salernitanum," a work on general practice, said to have been written by six Salernitan professors.

This appears to have been the first instance of the now common custom of uniting the writings of several authors in the formation of a general work. Dr. Baas characterizes the contents of the work as follows: "Especially prominent are the doctrines relative to venesection, the pulse, the urine and fever, all of which are treated chiefly on Hippocratic principles." The other work referred to was the famous poem, called *Schola Salernitana* or *Flos Medicinæ*. It was dedicated to Robert of Normandy, son of William the Conqueror, who was treated at Salernum for a wound in his arm. The custom of writing in verse even on scientific subjects for use in text books, first known in the Middle Ages, has been in different ways continued in modern times. Quotations from the *Schola Salernitana* are given by Handerson in Baas' History, also in his own treatise of the School of Salernum,¹ where it is spoken of as the "vade mecum of every well educated physician for centuries." Many translations in different languages are mentioned, the last English translation having been made by Prof. John Ordonaux, and published in Philadelphia in 1871.²

The school of Salernum, on account of its character and its place in history, has been noted as the connecting link between ancient and modern medicine. In the first place, in character it was cosmopolitan; the works and teachers of the ancient pagan nations, the Jews and the Christians, all seemed to have had a place and a part in the history of its work. Its beginning was before the time of the principal influence of Arabian medicine in the West, and its end was in the time of the establishment of universities of modern times. Concerning its comparative importance in the period of its life, a modern writer has said: "It is true that Hippocrates and Galen re-entered Europe after a long absence in the East, when the Moors occupied a greater part of Spain; but great as was this Saracenic influence on medical science, it was not to be compared to the powerful and permanent influence secured by the native growth which sprung up on Italian soil."³

A graphic description of Salernum, as seen in the retrospect, is given by Handerson at the close of his "School of Salernum" in a

¹ For a most complete account of this school of the Middle Ages, see "The School of Salernum, an Historical Sketch of Mediæval Medicine." By H. E. HANDERSON, A. M., M. D., a paper read before the Medical Society of the County of New York. Published in New York in 1883. An accurate account of Salernum is also contained in the recent work of Professor Roswell Park, "An Epitome of the History of Medicine."

² Code of Health of the School of Salernum, by John Ordonaux, LL. D., Philadelphia, 1871.

³ Berdoe.—Origin and Growth of the Healing Art. p. 308.

quotation from Daremberg's Introduction to *L'Ecole de Salerne*. It reads as follows: "I visited Salerno twice in 1849; I wandered sadly through the streets once animated by every movement of science and medical practice; I sought in vain for some trace or reminder of the illustrious masters whose voice resounded in the midst of the most troubled ages. Who could tell me what manner of persons were Petronius, Cophon, the Platearii, Bartholomæus, and the venerable Musaudinus, and the elegant Maurus, to whose lessons Ægidius of Corbeil had listened? Who remembered the beautiful Trotula or the artful Constantine? In default of a great medical institution, what monument, piously consecrated to all the glories of the school, could recall to me some features of its early history? No echo of its tradition, not one stone of the ancient edifice; not one manuscript in a single library, not even a good edition of the *Regimen Salernitanum* in the house of Dr. Santorelli, the only physician in whom the old remembrances were not extinguished.

But at least in those streets to-day almost deserted, on this square where the professors and their students were wont to assemble, on the shores of that ever-glorious sea which bathes the feet of the city, I could inhale the air which 'the Masters' had breathed."

MEDICINE AND SCIENCE OF THE MIDDLE
AGES.

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Part Fifth.—I. SCHOOLS OF MEDICINE.

THE term, school, in medicine as in other departments of learning, has been variously applied; as well to sect or denominations in art and science, as to institutions of learning. There was in early times a custom, the tendency to which has not yet wholly disappeared, for pupils to be associated with and known as the followers or disciples of some distinguished teacher, and to receive his name. In mediæval schools of medicine as in those of ancient times, the function of social and professional organization, and that of teaching the science and practice of the art, were more or less combined. A distinguishing feature of the Arabian schools, the most important in the middle ages, was their cosmopolitan character. All countries were represented: Persians, Phoenicians, Greeks and Romans, Christians, Nestorians, and Jews had their part in the work of instruction. This was the natural result of the changes in nationalities and the mingling of different peoples, incident to this period.

The most famous of the Arabian universities was that founded by Caliph Almanson (754-775) at Bagdad. This institution was munificently supported by Caliph Harun al Raschid and Almamon, the successors of Almanson, and continued as the most important seat of learning for more than three centuries. According to Gibbon, in the city of Bagdad alone, eight hundred sixty physicians were licensed to practice. Besides the University at Bagdad, there were colleges at Bassora, Samarcand, Ispahan, Damascus, Bokhara and other cities in Asia. In Europe were the Spanish schools of Cordova, Seville, Toledo, Almeria, Granada, and Valencia. It is also said by Gibbon, that above seventy public libraries were opened in the cities of Andalusia in Spain.

Concerning the extent and character of the literary work at Bagdad, Gibbon observes: "The fruits of instruction were communicated perhaps at different times, to six thousand disciples of every degree, from the son of the noble to that of the mechanic: a sufficient allowance was provided for indigent scholars, and the merit of industry of the professors was repaid with adequate stipends. In every city the productions of Arabic literature were copied and collected by the curi-

osity of the students and the vanity of the rich. A private doctor once refused the invitation of the Sultan of Bokhara, because the carriage of his books would require four hundred camels."¹ But the same author further observes: "In the libraries of the Arabians, as in those of Europe, the far greater part of the innumerable volumes were possessed only of local value or imaginary merit."

II. PHYSICIANS AND PRACTICE.

Phazes.—Abu Behr Mohammed Ibu Zacariya Ar-Razi (Rhazes) was the name of a distinguished Moslem physician who taught and practiced at Bagdad at the close of the 9th century. The name Rhazes (ArRazi) is from Rai, the place of his nativity, a town of Chorassan in Persia. In youth he was a musician, became a physician in middle life, was generous in his practice among the poor, and, on account of his boldness and originality in practice, he is said to have gained the title of "the Experimentator." His works were numerous, and covered the fields of medicine and surgery, ophthalmology, dermatology, gynaecology and obstetrics. In operative surgery he describes extraction of cataract, tracheotomy, operation for necrosis, hare-lip, and fistula; in gynaecology and obstetrics, he treats uterine displacements, hydrometra and mole pregnancy. In pathology he follows Galen almost entirely, and for this has the following reason: "Since otherwise the widely different opinions of the Ancients lead to embarrassment." (Baas). His famous work, "On the Small Pox and Measles," was translated first from the Arabic into Syriac and then into Greek. This is mentioned as the first known treatise on small-pox. Among more important works were "El Hawi" (Liber Continens,) "Aphorisms," and "Liber ad Mansorem," so called because of its dedication to Mansur, prince of Chorassan. The works of Rhazes, like others of his time, were valuable chiefly as compilations and translations. The estimation in which they were held by succeeding physicians appear in the following: The medical faculty of Paris in 1395, A. D., possessed very few medical works. The "Continens" of Rhazes is said to have been the most highly prized of any. When Louis XI. in 1471, wished to borrow this work in order to have it copied, long consultations were held by the faculty upon the subject, and they only granted permission after the king had deposited, as caution money, 12 marks in silver and had granted a loan of 100 thalers in gold.

(Puschmann from Sabatier.) The teachings of Rhazes gave him wide popularity and attracted students from all parts to the school at Bagdad. He was afterwards court physician at Cordova, but finally became poor and blind and died in his native town of Rai at an advanced age.

Avicenna.—About a half century after the death of Rhazes (A. D. 980) a son was born to "a reputable official" at Afschena in the province of Bokhara in Chorassan, who acquired the name, Abu Ali el Hossein Ebu Abdallah Sina. (Ebn Sina, Avicenna.) He had the advantage of an early education, the best his country afforded, and is said to have committed the Koran to memory at the age of ten years. He studied medicine under Nestorian professors at Bagdad, and at the age of sixteen years was qualified to teach and practice his profession. He is reported to have cured a prince of some malady, for which he became a court favorite. He received appointments to important offices, was deprived of the same, and was more than once thrown into prison. While in confinement he wrote some of his best medical works. The "Canon of Medicine," his most important work, was held as authority for a long period both by Arabians and Christian physicians. His commentaries and compilations of ancient works were numerous. His practice is represented as characteristic of Arabian Medicine,—making use of remedies composed of many ingredients and many "cordials." His *Materia Medica* included camphor, iron, amber, cubebs, aloes, manna, and many other drugs. He considered gold and silver as "blood-purifier;" hence gilded and silvered pills were said to be, in his view, especially efficacious. Besides the above, as a summary concerning Avicenna as a physician and philosopher, Baas' History has the following note: "His views as to what is allowable to a physician are characteristic of Arabian modes of thought and ideas. As a priest he could never reason; in his character as a philosopher, however, it was permissible to make some use of it. When, for example, it is asserted that jaundice is removed by looking at yellow objects, he will not, as a physician, question the fact, yet, as a philosopher, he cautions against superstitious remedies."

Avicenna is mentioned as "the Prince of Physicians" (this for the time in which he lived) and "the greatest philosopher produced by the Arabs of the East." After an adventurous and troublesome life, he died at the age of 58, while on a journey to Hamadan.

¹Gibbon's Roman Empire, Milman, vol. IV. p. 518.

Albucasis:—Cotemporary with Avicenna, the Persian-Arabian physician, was a Spanish-Arabian physician whose name reads as follows: Chalaf Ben Abbas Abul Casim el-Zahrewi. (Abulcasem, Alzaharavius, Albueasis.) He was born at Zahera near Cordova, the exact date being unknown. The date of his death is given by some at 1106, by others at 1122. He is known principally by his work, the "Altasrif," a compendium of Medicine and Surgery, copied largely from Greek authors. In this work he criticises the surgery of the time, which he regards as faulty because of the want of knowledge of anatomy; treats extensively concerning the use of the actual cautery, which was much used in surgery at this time; treats of the ligation of arteries in their continuity, of stitching the intestine with threads taken from the intestinal coat (resemblance to procedures in modern surgery,) and of operations for hare-lip, for cataract and for fistula.

The following from his book give his words concerning the importance of caution in surgery: "Avoid perilous practices, as I have already warned you; so shall you have the praise and profit, if God will."

The great work of Albucasis closes as follows: "This is the end of the book called Al-Tasrif, written for those who have not the entire works of Abulkasem Hhalaf ben Abbas, the Zahraite, on whom may God have mercy if he finishes his life in the good way."

Avensoar:—An Arabian physician whose name is given as Abd el Malik Abu Merwan Ebn Zohr (Avensoar), was probably a Jew, was the son of a physician, born in Spain near Seville in the latter part of the twelfth century. He is mentioned as an improver of Arabian medicine, in that he rejected useless theories and aimed to make medicine a science of observation. His book, the "Taisir," gives experience as the sole guide of the physician. This is a repetition of the doctrine of the ancient school of the Empirics, founded by Serapion of Alexandria and Philinus of Cos in the third century B. C. Notwithstanding the opposition in his time to practical anatomy and operative surgery, he operated experimentally on lower animals, and is said to have been the first to perform hysterectomy. The certainty as to the nature of this operation, as performed by him, has been questioned. The status of practice at this time is suggested by the following: "His treatment for vesicle calculus was the internal use of the oil of dates; and for exostoses, the use of the magnet. He advocated the milk cure for consumption, and

insisted that venesection must be done on the sound side. He dared in some things to oppose the teachings of Galen.

Averroes:—Abul Welid Muhammed Ben Ahmed ebn Roschid (Averroes), another distinguished Spanish Arabian physician, born (A. D. 1126) at Cordova, was a pupil of Avensoar. He was a theologian as well as a physician. The study of Aristotle made him a pantheist, and his opposition to the doctrines of the church caused him in modern times to be known as "the Mohammedan Spinoza." He taught that an attack of small-pox caused immunity to the disease. He urged the doctrine that no arbitrary rule could be adopted in practice, but that general principles must be the guide in the treatment of individual cases.

We have a history, more or less complete, of other physicians and teachers of this period. The few above mentioned are noticed as representative men whose works were illustrative of the practice of medicine in the time of their lives.

III. AN ENGLISH CONTRIBUTION.

A small addition to the history of Mediæval Medicine in the latter part of the period has been made recently by the discovery of an unpublished manuscript of the fourteenth century. This manuscript is a treatise on anatomy, both of which appear to have been written by an English surgeon of the fourteenth century whose name is unknown. It bears the date of 1392. It was brought before a section of the British Medical Association 1895, and a review of the same was then published in leading English¹ and American² medical journals. Dr. Payne, who introduced the manuscript, suggested that the MS. treasures of the British Museum and other great libraries may be found to harbor other works of this kind. The character and historical bearing of this hidden medical work, appear in the brief extracts given below from the reports in these journals.

It is observed that the only documents comparable to this anonymous manuscript are the works of John Arderne (1388), the translations of Lanfranc's Surgery, (about 1300), and translations of the French surgeon, Henri de Mondeville, (died about 1315). In this discussion Dr. Payne calls attention to the importance of the fourteenth century works of science, literature, and theology,—of Arderne, Chaucer and Wycliffe marks the fourteenth century as uneventful,

1. British Medical Journal, Jan. 25, 1896.
2. Journal of the Am. Med. Assoc., April 11, 1896.

and observes: "The Black Death and succeeding pestilences, and the wars of the Roses, brought the progress of science and medicine in England almost to a standstill; so that in the sixteenth century, when the revival of learning and the introduction of printing led men to take stock in their intellectual possessions, little more was done in practical medicine than to gather up the threads of the fourteenth century traditions."

This unpublished manuscript was evidently one brought to light in the times of revival of learning, in the sixteenth century. An idea of the character of the work may be had from its preface, a part of which, in the English of the time, reads as follows: "The Holy Trinity that is head and well of cunning, giver and graunter of grace to all tho that by her power trevailen truly about science and cunning, that is help and edification to his people, graunte you grace that this compilation shall have so for the usen and dispozen the fruyt of medicyns aud of worchyng in it conteyned, that it turne specially to the worschipe of God and profit of the peple. The which compilacion of sirurgie I have compiled and drawn aftir the discreet autoritie of my most worschiful maistris and predecessouris of the same science. And specially aftir the noble counseil of my worthi maistir Lanfranke, duttyng thereto worchyng that I have assaid and proved in my tyme and other expert medicyns y gaderid of dyvers worcheris that they also have assaid and proved, y compilid and endid in the year of our Lord MCCCLXXXII. Wherefor I prie and counseil you that usen the worching in this doctrine, contynue that ye ben gracious and helpe to the pore for Goddis sake, and to the riche for a competent salarie."

Part first of the book, that of anatomy, has three sections called "Distinctions," each distinction has several chapters. The first is a kind of histology: describes the "marrow, bones and gristles, the ligaments, sinews and cords," and ends with the "anatomy of fatness, skin, hair and nails." The second distinction has fifteen chapters. The description of each part of the body in order from the head to the feet has its chapter. It is indeed a regional anatomy, given in terms most of which are now in use, and put in the English of the time of Chaucer. The third distinction treats of four complexions or temperaments, and associates them with the signs of Zodiac, the course of the planets, etc.

In the part of the work relating to surgery the author speaks of a consultation of London physicians, in which he had a part, in a case of carcinoma of the breast: "a canker of her

pappe." The patient is represented as a "worschiful riche woman in London." The history and result in the case is given in these words: "But I see surely evermore the malice encreside from day to day, and for all that we myghten do the sycknesse was so fervent that it profited lital to the patient; so that not agenstonddyng al our craft and cunningge at the laste it was woundid, and so the woman diede withynne short tyme after."

A word is here in place concerning a few names mentioned in this manuscript, or which appear to have some connection with the same. Dr. Payne, in presenting the manuscript to the British Association, showed that the work of the Vicary, written nearly two hundred years later, was almost an actual transcript of the work of the fourteenth century surgeon.

Thomas Vicary was a London surgeon and master of the guild of barber surgeons in 1512. He was the first surgeon of St. Bartholomew's Hospital, and is accredited with the authorship of the first work on anatomy written in the English language.¹ His work was entitled "The Englishman's Treasure," or "The True Anatomy of Man's Body," London, 1548. Vicary's Anatomy was again printed in 1577, entitled "A Profitable Treatise of the Anatomy of Man's Body."

John Ardern (Johannes Arderne) was an English surgeon who practiced at Newark from 1349 to 1370, when he removed to London. He was afterwards an army surgeon in France. He made improvements in surgery and wrote several works, one of which was a "Treatise on Fistula."

Lanfrance (Lanfranco) was an Italian surgeon, born at Milan about 1250—practiced and lectured in Paris after 1295. His treatise on surgery was entitled "Chirurgia Magna et Parva."

Henri de Mondeville was a pupil of Lanfrance and a teacher, first at Montpellier, then physician to Philip IV. and professor at Paris. He is said by his works to have formed the connecting link between Italian and French Surgery. Died about 1315.

The brief account here given of the names and works of a few men who lived in the different centuries of the Middle Ages, is by no means an enumeration. Other names appear in the scanty record of these times that has come to us, and the works of others,

¹ There may be a question as to priority of authorship of the first English Anatomy. Dr. Handerson, the American translator of Baas' History, has this note: "According to Mangetus, Douglass, and other authorities, an Anatomy of the Human Body, in two books, was written by William Horman of Salisbury, an Englishman who died in 1535." Anything further concerning this publication is not known."

perhaps of equal merit, have disappeared in the ruins of time. What is given may show something of the condition of science and the character of the medicine of these times, with their relation to what was then in the past, and with what is now seen to have been in store for the future.