

SENN (N.)

POMPEIAN SURGERY AND SURGICAL INSTRUMENTS.

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A RECENT visit to the ruins of Pompeii and the Naples Museum has enabled me to make a careful examination of the ruined homes and corroded implements of the Pompeian surgeons. A visit of this kind, with its wonderful revelations at every step, is a memorable event in the life of every student of ancient surgery who has enjoyed such an opportunity. Nearly two-thousand years have elapsed since the last surgeons of that ill-fated city practised their art. They perished or fled during that fearful eruption of Vesuvius that wiped out of existence so suddenly the two neighboring cities, Pompeii and Herculaneum, burying the former under a bed of burning ashes and incorporating the latter in a mass of lava. It is interesting to posterity that the city of Pompeii, with all its antique treasures, has been preserved for centuries under this removable mantle of the product of volcanic action, which has made it possible for the interested archeologists of the present century to unveil to us the works of art and science of two-thousand years ago. A walk through the streets of the recently uncovered city of Pompeii brings vividly to the mind of the visitor the life, works, virtues, and vices of its former inhabitants. The old aqueduct that supplied the city with pure water from the mountains is well preserved and remains as one of the marvels of engineering of that time. The pavements of the streets can compare favorably with those of our day. The bare walls of public and private buildings testify to the unrivalled perfection masonry had attained at that day. The crude stone mills operated by human power furnished the city with flour, which in the adjacent bakery was converted into bread.

The enormous wine-jugs, so numerous in places where wine was sold and drunk, remain as lasting mementoes that the Pompeians were by no means prohibitionists. The numerous houses of prostitution, both public and private, remain as silent witnesses of a vice which appeared to have been unusually prevalent at that time. The capacious forum, amphitheater, comic and tragic theaters

that remain in a wonderful state of preservation, show that the people of that day—male and female, old and young—enjoyed the glittering stage and the bloody contests of the gladiators. The public bath-house is a marvel of its kind, and it is doubtful if in its artistic design and luxury it could be duplicated to-day. The private dwellings are all constructed on the same plan—masterpieces of comfort and sanitary construction. The numerous fountains furnished pure water for beast and man. The temple of Esculapius is one of the prominent landmarks of the former city, and fortunately time and the elements have dealt gently with its precious contents. In the center of the capacious anteroom stands the altar of pure marble, beautifully carved, at which the priests of old worshipped in the interests of suffering humanity. It is here where the sick, the maimed, and the injured sought relief. As I stood behind the altar where so many of the disciples of Esculapius had stood and performed their sacred functions, it seemed to me that I could hear the pitiable appeals of the suffering Pompeians and the sound advice and sweet words of consolation of the ministering priest. With the temple of Esculapius will always be associated the early history of medicine and the struggle between disease and its successful treatment.

A walk through the narrow, stone-paved streets of the uncovered part of the ruins of Pompeii is necessarily attended with serious thoughts of the past and present. The wider streets show deep grooves made by the chariot-wheels, while the narrower streets were reserved for pedestrians. The one-story buildings, both public and private, show a singular uniformity in their construction—evidence that the Pompeian architects and builders had in view more the comfort and health of their occupants than a desire to exhibit their talent. The many shops in the principal street were the homes and business-places of merchants who supplied the citizens with the luxuries and necessities of life. A large building on the corner of two streets served as a drug-store, where crude drugs were dealt out to those in need of remedial agents. The proprietor of this primitive pharmacy—living, as he did, next door to a

¹ Read before the Alumni Association of Cook County Hospital, November 18, 1895.



public house of prostitution—in order to protect himself and family against intrusion of an undesirable nature, found it necessary to place above the entrance a sign to indicate to the prospective customer the legitimate character of his business, and to direct him properly if he was in search of pleasure.

Before giving a description of the surgical instruments exhumed from the ruins of Pompeii, it is necessary to say something of the city of Pompeii and its destruction.

The temple in the leper forum at Pompeii, generally called "the temple of Hercules," is the oldest extant ruin in the city, and it is safe to say that it is of the same period with the Poestum temples, as it corresponds exactly with them in architecture; hence we may safely date it at 650 B. C., and the history of Pompeii is thus narrowed between that date and 79 A. D., when we know from reliable sources that the final destruction of the city took place. Our inquiry thus extends over a space of about seven hundred years. For the first three-hundred we are in the regions of conjecture; for the last four hundred we are in the realm of authenticated history. When the Greek temple was built at Pompeii the place was in the hands of the Oscans, a pastoral tribe who came down the plains in the winter and fed their flocks in the hills in the summer. The Oscans were driven out of Campania in 420 B. C. by the Samnites, a tribe of hardy mountaineers who attained the height of their power about 350 B. C. and built a great part of Pompeii. The Samnites practically built the city; and wherever we find houses built of large blocks of stone, neatly joined together without mortar, we may safely predict their Samnite origin. Their work was all in the Doric style, and it was the Romans who covered it with stucco, transformed it into the Ionic style, and decorated it with tracery and paintings. The Romans occupied Campania in 88 B. C., and thereafter Pompeii takes its place in Roman history, and is frequently mentioned by Seneca, Pliny, and other contemporary writers. Toward the close of Nero's reign—that is to say, in the year 63 A. D.—the whole region was visited by severe earthquakes, which made such havoc that the cities were deserted for several years. The rebuilding of Pompeii appears to have been begun about 69 A. D., ten years before its final destruction, which took place on the 23d of November, 79 A. D. and appears to have commenced in the afternoon. It is well to observe that although Herculaneum and Pompeii were destroyed by the same eruption, they were destroyed in quite different ways. The former was filled up by a flow of warm, muddy water, which filled it with a soft paste; and subsequent eruptions have covered it with molten lava no less than eleven times, rendering excavation

exceedingly difficult and costly. Pompeii, on the other hand, was covered with loose ashes and pumice-stone, which were ejected from the volcano to a considerable height and blown into the city by the violent northwesterly gale which Pliny tells us was raging at that time. In short, Pompeii can be excavated with a trowel, but it takes a chisel to make an impression on Herculaneum.

Lord Lytton has given us in his fascinating novel, *The Last Days of Pompeii*, a graphic and what must be considered as a correct description of the destruction of Pompeii. He connects the beginning of the terrible catastrophe with a public play in which Arbaces, the Egyptian, was to be turned over to the lion by the angry assembled multitude. The helpless Egyptian heard the shouting of the bloodthirsty audience and the roaring of the hungry lions, eager for their human prey, when he stretched his hand on high; over his lofty brow and royal features there came an expression of unutterable solemnity and command. "Behold!" he shouted with a voice of thunder, which stilled the roar of the crowd; "behold how the gods protect the guiltless! The fires of the avenging Orcus burst forth against the false witness of my accusers!"

The eyes of the crowd followed the gesture of the Egyptian and beheld, with ineffable dismay, a vast vapor shooting from the summit of Vesuvius in the form of a gigantic pine-tree; the trunk, blackness; the branches, fire!—a fire that shifted and wavered in its hues with every moment; now fiercely luminous, now of a dull and dying red, that again blazed terrifically forth with intolerable glare.

There was a dead, heart-sunken silence, through which there suddenly broke the roar of the lion, which was echoed back from within the building by the sharper and fiercer yells of its fellow-beast. Dread seers were they of the burden of the atmosphere, and wild prophets of the wrath to come! Then there arose on high the universal shrieks of women; the men stared at each other, but were dumb. At that moment they felt the earth quake beneath their feet; the walls of the theater trembled; and, beyond in the distance, they heard the crash of falling roofs. An instant more and the mountain cloud seemed to roll toward them, dark and rapid, like a torrent; at the same time it cast forth from its bosom a shower of ashes mixed with vast fragments of burning stone.

Over the crushing vines, over the desolate streets, over the amphitheater itself, far and wide, with many a mighty splash in the agitated sea, fell that awful shower. No longer thought the crowd of justice or Arbaces. Safety for themselves was their sole thought. Each turned to fly—each dashing, pressing, crushing against the other. Trampling recklessly over the fallen, amidst groans and oaths, and

prayers, and sudden shrieks, the enormous crowd vomited itself forth through the numerous passages. Whither should they fly? Some, anticipating a second earthquake, hastened to their homes to load themselves with their more costly goods, and escape while it was yet time; others, dreading the showers of ashes that now fell first, torrent upon torrent, over the streets, rushed under the roofs of the nearest houses, or temples, or sheds—shelter of any kind—for protection from the terrors of the open air. But darker, and larger, and mightier spread the cloud above them. It was sudden and more ghastly night rushing upon the realm of noon! Darkness reigned, interrupted only by the occasional column of fire which escaped from the volcano and the frequent lightning that encircled and illuminated momentarily the mountain, which was the central point of the fearful panorama.

Pompeii had no street-lights. The frightened inhabitants brought their oil-lamps into requisition to expedite their flight. Frequently, by the momentary light of these torches, parties of fugitives encountered each other, some hurrying toward the sea, others flying from the sea back to the land; for the ocean had retreated rapidly from the shore—an utter darkness lay over it, and, upon its groaning and tossing waves, the storm of cinders and rock fell without the protection which the streets and roofs afforded to the land. Wild, haggard, ghastly with supernatural fears, these groups encountered each other, but without the leisure to speak, to consult, to advise; for the showers fell now frequently, though not continuously, extinguishing the lights, which showed to each other the death-like faces of the other, and hurrying all to seek refuge beneath the nearest shelter. The whole elements of civilization were broken up. Ever and anon, by the flickering lights, one saw the thief hastening by the most solemn authorities of the law, laden with, and fearfully chuckling over, the produce of his sudden gains! If, in the darkness, wife was separated from husband or parent from child, vain was the hope of reunion. Each hurried blindly and confusedly on. Nothing in all the various and complicated machinery of social life was left save the primal law of self-preservation!

It was under such circumstances that the city of Pompeii, with such of the inhabitants who failed to escape, was buried and preserved for futurity. The bodies of human beings and animals were charred by the heat, but their forms have been preserved as in a mold by the fiery ashes which fell around and upon them. We thus find in the museums at Pompeii and Naples the size and form of the victims of the eruption preserved to perfection by the substitution of plaster-of-Paris for the original mold. Without such a support the remains on exposure would crumble into dust. At the time of destruc-

tion, November 23, 79 A. D., Pompeii is said to have had about 30,000 inhabitants. The number of those who died and were buried in the ruins will never be ascertained. Up to 1824, 350 skeletons were found. Many have been discovered since that time, and many remain in the unexplored part of the city, while the remains of many have been removed with the detritus, unrecognized. It is, however, safe to assume that more than one-half of the population escaped the fiery death and sought shelter in the surrounding country. There is no doubt that soon after the disaster many of the Pompeians rescued a large portion of their valuables from their ruined houses, but the site of the city remained lost for many centuries.

Excavation. The first discovery of the ruins of Pompeii was made in 1595; and the first attempt at excavation was made in 1748. But it was not until 1860 that systematic exploration was pursued, and since then it has been scientifically carried on as far as means and opportunity have permitted. It is estimated that the whole of Pompeii will be cleared in about fifty years' time. At the time of my visit to the ruins, excavation was in active progress. With pick-ax and shovel the ashes and pumice-stone which cover and fill the streets and houses are loosened, and a small army of boys is employed to convey the same in baskets to hand-carts, which are propelled by hand-power, over a temporary railway-track. The workmen at this time were engaged in cleaning a large house, evidently an aristocratic residence, with walls and ceilings beautifully decorated by paintings, representing female beauty and animal life. The pictures are so well preserved that it seems almost next to impossible to realize that the artist and former owner are dead, and that they have been buried in the ruins for nearly two-thousand years. At this place the houses are about ten feet under the surface of the soil. The workmen exercise great care in bringing all objects of interest in as perfect a condition as possible to the surface, after which they are brought to the museum at Naples, where they are examined, classified, and deposited in their appropriate places. The Naples Museum has become a great treasure house, in which the students of ancient history for ages to come will have an opportunity to study the interesting lesson of the high civilization of remote ages.

The objects of special interest to the surgeon in this great collection of ancient art are contained in a glass case, and are properly numbered and described in the catalog. They are the

Surgical Instruments. These instruments were found in a house which has since been called the "Surgeon's House." They are made of bronze, and some of them show a high degree of artistic workmanship. Some of them show the destructive

effect of heat and oxidation, while others are in a state of excellent preservation, as will be seen from the illustrations. The illustrations are taken from specimens from the Naples Museum by Domenico Monaco and E. Neville Rolfe, Naples, 1895.

A quadrivalve speculum, which is one of the most interesting and perfect specimens of the collection, is, unfortunately, not among the illustrations.

a. Actual cautery. Length 10 in. (Off. No. 78,034.)

b. Bivalve speculum working on a central pivot. Length 6 in. Width, when open, $2\frac{1}{2}$ in. (Off. No. 7831.)

c. Scissors with a spring-like shears. Length 4 in. (Off. No. 78,005.)

d. A male catheter which is almost a fac-simile of the one devised by J. L. Petit in the last century. At the closed end is an eye, as in the modern instrument. Length $10\frac{1}{2}$ in. (Off. No. 78,026.)

e. Hook. Length 6 in. (Off. No. 78,056.)

f. Point of injection-syringe, with eight small perforations near the distal end. The other end was, no doubt, filled with a syringe. Length 6 in. (Off. No. 78,235.)

g. Pompeian forceps, formed of two branches, crossing and working on a pivot. Each branch is fitted with an engine-turned handle and a spoon-shaped blade. A powerful forceps, undoubtedly used for the extraction of foreign bodies. Length 8 in. (Off. No. 8 in.)

h. Forceps with serrated bite. Length $4\frac{1}{2}$ in. (Off. No. 78,032.)

i. Cupping-glass of bronze. Height 6 in., diameter 3 in. (Off. No. 77,991.)

j. Medicine-box with medicines, 5×3 in. (Off. No. 78,199.)

k. Spatula for mixing ointments. Length 7 in. (Off. No. 77,726.)

l. Lancet for bleeding. Length 5 in. (Off. No. 78,003.)

m. Fleam for bleeding horses. Length $5\frac{1}{2}$ in. (Off. No. 78,007.)

n. Forceps. Length $4\frac{1}{2}$ in. (Off. No. 77,982.)

o. Toothed dissecting-forceps with the engraved name, A. C. A. A : G. L. V. S. F. Length $7\frac{1}{2}$ in. (Off. No. 77,985.)

p. Trocar for tapping, with a hole at the end for the escape of the fluid. Length 5 in. (Off. No. 78,008.)

q. Small spoon with bone handle, ending in the head of a ram. Length $5\frac{1}{2}$ in. (Off. No. 78,000.)

r. Female catheter. Length 4 in. (Off. No. 78,027.)

s. Bistoury, the blade oxidized and the handle in bronze. Length $5\frac{3}{4}$ in. (Off. No. 77,637.)

t. Trivalve speculum, an instrument which, like the bivalve and the quadrivalve, has been much dis-

cussed by archeologists and physicians. It is composed of three valves standing at right angles to the rest of the instrument, and jointly dependent on one another in the expansion transmitted only to one of them. By turning the screw one valve is drawn nearer the operator, and this forces the other two to open in a sidelong direction. The instrument can be held by the two curved handles with the left hand, while the right hand turns the screw. Length $8\frac{1}{4}$ in.; widest expansion of the valves $1\frac{1}{2}$ in. (Off. No. 78,030.)

u. Spatula. Length 7 in. (Off. No. 78,733)

v. A metallic case containing surgical instruments. Length $8 \times \frac{3}{4}$ in. (Off. No. 77,144.)

These are some of the most important instruments found in the ruins of Pompeii, and which were employed by our ancestors two-thousand years ago in the practice of surgery. I searched carefully, but without avail, for traces of needles or something else which would indicate that at that time wounds were sutured. The collection contains no saws, trephines, chisels, or any other instruments for operations upon bones. All of the instruments with the exception of the specula and catheters are diminutive in size as compared with the same instruments of less remote and modern times. The absence of saws and chisels is noteworthy, as among the agricultural instruments these tools are represented by specimens of a high degree of perfection.

In the writings of Hippocrates raspatories, mallet, and trephine are mentioned, and consequently must have been used in operations upon bones other than those of the skull. Hippocrates gives very minute directions as to the use of the trephine in the treatment of fractures of the skull: "With regard to trepanning, when there is a necessity for it, the following particulars should be known: If you have had the management of the case from the first, you must not at once saw the bone down to the meninx, for it is not proper that the membrane should be laid bare and exposed to injuries for a length of time, as in the end it may become fungous. And there is another danger if you saw the bone down to the meninx and remove it at once, lest in the act of sawing you should wound the meninx. But in trepanning, when only a very little of the bone remains to be sawed through, and the bone can be moved, you must desist from sawing, and leave the bone to fall out of itself. For to a bone not sawed through, and where a portion is left of the sawing, no mischief can happen; for the portion now left is sufficiently thin. In other respects you must conduct the treatment as may appear suitable to the wound, and in trepanning you must frequently remove the trepan, on account of the heat in the bone, and plunge it into cold water. For the trepan, being heated by running round, and heating and drying the bone,

burns it and makes a larger piece of bone around the sawing to drop off than would otherwise do. And if you wish to saw at once down to the membrane and then remove the bone, you must also in like manner frequently take out the trepan and dip it into cold water. But if you have not charge of the treatment from the first, but undertake it from another after a time, you must saw the bone at once down to the meninx with a serrated trepan, and in doing so must frequently take out the trepan and examine with a sound, and otherwise along the track of the instrument. For the bone is much sooner sawn through, provided there be matter below it and in it, and it often happens that the bone is more superficial, especially if the wound is situated in that part of the head where the bone is rather thinner than in other places. But you must take care where you apply the trepan and see that you do so only where it appears to be particularly thick, and, having fixed the instrument there, that you frequently make examinations and endeavor by moving the bone to bring it up. Having removed it, you must apply the other suitable remedies to the wound. And if, when you have the management of the treatment from the first, you wish to saw through the bone at once and remove it from the membrane, you must in like manner examine the track of the instrument frequently with the sound, and see that it is fixed on the thickest part of the bone, and endeavor to remove the bone by moving it about. But if you use a perforator you must not penetrate to the membrane, if you operate on a case which you have had the charge of from the first, but must leave a thin scale of bone, as described in the process of sawing." As Hippocrates at one time lived and practised in Athens during a great epidemic, it appears strange that his teachings in reference to the treatment of injuries of the skull should not have reached Pompeii, as evidenced by the absence of trepans and other bone-instruments in the "House of the Surgeon."

If we judge the worth of the Pompeian surgeon from the collection of instruments he left behind him, it is evident that bloody operations were confined to bleeding, cupping, extraction of foreign bodies, and opening of abscesses. The metallic medicine-box, the spatula and spoon indicate that the surgeons of that time made free use of medicines and ointments in the treatment of injuries and disease. The instruments and implements of wood, splints, etc., were of course destroyed by fire and heat, and their absence in the collection leaves undoubtedly a large gap in the surgical resources of the Pompeian surgeon.

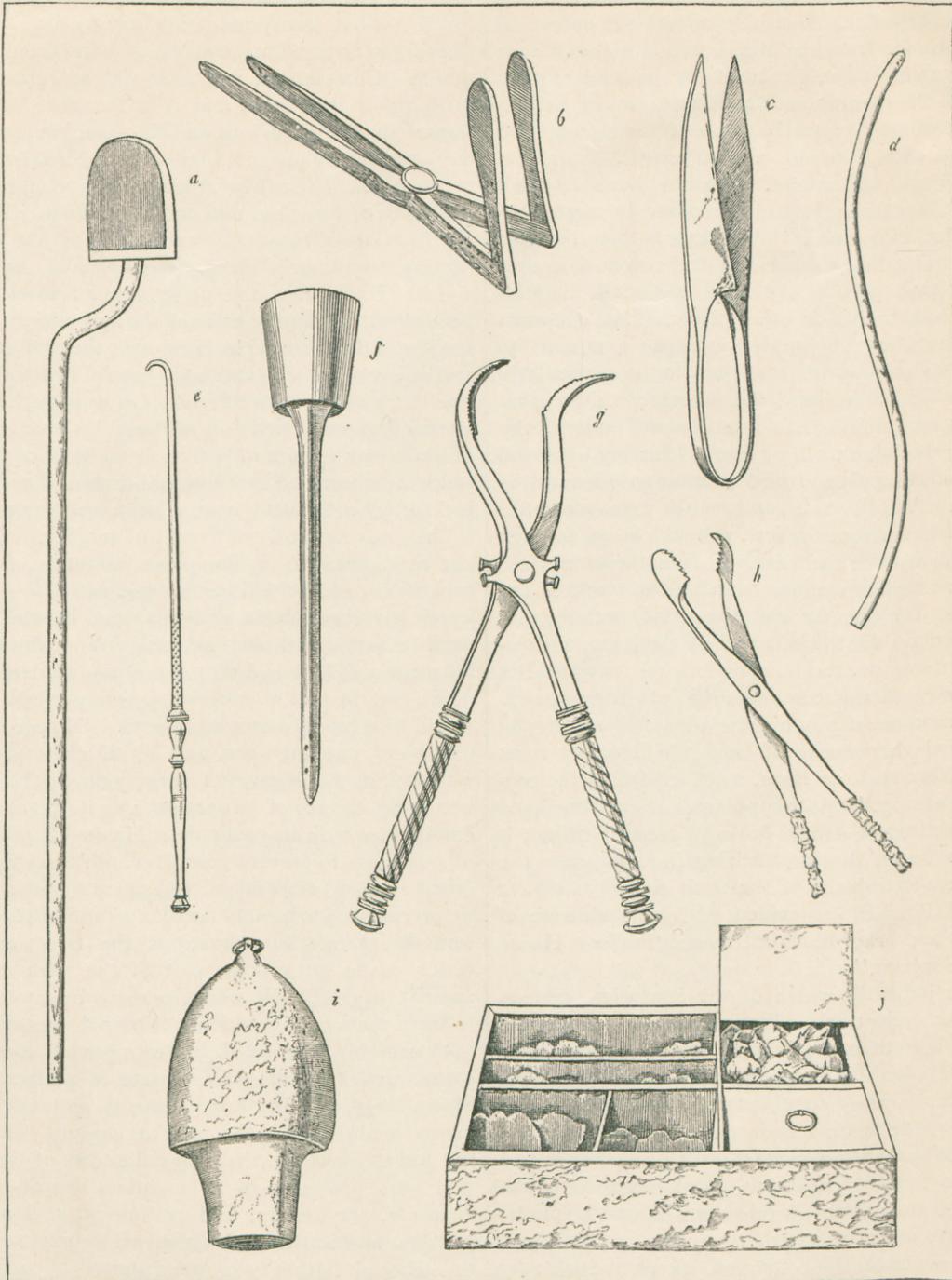
Surgeon's House. The surgeon's house does not differ from the private houses in its vicinity. It is roofless like the rest, all that remains being the bare walls. It is here that most of the surgical instru-

ments were found. This house was undoubtedly occupied by the principal surgeon of Pompeii, who ministered to those in need of surgical aid. It is here that bleeding and cupping were practised for all kinds of ills, real and imaginary. It is difficult to imagine what transpired from day to day. That the surgeon was a busy man there can be but little doubt. Competition was then not as active and pressing as it is now, and it is therefore safe to assume that the capacious waiting-room was crowded day after day by patients anxious to be bled, cupped, or burned. These bare walls, if they could talk, could tell of many sad and exciting scenes. Fainting from loss of blood and writhing under the actual cautery, must have been frequent and familiar sights. How often the neighborhood must have been disturbed by the cries of the suffering and the shrieks of the tortured! How often the atmosphere and adjacent streets must have been stifled with the smell of burned human flesh! Let us hope that the master escaped, leaving in his haste his instruments of skill and torture as lasting mementoes of his so suddenly interrupted professional career. The house is deserted and silent now, a permanent reminder of the great antiquity of the art of surgery. If the last representative of Pompeian surgery could return to day and behold the improvements in surgery which have been made since his time, he would indeed be astonished and amazed. What would be his surprise if he could visit one of our modern hospitals and inspect an aseptic operating-room. He would find his old occupation gone. No need now for lancet, cupping-glass, and actual cautery. He would find the science of surgery developed to a wonderful degree of perfection and its practice in consonance with its principles. He could make use of anesthesia to prevent pain, Esmarch's bandage to guard against hemorrhage, and operate under aseptic precautions to protect accidental and intentional wounds against complications the treatment of which made up a large part of the work of the ancient surgeon. He would perhaps be astonished to learn that since Pompeii was buried surgery not only came to a standstill, but retrograded for centuries, and that its present state of perfection is owing largely to the improvements and advancements made during the present century. Let us not forget, however, that our colleagues of the distant past, possessed of a primitive knowledge of anatomy, physiology, and pathology, and armed with few and imperfect instruments to practise their art, labored faithfully in the interest of suffering humanity, and unquestionably did much toward prolonging the lives and adding to the comfort and happiness of those who were intrusted to their care.

Pompeian Surgery. There can be but little doubt that the Pompeian surgeons practised surgery in accordance with the teachings of Hippocrates.

Hippocrates, who is justly entitled to be called the father of medicine, was born on the island of Cos, 450 B. C.; hence his lifework was contemporaneous with the early history of Pompeii. It is not difficult

from its ruins so far seem to indicate that no major operations were performed at that time, and that the surgeon's work was limited to cupping, bleeding, the treatment of injuries, and the performance of

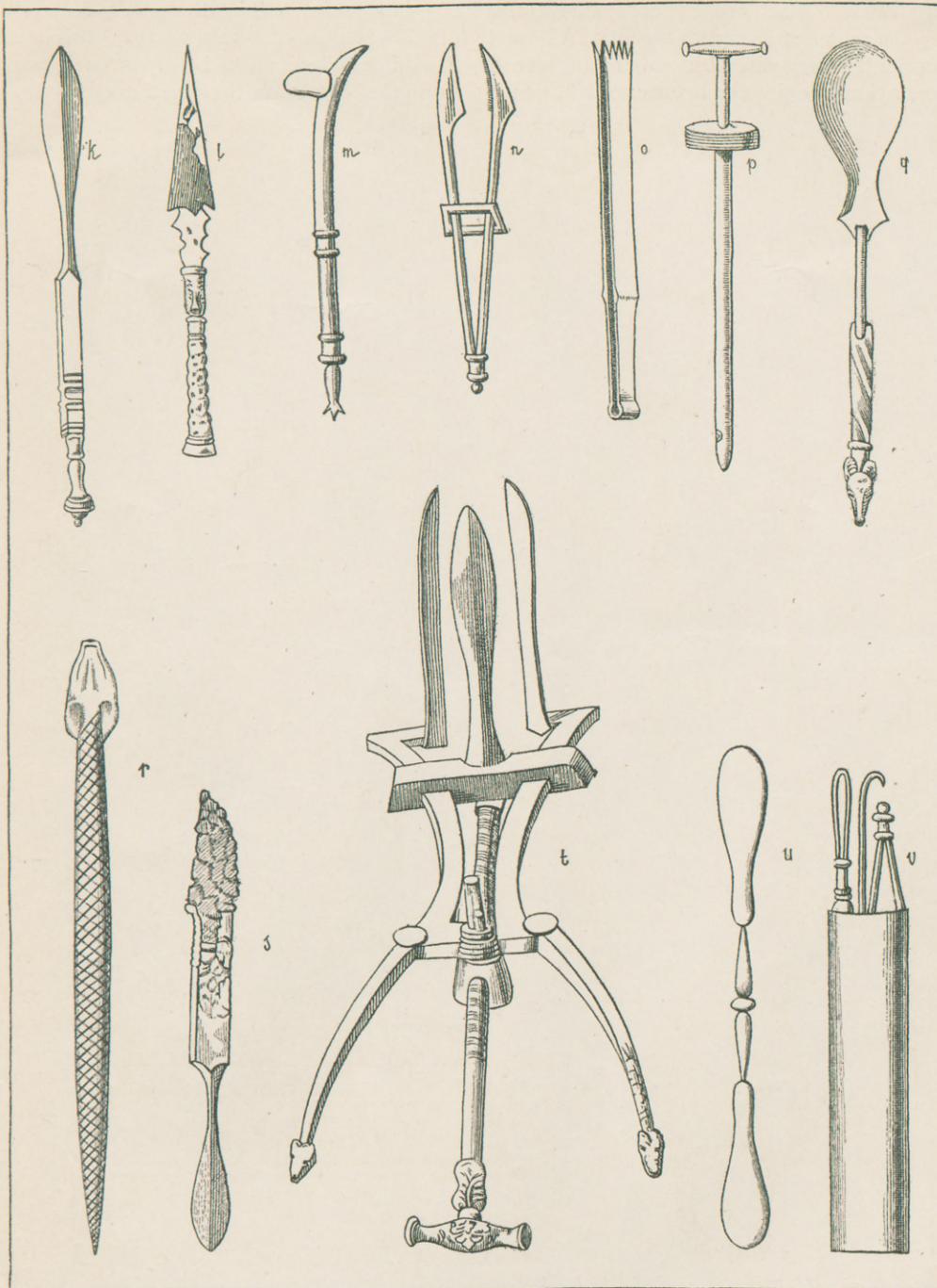


to conceive that his teachings penetrated to this city, or that some of its surgeons might have been his pupils. In all probability, Pompeian surgery was Hippocratic surgery. As has been remarked before, the instruments which have been recovered

minor operations. The discovery of a number of very ingenious specula in the "House of the Surgeon" furnishes us with positive evidence that at that time gynecology was not practised as a specialty, but constituted a legitimate part of the sur-

geon's work. Considering the character of the moral atmosphere of Pompeii, it is not astonishing to learn that diseases of the genito-urinary organs taxed the ingenuity and occupied much of the time

such a conspicuous part of the ruins of Pompeii, stand as lasting monuments of the debauchery and licentiousness of its former inhabitants, and furnish a satisfactory explanation of the prevalence of



and attention of its surgeons, as shown by the different kinds of specula then in use and the wonderfully perfect construction of the male and female catheter. The numerous wine-shops and houses of prostitution, private and public, that constitute

genito-urinary diseases among males and females, and which so often necessitated the services of a surgeon. The fleam for bleeding horses found in the instrumentarium of the Pompeian surgeon goes to show that he extended his sphere of usefulness to

the domestic animals, which furnished him with an additional field for observation and undoubtedly added materially to his income. That the surgeon of Pompeii was a man of means and good social position is amply testified to by the size and location of his house. This house is capacious, and is located in the aristocratic part of the city. A liberal income undoubtedly rewarded his labors and placed him in a position to enjoy the luxuries of life, which

seems to have been the main object in life of the mass of the people at that time. The existence of a separate house occupied as a pharmacy shows that the people then, as now, had great faith in the healing powers of herbs and drugs, and the medicine-box found in the "Surgeon's House" was replenished from time to time from this source, and its contents were undoubtedly frequently made use of by the surgeon in the practice of his profession.

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