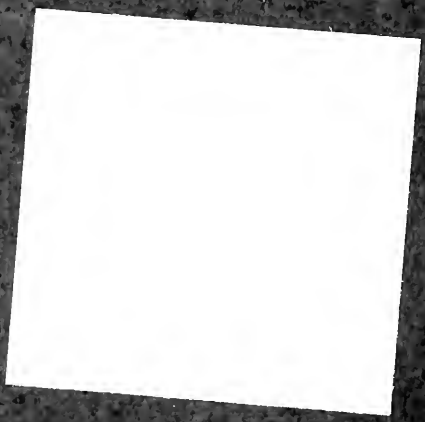

PART VIII.

THE AQUEDUCTS.

THE

ARCHÆOLOGY OF ROME,

BY

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THE AQUEDUCTS.

PREFACE TO THE AQUEDUCTS.

It is impossible to understand the archæology of Rome without studying the Aqueducts. In every part of the City, and of the country round it, there are remains of them; they are frequently mistaken for something else, and called by other names, misleading those who have not given attention to the subject. They are necessarily mixed up with the *Thermæ*, for most of the aqueducts were made to bring water to those great establishments. There was also a reservoir of water supplied by the aqueducts under each of the palaces, larger houses and villas, as may be seen in many parts of the Palatine, under the palaces of the Cæsars. In their original state the Aqueducts must have been among the grandest objects in Rome, and the most conspicuous in all directions. The principal approach from the east passed between two fine arcades of the aqueducts, one carrying three of them, the other two. These two fine arcades were not more than a hundred yards apart; all the great roads from the eastern side were brought into this space, and certainly, for the last mile into Rome, must have had one of these arcades on either hand: to the left, or south, the Claudian arcade, fifty feet high; to the right, the Marcian, thirty feet high.

For the last half-mile, the Claudian arcade was also the boundary of the palace gardens of the Sessorium, the residence first of the Kings and afterwards of one branch of the imperial family (that of Verus or Varius), who resided there for more than a century. That portion of the arcade still exists for a considerable extent, forming the northern wall of that garden, and at the same time part of the wall of the city, Aurelian having adopted it, and incorporated it with his great wall. This portion is thoroughly shewn in my Photographs, as it is a very important part of the antiquities of Rome, and illustrates many points. It was the place where the principal aqueducts entered Rome, and the whole ground is full of remains of them with their reservoirs and filtering-places. The inner side of the wall is the part necessarily shewn, because the outer side is concealed by the arcade of the Aqua Felice, excepting in places where the *specus* of the Claudia and the Anio Novus appear above it. Just outside of this garden, at the west end of it, is the great foss which

separated the Sessorium, or fortified palace, from the other fortifications of the City, and in it are remains of the two great reservoirs that were probably the Gemelli or Twins of Frontinus, made originally for the Appia and the Anio Vetus side by side, and used afterwards to receive the surplus water of the later aqueducts on a higher level. We then have a considerable number of the Arches of Nero, following a straight line for another mile to the west end of the Cœlian Hill; where remains of the great reservoir are on a level with the *specus* carried on the top of this arcade, fifty feet above the ground in that high situation, from which the water was distributed in all directions, first on other arcades, three of which branched off from this point, and afterwards in metal pipes when it was sub-divided; but for the main supply no metal pipes then to be had were large and strong enough to bear the pressure of a stream of water four feet deep and two feet wide, running at the rate of five or six miles an hour, if not more. The direct line went on over the Palatine to the Capitol, passing over the Forum Romanum on the bridge of Caligula, of which, also, some remains are shewn in my Photographs; the other two branches from the great reservoir over the Arch of Dolabella, went one to the right to the Colosseum (to supply the Stagna there), the other to the left to the Aventine, to supply the private house of Trajan and the Thermæ of Sura.

The Porta Maggiore stood at the end of the long vista between the two great aqueducts, and was itself made out of two of the arches of the Claudian arcade, in the last of the angles that occurred at every half-mile. The penultimate one was at the eastern end of the Sessorium palace gardens, where this water entered Rome, and then, after passing the angle to the north, with the usual *piscina* and *castellum aquæ*, or reservoir and filtering-place, turned again to the west, as far as that gate where the Claudian arcade terminated. From this point the Marcian turned to the north upon the great bank of earth which formed the outer defence of Rome in that part, and continued along it for another half-mile, as far as the Porta di S. Lorenzo, and beyond it to the Prætorian Camp; then turning again to the west, it went across the great inner foss between the outer bank, the great *agger* of Servius Tullius, which formed the inner line, where remains of it were found near the railway station in 1871, with inscriptions on two of the *cippi*, stating that the three aqueducts passed there. It is not quite correct to say that the *arcades* were carried there, because where the ground is high the *specus* are carried underground. This is the case between

the Porta Maggiore (the Porta Esquilina of Frontinus) and the Porta di S. Lorenzo (the Porta Viminalis of the same). The *specus* is seen on arches close to each of the gates; but, between the two, it passed underground through a sort of hillock, about midway between the two gates, as is mentioned by Frontinus. The ground is high again near the Porta Chiusa at the Prætorian Camp, and in the great bank or *agger* of Servius Tullius.

These two great arcades are those chiefly known to visitors to Rome as THE AQUEDUCTS; but the underground aqueducts are at least equally interesting when understood. The Anio Vetus being near the surface can be traced all over Rome; the Appia being very deep, is not so easily traced, and can only be seen with certainty near its source and its mouth. There are other arcades nearly as fine as these; but, as they do not come so near Rome, they are less known; in the parts nearest to the City they are either underground or destroyed. One of them is that called Alexandrina by Fabretti; but the original parts of it are of the time of Hadrian and Trajan. This runs from the source near Gabii and Labicum, now la Colonna, to the place called *Cento-Celle*. Possibly some of the hundred cells or vaults found there and supposed to have been all tombs, were really reservoirs of water. At every great villa there are always remains of these great cisterns for the supply of water, and this is about three miles from Rome, where a great villa of Hadrian was situated. This arcade extends for miles across the country between the two great roads, one from Gabii, the other from Preneste (now Palestrina). Another fine arcade is seen on the road to Albano, at the Tor di Mezza Via (or half-way house). This has been ascertained to be the Aqua Aurelia, which goes to the villa of the Quintilii on the Via Appia, and from thence into Rome to supply the Thermæ of Commodus and Severus, of which also remains have been found; the latter part of its course is chiefly underground.

It was very difficult at first to ascertain to which of the aqueducts each of the remains belonged that were seen on all sides; and I found it necessary to follow each aqueduct up to its source, and then down to its mouth, in order to ascertain this. This work has taken me some years, in connection with the other branches of the general subject of the Archæology of Rome. It has now been done, with one exception,—the aqueduct made to bring water to the Thermæ of Diocletian on the Viminal,—which has not been traced; but there is great probability that it was a branch from one of the older aqueducts, probably brought across from the great reservoir where the

Nymphæum of Alexander Severus was situated, on which the Trophies of Marius were hung. This is on high ground, and at a short distance only, so that it would be very convenient for the purpose. We see that there are several branches from that point, and one of them probably supplied these great Thermæ, for which purpose more than one aqueduct would be tapped. It may be that the curious sort of tower reservoir—long supposed to have been a tomb, a short distance to the south of the Trophies of Marius—was the one for these Thermæ; in either case, these reservoirs were supplied from the great old aqueducts.

I may almost say that wherever the aqueducts are visible, they can now be seen in my Photographs, and in some places the remains have been destroyed since these were taken, during what is called the *Restoration* of the City Walls. Perhaps the finest and most interesting part of the Aqueducts are the great cascades at the source of the Anio Novus above Subiaco, in the bed of that river, situated in some of the finest scenery in the world. Among later works the ingenious manner in which the bed of the small river Almo is made use of to carry the water of two other mountain streams, the Aqua Crabra and the Marrana, the water of which never fails; and the manner in which the tunnel of the Aqua Julia has been used again in the twelfth century, are the most curious and interesting. This had hitherto escaped observation, and was not easily traced. The Aqua Felice was unfortunately carried out in a very rude manner; the plan of the Pope was a good one, but was spoiled by the ignorance of the engineer.

The new aqueduct, the Aqua Marcia-Pia, restoring the celebrated Aqua Marcia to use in Rome, is a work deserving of high commendation. It is much to be regretted that my lamented friend the late Mr. Shepherd, to whose energy and perseverance we are chiefly indebted for this, did not live to see the completion of his work. Much credit is also due to Signor Moraldi, the originator of the scheme, to whom the Company still pay a premium, which he well deserves. His map[a] of the Aqua Marcia, of which he kindly gave

[a] During the first season that I was resident in Rome, it was my habit to go with my friend Mr. William Long, of Balliol College, Oxford, then resident in Rome, into the Catacombs every Monday morning, and along the line of the Aqueducts also once or twice a-week, when the weather permitted. We procured all the best maps of the Campagna that were to be had, but could find none that would enable us to trace the course of the Aqueducts. Moltke's map is the best as far as it goes; but, being intended as a military map only, he paid no attention to the antiquities. The one known in England by the name of Gell, and in Rome by the name of Nibby, is made especially for the Antiquities; but it is on a small scale, and we found it impossible to trace the Aqueducts upon it. Eventually I have had one made on a large scale,

me a photograph, was of great service to me, as far as it went; but I saw it was necessary to go further, and include all the Aqueducts on the eastern side of Rome. I was fortunate in meeting with Dr. Fabio Gori, who is a native of Subiaco, and has been interested in the Aqueducts from his boyhood. He shewed me that Signor Moraldi had not gone quite far enough, and that the real spring of the Marcia is about a mile further from Rome than the one he supposed to be so, which was a subsidiary spring, though of equally good water. At the original source the stone *specus* was found, having been long concealed by being a foot or two under water. I saw it, and stood upon it, and had a photograph made, so that there could be no mistake, and the engineer of the company also saw it, and carried his aqueduct to that point; so that the real ancient Aqua Marcia now comes into Rome again, and is getting rapidly into general use, being much the best drinking water. The water supply of ancient Rome has long been a subject of interest, and can now be more perfectly understood than it ever could before. The series of Photographs of them are a thorough illustration of their history, such as could not have been made before that art was invented.

to make it clear, have added the other Antiquities, and then had it reduced by photography to two smaller sizes: one very small, to give the general lines only; the other on a size convenient for the pocket; and, by using the portion near Rome separately, it makes a good and convenient map for the purpose.

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CHAPTER IV. PART I.

THE AQUEDUCTS.

In treating of the Aqueducts we have a trustworthy guide in a writer who flourished in the time of the Emperors Nerva and Trajan, namely, Sextus Julius Frontinus[a]. While he informs us of what improvements he made during the time he had the charge of these important public works, he also gives in his treatise a historical account of the several changes which had been from time to time made in the means of supply of water to the Imperial City, which kept pace with the growing wealth and population of Rome. When he died they had probably reached perfection, and were justly the admiration and surprise of all travellers[b].

His treatise is well worth examination, not only from an archæological point of view, but as suggesting also many curious enquiries as to the engineering abilities which the Romans possessed, compared with those exhibited at the present day. In elucidating, however, the architectural antiquities of the city of Rome, it will be necessary, as far as possible, to limit the extracts from his treatise *De Aquæductibus*, to those portions which refer either directly to existing remains, or which indirectly explain them, by pointing out the principle on which the several Roman aqueducts seem to have succeeded each other.

Frontinus tells us in his fourth chapter, that "for 441 years after the building of the city, or until B.C. 312, the people were content with the water which they could draw from the Tiber, or from wells[c] or from springs, of some of which the memory was in his time still held sacred and honoured, for they were thought to afford health to the sick[d].

[a] Frontinus is usually said to have died A.D. 106.

[b] See notably Plutarch, Vita Anci Marcii; Dionys., Hal. Ant. Rom., lib. iii. c. 679, sect. 9; Strabo, lib. v.; Cassiodorus, lib. vii. cap. 6, &c.

[c] These wells may have included the cisterns for holding rain-water, one of which exists on the Palatine.

[d] In the best text, that of the MS. at Monte Cassino, and in the best printed edition of the text, that of Buecheler (Lipsiæ, 1858), the passage runs "Salubritatem enim ægris corporibus afferre creduntur, sicut *Camœnarum, et Apollinis, et Juturnæ*." The spring of the Camœnæ or Muses referred to, is that which existed in the grove outside the

Passing to his own time, he says, "there now flow into the city:"—

I. Aqua Appia.
II. Anio Vetus.
III. Aqua Marcia.
IV. ,, Tepula.
V. ,, Julia.
VI. Aqua Virgo.
VII. ,, Alsietina (which is also called Augusta[e]).
VIII. ,, Claudia.
IX. Anio Novus.

Frontinus describes the above nine aqueducts in order, giving details as to the source of the water in each, the quantity, and the distribution. Such extracts as are calculated to throw light upon the existing remains, are given in the course of the following remarks. Seven other Aqueducts were added after the time of Frontinus at different periods, of which an account will also be found in the second part of this Chapter.

Porta Capena, and beneath the western slope of the Cœlian. There was an Area Apollinis in the same Regio, and possibly there was a spring there; but no writer refers to it. A stream, now subterranean, still exists, and is very copious, running into and through the Cloaca Maxima; it may be seen in the excavations of the Forum Romanum. This subterranean stream comes from three different springs; the source of one is near the Arch of Titus, or more immediately in front of the usual entrance to the Palatine;—a second has its source near the foot of that part of the Quirinal Hill on which the Torre de' Conti and the Torre delle Milizie are situated; it now emerges in a cellar under a shop behind the church of S. Hadriana;—a third comes from the prison of S. Peter, at the foot of the Capitol. These streams meet near the church of S. Maria Liberatrice and the celebrated three columns of the temple of Castor and Pollux; by their union they formed the lake usually called after Curtius, but by Ovid the Lacus Juturnæ (Ovid. Fasti, l. i. ver. 708). This is not the same as the stream so called on Nolli's Map. The lake was between that part of the Velabrum of the Palatine on which the church of S. Maria Liberatrice and S. Teodoro are situated, which formed the southern side of the lake, and the Forum Romanum the northern side.

The Aqua Juturnæ, marked 1056 in Nolli's Map, is the stream that gushes out in great volume from the rock at the foot of the Palatine in the Lupercal of Augustus, which is now in a very ruinous state, the cave being used as a mill-head to a modern mill, between that point and the Cloaca Maxima. This cave is close to the Carceres of the Circus Maximus. The authority for the name of this stream is doubtful; it is now usually called Aqua Argentina, and falls into the Cloaca Maxima, near the church of S. Giorgio in Velabro and the arch erected by the silversmiths in honour of Septimius Severus.

[e] The Augustan is a name applied also to a branch of the Marcian close to its source, as well as to one supplementary to the Appian within the city.

I. The Aqua Appia (a.u.c. 441, b.c. 312).

"The *Aqua Appia* was brought into Rome by the censor Appius Claudius Crassus, afterwards called *Cæcus* (the blind), who also caused the Via Appia to be constructed from the Porta Capena to the city of Capua[f]."

"The Appian stream rises in the Lucullan fields on the Via Prænestina, between the seventh and eighth milestone, and about 780 paces (or about ¾ of a mile) off on the left-hand side. The channel from its source to the '*Salinæ*,' which is a spot near the Porta Trigemina, measures 11 miles, 190 paces (about 300 yards) in length. For 11 miles, 130 paces, (about 200 yards,) the channel runs underground, and for 60 paces (about 100 yards) it is carried above ground on a substructure and arcade (in the part) nearest to the Porta Capena[g]. At the '*Spes* (*Specus*) *Vetus*,' (the old *specus* or conduit,) on the confines of the Torquatian and Pallantian gardens, a branch called the *Augustan* was added to it by Augustus as supplementary, whence it received the name of 'Gemelli[h]' . . . ."

"The distribution of the Appian water begins at the bottom of the *Clivus Publicii* at the Porta Trigemina[i]; the stream having passed beneath the Cœlian and Aventine Hills."

". . . . . The measure at the head of this could not be obtained because it consists of two channels. At the Gemelli, however, which is under[j] the *Spem* (*Specum*) *Veterem*, (the old conduit,) where it joined with the Augustan branch, I found the height or depth of the water to be 5 ft., the width 1 ft. 9 in., which makes the area 8 ft. 9 in.: . . . . it should be noticed that the water in many parts of the City was observed to be lost, that is, by trickling away. Moreover we found some of it intercepted by illegal pipes within the City; without the City, owing to the pressure, that which was underground (at the head 50 ft.), received no injury[k]."

[f] Frontinus, c. 5. [g] Ibid.

[h] "Jungitur ei ad Spem [Specum] veterem in confinio hortorum Torquatianorum et Pallantianorum ramus Augustæ, ab Augusto in supplementum ejus additus, ... loco nomen respondenti Gemellarum." (Ibid.)

[i] "Incipit distribui [Aqua] Appia imo Publicii clivo ad portam Trigeminam." (Ibid.)

And again: "Rivus Appiæ, sub Cœlio monte et Aventino actus, emergit, ut diximus, infra clivum Publicii." (Ibid., c. 22.) The cave reservoir which formed the mouth of this stream, where it was distributed, has been found near the Marmorata, or marble-wharf. The Porta Trigemina was between that and the Salaria, or salt-wharf. Both of the wharves are still in use. Some good antiquaries consider that the Porta Trigemina consisted of three double gates, at intervals along the narrow strip of ground between the Aventine and the Tiber, and that the one of which remains have been found near the Sublician bridge was the middle one of the three: if so, this cave would be literally *in* the Porta Trigemina. In any case, it must have been close to it.

[j] That is, in the reservoir, or *castellum aquæ*, through which the conduit or *specus* passed. This reservoir exists, or rather considerable remains of it, just within the Porta Maggiore, between that and the church of S. Croce, and just outside the *agger* of the Sessorium, on which the road from S. Croce to this gate now runs.

[k] ". . . . Cujus aquæ ad caput in-

The Lucullan fields, in which are the sources of the Aqua Appia, are nearly due east from Rome, on the bank of the river Anio, at about six miles from the present gates of Rome, and three quarters of a mile off the Via Collatina, now a cart-road. This is the old Via Prænestina, which went through Collatia, now called Lunghezza, about two miles higher up the river Anio, at the point where the smaller river Osa falls into it. In this part the old paved road remains for some distance in use, both before and after the entrance to Collatia, and was the more direct road; the present carriage-road, now called Prænestina, was the Via Gabina, and went through or near to Gabii, but was not so direct a line to Præneste or Palestrina as the one through Collatia. The old road passes close in front of the ancient stone quarries, on the bank of the Anio, in which one of the springs or reservoirs of the Aqua Appia is situated; the pavement of it remains, and is now used as a foot-path only.

There are several springs or sources for this aqueduct, and also several ponds to collect the rain-water, made in the clay, the water from all of which was collected into a central reservoir cut in the rock, with a large well over it. There are also seventeen wells visible in two lines, eight in one and nine in the other, converging and meeting in the central reservoir. The soil is clay upon stone. The *specus* is here a large tunnel cut in the rock, and the wells descend into it. They may be distinguished from above by the bramble-bushes which grow over and cover each of the openings, and do not grow on the other part of the field; each well is also protected by a wooden rail, to hinder cattle from falling into it. The water still runs through in some parts. Near to this reservoir is a tomb of very early character, similar to what are usually called Etruscan[1] tombs, cut out of the rock.

As the length of its course was rather more than eleven miles, while the distance by the Via Prænestina direct was only between seven and eight, it is clear that it did not follow that road. It was carried to the south towards the Via Labicana by a winding course,

veniri mensura non potuit, quoniam ex duobus rivis constat. Ad Gemellos tamen, qui locus est infra Spem (*Specum*) veterem, ubi jungitur cum ramo Augustæ, inveni altitudinem aquæ pedum quinque, latitudinem pedis unius, dodrantis: fiunt areæ pedes octo, dodrans: . . . . . quas esse ex eo adparet quod in plerisque urbis partibus perdita aqua observatur, id est quæ ex ea manat, sed et quasdam fistulas intra urbem illicitas deprehendimus, extra urbem autem propter pressuram libræ, quam vidi infra terram ad caput pedibus quinquaginta, nullam accipit injuriam." (Frontinus, c. 65.)

[1] There is good reason to believe that such tombs were not *exclusively* Etruscan, but were also used by the Latins and other nations at the same period, and this one may very well be early Roman.

according to the levels of the ground. The Aqua Virgo, whose source is in the same Lucullan fields as the Appia, is carried to the north by another winding course of a greater length, to supply the northern parts of the city.

The course of *the old Via Prænestina*[m] has undergone but little change, and the 7th milestone is soon measured. A little beyond it, and 780 paces off on the left of the road (i.e. on the northern side), we are brought to a point[n] where the sources of the Aqua Appia are still to be seen in caves formed by ancient stone quarries, near a tenement called *La Rustica*. One cave is of a triple form, with three springs, and the soil above the stone is much mixed with clay. These three springs meet at the mouth of the cave in one stream, which runs in the old *specus* cut in the rock, but open at the top, and having the appearance of a mere country ditch, half hid by the grass and weeds in the winter, and in the summer months entirely concealed by them. This *specus* runs across a low meadow for about a quarter of a mile. It crosses the line of the Aqua Virgo, the respirators of which cross this meadow in an opposite direction; the sources of the Virgo are about a mile further from Rome, on the same road. It then enters the rock again in a tunnel, and at this point is the first *castellum* or reservoir, with a large circular well cut out of the rock, which forms the vault over it. There are the grooves for sluices at each end of the reservoir, and an opening has been made into the tunnel a little beyond this reservoir. The course of the aqueduct is then in a tunnel entirely underground, in the direction of a series of ancient caves, through which, or by which, it must pass, but being underground it cannot be seen. These caves are evidently an ancient stone quarry, but of later character than the one first mentioned. In the earliest one, at the source, the stone has been split off the rock, not cut; in the other caves, the stone has been well cut, and of these many are to be seen, the openings being large square apertures like doorways, but side by side in the face of the scarped cliff, not following each other: a practice common in quarrying, where the circumstances require it, down to the present day. Between the chambers are massive square or oblong piers, left to support the vault and the earth above. At the bottom of one

[m] The modern carriage-road, so called, was called Via Gabina in the time of Frontinus. The old Via Prænestina is now a bridle-road only for the first three miles out of Rome, to the Torre de' Scavi; it is then a cart-road, called Via Collatina, with a branch road into it from the present carriage-road.

[n] In the Map of Gell and Nibby, along the Via Prænestina will be seen the name *Pupinia*. The spot is just north of this, and not far off from the piece of road marked in the same map as the Via Collatina.

of these chambers is water running from another spring, and the shepherds state that there is an opening from it to the *specus* of the aqueduct; but as the bottom is filled up to the depth of several feet with broken stone, it cannot be seen. Some of the chambers of this ancient quarry have been used as a burying-place, probably for the neighbouring town of Collatia. The graves are cut out in the side of the walls, like the *loculi*, and there are also chambers like the *cubicula* of a catacomb. The tombs of this necropolis of Collatia are very ancient, perhaps anterior to the Kings of Rome, and certainly not posterior to the Republic. This stone has been cut out in large square or oblong blocks, such as are usual in work of the time of the Kings; it is probable that Appius Claudius made use of a quarry which he found, and that the ground was not excavated for the purpose of the aqueduct only.

From this point the course was entirely underground, therefore no traces are visible without some difficulty. Incidentally, as we have seen, Frontinus notes, that at the head the water ran as much as fifty feet below the surface, and was thus protected from being fraudulently diverted. It could not have taken a very direct line, as the levels of the crossing valleys must have necessitated here and there a circuitous course; and moreover this is clearly implied by Frontinus, who says that the total length from the source to the "Salinæ" was more than eleven miles, while the distance in a direct line is less than nine miles. As it had no *piscina* [o], it flowed on in an uninterrupted course to the spot where it was distributed for the public service.

One branch seems to have entered Rome under the line of the Claudian arcade, near the Porta Maggiore [p], and its course within the city is not difficult to follow, since for certain purposes access has been made in more than one place into the old *specus*, part of which is used to carry the lead pipes of the Aqua Felice to the Hospital of the Lateran and other places. From the surface where one of the shafts is situated to the bottom of the channel, is a depth of twenty-five feet. No water runs along it at present, except in the metal pipes from the Aqua Felice, belonging to the modern system.

The direction of this channel, after it enters Rome, happens to be easily seen above, as it is marked throughout its course, from the eastern end of the Cœlian to the Arch of Dolabella, by the

[o] Frontinus, c. 22.

[p] In the *Bullettino dell' Instituto Archeologico*, and the *Civiltà Cattolica*, for the year 1861, it is stated that for the works of the iron railroad between the Via Labicana and the Via Gabina the *specus* of the Aqua Appia was found, 450 yards (metres) from the Porta Maggiore. It was constructed of square stone of tufa, and was incrusted with *tartar*, had an acute vault, which was 5 ft. 9 in. high, and 2½ ft. wide.

fine arches of the Neronian branch from the Claudian Aqueduct erected almost over it. It is very probable that one of the laws (referred to by Frontinus as having been in existence long before his time) respecting aqueducts was in force from the commencement, namely, that there should be no buildings of any kind within ten feet on either side of the aqueducts; thus an open space was probably existing at the time when Nero wished to carry water to his magnificent reservoir at the north-western end of the Cœlian, and of this he availed himself in rearing the splendid arcade which is called by his name. It will be remarked, however, that the brick buttresses actually came down to the flat roof of the original *specus* of the Appian. The top of that *specus* was raised to a greater height by the engineers of Sixtus V., and in this enlargement the underground supports of the Neronian arches are cut through to give headway to the *aquarii* passing along the channel. They have however to stoop their heads as they pass under each buttress.

The old tunnel *specus* was discovered in the time of Sixtus V., (Felice Peretti), filled up by clay deposit to the depth of three feet, or half the height of the *specus*, as in other places, and the builders found it easier to raise it, for the *aquarii* to go along it, than to clear it out. They therefore knocked away the flat tile-covering of the time of Nero, and raised a vault of rubble-stone three feet higher.

From the great subterranean reservoir, still in use for the water of a spring, near the Arch of Dolabella, to the edge of the western cliff of the Cœlian is but a short distance, and here the *specus* seems to run in a bank dividing the vineyard or garden of the Villa Mattei from that of the monks of S. Gregory, on which a wall has been built. At this point subsequent alterations, and especially those under the Emperors Nerva and Trajan, have buried to a great depth the actual remains of the original aqueduct; but this later work occupies the same line, and must be described. We first come to a large *piscina* or filtering-place on the cliff of the Cœlian, immediately above the Porta Capena. This *piscina* is divided into two parts, one above the other; but both are below the top of the cliff, and are faced with brick and reticulated work of the time of Trajan. There are remains of two *specus* running along against the face of the cliff; of the upper one the lower part, or pavement, of *Opus Signinum*, only remains, and this runs down in a sloping direction from the upper reservoir to a lower one, a little to the south of it, which is very extensive. This lower reservoir consists of several parallel

chambers, through which, or rather in front of which, another *specus* runs at a lower level; this appears to be horizontal. This *specus* goes on in the direction of the ruins of a building of various periods, possibly the remains of the Ædes Camenarum, and passes then to the south in the direction of the Thermæ of Severus and Commodus.

Another branch was evidently afterwards made from the upper reservoir going towards the north for a very short distance, merely for one of the usual angles; then, turning again to the west, in the valley below, there is another large *castellum aquæ*, or reservoir of five chambers, all as usual oblong and side by side. This is on lower ground, and is built upon the wall of Servius Tullius, where it crosses the valley; the upper part of this reservoir has been made into a house for the gardener. The underground part of the chamber nearest to the Cœlian is built of the large square blocks of tufa usual in the time of the Kings, and belongs to the fortifications of the Porta Capena, over the Via Appia, which here passed close under the Cœlian; the other chambers appear, from the bricks, to be of the time of Trajan. From this point to the Piscina Publica, the line of tall brick piers of Trajan can be distinctly traced by the existing remains, passing across to the other side of the road and of the stream here close to it[q]. The ruins of the Piscina Publica, as rebuilt by Trajan, remain visible under the corner of the Pseudo-Aventine, near S. Balbina, and from this the water was again distributed in different branches. At this point, let it be observed, and only at this point, is the valley which divides the Cœlian from the Aventine sufficiently narrow to admit of agreement with the direct and clear assertion of Frontinus, that here alone, throughout the whole course, was it carried on a substructure and on arches for a distance of one hundred yards.

Although there are no remains of the *specus* now visible at this spot, because the gate has been destroyed, there can be little doubt that the channel for the water was carried *over* the southern gate of *the city* according to its extent at that time. This gate was called the Porta Capena; and as the Appian aqueduct was allowed to fall into decay, it gave rise to the descriptions both of Martial and Juvenal, who describe it as wet or moist[r].

[q] This is on the line of the wall of Servius Tullius. It appears that Trajan made a reservoir here over the old one. The *specus* of the Appia passes through the present gardener's house lengthwise, from east to west. This *specus* was found again in another excavation to the west of it, by the side of the present road.

[r] "Substitit ad veteres arcus *madidamque* Capenam." (Juvenal, sat. iii. ver. 11.) "Capena grandi porta qua *pluit gutta*." (Martial, lib. iii. epigr. 47.) The distance from the foot of the Cœlian

The excavations made in 1868 and 1869 under the direction of Mr. Parker, with the help of the British Archæological Society of Rome and the Roman Exploration Fund, have clearly shewn the *specus* of the Aqua Appia and those of two other aqueducts carried upon the *agger* of Servius Tullius across the valley from the Cœlian to the Aventine, with branches to the left running into the subterranean chambers of the Piscina Publica. These underground chambers are of the time of the Republic, the walls are built of rubble stone as usual at that period, and there are small openings through these walls for the circulation of the water, although the upper part has been rebuilt in the time of Trajan, as the remains of the wall are faced with the brickwork usual in his time. The lowest *specus* is cut out of tufa rock *under* the wall of Servius Tullius, which is built of the usual large blocks of tufa.

The principal branch went underground to the cave reservoir at its mouth, on the level of the quay of the Marmorata between that and the Salaria, just outside of the old Porta Trigemina; the old *agger* in which that gate was situated still forms the southern or lower boundary of the wharf of the Salaria. Part of the course of this earliest *specus*, that of the Appia, can be traced and seen in a subterranean stone quarry nearly under S. Sabba. The *specus* is six feet high and two feet wide, and it is filled up to nearly half its height by solid clay, evidently the deposit left by the water. The old *specus*, long after it had been out of use, seems to have been employed by the quarrymen: as it was a tunnel in the tufa rock just high and wide enough for a man to walk in, by cutting away one side they made it wide enough for a horse and cart to carry the stone, and they raised the vault as high as was convenient for the purpose of making an entrance into the quarry. The series of wells descending into the old *specus* from the gardens above remain at intervals, with notches for steps cut in the rock to enable a man to go up and down when required. The course of the *specus* is cut off by the road to the Porta Ostiensis, but probably that road was originally carried over it[8] at the crossing;

to the Marrana is just a hundred yards along the line of the wall of Servius Tullius, across this part of the valley or great primitive foss. The ground on the side of the wall is all made earth and rubbish, and two aqueducts are carried on arcades against the wall, one on either side. These arcades have not been traced beyond the Marrana, the ground there being higher. At the Piscina Publica, where another pit was dug 20 ft. deep, the wall is built against the tufa rock, and there is a third *specus* in a tunnel in the rock under the wall.

[8] Or perhaps the road was a deep foss-way, and the *specus* passed over the arch of the gate at this point, where four roads meet.

it then passed through another large subterranean quarry nearly under S. Prisca, to the cave reservoir at its mouth [t].

Before arriving at the two large reservoirs just outside of the garden of the Sessorium, now Sante Croce, the *specus* of the Appia must have passed by another smaller reservoir at the same low level, near the ruins of the apse of a hall, miscalled the temple of Venus and Cupid. This seems likely to have been the point at which the branch *specus*, coming from the north, entered Rome, and it was then carried on to the two large reservoirs outside this garden, supposed to have been the *Gemelli* [u].

Below the "Salinæ" or salt warehouses on the bank of the Tiber, and near the "Porta Trigemina," the water was "distributed." This was also close under the Clivus Publicii, or the slanting zig-zag road leading up from the wharf to the top of the hill.

So far the general course can be traced; but the exact point of entrance into Rome could not be fixed without excavations, which have not as yet been made. There are, however, some *data* given by Frontinus which should not be overlooked, as they bear incidentally upon the course of some other of the aqueducts.

[t] In the spring of the year 1870, another excavation was made close to this point, and a way was found into another old subterranean stone-quarry long out of use. Through this cave, or quarry, the *specus* of five different aqueducts pass on their way to the Tiber. Some of these come down at a steep decline, and the water of the whole seems to have been carried into the lowest one, the Appia, at this point. This *specus* must have been carried over the deep foss-way upon or under the arch of the gate of the old wall of *the city*, where four roads meet. It is also visible again in another old subterranean stone-quarry on the other side of the road, nearly under S. Prisca, and from thence it must have gone to the old cave, used as a reservoir near the Marmorata, and the Porta Trigemina, immediately under the monastery of S. Maria del Trinita di Malta, where the *specus* is again visible, and where the wells of other aqueducts run into the same cave reservoir at the mouth of the aqueducts in this part of Rome. One of these runs down a vertical pipe from the reservoir nearly over this cave, but under S. Sabina on the hill above, excavated in 1865, and described by M. Descemet (Sect. xi.) There is another large reservoir in the interior of the hill, still full of water, supplied by a spring rising there; the water from this still passes through the same passage to the Tiber. This is also said to have been called the cave of Faunus by the poets. It is probably also the same as that of Cacus, being a large natural cave, with a spring of water, and a natural reservoir of considerable size in it about knee-deep, the entrance to which is by a narrow passage made into the *specus* of the aqueduct. Such a cave might very well have been used to drive cattle into for concealment, and a resolute, well-armed man standing at the entrance might defend it against any number. Solinus (i. 7) says that the cave of Cacus was at the Porta Trigemina, and that he dwelt in the Salinæ, which are close by this spot. "Qui Cacus habitavit locum cui Salinæ nomen est, ubi Trigemina porta."

[u] On the wall of the smaller reservoir, the fragment of an inscription, relating to the Thermæ of S. Helena, now in the Vatican Museum, is said to have been found:—

D. N. HELENA . VEN. . . . AVG. MAT.
AVIA . BEATIS . . . . . .
THERMA . . . SI . . . . ESTRV . . . .

First, it should be remarked, that the water of the Appia was augmented by an additional stream. This was not accomplished till the time of Augustus. The source of this latter[x] was on the same side of the Via Prænestina, but a little nearer to Rome (near the sixth milestone) we are told, and its course was, like the main stream, entirely underground. It was more direct, as its length was less than six miles and a-half, while the original stream, by its windings, required about eleven miles to complete the same distance[y].

It joined, however, the Appia *at the* "*Spes* (*Specus*) *Vetus*," and at the Gemelli[z], which was *under* (*infra*) *the* "*Old Specus*," it could be measured. This is an important landmark; it is well at once to observe that the usual interpretation of the passage as referring to a "Temple of Spes," and the statement that a temple occupied the site of some ruins which are marked thus in a few maps, (in most, *Templum Veneris et Cupidinis*) does not seem to fit the circumstances. It is proposed to read in both these two instances "Specus Vetus." The expression occurs, altogether, five times in Frontinus, and it will be most satisfactory therefore to consider the passages together, which will be done more conveniently in connection with the next aqueduct described.

The Torquatian and Plautian, or Pallantian gardens, seem by the

[x] Frontinus says, c. 5, at the sixth milestone on the Via Prænestina, about nine hundred and eighty paces off to the left, and near the Via Collatina, this stream has its source. The sources both of the Aqua Appia and of the Augusta were traced by Signor Fabio Gori and Mr. J. H. Parker, in March, 1868, and were afterwards shewn to the British Archæological Society of Rome.

[y] The source of the *Appia* was 780 paces off the road, between the 7th and 8th milestone. That of the *Augustan* 880 paces off, and by the 6th milestone. The former was measured to its termination, giving $11\frac{1}{8}$ miles. The latter went only to the "Specus Vetus" (which is two miles less) and gave $6\frac{1}{3}$ miles. Two miles is the distance from the Porta Maggiore to the Porta Trigemina and the Salaria. In all probability the Augustan branch was carried for the six miles into Rome along the bank of the Via Prænestina, here a deep foss-way between two high banks; and at a later period the Aqua Virgo was carried over it at a higher level, till within about half a mile of Rome, where it arrives at the outer bank of the great foss, and is carried at a sharp angle to the north to the Pincian. The Appia, being much deeper, was carried straight on at the bottom of the great foss into Rome, and entered at the extreme eastern corner, under the line afterwards taken by the Claudian arcade, to the two great reservoirs or *gemelli* before mentioned; the main line running here parallel to it, a little to the south, till it reached the Piscina of S. Helena, the two lines converging at the *gemelli*.

[z] There are considerable remains of two large reservoirs in a garden just outside of the boundary-wall of the Sessorium, which wall is of the time of S. Helena, on its western side. Some excavations made in them in 1869 under my direction shewed that they went to a great depth, the workmen being stopped by water. These two great reservoirs, so close together in the line of the Aqua Appia, seem to have been the Gemelli mentioned by Frontinus. From this point the *specus* can be traced along the Cœlian, and the reservoirs are below the level of that *specus* (*infra specum veterem*).—F. ii. 65.

context to have occupied a spot on either side of the point of junction of the two streams. The Torquatian gardens are not mentioned elsewhere, and with respect to the Plautian[a] (which is only conjectural, and has the authority of neither of the early MSS.), it has been suggested to read *Pallantian*, which gardens are mentioned twice elsewhere by Frontinus in connection with the Specus Vetus, besides once in such a way as to imply the same[b].

The Torquatian gardens probably occupied the space between the outer wall and the modern "Via di Porta Maggiore," and were probably those of Titus Manlius Torquatus, a member of an important patrician family; Livy mentions at least three generations of that name. This ground shews numerous remains of aqueducts and reservoirs, and here also is the fine building of the third century called the Minerva Medica, which was probably the *nymphæum* of some *thermæ* of that period[c]. The Pallantian gardens is a natural name for those belonging to the Sessorium, or the Sessorian fortified Camp and Palace[d], and occupied the low ground near it. They would therefore be to the south of, but adjoining to, the Torquatian gardens.

[a] If the "Plautian" be the better reading, they may have been the gardens of Plautius Lateranus, which were near those of the Sessorian Palace.

[b] Frontinus, cap. 19: "Marcia autem partem sui post hortos Pallantianos in rivum qui vocatur Herculaneus, dejicit." Cap. 20: "Finiuntur arcus earum (Anionis Novi, et Claudiæ), post hortos Pallantianos." Cap. 69: "Præterea (Julia) accepit prope urbem, post hortos Pallantianos." In the *Notitia* and the *Curiosum Urbis* the "Horti Pallantiani" are given as being in the Regio V. or the "Esquiliæ."

[c] Remains of these *thermæ* were accidentally brought to light in 1871, during some excavations made by a building company, who had bought the ground on speculation. They are of great extent, and on both sides of the present road from S. Maria Maggiore to S. Croce in Gerusalemme, which was made in the sixteenth century by Sixtus V.

[d] "Exquiliæ locus in quo sepeliebantur corpora extra portam illam in qua est Sessorium." (Acron ad Horat., lib. i. Sat. viii.)

"Eodem tempore fecit Constantinus Augustus basilicam in palatio Sessoriano, ubi etiam de ligno S. crucis D. N. Jesu Christi posuit." (Anastasius in vita S. Silvestri papæ, xxxiv. § 41.)

II. The Anio Vetus (B.C. 272).

"Forty years after the Appian aqueduct had been completed, and in the year A.U.C. 481 (B.C. 272), Marcus Curius Dentatus, who bore the office of censor with Lucius Papirius Cursor, contracted to bring into the city the water of the Anio, which is now called the Anio Vetus, from the spoils taken of Pyrrhus[e].

"The Anio Vetus takes its rise beyond Tibur (now called Tivoli), outside the gate, at the twentieth milestone, where it parts with some of its water for the use of Tibur. Its course has in length, in consequence of the difficulties caused by the levels, 43 miles. Of this for 42 miles and 779 paces, the stream is underground, and for 221 paces (about 350 yards) on a substructure above ground.

"Near the fourth milestone within the new road (*infra novum*) the Anio Vetus crosses between the arches from the Via Latina into the Via Lavicana, and has (there?) a *reservoir* (or *piscina*). Thence just within the second milestone it gives a part of its water into the *specus*, which is called the Octavian, and this comes in the direction of the New Road to the Asinian Gardens, whence it is distributed through that neighbourhood; but its direct channel, following the *specus* (or conduit) coming within the Porta Esquilina, *along* the *Spes* (*Specus*?) *Vetus*, is drawn off for distribution in the city, through the high channels[f].

"It held the sixth place in height, but would have been sufficient for even the higher parts of the city, if it had been carried across the valleys and the low ground, where requisite, upon substructure, arches, and buttresses[g]."

Passing on to the second aqueduct, namely, the stream taken from the River Anio (and which was called the Anio Vetus to distinguish it from a later diversion from the same river), we find that Frontinus is also very distinct in many of his details; a few only he leaves to conjecture.

The point where a branch was taken from the river Anio can be traced[h]. There was a reservoir by the side of the river, of which

[e] Frontinus, c. 6. Pyrrhus was king of Epirus, and came to the aid of the Samnites against the Romans; he was conquered *c.* B.C. 272.

[f] The passage is corrupt, as will be explained. The following is the reading, as given by Buecheler, whose text is *an exact copy* of the best manuscript, that of Monte Cassino:—"Anio Vetus citra quartum milliarium *infra Novum*, *qui* a via Latina in Lavicanam *inter* arcus trajicit, et ibi piscinam habet. Inde intra secundum milliarium partem dat in specum, qui vocatur Octavianus, et pervenit in regionem *viæ Novæ* ad hortos Asinianos, unde per illum tractum distribuitur. Rectus vero ductus, *secundum Spem* (*Specum*) veniens intra portam Exquilinam, in altos rivos per urbem deducitur." (Frontin., c. 21.) *Infra Novum*, therefore, signifies within the fourth mile on the Via Nova, the New Road of the time of Frontinus, the Via Appia Nova (?).

[g] Frontin., c. 18.

[h] Signor F. Gori, who is a native of Subiaco, and has followed the line of the aqueducts on foot from Subiaco to Rome, says that he has found the source of the Anio Vetus in the river Anio, at three miles from Subiaco, on the *Via Sublacensis vetus*, twenty miles from the old gate of Tibur or Tivoli, in the district called *Le Connotta*, where he finds two *specus*, the higher one the Anio Novus, the lower one the Anio Vetus. He traces the same *specus* near Marano, a village thirty-eight miles from Rome, on the Via Sublacensis Neroniana, near *Vico-varo*; and again near Tivoli, on the

some ruins remain; but it was nearly destroyed a few years since by some peasants in their ignorant and too eager search after hidden treasure which they expected to find there. The *specus* is cut in the rock as a tunnel in the cliff of the valley of the Anio, just below the level of the road; it follows the line of the cliff, of the river, and of the road: for they are all the same, the only opening through the rocky mountains of limestone in this part, obviously made by the river itself. It follows this line as far as the valley called the "Valle degli Arci," or of the Arches, where three later aqueducts cross the river on arcades about two miles above Tivoli. At this point several aqueducts are visible crossing the valley on arcades, each on a separate arcade, not three on one arcade and two on another, as near Rome. The one nearest to Tivoli is the Marcian, and at the foot of one of the piers of the arch, which here crosses the road, the *specus* of the Anio Vetus is visible, partly underground, but the upper part above ground, on the right-hand side of the road in going from Tivoli. It then is carried in a tunnel through the hill, but appears again on the other side with a large reservoir, and runs gradually downwards in a winding course round part of the hill.

It is not easy to distinguish to which of the aqueducts belongs any one of the numerous reservoirs, the ruins of which are conspicuous objects on the roads up to Tivoli on the other side towards Rome, especially along both sides of that called the "Promenade of Carciano," for the distance of about three miles from Tivoli. The *specus* and reservoir of the Anio Novus are on a natural terrace above that road, and the Marcia below it; these have passed through Tivoli, winding round that end of the hill. The Claudia passed upon a great arcade the valley of the Arci, and another valley in the direction of Gerocomio. The Anio Vetus was carried in a tunnel through the hill, and appears on the other side near Tivoli, at a considerably lower level than the others. The road passes across the *specus*, and is made upon the surface of the vault, which is visible about four miles and a-half from Tivoli. A little further on there are two large reservoirs belonging to it, near a modern villa called Gerocomio, built by the Cardinal Santacroce in the year 1579, now a farm-house only, but on the site of an ancient villa, of which some remains are built into the walls. One of these reservoirs or *piscinæ* (?) appears to be unaltered, the buttresses remain and apparently the

bank of the *Valle degli Arci*. "Delle vere Sorgenti dell' Acqua Marcia e delle altre acque allacciate dai Romani presso le Vie Valeria e Sublacense," per F. Gori. Roma, 1866, 8vo., pp. 53, 54.

vault; but it is covered with herbage and shrubs, which conceal it. The other has been turned into a cottage or an out-house of the villa, and this is of later date than the other. The Anio Vetus, the Marcian, the Claudian, and the Anio Novus, all have to be conveyed down this lofty hill from the high ground on which the remains above mentioned are situated, to the valley below. The river Anio itself rushes straight down the celebrated cascades by a fall of about a hundred feet; but the channels of the aqueducts follow a winding course, which allowed of the descent towards Rome being very gradual.

This road or promenade of Carciano is rather high on the side of the hill above the villa of Hadrian, looking towards Rome. The dome of S. Peter's is distinctly visible from it. The road is on a ledge on the side of the cliff, and the aqueducts run along the steep side of the hill or cliff, until they come to the valley of a small stream winding down to the Anio; along the cliff of this they are then carried. The Anio Vetus being at a considerably lower level, is more difficult to trace than the others; but it seems clear that after the later aqueducts had arrived at the point where the Anio Vetus emerges from the hill, they all followed the same line, winding along with the small stream, and their *specus* or channels cut in the cliffs as far as they could be made available. The Anio Vetus has been discovered at the left hand of the modern road to Rome, and to the right of the promenade of Carciano. It passed, upon a lofty bridge called the Ponte di S. Antonio, over a torrent, with the Marcia. Afterwards upon another bridge called Ponte delle Mole di S. Giovanni, and over the Ponte Lupo it went with the others. Near Gallicano (or the ancient Pedum) are two *cippi* of Augustus in two wells of his *specus;* one is in the country called Le Sette, and another at Obrego[1] dell' Ermito. The others have all been followed, and an account of them will be found under their respective heads.

In order to avoid the many small valleys occupied by streams which run parallel to each other from the hilly ground on the south, down to the river Anio on the north, (the general course of which river is west and east,) the course was kept along the higher ground, and in fact wound round the heads of those valleys in order to retain a level, gradually becoming more and more depressed, till, by

[1] The local *patois* for *Albergo* or *Auberge*.

IMP. CAESAR
DIVI. F. AVGVST. EX . S.C.
delix. P. CCXL.

IMP. CAESAR .
DIVI. F. AVGVST. EX . S.C.
delxix. P. CCXL.

the time it reached Rome, the base of the *specus* (according to the computation of Piranesi), was 55 ft. above that of the Appian[k]. The whole course is underground, as has been said, except for 221 paces (about 360 yards); for this short distance it was carried on a substructure above ground. It is reasonable to suppose that this exception to the subterranean course was, as in the case of the Appian, within the present boundary of the city.

Before it reached Rome, two circumstances have especially to be noted. Just within the fourth milestone we are told it had a reservoir and *piscina* or filtering-place, and at the second milestone it parted[l] with some of its water, which was conveyed to Rome in a separate channel.

This fourth milestone was clearly on the Via Latina, as Frontinus in the previous paragraph had referred to some *piscinæ* at the seventh milestone on the same road; and it appears, although the sentence is exceedingly corrupt, that the course of the Aqueduct left the Via Latina at this point, and crossed towards the Via Labicana "amongst the arches[m]" at the fourth milestone. The *specus* is here visible, and appears to be perfect; it is very near to the Torre Fiscale[n], between that and the Osteria, called the Tavolato (which itself appears to be made out of another, but a later, reservoir belonging to the aqueducts, as many of the houses in the Campagna have been). The

[k] By the side of a plan of Rome in the first volume of his magnificent work (pl. xxxviii.), Piranesi gives a section of the relative heights of the Aqueducts, as compared with each other. The figures refer to the base of each *specus* above that of the Appian, and the following is the result, according to his measurements, reduced to English feet:—

Above Specus of Appian.	Palmi.	Feet.
Anio Novus	173.8	127
Claudian	163.2	119
Julian	145.1	106
Tepulan	138.7	101½
Marcian	128.7	92½
Anio Vetus	75.4½	55½
Virgo	9.3	7
Appian	—	—
At a lower level than Specus of the Appian.		
Alsietina in the Trastevere	37.6½	27½

He gives as the total full range, i.e. from the *specus* of the Alsietina (the lowest), to that of the Anio Novus (the highest), as 211.2½ *palmi*, or 154½ English feet. The height of the Appian, he shews by his diagram to be about 24 English feet above the Quay of the Tiber. The points at which Piranesi obtained his measurements, and the mode employed, are not recorded. It seems hardly possible that the Appia is 55 ft. under the Anio Vetus in Rome.

[l] See ante. Frontinus, cap. 21.

[m] The passage, as it stands in the Codex Cassinensis, is, "Anio Vetus *citra* quartum miliarium *infra* novum *qui* a Via Latina in Lavicanam *inter* arcus trajicit, et ipse piscinam habet." This piscina is visible at the third modern milestone on the Via d'Albano, and at the fourth on the Via Latina. The Codex Vaticanus is an inferior copy of the Codex Cassinensis; but the Codex Urbinas, now also in the Vatican Library, is distinct. No other MS. is of any authority.

[n] Remains of the tombs on the Via Latina are distinctly visible and rather prominent objects, close to the Torre Fiscale. The Marrana, or Almo, the small stream that received the surplus water of the aqueducts, also washes the foot of the tower.

vault of the old *castellum aquæ* or *piscina* is now covered with turf, but the side of it forms a sort of cliff like the edge of a quarry.

This place, where the Anio Vetus leaves the Via Latina, is near the great junction and crossing of the aqueducts, over which the tall medieval tower called the Torre Fiscale has been built. Here six aqueducts meet and cross each other. The Marcian arcade, with three of these, makes one of its many angles, and the lofty Claudian arcade, with two more, is carried over it. The expression that it passed amongst the arches is a very natural one, to any person who knows the locality, as there are many arches at this point. It then goes on to another angle and crossing of the great aqueducts, where there is a gate called Porta Furba, about two miles and a-half from the Porta Maggiore. There is a *castellum aquæ* of the time of Nero, with an ancient *piscina* under it, and a fountain of Sixtus V. by the side of it. At the second milestone it parted with some of its water into the *specus* called the *Octavian*, which enters Rome at the Asinian gardens, following the direction of the new road.

By referring to the maps it will be seen that the original line of the Via Latina united with the Via Appia within the outer wall and before reaching the old southern entrance of the city (the Porta Capena); but, in joining this latter road (the most convenient course to pursue in the then state of the fortifications), the Via Latina swerved rapidly to the south-west. Had it been continued in a direct line, it would have reached the Cœlian Hill, near the Porta Asinaria, as the Via Appia Nova still does, following the line of the old Via Asinaria.

At this second milestone also is another *castellum aquæ*°, men-

° This *castellum aquæ* is exactly two miles from the Porta Maggiore, another proof that the entrance *to Rome* (though not to the City) was considered by Frontinus to have been at that gate. All the aqueducts on the eastern side of Rome are measured by him from this gate, and the inscriptions put over that gate as the entrance into Rome indicate the same thing. The level of this *castellum* above the sea is about 153 ft.; at the Porta Maggiore, where the Anio Vetus enters Rome, it is about 146 ft., allowing a descent of about 3 ft. 4 in. for the two miles, which is natural. The Via Appia Nova, in the part near Rome, was made out of the old Via Asinaria. Frontinus says that this branch "was conveyed to the Asinian gardens," which were between the Lateran and the Sessorium, and to which the Porta Asinaria (or gate of the Asinii) was the entrance. Between that gate and the Amphitheatrum Castrense are remains of an ancient reservoir or *castellum aquæ*, cut in the rock at the foot of the wall and half underground, as was very usual with the Anio Vetus. The branch that goes along the Via Latina appears to have gone from the same reservoir, but to be distinct from the one mentioned by Frontinus, and to have been made after his time. This last branch seems to be the same as the Aqua Antoniniana of the Regionary Catalogue, having been made in the third century to supply the great Thermæ of the Antonines. In the Middle Ages, this was considered to have been a branch of the Aqua Marcia; but if this had been the case, there must have been some remains of the arcade for it across the valley.

tioned by Frontinus as two miles from Rome. This is near the Porta Furba; it is entirely buried, but the vault of it is not many feet underground. In the spring of 1871, some excavations were made under my direction in a large vineyard hard by, and another subterranean reservoir was found near the road to Tusculum and Frascati, with a *specus* cut in the rock going in the direction of that road, and apparently passing under it, on the line of a cross-way to the Via Appia Nova, a short distance only. On the other side of that is the "Albergo dei Spiriti," near the junction with the Via Latina; and, in the garden at the back of that house, a *specus* was found in a stone quarry, the vault of which had fallen in and brought the *specus* to view. It seems to have passed underground along the southern side of that ancient Via for a short distance, and then crossed it to a *piscina*, of which there are remains at the foot of the bank on which the road runs in that part. It then goes along the edge of some higher ground, and for a short distance underground again towards a by-lane (*diverticulum*), parallel to the Via Latina; remains of a brick arcade can be seen on the bank of that lane, which is a deep foss-way, and goes on to Rome about a mile distant. It is cut by the railway before it arrives at the wall of Rome. It then passes through that wall and underground again as far as the arch of Drusus, over which it passes; and thence on an arcade, part of which only remains, to the great *piscinæ* at the back of the *thermæ* of Caracalla [p].

The Via Appia Nova was probably made in the time of Frontinus, and is the road which he calls Via Nova. The part nearest to Rome was previously called the Via Asinaria, and extended from the Porta Asinaria to the junction with the Via Latina, at three miles from Rome, which name was then dropped. The new road continues parallel to the Via Appia Antiqua as far as the eleventh milestone, and there forms a junction with it. Both of these roads are now open. The railway to Capua and Naples passes near to this point of junction. The short Via Lateranensis, going out of the Porta Lateranensis (excavated in 1868), ran into the Via Asinaria, and so joined the Via Appia Nova, which has tombs of the first century along the line, and none of any other period. Those

[p] This branch is believed to have been called AQUA ANTONINIANA, as it conveyed water to supply the great Thermæ of the Antonines, called after Antoninus Caracalla. But it seems doubtful whether it may not be the SEVERIANA, which conveyed water to the Thermæ of Septimius Severus. There appear to have been two aqueducts along this point of the Via Latina at different levels, and the higher one, passing over the Arch of Drusus, is said to have been a branch from the Marcia.

which were of stone have been used as a quarry by the farmers to build the low walls that line the road on both sides, the foundations only being left in the banks; but those which were built of concrete faced with brick, would not pay for the trouble of destroying them, and have therefore been left standing in their places. One of these, a very fine one, faced with brick of the time of Trajan, with moulded pilasters, remains nearly perfect near the seventh mile, just where a path turns off to the left across the fields to the *piscinæ*, which are near the line of the old Via Latina in this part, about half-a-mile from the Via Appia Nova, and forming the carriage-road to Albano through Marino. It left Rome by the Porta Asinaria as it now does by the modern Porta S. Giovanni, which is close to the old gate, but at a much higher level. The Via Latina crosses it in a diagonal line, and runs nearly parallel to it as far as the Torre Fiscale, that is, for about a mile gradually diverging from it.

Wherever the exterior of the *specus* of the Anio Vetus is visible, it is faced with *Opus Reticulatum*. The reservoirs of this Aqueduct are of the same construction, and this may serve to distinguish those on the slope of the hill at Tivoli from the other aqueducts there.

"The water of this straight branch," says Frontinus, "coming within the *Porta Esquilina* along the *Spes* [*specus*] *Vetus*, was carried down into the city in the high streams [9]."

This *specus* is on the high bank of the Tarquins, the outer and lofty line of defence on the eastern side of Rome. On this the wall of Aurelian was afterwards built. After its entry into Rome, the Anio Vetus was divided into several branches, in the same manner as the later aqueducts were.

The right-hand branch, in crossing the Campagna, appears to have run nearly under the Marcian arcade, which was afterwards built on the same line and nearly over it. As we approach near to Rome, there are remains of a reservoir built of large stones a little way down the road, about a hundred yards from the Porta Maggiore. It enters Rome under the wall, almost on the level of the ground; the upper part of the *specus* was visible in 1868, but in 1869 was studiously concealed by a modern brick wall. It is visible again inside the wall, on the other side of the road, going into the vineyard in which the Minerva Medica stands, while one branch went to the great reservoir near to it, westward of the gate.

Another branch passes along the bank under the wall of Aurelian,

[9] Frontinus, c. 21. On the subject of the word *Spes* (?) or *Specus* (?), see the Appendix to this Chapter.

and is not visible again until it reaches the Prætorian Camp, where a portion of it was excavated in May, 1868, built of large stones of tufa, under the Porta Chiusa. It may then be traced all round the three sides of the Prætorian Camp, and near the north-east corner there was, in 1868, an opening into it, now closed by a modern wall. It is distinctly visible in several places, especially on the north side of the Camp, where the wall of Tiberius remains perfect, faced with the fine brickwork of his period, whereas the *specus* under it is faced with *Opus Reticulatum*, probably of the time of the Republic. The wall of Tiberius distinctly stands on the old *specus*. There was an opening into it here also in 1868; but this was also carefully walled up in 1869 under the influence of the Garibaldian panic, which had a bad effect upon the Roman authorities at that period. Remains of a reservoir or *castellum aquæ* were also found on the surface of the ground on the bank near the Porta Chiusa, with the present wall of Rome built right across it, but this part of the wall has been rebuilt of old materials, and is not exactly in the same line. There are remains of several other reservoirs on the bank at intervals outside the wall in the modern road, and in many places all along the eastern and southern sides of Rome.

Beyond this, near the Porta Nomentana, are the ruins of another reservoir or *piscina* on the surface of the ground, against the wall. From near the Porta Chiusa another branch went along the old road, which passed through that gate across the inner foss to the Thermæ of Diocletian, where a part of the *specus* and two *cippi*, with two inscriptions upon them, naming this aqueduct the Anio Vetus, were found in the year 1861, when the railway was made[r]. These *cippi* are now in the Vatican Museum.

Another branch went from the reservoir near the Porta Maggiore before mentioned, across the road into the bank on which the arches of Nero stand, near the Lateran, and passed under them apparently into the old *specus* of the Appia, which runs parallel to and nearly under the arches on the other side. Two small *specus* or stone pipes can be still seen (in 1872) passing obliquely into that bank; and, as they came from this large reservoir and *piscina*, (or from this direction,) they seem to have belonged to two aqueducts at different levels. A branch of the Marcian may have been brought to the same filtering-place for distribution, and the surplus water carried

[r] ANIO
IMP . CAESAR
DIVI . F . AVGVST . EX . SC
VII PCCXL

IMP . CAESAR
DIVI . F . AVGVST . EX . SC
VII PCCXL
C

into the old *specus* at the lowest level, which was evidently used for receiving and carrying off the surplus water of all the other aqueducts in the same line.

The fifty yards outside the wall added to the three hundred yards between the Cœlian and the Aventine, make up the three-hundred-and-fifty yards above ground, mentioned by Frontinus. In this valley we found it again, in 1869, parallel to the Appia, sometimes on the *agger* or bank of Servius Tullius, which was used as a substructure for it, in other places on an arcade built up against the tufa wall of Servius Tullius, and faced with reticulated-work.

APPENDIX.

On Spē or Spc.

For the supposed Temple of Spes, the ruins of an apse in the gardens of S. Croce, of "Venus and Cupid," (as it is marked in most maps, and as "Speranza Vecchia" in others,) was fixed upon by Piranesi, who carefully examined all that he could with a view of mapping out his aqueducts, according to the knowledge possessed in his time. This building was no doubt a hall belonging to the Sessorian Palace. Others, again, have suggested the so-called temple of Minerva Medica, but this again is a *nymphæum*, or *pantheum*, and not a temple at all. Besides, a further difficulty lies in one being too far south, while the other is too far north.

Canina, in his account of the results of the excavations at the Porta Maggiore [s], and of the tomb of Eurysaces the baker there discovered, just outside of the gate, gives a plan in which he inserts a temple just inside the gate on the southern side, which he calls the Temple of Spes [t]. It is quite possible that this was a Temple

[s] "Descrizione del luogo denominato anticamente Speranza Vecchia, del monumento delle Acque Claudia ed Aniene Nuova, e del Sepolcro di Marco Virgilio Eurisace, dell'architetto cav. Luigi Canina." 8vo., Roma, 1839, with six Plates; extracted from the Annali dell' Instituto Archeologico.

[t] There are two other temples known to have been dedicated to Spes, and the one near the Porta Carmentalis is thus entered in the *Notitia* and *Curiosum Urbis:* "Fortunæ et Spei Templa *Nova*." We know that there had been a great fire here, and that these temples were rebuilt, and therefore the *Nova* has reference only to the new structure. Besides, to be analogous, it should have been "Spes Nova," or "Templum Spei Novæ." According to Dionysius, another Temple of Spes was a mile or eight *stadia from the City*. (Dion. Hal., ix. 24.) "Having in the first battle, which was fought at the distance of eight stadia from *the City*, near the temple of Hope, overcome the enemy and beaten them out of the field, and after that fought them again near the gate called Collina," &c. The Porta Maggiore, in the outer wall of *enceinte*, is just a mile from the Porta Esquilina, in the inner wall of *the City*, and the Arch of Gallienus. On the other hand, the line of the *specus*, with the fossway by the side of it, must have been important ground for a battle. The modern theory that the whole of the eastern side of Rome was called after Spes, has no ancient authority. Another instance is on all accounts very puzzling. It is a passage in Lampridius, in the life of Heliogabalus: "Ipse secessit ad hortos Spei Veteris, quasi contra novum juvenem." (Lampridius, Antoninus Heliogabalus, 13.) It would almost appear that there were some gardens called by the name of Spes, unless indeed in transcribing some such error should have been made as in the case of the transcriber of Frontinus, and "Spei" written for "Specus," by a scribe to whom the former word was familiar but the latter not, who had mistaken *Spē* for *Spē*. It is a strong passage in favour of the temple theory; but still there is strong evidence on the other side. This garden was that of the Sessorium, one side of which was enclosed by the arcade carrying the *specus* of the Claudian aqueduct.

of Spes. There certainly was a temple on the site indicated, where the modern guard-house stands; and during excavations carried on there, fragments of a temple of the time of the early Empire were found, consisting chiefly of a fine cornice of travertine.

When, however, the words of Frontinus have to be applied, the difficulties of the theory of his referring to a temple are increased. In the case of the expression last referred to, "*following the specus* (*spes*), or, according to one manuscript, *the old specus*, which is obviously the sense," it is very difficult to imagine what circumstances there were in connection with a temple which could warrant the use of such words; and even in the instance mentioned, where we were noticing the Appian aqueduct, "the expression, the Gemelli, which is a place under the *old specus* (Spēs Vetus)," is somewhat singular. Granting that a temple once existed just within the wall of the city (which, from the context, must have been its position if any) it is singular that he should use it as a landmark when describing the junction of two streams of water. The remaining three expressions are simply "at the *old specus* (Spēs Vetus[u])."

With these difficulties to contend with, it has been thought well to seek a different solution, and this is found in the reading of "Specum Veterem" for "Spēm Veterem," i.e., the "old *specus*." With this reading, it naturally follows that it would refer to the old *specus*, or the *specus* of the Appia and the Anio Vetus; and it is singular that the first time it occurs in Frontinus, the Codex Urbinas[v], only second in authority to the Codex Cassinensis, has the reading "Anienem Veterem," instead of "Spem Veterem." What was the true reading of the Codex or Codices from which these two copies were made, it is impossible to say; they are the earliest we have, and it is clear from several other instances that the scribes did not copy with much knowledge of the matter in question: then it was easy to mistake *Spē* for *Spē*. That it was the Specus Vetus which was meant, must rest therefore upon the circumstances which allow of its application to the passages named, and it remains to shew that this is the case.

[u] The seven places where the abbreviation of *spem* or *specum* occurs in Frontinus are given in another page, with tracings of these passages from the best manuscript.

[v] Polenus and Buecheler have demonstrated that the Codex Cassinensis is the earliest and best. It was discovered at Monte Cassino by Poggio in the fourteenth century. The Codex Vaticanus is a copy of the above; but the Codex Urbinas, though of later date, is not a copy from that manuscript. Probably both are copies from an earlier one, not now extant. Some of the various readings in the Codex Urbinas are better than those of the Codex Cassinensis. See the edition of Frontinus by Polenus, Prolegomena, p. 20. Patavii, 1722, 4to.

In the instance under discussion, the water of the Anio is said to flow along its own *specus*, and therefore it would not be probably possible to find an interpretation more suitable as far as this case is concerned. The conduit of the water of the Anio Vetus had "emerged," as the other aqueducts emerge, near the Porta S. Lorenzo, from the higher ground between the Porta Maggiore and that gate: it must consequently have been carried on a substructure from that point on the outer bank of the original fortifications of Rome, that is, on the high bank on which the aqueducts were carried, and on which the wall of Aurelian was afterwards built, to the inner bank, on lower ground faced with the tufa wall of Servius Tullius. The names of the gates are matters of dispute, and are quite immaterial; the levels of the ground decide the question[x].

In another place, Frontinus says[y] that several streams of water, and first the Marcia, were carried to the Aventine from the *specus* (*a spe-cu*), that is from the old *specus* he had before mentioned on the Cœlian, and obviously from the west end of the Cœlian. The Temple of Spes of Canina and others at the Porta Maggiore, is at least a mile from the Aventine. The only way of giving an intelligible meaning of the passage is that the author refers to the old *specus* he had before mentioned, as leading along the Cœlian to the Porta Capena. In the excavations made in 1868 and 1869, on the line of the wall of Servius Tullius from the Cœlian to the Aventine, the conduits of three *specus* were found, two of which must have passed over the arch of the Porta Capena, in order to cross the Via Appia, there a deep foss-way. Two conduits were seen in each of the pits that were dug at intervals along the line, and at the junction with the Piscina Publica under the Aventine they were all three perfect; the lowest one is there cut in the tufa rock under the wall, the other two are on the wall, and partly cut out of it.

Piranesi has preserved a sketch of the *specus* of the aqueduct, which he supposed to be the Anio Vetus upon its substructure; but he gives no clue as to the exact spot whence that sketch was taken[z]. In its character the masonry is very similar to that of the Marcian, but there are minor differences sufficient to shew that it belongs to an earlier age.

Those who have paid attention to the manner in which ancient books have been transmitted to modern times before the invention

[x] Other excavations, made in 1871 in the large vineyard near the Porta Maggiore, near the building called Minerva Medica, shewed the aqueducts very distinctly passing through the higher ground and going along the line of the wall towards the Porta di S. Lorenzo.

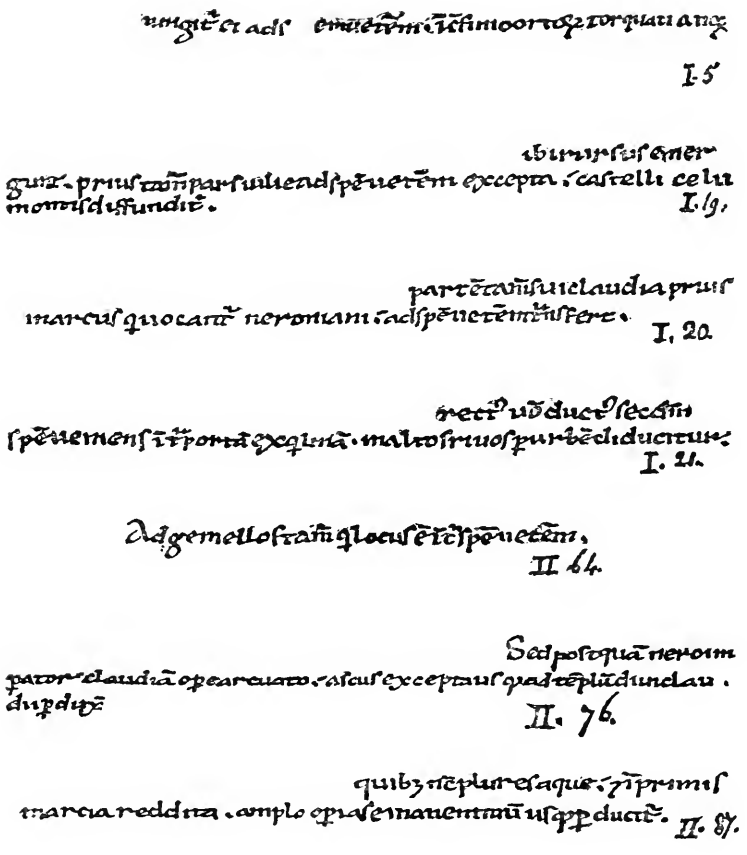
[y] Frontinus, c. 87.

[z] Piranesi, Le Antichità Romane, vol. i. pl. x.

of printing, and who are familiar with the use of records and of other medieval manuscripts or transcripts, well know how full of abbreviations they are, and how difficult it often is for the editor to fill up these abbreviations, if he does not happen to know the word intended. The name of *specus* for the conduit of an aqueduct was essentially a technical word. The first transcribers of the text of Frontinus were not Romans, and did not know the term: hence they filled up the abbreviation *spē*, or perhaps originally *spc̄*, with *spem* or *spei*, instead of *specum* or *specûs*. The same thing may have occurred in the text of Lampridius (as mentioned in a note on a preceding page).

The Abbot of the monastery on Monte Cassino (now a public school and public library) has kindly given me tracings of all the passages in that manuscript in which this abbreviation occurs, and I have had them reproduced by photography and phototype on the page annexed. Opposite to this the same passages are given in the Italic characters, and a few words that are necessary to complete the sense in Roman characters. This is followed by an English translation of these passages, and by some extracts from Livy and other authors in explanation.

FACSIMILE FROM THE MANUSCRIPT AT MONTE CASSINO[a].



I. 5

I. 19.

I. 20.

I. 21.

II. 64.

II. 76.

II. 87.

[a] I am indebted to the kindness of the abbot of the monastery at Monte Cassino, for the tracings of these passages here reproduced by the process of photo-engraving.

FRONTINUS DE AQUÆDUCTIBUS.

EXTRACTS REFERRING TO THE ABBREVIATION SPE̅S FOR SPECUS.

I. *iungitur ei ad s . . em ueterem*[b] *in confinio ortorum torquatianorum* et . . . novum ramus Augustae, hac tres . . . ad Viminalem usque portam deveniunt. I. 5.

II. *ibi rursus emer gunt prius tamen pars julie ad spē . . . veterem excepta, castelli celii montis diffunditur.* I. 19.

III. *partem tamen sui claudia prius in arcus que vocantur neroniani ad spē ueterem transfert* hi directe per Caelium montem juxta templum divi Claudii terminantur. I. 20.

IV. *rectus vero ductus secundum spē veniens intra portam exquelinam in altos rivos per urbem diducitur.* I. 21.

V. *ad gemellos tamen que locus infra spē ueterem,* ubi jungitur cum ramo Augustae. II. 64.

VI. *sed postquam nero im perator claudiam opere arcuato ascus*[c] *(?) excepta usque ad templum divi claudii perduxit,* ut inde distribuetur. II. 76.

VII. *quibus nunc plures aque et imprimis marcia reddita amplo opere a spē in auentinum usque perducitur.* II. 87.

[b] The manuscript called *Codex Urbinas* reads, *jungitur ei ad anionem veterem.* In the present instance, the true reading is evidently *specum.* Frontinus is describing the Aqua Appia, the oldest of the aqueducts, and the junction of the Augusta with the old *specus.* This could have nothing to do with the Anio Vetus.

[c] *ascus (?):* Buecheler reads this *ad spem.*

Translation of the Extracts from the Treatise of Frontinus on the Aqueducts, containing all the passages in which the abbreviation Spē occurs.

I. [The Augustan branch] is joined to it [the Aqua Appia] at the old *Specus* [or old Spes (?), temple of Hope], in the border of the Torquatian gardens [d]. I. 5.

II. [The three, Marcia, Tepula, Julia] there emerge again; first, however, part (of the water) intercepted from the Julia is poured at the old *Specus* (or at the old temple of Spes [e]), and so into the reservoirs on the Cœlian Hill, near the temple of the divine Claudius. I. 19.

III. First, however, the Claudia transfers part of its [water] into the old Specus [or at the temple of Spes], on the arches called Neronian [f]. I. 20.

[d] The Torquatian Gardens were near the Porta Maggiore, and probably the same as those of the Sessorium, now those of Santa Croce in Gerusalemme.

[e] Canina published a volume on what he considered to be the Temple of Spes, by the side of the Porta Maggiore (as before mentioned); but a few years afterwards those ruins were pulled down to make room for a modern guard-house. In doing so, the inscription of the dedication to HERCULES was found by the architect, Felice Cicconetti, and sent to the Vatican Museum. This statement was made to me some years since by Signor Cicconetti himself, and was confirmed by his friend, Signor Simelli, the photographer, who said he had seen it.

The fact is now denied by the Roman archæologists, and when challenged by the Cavaliere Visconti to shew him the inscription in the Vatican Museum, they say they cannot now remember anything about it; and the stone with the inscription upon it has not been found. It is printed by Dr. Henzen in his collection of Inscriptions as *then* in the warehouse of the Vatican Museum; but he considers it to have belonged to a wayside altar only, not to a temple.

The twin reservoirs are very near the same spot; but the place where the Aqua Appia enters Rome is in the gardens of the Sessorium, some distance from the gate, to the east of it. An old *specus* certainly runs along the Cœlian Hill, nearly under the Neronian Arcade, and part of it is now used for the Aqua Felice. I have been along it for more than a quarter of a mile, from near the Porta Maggiore to the Lateran. The Aqua Felice is carried down a sharp incline into that old *specus*, and the metal pipes on the slope are still supported on brickwork of the first century, probably part of the Marcian Arcade, when rebuilt in that part by Frontinus. The old *specus* runs on (or ran on, it is said to be now interrupted,) to the reservoir on the Cœlian Hill, at the Arch of Dolabella.

That a part of the eastern side of Rome went by the name of *Spes Vetus*, is said to be proved by a curious graffito upon the bottom of an amphora, found in 1871 in the excavations in the Exquiliæ, near the Porta Maggiore, of a cobbler's stall, in that district:—

TYCHICI
SVTORIS
A. SPEM VE
TERE.

This piece of *terra-cotta* is of the first century of the Roman Empire; but *at what period* the name and address of the cobbler was scratched upon it, is a question not so easily answered.

[f] The Aqua Claudia and Anio Novus enter Rome at the extreme eastern point on a lofty arcade, which formed the northern boundary of the Sessorian gardens, and was incorporated in the Wall of Aurelian. This extends for about a quarter of a mile; it then turns at a sharp angle to the north, and passes over the Porta Maggiore, to its final reservoir in a tower at an angle to the north of that gate. But

IV. But the direct conduit [of the Marcia, &c.], passing by the old Specus (?) of the Appia (at a higher level, or following the old Hope?) [g], coming within the Porta Esquilina, [the water] is drawn off in the high streams through the City. I. 21.

V. [The Aqua Appia], however, at the *Gemelli* [h], which place is below the old *Specus* [or below the old temple of Hope (?)], is joined with the Augustan branch. II. 64.

VI. But after the Emperor Nero had carried the Claudian (water), which he diverted, on arched work to the temple of Claudius [or the Claudium], at the *specus* [i] (or at the Temple of Hope?), that it might be distributed thence. II. 76.

VII. By which many waters, especially the Marcia, being supplied in great abundance, are conducted from the *specus* [k] (or from the temple of Hope?) on to the Aventine. II. 87.

part of the water of the Claudia and the Anio Novus united, was carried straight on along the bank on which the arches of Nero stand, to the Cœlian Hill and the reservoirs at the west end of it. The temple, called by Canina *Spes*, stood near the angle where the water was divided into two distinct channels, between that point and the Porta Maggiore.

[g] The name of *Porta Esquilina* is here given to the Porta Maggiore, the outer gate on the road to the Esquiline. The same name was also given to the inner gate in the *agger* of Servius Tullius; but there must always have been an outer gate also in the outer *mœnia*, or bank and wall for enclosure, which was a necessary part of every fortified city. (The same name, *Porta Angelica*, is still given to both the inner and the outer gate of the Leonine City, near the Vatican.) The high streams were carried on this bank to the Porta Viminalis of Frontinus, now called the *Porta di S. Lorenzo*. The remains of these three aqueducts can be plainly seen on entering through the city wall close to the Porta Maggiore, on the north side, and going along on this bank to the Porta di S. Lorenzo. The *specus* is visible at both ends, carried on arches. In the middle the ground is higher, and the *specus* pass through it underground, and then emerge and are carried again upon arches, exactly as described by Frontinus. The Aqua Felice is carried *over* the three aqueducts of the Marcian arcade; it is on arches twenty feet from the ground at each end, and in the middle, where these three are underground. The lower part of the *specus* of the Aqua Felice almost touches the ground, while the other three are underground.

[h] The *gemelli* are, in all probability, the large twin reservoirs just outside the western wall of the Sessorium, now in a large vineyard near the Porta Maggiore, through which the Neronian arches pass. These reservoirs are below the level of the *specus* of the Anio Vetus, as was shewn by some excavations made in them under my direction in 1869.

[i] Some of the water had been thrown into the old *specus* at the junction of the Claudian with the Neronian arches.

[k] There are remains of more than one *specus* crossing the valley from the Cœlian to the Aventine upon the *agger* of Servius Tullius, and passing over the Porta Capena at the foot of the Cœlian. One of these was the Marcia, from the reservoir over the Arch of Dolabella, which is near the site of the Claudium and Temple of Claudius. There were great reservoirs for the aqueducts at this point on different levels; one of them underground is still in use, the remains of the others are among the most picturesque objects in Rome. This passage cannot apply to the temple of Hope, which is full a mile away from the Aventine.

Passages in which the Temple of Spes occurs in Livy.

"At the time when this disaster happened, Caius Horatius and Titus Menenius were in the Consulship. Menenius was immediately sent against the Etruscans, elated with their victory. He also was worsted in battle, and the enemy took possession of the Janiculum; nor would the City, which besides the war was distressed also by scarcity, have escaped a siege (the Etruscans *having passed the Tiber*), had not the Consul Horatius been recalled from the country of the Volscians. So near indeed did the enemy approach to the walls, that first the engagement was at *the temple of Spes*, in which little was gained on either side; again at the Porta Collina, in which the Romans gained some small advantage, and this, though far from decisive, yet by restoring to the soldiers their former courage, qualified them the better to contend with the enemy in future[l]."

"At Rome a dreadful fire raged during two nights and one day; everything between the Salinæ (or salt wharf) and the Porta Carmentalis was levelled to the ground, as were the Æquimælian and the Jugarian streets. The fire catching the *temples* of Fortuna, of mater Matuta and *of Spes*, on the outside of the gate, and spreading to a vast extent, consumed a great number of buildings, both religious and private[m]."

"After this, in pursuance of a decree of the Senate, and an order of the people, an assembly of election was held by the city prætor, in which were created five commissioners for repairing the walls and towers, and two sets of triumvirs: one to search for the effects belonging to the temples, to register the offerings; the other to repair the *temples* of Fortuna and mater Matuta within the Porta Carmentalis, and likewise *that of Spes* on the outside of the gate, which had been consumed by fire the year before[n]."

[l] "Quum hæc accepta clades esset, jam C. Horatius et T. Menenius consules erant. Menenius adversus Tuscos, victoria elatos, confestim missus. Tum quoque male pugnatum est, et Janiculum hostes occupavere: obsessaque urbs foret, super bellum annona premente, (transierant enim Etrusci Tiberim) ni Horatius consul e Volscis esset revocatus: adeoque id bellum ipsis institit mœnibus, ut primo pugnatum ad Spei sit æquo Marte, iterum ad Portam Collinam. Ibi quanquam parvo momento superior Romana res fuit, meliorem tamen militem, recepto pristino animo, in futura prœlia id certamen fecit." (Livii Hist., lib. ii. c. 51.)

[m] "Romæ fœdum incendium per duas noctes ac diem unum tenuit: solo æquata omnia inter Salinas ac Portam Carmentalem cum Æquimælio Jugarioque vico. In templo Fortunæ ac matris Matutæ et Spei extra portam late vagans ignis, sacra profanaque multa absumpsit." (Ibid., lib. xxiv. c. 47.)

[n] "Comitia deinde a prætore urbano de senatus sententia plebisque scito sunt habita: quibus creati sunt quinqueviri muris turribusque reficiendis: et triumviri bini; uni sacris conquirendis donis-

"He agreed with contractors for building a theatre near the Temple of Apollo, and for embellishing the Temple of Jupiter in the Capitol, and the columns around it; he also removed from those columns the statues that stood incommodiously before them, and took down the shields and military ensigns of all sorts which were hung upon them. Marcus Fulvius made contracts for more numerous and more useful works—a haven on the Tiber, and piers for a bridge across it, on which piers Publius Scipio Africanus and Lucius Mummius, censors, many years after, caused the arches to be erected; a court of justice behind the new bankers' houses, and a fish-market, surrounded with shops for private sales; also a forum and porticus, on the outside of the Porta Trigemina; another porticus behind the dockyard, and one at the *Temple of* Hercules; also a temple of Apollo Medicus, behind that *of Spes*, near the bank of the Tiber[o]."

It will be observed that all these passages apply to the well-known Temple of Spes near the bank of the Tiber, of which there are considerable remains now in the church of S. Nicolas in Carcere, and do not apply to a Temple of Spes at the Porta Maggiore.

The word *specus* is used by Vitruvius in the sense of a covered water-course :—

"But if there should be mounds in the middle between the walls and the fountain-head, it must be so contrived that the water-channel (*specus*) be dug under the earth, and poised on the top[p]."

And at a later period by Hirtius :—

"Alexandria is almost wholly undermined with water-courses, and has a *specus* extending to the Nile, by which water is conveyed into private houses[q]."

que persignandis; alteri reficiendis ædibus Fortunæ et matris Matutæ intra Portam Carmentalem, sed et Spei extra portam, quæ priore anno incendio consumptæ fuerant." (Livii Hist., lib. xxv. c. 7.)

[o] "Theatrum et proscenium ad Apollinis, ædem Jovis in Capitolio, columnasque circa poliendas albo locavit: et ab his columnis, quæ incommode opposita videbantur, signa amovit: clipeaque de columnis, et signa militaria affixa omnis generis dempsit. M. Fulvius plura et majoris locavit usus: portum et pilas pontis in Tiberim; quibus pilis fornices post aliquot annos P. Scipio Africanus et L. Mummius censores locaverunt imponendos; basilicam post argentarias novas et forum piscatorium, circumdatis tabernis, quas vendidit in privatum; et forum, et porticum extra Portam Trigeminam, et aliam post navalia, et ad fanum Herculis, et post Spei ad Tiberim ædem Apollinis Medici." (Ibid., lib. xl. c. 51.)

[p] "Sive autem medii montes erunt inter mœnia et caput fontis, sic erit faciendum, uti specus fodiantur sub terra librenturque ad fastigium," &c. (Vitruv., *De Architectura*, lib. viii. c. 6. § 3.)

[q] "Alexandria est fere tota suffossa, specusque habet ad Nilum pertinentes, quibus aqua in privatas domos inducitur." (Aulus Hirtius, *De Bello Cæsaris Alexandrino*, cap. 4.)

III. The Aqua Marcia (B.C. 145).

"127 years afterwards, that is, from the building of Rome 608 years, when Servius Sulpicius Galba and Aurelius Cotta were consuls, as the aqueducts or conduits (*ductus*) of the Appian and Anio were much decayed by age, (and also intercepted fraudulently for private purposes,) the business of repairing and reclaiming the said aqueducts was entrusted by the senate to Marcius, who was then acting as Prætor. And because the increase of the population of the city seemed to demand a more ample supply of water, instructions were given to him by the senate that he should carefully examine how far there were other streams which he might be able to bring into the city[r].

"He therefore restored the two old conduits, and introduced a third, *which he caused to be erected with 'squared stones,' and larger aqueducts, and carried through them the water which he had obtained for the public service*[s]. Hence it received the name of the 'Marcian' from himself, as the author of it.

"The Aqua Marcia has its origin on the Via Valeria at the thirty-sixth milestone, three miles off in the *diverticulum* (or cross-road), on the right-hand to those going from Rome. On the road to Sublacum, now called Subiaco (*Via Sublacensis*) also (which was paved for the first time under the Emperor Nero), at the thirty-eighth milestone, for the space of two hundred paces on the left-hand side the water lies like a pond, bubbling up in innumerable springs from beneath the stony hollows, and is very green in colour.

"The length of the course from its head to the city is 61 miles, 710 paces;—by an underground channel 54 miles, 247½ paces, on structure above ground 7 miles, 463 paces. Out of this, in many parts away from the city, in the upper part of the valleys, it is carried on arched substructure for 473 paces; nearer the

[r] Frontinus, lib. i. c. 7. He also quotes from Fenestella concerning the delays which occurred, and speaks of the Decemvirs consulting the Sybilline books, and being supposed to have found that it was not the Marcian but rather the Anio which should be brought into the Capitol: ("Invenisse dicuntur, non esse aquam Marciam, sed potius Anionem in Capitolium perducendam.") Eventually, however, Marcius prevailed, and his plan was carried out.

Pliny also refers to the work of Marcius: "Sed dicantur vera æstimatione invicta miracula; Q. Marcius Rex jussus a senatu aquarum Appiæ, Anienis, Tepulæ *ductus reficere*, novam a nomine suo appellatam cuniculis per montes actis intra prætura suæ tempus adduxit." (Nat. Hist., lib. xxxvi. c. 121; see also further details in Plin., xxxi. 41, and ibid.)

[s] "Qui lapide quadrato ampliores ductus excitavit, perque illos aquam quam acquisiverit rei publicæ commodo, trium millium opera fabrorum duxit cui ab auctore," &c. These words are wanting in the best manuscript, that of Monte Cassino. In place of them we have "(. . . priores ductus restituit et tertiam illam aquarum in urbem perduxit) cui ab auctore," &c. This does not agree with the opinion of the learned, that the Urbinas Manuscript is a copy of the one at Monte Cassino, unless great liberties were taken with it. The fact that the arcade with the *specus* of the aqueduct is always built of large squared stones, is strongly in favour of the Codex Urbinas. It is also certain from the nature of the work, that a large number of men must have been employed upon it. This passage seems to have been omitted in the Codex Cassinensis, which is a proof that the Codex Urbinas is not a *copy* from it. Dederich, p. 15, suggests after "commodo," the words "trium millium opera fabrorum."

city, from the seventh milestone, on a substructure for 528 paces. In the rest of the work it is carried on an arcade for 6 miles, 472 paces[t]."

"The Marcian ranks fifth in height, and is at its head even in level with the Claudian[u]."

"In the year of the building of the city, 719 (i.e. B.C. 44), Agrippa repaired the three aqueducts—the Appian, the Anio Vetus, and Marcian—and took care to supply the city with many fountains[x]."

"[Temp. Nervæ, (A.D. 96)] the Marcian having been enlarged was carried across from the Cœlian [i.e. its *specus*] to the Aventine[y]."

IV. The Aqua Tepula (B.C. 126).

"In the year 627," writes Frontinus, "after the building of the city, when Plautius Hypsæus and Fulvius Flaccus were consuls, the censors, Cneius Servilius Cæpio and Lucius Cassius Longinus, took care to bring into Rome and the Capitol the stream called the Tepulan, from the Lucullan Fields (which some call the Tusculan[z])."

"The Tepula has its source on the Via Latina at the tenth milestone, two miles off on the right of those going from Rome. Thence it was brought by a separate channel into the city[a]."

V. The Aqua Julia (B.C. 34).

"Afterwards Marcus Agrippa collected the natural waters of another stream, at 12 miles from the city on the Via Latina, (2 miles off on the right of those going from Rome,) and so intercepted the stream of the Tepula. To the newly-acquired water the name of Julia was given, from the finder of it; nevertheless the distribution was so divided that the name of Tepula was retained[b]."

"The course of the Julia runs for the length of 15 miles, 426½ yards. In work above ground 7 miles; out of this in parts nearest to the city from the seventh milestone (it is carried) on a substructure for 528 yards; the rest on arched work for 6 miles, 472 yards[c]."

III., IV., V. The Aquæ Marcia, Tepula, and Julia.

"Of these [Aquæ], six within the seventh mile, on the Via Latina, are taken up into covered *piscinæ*, where, as though breathing again after their course, they deposit mud. The Julia, the Marcia, and the Tepula, are joined there; of these, the Tepula, (which had been intercepted, and joined to the stream of the Julia,) now receives from the reservoir of the same Julia its proper quantity, and flows out in its own channel, and under its own name.

"These three are carried from the reservoirs on the same arcade.

[t] Frontinus, lib. i. c. 7.

Frontinus states in another chapter (c. 12) that Augustus brought underground another stream, which should be supplementary to the Marcian whenever the dryness of the season rendered extra supply necessary. It was called from the name of the contriver, Augusta, and had its rise above the spring of the Marcian. This additional *ductus*, or Specus Augusta, was 800 paces long.

[u] Frontinus, c. 18.

[x] "Salientibus aquis instruxit urbem." Ibid., c. 9.

[y] Ibid., c. 87. [z] Ibid., c. 8.

[a] Ibid. [b] Ibid., c. 9. [c] Ibid.

"The highest of them is the Julia, lower the Tepula, then the Marcia. These come down towards the Viminal, running together beneath the ground, on the same level as the Collis Viminalis, as far as the gate. There they again emerge.

"First, however, a part of the Julia is, at the *Spes Vetus*, taken out and distributed in the *castella* on the Coelian Hill; but the Marcia, after the Pallantian Gardens, throws off part of its water into a stream called the Herculanean. This conduit through the Coelian, being of no use for the houses on the hill because at too low a level, comes to an end above the Porta Capena [d]."

The Piscinæ.

To this point, Frontinus tells us, the three aqueducts tend [e], while from this they are carried on the same arcade into Rome. The ruins of these remain visible. Some of them are situated a little way off the south side of the Via Latina, others on the east side of the Via Appia Nova. Of these, two belonging to the Claudia and Anio Novus are subterranean, and are now only to be distinguished as mounds of earth, looking like tumuli. Others are above ground, near that part of the Via Latina [now the road to Frascati and Tusculum], and close to the *Torre di mezza via*, or half-way house from Rome to Frascati, just beyond the sixth milestone of the modern road. Others are at or near the Villa of the time of Hadrian, called *Sette Bassi* (which is supposed to be a corruption of Septimius Bassus), near the same point. All of these are between seven and eight miles from the City; they are the chief landmarks in tracing the course of the three aqueducts now to be explained, and each of the three comes from its own separate source. The Marcia, the lowest on the arcade, has its origin at the greatest distance from Rome. The Tepula and Julia have their sources comparatively close to the city. The Marcia takes its rise from the Simbrivine Hills, as far removed beyond Tibur to the east as Tibur is from the city, while the latter two find their way from springs in the volcanic region around the lake of Albano.

III. Marcia.

The source of the Marcia is plainly visible, the exact description of Frontinus pointing to the spot without leaving room for doubt.

[d] Frontinus, c. 19.

[e] 'The three aqueducts' in this passage may mean either the Anio Vetus, the Marcia, and the Claudia, all of which come from the neighbourhood of Subiaco, and follow the same line on the bank of the river Anio, and the cliffs above it as far as Tivoli, but diverge considerably between Tivoli and the Piscinæ; or it may mean that the Tepula and the Julia coming from near Marino, and the Marcia coming from Tivoli, meet at this point—both are true. The *piscinæ* of the Claudia, the Anio Novus, the Marcia, the Tepula, the Julia, are all within half-a-mile of each other.

In one of the numerous little valleys which run down on the north side of the River Anio, feeding this stream with their rivulets, the Marcian has its rise. The lake of S. Lucia[f] in that valley is so called from a small village situated some distance up the slope; along the bottom of this valley the Via Valeria passes. This lake is usually, but erroneously, considered as the source of the Aqua Marcia.

The exact position of the source is about two miles from the village of Marano, but on the other side of the river, on the right of the valley to one looking towards the mountains, and there are still at times pools of water forming here from the springs which emanate from the overhanging hills. The water now falls into two or three rivulets, which run at the bottom of the valley into the river Anio.

The aqueduct, however, when it reached the high road from Rome to Subiaco, along the north bank of the Anio, turned abruptly to the west, followed the course of the road back towards the city, chiefly passing the further or hill side of it, but winding somewhat according to the nature of the ground. After following the road for some seven or eight miles, it crossed the river (close to the monastery of S. Cosimato) and then pursued for some six or seven miles the southern or right bank of the river Anio. Here (at a spot scarcely more than a mile from Tivoli (*Tibur*), the course of the aqueduct left the line of the river, and wound its way in a south-westerly direction towards the *piscinæ* before referred to; at times on a substructure, and in a few places, where the valleys were deep, on arches, but for by far the greater distance beneath the surface.

The line of the Marcia can be clearly traced along its whole length. The principal source, called Acqua Serena, is a beautiful spring gushing out from the mountain under the present carriage-road, about seven miles and a-half before arriving at Subiaco, clear as crystal and very abundant; it forms a small lake in the valley, and fully realizes the description of Martial. The old *specus*, which had long been concealed by being a foot or two under water and overgrown with weeds, was brought to light in 1869 by the engineer of

[f] Dr. F. Gori says* that the lake of S. Lucia, in the territory of Arsoli, near Subiaco, is *not* the source of the Aqua Marcia, but of the Aqua Claudia only, and that the sources of the Aqua Marcia are nearer to Subiaco, and are called by the people *Acque Serene*. He also considers that the branch of the Aqua Augusta added to the Marcian by Augustus, now called *Le Rosoline*, comes from near the village of Agosta, and that the spring, now called *La Fonte* (*Fons novus Antoninianus*), added to the Marcian by Antoninus Caracalla, is under the same village of Agosta. One of the inscriptions on the Porta S. Lorenzo records this.

* See Delle varie Sorgenti dell' Acqua Marcia, &c., pp. 56, 57.

the Aqua Marcia Pia, in making his new works for the restoration of this beautiful water to use in Rome. He drained the lake a little, and by that means made the *specus* visible[g]: this *specus* is then carried to the cliff of the valley of the Anio (into which the water from the small lake falls), and then follows the course of the valley and the river, until it comes to the monastery of S. Cosimato, a mile from Vico-Varo: here it crosses the river on an arcade of brick. It there leaves the present road, and then is carried in the cliff on the other side of the river until it arrives within two miles of Tivoli, where it again crosses the river (here a deep ravine) on a fine arcade parallel to that of the Anio Novus, and at a very short distance from it. There are very fine and picturesque ruins of both these arcades in the valley called the Valley of the Arches. It then continued in the cliff by the side of the present road, which is on a ledge of the rock or hill overlooking the Anio, as far as the old town of Tibur and the Cascades, behind the present town of Tivoli: to avoid these it follows a serpentine course, winding round the end of the hill, and has a fine reservoir about half a mile beyond the town, on the side towards Rome, below the level of the Promenade of Carciano, by the side of which are considerable remains of a large reservoir or *piscina*, with the *specus* running into it and from it. This large building is divided down the middle by an arcade, into two nearly equal parts. Some of it is faced with *Opus Reticulatum* of a peculiar pattern. On the exterior, there are remains of niches and fountains, a villa of some importance having been built at this spot to take advantage of the abundant supply of excellent water[h]. The *specus* then runs near the cliff below the level of the road to another extensive reservoir and *piscina* about a mile further on. There are considerable remains of a large building erected on a steep slope just under the cliff, with no upper wall, as

[g] The new company had at first proposed to draw their chief supply of water from the small lake called the Lago di S. Lucia, which is nearer to Rome, and which they had been misinformed was the Aqua Marcia. Dr. Fabio Gori, from his great local knowledge and his archæological researches, was able to shew that this was a mistake, and wrote to that effect a letter in the Roman newspaper called the *Osservatore Romano*. This letter at first gave great offence, and a very warm controversy was carried on for some time on that subject. Eventually, however, a new engineer of the company thought it better to examine the ground himself, and the result was to establish that Gori's views were perfectly correct. He then became a warm advocate for the company, which he thinks entitled to great praise for the admirable manner in which its works in the valley of the Anio have been carried out as far as Tivoli. Their works almost equal those of the time of the Empire, and are carried out on the same principles; but from Tivoli to Rome the water is carried in metal pipes, and not in a stone *specus* as it is above Tivoli. This enables the company to carry it in a more direct line.

[h] See the Appendix to this Section.

the cliff itself supplied its place; but there is on the lower side a fine wall of considerable extent and height, built of large square or oblong stones of the construction called Cyclopean Masonry[1], in this instance differing little from that of the Walls of the Kings in Rome, except that the stones are rather larger, the building-material being not tufa, but a kind of calcareous stone of the country, dug on the spot. This wall has been supposed to be a portion of the fortifications of the ancient city of Tibur, but for this there does not appear to be the slightest evidence or probability. It is simply the natural construction of the material at hand, and therefore the cheapest wall that could be built for the purpose. No cement is used, because none was required; these large blocks of stone require none, and some chippings are used to fill up interstices, as usual when no cement is used. Again the wall turns the corner at both ends; it is not part of a large wall but is complete in itself, as the facing of one side of the reservoir and filtering-place, the interior of which is built of the usual concrete of rough stone and mortar, and lined with cement of the kind which holds water, *Opus Signinum*, used for all the aqueducts. The end is faced with *Opus Reticulatum*, and there are remains of niches against the wall at intervals. It was also more ornamented, because it was intended to be the one seen chiefly; the other side, being near the edge of a precipice, would only appear from a distance, and the large stones were therefore more effective in that situation. There is no reason to doubt that the whole was built together at the time that the Marcian Aqueduct was made, and it was probably restored by Augustus. It may be doubtful whether some caves in the cliff, which formed part of the reservoir, were natural or were cut, and the stone dug out from them. It is altogether a very picturesque and interesting structure. There may be a question also whether there was not a branch from this reservoir to the Villa of Hadrian at the foot of the hill, perhaps a mile lower down.

The *specus* of the Marcia is visible at the Ponte di S. Antonio over that of the Anio Vetus; and again, but alone, at the Ponte di S. Pietro, and it passes the Ponte Lupo with the Anio Novus, Claudia and Anio Vetus. It then continues, chiefly underground, to the great *piscinæ* before mentioned, and thence on the arcade into Rome.

After reaching the City, the branch mentioned by Frontinus, c. 87, as being carried across the valley from the Cœlian to the Aventine in the time of Nerva, seems to be the one found during the ex-

[1] A great deal too much importance has been attached to this Cyclopean Masonry, *Opus Cyclopæum*. See the Chapter on the Construction of Walls.

cavation in 1868, passing over the Porta Capena at a higher level than the Appia, but still at a much lower level than the lofty arcade of Trajan, of which only the bases of the series of piers crossing the valley now remain. The aqueducts following this line had all to cross the Via Appia, here a foss-way, on the arch of the Porta Capena. This southern branch of the Aqua Marcia is probably the one that can be traced along the side of the cliff of the Pseudo-Aventine, after it had been repaired and brought again into use, for it must be remembered that at one time, as Frontinus says, it ended at the Porta Capena.

The conduit and arcade were rebuilt by Augustus, as recorded on the inscription on his arch at the Porta S. Lorenzo, and in the sixth decree of the Senate, on the subject of the aqueducts. This branch arcade of Augustus is there expressly named as distinct from the others, all needing repairs at the time of this edict. The consuls are charged to see to "the repairs, at the expense of the city, of the streams, conduits, and arches, of the Julia, Marcia, Tepula, Anio; also of those streams and arcades which Augustus Cæsar had rebuilt."

A branch of the Marcian aqueduct was carried along the *agger* into the Prætorian Camp. Some leaden pipes were found there in 1742, with an inscription upon them, recording that they were of the time of the Emperor Macrinus (A.D. 217). This probably indicates either a renewal of the pipes, or an additional supply of water. The garrison in that camp was twelve thousand men, and a large supply of water must have been required for their use[j].

The excellent qualities of the Marcian water are mentioned by several of the classical authors, and were celebrated for a long period; they were known in England in the time of Shakespeare, as appears from the following passage in CORIOLANUS, *Act* ii. *Sc.* 3—

> *Brutus loquitur.*—"What stock he springs of,
> The noble house of the Marcians; from whence came
> That Ancus Marcius, Numa's daughter's son,
> Who, after great Hostilius, here was king:

[j] It is probably the case that part of this supply was brought in metal pipes only, from the evidence of this inscription. A stone *specus* passes under the wall on the bank round three sides of the camp on the exterior of the walls, and is plainly visible at the north-east corner; but this agrees with the general character of the Anio Vetus, and was probably a branch from that aqueduct.

The inscription is as follows:—

IMP. CAES. M. OPELLI . SEVERI . MACRINI . AVG
M. OPELLI . SEVERI . DIADVMENIANI . CAES. PRINC. IV
CASTRIS . PRAETORI
TERENTIVS . CASSANDER . FECIT

Of the same house Publius and Quintus were,
That our best water brought by conduits hither;
And Censorinus, darling of the people,
And nobly named so, being censor twice,
Was his great ancestor."

There is a slight anachronism here. Coriolanus lived in B.C. 489, and the Marcian aqueduct was constructed in B.C. 145, more than three hundred years after his death. Marcius Censorinus also, who was twice Censor (the only Roman who filled that office twice), lived B.C. 294.

In the thirteenth century, the church of S. Bibiana is incidentally mentioned as being near the arcade of the Marcian aqueduct[k]. In some excavations made in the year 1871, a portion of the Marcian arcade, built of the usual large squared stones, was shewn, passing under some high ground to the north of the Porta Maggiore, within the wall of Aurelian, in a direction to join the bank on which that wall is built, and passing between the Minerva Medica and the wall in that part. This is very near the church of S. Bibiana.

IV. Tepula.

The sources of the Tepula and the Julia are in the valleys on either side of the promontory on which the modern town of Marino stands, the ancient Castrimœnium (under the village of Rocca di Papa). That of the Julia is on the south side, and almost close under the crater now the Alban Lake. The Tepula rises near the bottom of the valley which comes down from the hills in the neighbourhood of Grottaferrata, and along which the Via Latina passes. This lies somewhat nearer to Rome than the source of the Julia; but the Julia joined it before it had advanced far, and thus the expression of Frontinus, "Marcus Agrippa intercepted the Tepula[l]."

[k] "[Honorius, Papa III.] Ecclesiam Sanctæ Bibianæ juxta formas aquæ Martiæ cum Monasterio Monialium restituit." (Ciaconi, Vitæ Pontif. Roman., &c., vol. ii. col. 46, C.)

[l] An inscription recording repairs by Agrippa is said by Ligorio to have been found on a *cippus* of travertine at the third mile on the Via Latina. The genuineness of this is doubted by Fabretti, because the number of miles does not agree; but it seems more probable that this was an error in transcribing, than that the inscription should be forged without any motive for doing so:—

AQVAE . IVLIAE . TEPVLAE .
IMP. CAES. DIVI . IVLI . F.
AVGVSTVS . PONTIF.
MAX. COS. XII. TRIB. POT.
XIX. IMP. XIII. CVRANTE
M. VIPSAN . AGRIPPA .
AEDIL . CVRVL . L. C. C.
P. MILL. X.

Another inscription, also recording re-

is explained. The waters, therefore, flow into the same series of reservoirs and cisterns which received the Marcian after they enter Rome.

Under the account of the Julia, the *Aqua Crabra* is mentioned. This is the little stream into which the water of the Julia and Tepula falls; which is united at the foot of the hill on which the town of Marino stands, to another stream called the Marrana, and the united water is now generally called by the latter name only[m]. Frontinus mentions several reasons why it was not made use of for supplying the city with water; but it was brought into Rome in the twelfth century as a small mill-stream.

Frontinus also says that the Tepula had its source at ten miles from Rome on the Via Latina, with two more miles to the right on a cross-road[n]. Ten miles on the Via Latina brings us near to Tusculum, at the tenth mile is the Casino de Ciampino, from which starts a cross-road to the right; and at two miles from that point we arrive at the springs called Fontanaccio, before reaching Grotta Ferrata, but close under that village. It follows that the source of the Tepula was at this place, now called Fontanaccio. The spring comes out under a cliff of the rock of lava near the road, and has a modern washing-cistern in front of it; but behind this the ancient work can be seen, with openings into a reservoir in the cliff. This is probably contemporaneous with the time that the conduit of the Tepula was made. The supply of water is small, but of good quality.

As the Aqua Tepula supplied only the Regiones in the northern part of the city, it seems to have passed into the *castellum*, the remains of which may still be seen in the city wall near the Porta S. Lorenzo, evidently built upon an old *agger* before the Aurelian wall was erected[o]. It, however, has been a house as well, the lower part only being used as the reservoir for the water, and the upper

pairs of the time of Augustus, was found by Fabretti himself, in the Vinea Bartholomæi Virginii, two miles from the Porta Maggiore, between the ruins of the arcades of the Marcian and Claudian, and was preserved in a private museum:

IVL. TEP. MAR.
IMP. CAESAR.
DIVI . F.
AVGVSTVS.
EX. S. C.
LXIII.
P. CCXL.

[m] *Marrana* is a general name for a running stream in the Campagna round Rome, probably a provincial word; but it is also the special name of this particular stream coming from Marino.

[n] "Tepula concipitur via Latina ad decimum milliarium, diverticulo euntibus ab Roma dextrorsus millium passuum duum . . . . . inde suo rivo in urbem perducebatur." (Frontinus, c. 8.)

[o] It is the building pointed out in guide-books as "The House of Cicero," although there does not appear to be any historical ground for this name.

part, which is large and important, for chambers. The front of this house, or *castellum aquæ*, still forms part of the city wall. It has been much disfigured, and the old drains walled up during the *restorations* (!) of 1869.

On the level of the first floor, in which is part of the reservoir, is a row of corbels to carry a wooden gallery or *hourd*, probably an external passage for the use of the Aquarii, behind which the *specus* runs at the same level. Immediately above the line of the corbels which carried the floor of the gallery or balcony, is a row of large arches; but these are merely the arches of construction found in most walls of the period. At the south end of this line of corbels, which mark the extent of the *castellum* in that direction, there is an angle, and the wall recedes a few feet. In this angle is the *specus*, corresponding in form and dimensions with that of the Aqua Tepula in other parts; it can be seen entering into the reservoir behind the line of corbels. Within the wall are the usual marks of a reservoir of water: the tartar deposit remains visible in the corners of the chambers cut through by the wall of Aurelian, or by the engineers of the Acqua Felice, whose *specus* runs behind it on the bank within the wall which formed the front of the house. The *specus* of the Acqua Felice is here at rather a higher level than the Marcian arcade, with the three *specus* upon it, although at the "Sette Bassi," five miles from Rome, and near the *piscinæ*, it is at a lower level. On the bank just above the level of the ground are the water-drains (hidden by the restorers in 1869) for carrying off the superfluous water into a large subterranean drain which runs under the gateway, and which is still in use for purposes of irrigation.

V. Julia.

Frontinus states that the source of the Julia was at twelve miles on the Via Latina, with two more miles added on a cross-road to the right[p]. The twelfth mile is at Frascati; from thence, by a cross-road to the right, we arrive at the bridge of the Squaricarelli, and at the copious springs called the Fontanile, exactly two miles from the starting-point at Frascati. This must, therefore, be the source of the Aqua Julia.

[p] ". . . ad milliarium ab urbe duodecimum via Latina, *diverticulo* euntibus ab Roma dextrorsus millium passuum duum alterius aquæ proprias vires collegit et Tepulæ rivum intercepit. Acquisitæ aquæ ab inventore nomen Juliæ datum est, ita tamen divisa erogatione, ut maneret Tepulæ appellatio."—(Frontinus, c. 9.)

The swampy ground in which the source of the Angelosa or Aqua Julia is found, is full of springs, like the Lucullan fields, from which flow the Appia and the Virgo, and from it run also the streams called di Monte Fiore and la Marrana di Marino.

This ground is on a high level on the Monte Fiore e dell Aglio (the Mons Algidus of the ancients), or "The hill of flowers or of garlic;" and the springs come from the gardens of the modern Villa Aldobrandini, at Frascati. Canina cleared out the ancient *specus*, which had a curved vault, almost oval (*a capanna*).

This source of the Julia is on the left-hand side of the road from Grotta Ferrata to Marino, about a mile above the former, and nearly the same distance below the latter. The water gushes out from the foot of the rock and passes under the road to a *lavacrum*, or washing-place, at a lower level on the opposite side of the road, and then falls into the Aqua Crabra, which passes at the foot of the cliff many feet lower down. A part of the water of the Julia, before it goes into the *lavacrum*, is carried to the right in a *specus* to Grotta Ferrata. This is ancient, but has been restored to use, so that it looks modern. Below Grotta Ferrata, the *specus* has been destroyed in many parts; but remains of it may be seen close to the ancient fortified villages called Pagus Lemonius (on the maps Castellaccio, a small castle). It is ten miles on a branch of the ancient Via Latina, and between the present roads to Frascati and Grotta Ferrata. In a part of the fortifications of this village is a *castellum aquæ*, or reservoir of the Julia, and near it part of the *specus*, on an arcade on the brow of the hill. This *specus* is built of rough stone, and faced with a rude early kind of *Opus Reticulatum*, more rude indeed than might have been expected at its date (B.C. 34), and not nearly such good work as the Muro Torto, but more like the Emporium. The reservoir is of the same character, but part of the *specus* in the fortifications is carried on brick arches which agree with that date; the brickwork is not of the time of Nero, to whom it has been attributed. A *specus* of rough stone follows the line of the hill to the Marrana, after the junction of that stream with the Aqua Crabra, close to the point where the water from that stream enters a tunnel of the Aqua Julia. After it emerges from this tunnel, it arrives at the *castellum* or *piscina* in which the water of the Julia was received before it was carried on the Marcian arcade. This *piscina* is about two miles nearer to Rome, close to the point of junction between the roads to Frascati and Marino, through Grotta Ferrata, and near to the other *piscinæ*.

Frontinus says that the AQUA CRABRA flowed past the head of

the Julia, but was excluded from it by Agrippa[q]. We find this stream coming from that part of the hill on which the village called Rocca di Papa is situated, passing near the head of the Julia at Fontanile, now Angelosa, and sometimes mixing with the springs there. It has one of its sources in the grounds of the Villa Torlonia, at Frascati. All these three streams now fall into the river Anio.

Near Rocca di Papa an arcade, or bridge of ten arches, of silex or flint, covered with brick, passes over the Aqua Crabra to carry some aqueduct, probably a part of the Julia. This arcade is called Arcioni, ['the arches.']

There are some remains of another reservoir within the wall of Rome, on the bank between this and the Porta di S. Lorenzo, which seems to have belonged to the Julia: the *specus* of the Marcia, with that of the Tepula and remains of that of the Julia over it, are visible on an arcade a little beyond, close to the gate. The lower part of a fine brick wall with bold buttresses, of the usual character of a *piscina* or *castellum aquæ*, are visible, and this faces the present Wall of Rome, almost touching it, so that this has been built since the *piscina*, but that not being exactly in the same line it could not be used. The *piscina* of the Tepula being on the outer side of the bank or *mœnia* came into the line of defence of Aurelian, and was used as part of his wall; that of the Julia, being on the inner side of the bank, was too much within the line to be used.

The Castellum Aquæ Juliæ, or chief reservoir of the Julian Aqueduct, is usually, but erroneously, said to have been the one situated on high ground near the church of S. Maria Maggiore, where the picturesque ruins stand, usually called the "Trophies of Marius," because those trophies were hung under two of the arches there, until they were removed to the Capitol. A lofty arcade carrying a *specus* at a high level passes across the valley, from the reservoir near the Porta S. Lorenzo to this point. This arcade is of the first century, built of the fine brickwork usual at that period, and agrees with the time of Frontinus; but the only aqueduct that was high enough to have carried water to that spot was the Anio Novus.

This great reservoir was rebuilt by Alexander Severus, and called a Nymphæum, being given as such on one of his coins. This name is rather a vague one; but it is evident, from some ex-

[q] "Præter caput Juliæ transfluit aqua quæ vocatur Crabra. Hanc Agrippa omisit."—(Frontinus, c. 9.)

cavations made in 1871, that there were extensive *thermæ* of the Emperors of the third century near this place.

From this lofty reservoir the distributing channels may be seen branching off in different directions, one going to the Thermæ of Titus, towards the reservoir called the Sette Sale, another going in a different direction.

This Nymphæum(?) is on lower ground than the outer wall, though still on ground so high that the only water that could reach it was that of the Claudia and Anio Novus, of which part of the arcade remains between it and the reservoir on the high bank. From that point the ground descends gradually and gently along the line of the *agger* of Servius Tullius either way, and still more towards the interior of the city. The aqueduct, therefore, could not pass underground and then *emerge* in this part. The Porta Esquilina of the inner wall was on the same level, or nearly so. The Porta Tiburtina of the inner wall was near the *thermæ* of Diocletian, with a gradual and gentle descent to it along the line of the *agger*. The only possible explanation of the text of Frontinus is that the same names of the gates in the inner wall were applied to those in the outer wall on the same roads.

A piece of leaden pipe, with an inscription upon it, was found at the Porta S. Lorenzo, which gives the names of Dolabella and Silanus as Consuls; this fixes the date at A.D. 10, and shews that the Marcian water was conveyed in leaden pipes at that point in the time of Augustus. The stone *specus* was carried over the gate, as we see by the remains of it in the wall, and the inscription upon it recording repairs by Augustus. The one upon the leaden pipe is given by Gruter[r].

Another leaden pipe was found by Panvinius on the site of the Prætorian Camp, with an inscription, given by Gruter[s], which records that it conveyed the Marcian water to that point.

Three aqueducts are mentioned in other inscriptions found during the excavations near the railway station in 1869[t]; the *three* aqueducts intended can hardly be other than the Marcia, Tepula, and

[r] Pag. clxxxii. 8, "In tubulo plumbeo reperto ad portam S. Laurentii,"—
P. CORNELIO . DOLABELLA . C . IVN .
SILANO . COS—AQVA . MAR

[s] Gruter, pag. clxxxiii. 4,—
Q. AQVILLIO . SABINO . II.
SEX . AVR . ANVLLINO
CASTR . PRÆT . L. VRBIS . OFF . PED .
COS . CCCLXXXIII.
AQVA . MARC

[t] HAC RIVI AQVAR
TRIVM EVNT CIPPI
POSITI IVSSV
A. DIDI. GALLI
T. RVBRI. NEPOTIS
M. CORNELI FIRMI
CVRATORVM AQVAR

Julia. The upper one only was excavated; but if the noble Roman princes who conducted this excavation had dug a little deeper, they would probably have found the other two *under* the one that they had discovered. These three *specus* must have been carried along and in the *agger* of Servius Tullius.

To reach that part of it on the side of which these *cippi* are found, they probably went along the side of the road that passed on the south side of the Prætorian Camp, on which was the gate called Porta Chiusa. Close to this gate remains of a large reservoir were found in the researches of 1869 on the bank, with the Wall of Rome carried right across it; but this part of the wall is medieval, built of old materials, and it is probable that, originally, the front wall of this reservoir was included as part of the wall of the city, in the same manner as that of the Tepula near the Porta S. Lorenzo. This reservoir, with the Porta Chiusa by the side of it, and the road from it to the *agger*, at the place where the *cippi* were found, is now in the garden of the Baron Grazioli.

VI. Aqua Virgo (B.C. 21).

This Aqueduct was made by Marcus Vipsanius Agrippa to supply water to his Thermæ, on the south side of the Pantheon, which was the hall of entrance to them.

Frontinus writes :—

"The same (M. Agrippa) when he had been consul for the third time, and when C. Sentius and Quintus Lucretius were consuls, that is, thirteen years after he had brought down the Julia, he brought the 'Virgo' also, the water of which was collected in the Lucullan fields[u].

"The Virgo begins on the Via Collatia, at the eighth milestone, in some marshy places: a cemented wall [*signino*[v] *circumjecto*] being placed round it, to retain the bubbling waters; the source was increased by many other additional supplies. It comes for a length of 14 miles and 105 paces. Out of this,— by a subterranean stream 12 miles, 865 paces; above ground for 1 mile, 240 paces, of which it runs on a substructure in several places for a distance altogether of 540 paces; on arched work 700 paces. The channels of the additional supplies of the subterranean stream make 1 mile, 405 paces[x]."

The Virgo has no reservoir, i.e. Piscina ... "The arches of the Virgo have their commencement beneath the Lucilian (or Lucullan?) gardens. They end in the Campus Martius, along the front of the Septa[y]."

The Virgo was the seventh in height as to level (c. 18).

The road now called Via Collatia, or Collatina, where the Aqua Virgo has its origin, is between the present roads to Tivoli and Palestrina; it turns off to the left or north of the highway now called Via Prænestina, just beyond the ruins called Torre de' Scavi or de' Schiavi, about three miles from the city. But this is an alteration; the old road from Rome to this point in a foss-way may be traced *behind* the tower in the meadows, with the subterranean aqueduct running under and in the southern bank of it, as traced by the respirators or ventilating shafts. There are remains of very ancient tombs at intervals all along the line of this old road, which goes straight towards a postern-gate midway between the Porta Maggiore and the Porta di S. Lorenzo. This must be the Via Collatia of Frontinus.

Close to this road, at eight miles from Rome, near the ruins of Collatia, there are several springs in marshy ground, from which

[u] Frontinus, c. 10.

[v] "Concipitur Virgo via Collatia ad milliarium octavum palustribus locis, *signino circumjecto* continendarum scaturiginum causâ." *Signinum* is the particular kind of cement to hold water, always used to line the walls of the Aqueducts. It was not used after the time of the Empire, and the art of making it is said to be lost. It is the usual characteristic of the remains of an aqueduct.

[x] Frontinus, c. 10.

[y] Ibid., c. 22.

the water is collected in a series of reservoirs, just below the level of the ground, the vaults over them being sometimes above ground; from these small reservoirs separate short conduits run to the same point, the great central *castellum aquæ*, part of which is a cave in a rock, with a larger semicircular basin built out in front of it, over which passes the cross-road from the Via Collatia to Salone.

The line of the *specus* can be distinctly traced from this reservoir near its source to the city by the respirators over the wells. The smaller *castella*, or cisterns, at the sources are also still in use.

About four miles from Rome, on the road now called Via Collatia, or Collatina, a portion of the Aqueduct was rebuilt under Benedict XIV. in 1753, as stated on an inscription upon it. It is here carried across a shallow valley, on an *agger* built of rough concrete faced with brick, for about a quarter of a mile. At the further end is a conduit-head, or a modern *castellum aquæ*. This is a small oblong building with a semicircular head erected under Pius VI. in 1788, by Joseph Vai; and the conduit was continued by him for the length of 175 feet, also stated in an inscription upon it[z].

From this point there is a branch to the south for a short distance, with two respirators visible in the field; but this, though appearing like an additional source, is only a branch leading to an old fountain of a villa.

The main line comes from the north along the bank of the Via Collatia, as shewn by the respirators, at regular intervals of about a hundred yards. These are mostly round masses of concrete with round heads; but some are dwarf pyramids, one of which, numbered "40," has been rebuilt in 1866. The surplus water is

[z] This water is now usually called Acqua di Trevi, because its terminus is at the great fountain of Trevi. The sources are in the estate of Salone, as above described. It is still in use, and was long considered as the best water brought into Rome. The line now used is the one repaired and restored by the Popes; but, near Rome, it has been altered, probably after it had been damaged by the Goths or the Lombards. The old *specus* passed through the Catacomb of S. Priscilla, in the Via Salaria, where it may be seen. This is demonstrated by the *cippus* of the aqueduct of Virgo, discovered in the Via Salaria, and so recorded by Muratori, Thes. Vet. Inscr., ccccxlii. 7, "Romæ in Via Salaria:"—

VIRG.
TI . CÆSAR . AVG.
PONTIF . MAXIM.
TRIB. POT. XXXVIII.
COS . V. IMP. VIII.
I.
P. CXL.

This inscription is A.D. 36.

It was then brought to the bank or *mœnia* on which the wall of Aurelian was afterwards built near the Porta Salaria, and may be traced upon or in that bank under the present wall of Rome for about a mile. For a short distance, where this ground is low, it was carried on an arcade, of which there are remains under the wall built upon it. After this it goes on as far as the garden of the Villa Borghese and the French Academy, under which it now passes through the Pincian Hill.

carried into a brook which runs by it, and receives its chief supply from it.

The *specus* or conduit of the Aqua Virgo passes along the line of the old road in a direct line west, towards the Porta Maggiore, until within about half a mile from that gate; then it makes a great detour to the north, passing under the modern Via Tiburtina, and eventually enters Rome through the Pincian Hill a little to the north of the Spanish steps, and there is a reservoir for it at the end of a short street called the Via del Bottino. It then goes to the present fountain of *Trevi*, passing at the back of the houses in the Via del Nazareno, where it may be seen in several of the courtyards. In one of these, on the left hand of the street, is an inscription recording its repair by Claudius[a]; in another, on the right, is an ancient lavatory below the level of the street. A branch passes under the Via dei Condotti carried in leaden pipes, enclosed in a brick *specus;* this branch is the one that led to the Thermæ of Alexander Severus, which were situated to the north of the Pantheon. The main line supplied those of Agrippa, for which this aqueduct was made. The Aqua Virgo chiefly supplies the fountains and houses in the Campus Martius, or lower city, and the main stream terminated originally in front of the Septa[b], considerably to the south-west of that fountain. In some excavations made in the summer of 1871, a portion of it was found in the Piazza di S. Ignazio. This original termination was at the north end of the Septa, very near the Pantheon.

This aqueduct was restored by Pope Hadrian I., A.D. 772—795, after it had been damaged by the Goths. It was afterwards repaired by several subsequent pontiffs, especially by Boniface IX., A.D. 1389, and by Nicholas V. in the fifteenth century. It now supplies the

[a] TI . CLAVDIVS . DRVSI . F. AVG. GERMAN. PONT. MAX. TRIBVNIC. POT. V. IMP. IX. P.P. COS. III. DESIG. IIII. ARCVS . DVCTVS . AQVÆ . VIRGI NIS . DISTVRBATOS . PER . C. CÆSAREM . A. FVN DAMENTIS . NOVOS . FECIT . AC . RESTITVIT

This inscription was erected A.D. 46.

[b] There are remains of the Septa in the cellars under the houses on the west side of the Corso, in its lower part. These remains of the arcade are now chiefly underground, owing to the filling up of the great foss, called in this part Via Lata, because the wide foss under part of the Quirinal and of the Capitol had at one time been made into a wide street or place, on the eastern side of which is situated the Church of the "SS. Apostoli in Via Lata" and that of S. Maria in Via Lata on the western side, at the north-west corner. The great public building called the Septa went down the western side of this wide place from S. Maria to the Venetian Palace, with an arcade towards the street or place, of which many of the arches remain in the cellars. These arches under the church of S. Maria are absurdly called the house of S. Paul. They are visible also under the Palazzo Doria to the south of that church, and in other cellars.

fountains in the Piazza Colonna, erected in 1574; at the Pantheon, restored in 1711; several others of the seventeenth century; and that of the *Trevi*, erected by Benedict XIV. in 1730.

Near the source of the Virgo passes an abundant stream, also called Marrana; but this has mineral properties, and was therefore carefully avoided in forming the aqueduct for the Virgo. Pliny says [c] that there was a stream which was abhorred by the Virgo, and for that reason the water was called the Virgin. This stream was called by him *Rivus Herculaneus*, some say for its salubrious qualities, because Hercules was the god of health; others because it was a strong stream. There is little doubt that this is the stream here described. The same name of Herculanean is given by Frontinus to the stream now called Marrana [d] in two places, because it was also a strong stream.

[c] "Idem et Virginem adduxit ab octavi lapidis diverticulo duobus millibus pass. Prænestina Via.

"Juxta est Herculaneus rivus quem refugiens Virginis nomen obtinuit." (Plinii Nat. Hist., lib. xxxi. c. iii. § 25.)

[d] Of this stream and its introduction into Rome in the twelfth century, an account will be found in the second part of this chapter.

Frontinus, c. 15 and 19.

VII. The Alsietina (A.D. 10),

Afterwards made the Aqua Paola.

Frontinus says of this water, "What could have induced Augustus, that most careful of emperors, to bring in the water of the Alsietina (which is called Augusta) I do not well know; for it is not pleasant to the taste, and therefore of no use for the people. It may be, however, that when the work of the Naumachia approached completion, in order not to divert the more wholesome water, he introduced this for the special purpose, and gave the surplus to the adjacent gardens and territories.

"It is the custom, however, in the Transtiberine Regio, when the bridges require mending, and there is no water forthcoming from the city side, to make use of this for supplying the public springs, as a matter of necessity.

"It begins in the Alsietine lake on the Via Claudia, at the fourteenth milestone, about six miles and a-half off on the right hand. Its course is in length 22 miles, 172 paces, and over arched work 358 paces [e]."

"It is the lowest of all as regards the level, supplying only the Transtiberine Regio, and the places adjacent [f]."

"The manner of beginning the Alsietine aqueduct is not described in the commentaries, nor can it now be found with certainty; it begins from the Alsietine lake, and then about the *Cariæ* receives water from the Sabatine lake also, as the Aquarii regulate. The Alsietine gives 392 quinariæ [g]."

The lake formerly called "Lacus Alsietina," now called Lago di Martignano, is situated on the hills on the western side of Rome, between the Via Aurelia and the Via Claudia, (not far from the old carriage-road from Florence to Rome). It is about 679 ft. above the level of the sea; and as Rome is only 204 ft. at the Porta Maggiore, the lake is 475 ft. above the level of Rome at that high point. There is another small lake about a quarter of a mile from, and a little above the level of, the Alsietina, called Strachia Capra, which has recently been drained by a tunnel in imitation of the *emissario* from the lake of Albano. The water in the Lacus Alsietina has also been very much lowered in the same manner [h]. In consequence of this reducing of the level of the water,

[e] Frontinus, c. 11.
[f] Ibid., c. 18.
[g] Ibid., c. 71.
[h] The draining of the lakes in the hills round Rome is a great mistake, and very injurious to the health of the city. Such lakes are a wise provision of nature for collecting some of the surplus water in the rainy season, and preserving it for use in the hot and dry season, when the evaporation from the lakes helps to cool the air. The water also drawn from these lakes was most useful for the irrigation of the country round Rome, and watering the gardens in Rome itself, thereby promoting vegetation, which is essential for health in a hot and dry climate. It is well known that the leaves of plants and trees (more especially of deciduous trees) absorb *nitrogen*, which is the part injurious to human life, and give out *oxygen*, that

the *specus* of the aqueducts are now brought to view, being on the bank and above the present level of the water, so that they can distinctly be seen and entered into[i].

To begin with the highest, the *specus* of the Aqua Paola begins in the upper lake, and forms a junction with the water from the Alsietina Lake, near the bank of the latter, at the south end of that lake. The *specus* of the Alsietina of Augustus is a tunnel cut in the rock[k]. The Lacus Sabatina[l] is at the elevation of about 523 ft., and therefore 156 ft. below the Alsietina. Augustus drew an additional supply of water from this lake, and this portion only of the aqueduct of Augustus was restored by Trajan. The water for this was not drawn from the lake itself, but from the springs that supply the lake on the western shore, the side most distant from Rome. Some of the work of the time of Trajan is visible there. The *specus* of the Alsietina has been traced to the point of junction with the Aqua Paola (this water having been restored to use by Pope Paul III., A.D. 1540), and it still supplies the district of the Trastevere. It does not appear that Trajan used the water of the Alsietina at all, but the engineers of Pope Paul evidently did so; a tunnel, or *specus*, from that lake having been made in the time of Pope Paul, the entrance to which remains, with the grooves for a flood-gate[m]. After the junction with the Aqua Paola, the old wells can no longer be traced; their place is supplied by the constructions called *respirators*, each of which is a small square structure surmounted by a pyramid. These are evidently built over the wells, and very rudely constructed of the stone of the country, worked rough. When we arrive at the Osteria Nuova,—which is near the site of the

portion which is beneficial to, and necessary for, human life. Where there is no vegetation, therefore, the climate cannot be healthy, and without water there can be no vegetation; for water is the necessary food of plants.

[i] The line of this subterranean aqueduct can also be traced by the wells descending into the *specus*, in the same manner as the Aqua Appia was traced in 1870, that is, by the bushes growing at the top of each of the wells, and generally enclosed by a wooden railing to prevent animals from falling into them.

[k] The rock in which the tunnel is cut is a sort of peperino, hard and rough, covered with a bed of clay.

[l] This lake, called Sabatina in the time of Frontinus, was called Anguillara in the Middle Ages, and is now called Bracciano, in both cases from the names of the proprietors. The great family of Anguillara had their origin from this village, of which they were the proprietors, and where they had a castle on the bank of the lake. The present proprietors are the Dukes of Bracciano. The lake produces a great abundance of fish, especially a small fish much resembling the whitebait of London, at least when cooked.

[m] There is a small construction over this flood-gate, and at the back of it is this inscription:—

ACQVA PAOLA
ALLA PRESA DELL' ACQVA
ALSEATINA

ancient city of Cariæ [n], mentioned by Frontinus, and the old village of S. Maria in Celsano, the point of junction of the Alsietina and Sabatina,—there are evident marks of another junction of aqueducts there. The house itself, now used as an *osteria* or hostelry (*auberge*), is made out of an ancient Castellum Aquæ, as is frequently the case with similar houses in the country round Rome, and sometimes even within the walls. At about half a mile from this *osteria*, in a hollow, is a white house called Casale Bianco; and close to this is a fountain, supplied by a spring which runs into a *specus*. This water, being one of the sources of the Aqua Paola, passes through the hill at a considerable depth. At about half the distance between this and the *osteria* is a remarkable passage for the Aquarii into the tunnel by a very steep descent, passing sideways across the *specus* of the Aqua Paola, and going on to a much greater depth to the Aqua Alsietina [o]. This passage is 150 ft. in length from the surface of the hill, and 70 ft. in perpendicular depth, with ninety steps, of which only a few at the top are visible; the others are covered with earth. The water still runs through the upper *specus*, and is still in use, but not through the lower one [p].

From the valley beneath the sloping passage for the Aquarii, near the Osteria Nuova, Nibby [q] traced the Alsietina as a tunnel cut in the tufa rock, a part of which he saw near an oil mill. The *specus* then followed the low ground from the tenements of S. Niccola, Porcareccina, Maglianella, and from the Villa Panfili, to the principal gate of the monastery of *S. Cosimato* (or SS. Cosmas and Damian in the Trastevere), where it is stated by Cassio [r] that the *specus* was found in 1720, about thirty feet underground. The Naumachia of Augustus is said to have been near this monastery.

[n] There are interesting remains of the Necropolis of this ancient city close to the fountain before mentioned, on each side of a deep ravine. On one side, there are nine chambers cut out of the rock on the edge of the cliff, the entrance being in the central chamber, with four others on either side of it. All are full of small square *columbaria*, of very early character. On the opposite side of the ravine, is a similar series of tombs, but in a less perfect state.

[o] There is *Opus Reticulatum* of rude and early character (more like the *Opus Incertum* of the Emporium than the mausoleum of Augustus) at the entrance of this passage, which is mentioned by Nibby. There is a stone-quarry also at the entrance, of the hard, dark-coloured stone used for making roads, and excellent for that purpose. This is the same stone that is called *selce* or *silex* in Rome, and seems to be similar to the hard lava under which Herculaneum is buried, and of which there are quarries near the tomb of Cecilia Metella.

[p] The persons employed by Mr. Parker went down to the bottom of this steep tunnel-passage to ascertain this.

[q] Nibby, Analisi storico-topografico-antiquaria della carta de' Dintorni di Roma, tom. i. Roma, 1837, 8vo. art. *Alsietina*.

[r] Cassio, Corso delle Acque, vol. i. p. 147.

The complaints of Frontinus appear to have been listened to by the Emperor, and great changes and improvements were made in this aqueduct under his direction, in the time of Trajan; this is in fact the same as the Aqua Trajana (see X.), and the water still comes from the Lacus Sabatina, but not from the Alsietina. In going from Rome, the respirators can be followed across Monte Mario, and near the high road that passes over Ponte Molli, to the point of junction about ten miles on the road to the Cariæ [now Osteria Nuova]. Here the respirators cease; but their place is supplied by a line of old wells descending into the subterranean *specus*, which follows the line of the *old road*. This is not always the same as the new one. The other branch, which supplied the Naumachia, was the only one made in the time of Augustus. Paul V. repaired this aqueduct along the whole line, restored it to use, and put up in various places inscriptions recording this, in which he calls it the Aqua Alsietina[s]. The last of these is on his fountain at the mouth of the aqueduct, where the water still gushes out in great abundance, as it did in the sixth century, when it was observed by Procopius; this is on the Janiculum, above S. Pietro in Montorio, the highest ground in Rome.

[s] Nibby considers this a mistake, and is of opinion that the water was the Sabatina, not the Alsietina; but the mistake is made by Nibby himself, not by the engineers of Pope Paul, who certainly brought the water from the Lacus Alsietina and the other small lake above it (as mentioned on p. 50). By the draining of these lakes, the aqueduct is *now* made to depend on the Lacus Alsietina only. The sources of the Alsietina are very different from those of the Sabatina. The former was taken by Augustus from the lake Alsietinus, now called Lago di Martignano, and the latter by Trajan from the sources between the lake Sabatinus and the villages of Vicarello, Bassano, and Oriolo. The Alsietina was at the lowest level of all the aqueducts, and the Sabatina at the highest. The first *specus* was for the most part subterranean, and the other was carried upon arcades for part of its course.

VIII., IX. The Claudia and Anio Novus (A.D. 52).

"Afterwards Caius Cæsar, (Caligula,) who succeeded Tiberius, considered seven aqueducts scarcely sufficient for public purposes and private amusements, and began two new aqueducts in the second year of his rule as Emperor, when Aquilius Julianus and P. Nonius Asprenas were consuls (i.e. A.D. 38), in the year of Rome 789, which work Claudius in a most splendid manner finished and dedicated, on the calends of August, in the year of the city 803 (i.e. A.D. 52), when Sulla and Titianus were consuls[t].

"To one, which was brought from the springs of Cæruleus and Curtius, the name of *Claudia* was given. This one is next in order of excellence to the Marcian.

"The other, because two streams of the Anio had begun to flow into the city, so that they should be more easily distinguished by their names, began to be called *Anio Novus*. It ruins all the others[u]. To the former Anio the cognomen of *Vetus* was added[x]."

"The Anio Novus and Claudia are carried from the *piscinæ* upon higher[y] arches, so that the Anio is the highest of the two. Their arches come to an end after the Pallantian Gardens, and thence they are carried down in pipes for the use of the city.

"But first of all the Claudia transfers a part of its water on to the arches which are called the Neronian, at the *Spes* (*Specus*) *Vetus*. These, being continued in a direct line along the Mons Cœlius, are terminated close to the temple of Claudius. They disperse the quantity which they had received either about the 'Mons Cœlius' itself, or in the Palatine, in the Aventine and the Transtiberine Region[z]."

VIII. The Claudia.

"The Claudia begins on the Via Sublacensis[a], at the thirty-eighth milestone, about 300 yards off the road towards the left. There are two very large and beautiful springs, one called Cæruleus, from its blue appearance, the other Curtius[b]. It receives also the spring which is called Albudinus, of such excellence, that when there is need of adding it to the Marcia, the latter loses none of its quality by the addition. The spring of the Aqua Augusta, because the Marcian seemed to be sufficient for itself, was turned aside into the Claudian; nevertheless it was retained as a protection for the Marcian, but so that the Augustan might be added to the Claudian, if the channel of the Marcian was not capable of receiving it[c]."

"The channel of the Claudia is 46 miles, 406 paces in length; of this, 36 miles, 230 paces is by a subterranean course: on work above ground 10 miles, 176 paces, and out of this on arched work, in many places in the upper part, 3 miles, 76 paces; and near the city from the seventh milestone, by a substructure of channels for 609 paces, on arched work 6 miles, 491 paces[d]."

"The Claudian was the second in height as to level[e]."

[t] By the more usually received computation, the second year of Caligula would be A.U.C. 791; and the year of the consulship of Sulla and Titian, A.U.C. 805.

[u] It surpassed all the others *in quantity*, and being the highest, was used to supply the others when the water fell short; but the water was not so good for drinking.

[x] Frontinus, c. 13.

[y] That is, higher than any other aqueduct.

[z] Frontinus, c. 20.

[a] The road to Subiaco.

[b] Frontinus, c. 14.

[c] Ibid.

[d] Ibid.

[e] Ibid., c. 18.

IX. The Anio Novus.

"The Anio Novus, at the forty-second milestone, on the *Via Sublacensis*, at *Simbruinum*[f], is taken out of the river, which, since it has about it cultivated land in a rich territory, and so very loose banks, flows muddy and turbid even when uninfluenced by violent rains; and therefore at the very entrance of the channel is placed a cistern for the mud (*piscina limaria*), so that the water on its way from the river to the *specus* should settle and become clear. From this cause also when heavy showers come down, the water flows into the city in a muddy state.

"There is joined to it the *Rivus Herculaneus*[g] which rises on the same road at the thirty-eighth milestone, in the same neighbourhood as the springs of the Claudian, on the other side of the river and the road. This is very pure by nature, but when mixed it loses the advantage of its freshness.

"The channel of the Anio Novus is in length 58 miles, 700 paces. Out of this 49 miles, 300 paces is by a subterranean channel;—on work above ground 9 miles, 400 paces; out of this on substructure or on arched work in several places in the upper part 2 miles, 300 paces, and nearer the city, from the seventh milestone, on a substructure of channels 609 paces, on arched work 6 miles, 491 paces. These are the highest arches, elevated in some places 109 feet[h]."

"Nor was it enough for our Emperor [Nerva] to have restored an abundant and pleasant supply of water in the other aqueducts; he thought he saw his way to getting rid of the bad qualities *even of the Anio Novus,* he therefore ordered the *source to be changed from the river*, which was now left alone, and taken instead *from the loch in which* the water was most pure, and which *is situated above Nero's villa on the lake* (*super villam Neronianam Sublaquensem*[i]);" i.e. at Subiaco, now a medieval castle and a modern town.

"But the water of the Anio Novus often spoilt the rest, for since it was the highest as to level, and held the first rank as to abundance, it was most often made use of to help the others when they failed. The stupidity, indeed, of the Aquarii was such that they introduced this water into the channels of several others where there was no need, and spoilt water which was flowing in abundance without it. This was the case especially as regards the Claudia, which came all the way for many miles in its own channel perfectly pure, but when it reached Rome, and was mixed with the Anio, lost all its purity. And thus it happened that most of the streams were not in fact helped at all by the addition of the extra water, through the want of care on the part of those who distributed it[k]."

[f] *In Subruino* is the reading given in the text by Dederich. *In suo rivo* is the reading adopted by Polenus, Jocundus, and other editors. A third reading has been suggested, "In Simbrivio," or in Simbruino, that is, referring to the Simbruine hills. This is the reading of Buecheler (1868), who follows verbatim the manuscript of Monte Cassino. The reading, however, bears little upon the evidence.

[g] *Herculaneus Rivus.* This is not the same *Herculaneus Rivus* as the one mentioned by Frontinus in connection with the Anio Vetus, in ch. 19. The same name is given in these places to different streams, all strong and rapid.

[h] Frontinus, c. 15.

[i] Ibid., c. 93.

[k] Ibid., c. 91.

The Neronian Arches.

"Amongst those abuses which seemed to require reform, may be mentioned what took place regarding the supply to the Cœlian and Aventine hills. These hills, before the Claudian was supplied to them, were accustomed to use the Marcian and Julian; nevertheless, when the Emperor Nero gave them the Claudian raised to a greater height on the series of arches extending to the Temple of Claudius, where it was distributed, the older streams, instead of yielding an increased supply, were lost altogether. He made no new castella [for the Claudian], but used those which were there, and which retained their names, although the water brought to them was different[l]."

The River Anio.

The highest source of the river Anio, or Aniene, is in a gorge in the highest part of Mount Cantaro, about 63 miles from Rome. This spring never fails in the hottest and driest weather, and is always cool; it is situated in the close or (*serra*) of St. Antonio, and is called *La Canala*, or the canal at the gate of the small castle or fortified village of Filettino. Pliny says[m] that it rises in the territory of Treba[n]. In going from Filettino towards Trevi the road has an ancient pavement, and on the left-hand side is a magnificent substructure of Cyclopean character called *Mura Saracine*, against the cliff. In 1857 Signor Gori saw some of the large stones of this fine ancient substructure thrown down to the banks of the stream, to make the foundations of a small bridge across it. The stream receives several accessions from other springs in its course, two from a cave called Pertusu, the small limpid stream called Suria, on the hill of Trevi, and another called Capo d'Acqua. The Anio thus augmented falls in two cataracts, or cascades, near Pertusu, and passes under the Ponte delle Tartare with much violence. This

[l] Frontinus, c. 76.

[m] "At ex alia parte Anio in monte Trebanorum ortus lacus tres amœnitate nobiles, qui nomen dedere Sublaqueo defert in Tiberim." (Plinii Nat. Hist., iii. 109.)

[n] The inhabitants of Filettino probably belonged to the tribe of the Trebani, or of Trebula, who were located in the neighbourhood of Trevi, where was a Roman colony and principality. Inscriptions giving the names and titles of Augustus, Septimius Severus, and Commodus, were found here, and are published by Signor Gori in his Trattato dell' Acqua Marcia, &c., 12mo., 1866, p. 37. Another inscription at Anagni, on the front of the Governor's palace, gives the name of Publius Vecellius, curator of the Republic of the Trebani.

Martial mentions the Treba Augusta of Frontinus, under the name of Trebula:

"Trebula nos genuit, commendat gratia duplex
Sive levi flamma, sive domamur aqua."
(Lib. v. epigr. 65, and lib. xiii. epigr. 33.)

Livy also mentions it: "Eodem anno Arpinatibus Trebulanisque civitas data." (Livii Hist., x. 1.)

bridge is a natural arch of rock formed by the force of the water piercing it. The river then passes on through a gorge in the mountain-pass in small waterfalls, especially at a place called Pendema, where in 1855 an ancient mosaic pavement and a wall of reticulated masonry were found.

At the two bridges of Communacchio (*comune acqua*), where an amphitheatre of mountains and the castle of Valle-pietra are situated, another stream coming from the mountains of the Trinitá and Autore, the highest in that district, joins the Anio.

In the basin of Valle-Pietra, two fine cascades fall over the massive rocks and unite in a single stream. From the bridge of Communacchio a road leads to Arcinazzo, situated in a large plain, surrounded by the mountains, with several roads leading into it. One of these from Palestrina, passing by Piglio, is an ancient paved road, and some persons consider that an arcade of Cyclopean masonry, near Guarcino, carried an aqueduct to the *thermæ* there. On the south-west side of this plain are the ruins of an imperial villa, commonly called of Nero; but two inscriptions found there upon leaden pipes in 1860, shew that it was of Trajan[o]. Great quantities of marble were dug up here in the time of Pius VI., A.D. 1795.

The river passes below the monastery of S. Benedict, called the Sacro Speco, and a little lower down, the monastery of S. Scholastica, both of which stand on the brink of a precipice, over which the Anio makes a large and picturesque waterfall, and passes under the bridge of S. Mauro or Piedilago, where the rocks approach so closely as to leave only a narrow passage, which was formerly closed by a gigantic wall, forming a long lake or lock. The stream now passes through the ruins of the wall, the demolition of which was caused in 1305 by two ignorant monks, who pierced a hole at the foot of the wall, the result being that the whole country was inundated up to the walls of Rome, and serious mischief done, as recorded in the anonymous chronicle of the monastery[p].

On the banks of the lake are the ruins of a villa of early character, called Casa de' Saraceni and Carceri, with a *nymphæum* and baths. At Pianigliu, are other ruins on an enormous scale.

Subiaco is more than two thousand feet above the level of Rome, and all the foregoing description applies to the part of the river

[o] IMP CAESARIS NERVAE TRAIA(*ni*) . . . OP(T)IMI AVG GERMANIC DACICI.

[p] "Lacus monasterii ad nihilum redactus, quia duo monachi levaverunt duo lapides, qui fuerunt firmati cum aliis petris; et sic aqua destruxit." (Chronicon Sublacense, apud Muratori, Rer. Ital. Script., tom. xxiv. col. 962, D.) The author of this Chronicle was living in the year 1390.

above Subiaco. In all this upper part of the stream, the river Anio has very much the character of a large mountain-torrent rushing through the rocks with great violence. It usually appears to be a clear stream of beautiful water, excepting in time of floods, when the clayey soil is brought down into the stream and makes it muddy. To guard against this evil, Nero made his great lakes, which do not correspond at all to the usual English idea of a lake, by which is commonly understood a considerable sheet of water, like the Swiss lakes or the lakes of Westmoreland, Scotland, and Wales. The Roman word *lacus*, and the modern Italian *lago*, may mean a lake of this description also; but it includes a reservoir of water of any kind. We are expressly told in the *Breviarium*, at the end of the Catalogue of the Regionaries, that a *lacus* is a well, *puteus*, and the numerous *lacus* of that Catalogue are the same as the *castella aquarum* of Frontinus, within the walls of Rome. These justly-celebrated lakes of Nero are in fact portions of the river Anio, intercepted in a gorge of the rocks about a mile above Subiaco, and are formed by cutting away some large pieces of the rock on each side in large masses, and with these building a great high and massive wall across the stream, forming an effectual barricade or dam to stop the water and raise it to the level of the top of this great wall. There were three of these walls across the stream, over each of which the river fell in tremendous cascades. The first loch (*lacus*) commenced at the Mola di Ienne, where the first great wall of enclosure is situated. The second at the cascade of the river, under the great monastery of S. Benedict, and called "the Sacred Specus," from a cave in which the saint is said to have lived, extends to the bridge called Ponte di S. Mauro, where the *specus* of Trajan commenced. The third is from the Ponte di S. Mauro, through a gorge, where the wall of enclosure is visible. Here was the Piscina Limaria of Claudius, and the *specus* of the Anio Novus originally commenced at the Emissarium, restored by Cardinal Barberini. This was made by Claudius, but was abandoned by Trajan, because the earth from the adjoining fields had fallen between the river and the *specus*.

The Villa Sublacensis of Nero was below the level of the upper lake or loch, as mentioned by Frontinus. This was just above the present bridge called S. Mauro or Piè-di-lago, which seems to be made upon the two ends of the dam. This dam, wall, or barricade, was quite 150 feet above the surface of the water in ordinary times. The bridge is still 144 feet above the water by measurement, and the *specus* is nearly ten feet higher. This *specus* or conduit is cut in the rock of the cliff on the side of the valley, at

the level at which the water originally stood in this lake or loch; the wall was a few feet higher, in order to force a portion of the water to pass through the *specus* before the rest fell over the cascade. There are ruins of the *piscinæ* on the bank where the *specus* began, and of the villa of Trajan on both sides of the loch, with the well-known brickwork and *Opus Reticulatum* as facings for the walls. These magnificent cascades still remain, being a natural formation; but as the bed of the river is very deep, they are much concealed by the banks, and the shrubs upon them. The great walls or dams of Nero and Trajan being brought out to the edge, the cascades falling over them must have had a much finer effect, although the natural site is extremely grand and most picturesque; in fact it is celebrated among all the landscape painters of Italy, the scenery about Subiaco being among the finest of its kind of river and mountain scenery that is known. The enormous reservoirs or lakes, or lochs of Caligula and Claudius (commonly called of Nero), cover the space between the natural cascade and the outer wall of rock artificially constructed, over which the water was made to fall. When the ignorant monks in the fourteenth century made an aperture in the great wall or dam, the force of the water soon enlarged it, and washed the whole structure away, leaving the great masses of stone or rock, of which it had been built, scattered in the stream below as if they were natural rocks, where they still remain. The object of the monks was to release their fields adjoining to the monastery above the falls from a temporary flood.

The *specus* is nearly six feet high, and only sixteen inches wide; the men must have cut it standing sideways. There are apertures into it at intervals now open, and there probably always were such openings for the use of the *aquarii* to keep the course clear. The *specus* which Frontinus calls *subterraneus*, although that is *literally* true, does not mean exactly what we now call a tunnel; but this *specus* is cut in the rock of the cliff, with a few feet of stone only as an outer wall to it, and in this manner it is continued along the edge of the valley of the river Anio for many miles, always on the left side of the river in going towards Rome. An old road runs by the side of it, not now used for carriages, but remaining as a cart-road only; this must be the Via Sublacensis of Frontinus. Another road runs along the right-hand side of the valley, and is the one now in use: this is the Via Sublacensis Neroniana of the time of the Empire. The valley varies in width very much, in some parts it is three or four miles wide; this is the case where the springs of the Marcia and the Cerulean Lake gush out from the rock under the

diverticulum of the Via Valeria or present carriage-road, on the right-hand side of the valley.

The lowest of the three lakes of Claudius above Subiaco was circular, the rock being cut away to a half circle on each side of the stream; into this great basin the grand cascade fell from the second lake. The lowest lake or loch was comparatively not very deep. It seems most probable that the lowest reservoir was intended to serve for the Aqua Claudia. The *specus* has not at present been traced quite so far; but it is found a little lower down, above the modern paper-mill. This is more than a hundred feet below the level of the Anio Novus. It may be that this was one of the springs that fell into the Anio, and was intercepted for the aqueduct. It is probable that the same was the case with the Anio Vetus, as we know it was with the Marcia; but as the water from the springs sometimes ran short in dry seasons, the Anio Novus was taken from the river itself, a part of which was turned into it from the great lake or loch. For this reason that water was always more abundant than all the rest, and was used to supply the deficiency in case of need, as Frontinus tells us. This *specus* can be entered and examined; it is here a tunnel made in a rock of soft stone, with fissures filled with clay. The *specus* is lined with brick, and covered with large flat tiles, placed at an angle, so as to form a roof sloping down to the two sides from the ridge in the middle. There are inscriptions recording repairs by Cardinal Barberini, nephew of Urban VIII. This *specus* is that of the Anio Novus, constructed by Claudius; that of Trajan is about half-a-mile above the town of Subiaco, and on the right-hand side of the river Anio, not on the left, as the Anio Novus is.

The thirty-eighth milestone on the Via Sublacensis was found by Fabretti *in situ*, and the thirty-eighth milestone in the Via Valeria, now at Arsoli, is said by Gruter[q] to have been formerly at *La Sonnoletta*, or *ad fontem Somnulæ:* so that the two sources of the Claudian water, called Cæruleus and Curtius, were at the lake now called S. Lucia, in the territory of Arsoli; and the source called Albudinus is the *first* of the four springs now called *Acque Serene*, while the other springs of the same name formed the *Aqua Marcia*.

The *Piscina Limaria*, referred to by Frontinus as erected by Claudius for filtering the stream, at the entrance of the Anio Novus, at the forty-*second* mile[r] on the Via Sublacensis, is visible at the

[q] Gruter, Inscriptiones, p. clv. 4.

[r] Probably the text of Frontinus here is corrupt, because the Piscina Limaria and the *specus* of Claudius are at the forty-sixth mile on the Via Sublacensis, "ad milliarium quadragesimum *secun-*

Parata della Cartiera of Subiaco. This *piscina* is not covered over, but open at the top, and is excavated in the rock of the bed of the river Anio, with a great declivity and with four cascades to throw down the sand, wood, and weeds brought down the river, and so to purify the water; but as it was still liable to become muddy in the time of floods, Trajan, according to Frontinus, excavated another *specus* in the rock of the mountain near the Ponte di S. Mauro, where the great wall of the lake was situated [8].

The *specus* of the Claudia seems to have been carried on the right-hand side of the valley as far as Vicovaro, about half-way to Tivoli, and then across the valley on an arcade, and carried on under the Anio Novus, and above the Marcia and Anio Vetus. All of these seem to be at different elevations on the side of the hill to the left of the valley, until they arrive at another valley crossing this, called the Valley of the Arches, about two miles from Tivoli, where they were carried across upon arcades. On these ancient arcades, or out of the materials of them, modern bridges have been made, both at Vicovaro and in the Valley of the Arches. The ruins of these splendid arcades are among the finest and most picturesque ruins of the Roman empire.

After passing the bridges across the valley of the Anio, the Anio Novus, Marcia, and Anio Vetus are continued along the side of the hill in what may still be called the cliff of the valley of the Anio, to *near* the cascades at Tivoli, at different levels, the Anio Novus considerably higher than the others. To avoid the cascades here the aqueducts wind round the end of the hill. In going out of Tivoli to the promenade of Carciano, on the side towards Rome, there is a large college of the Jesuits on the left hand, the *specus* of the Anio Novus passing under this, and through a wine-cellar. About a quarter of a mile out of the town, two *specus* are visible on the side of the hill above the road or promenade, and these may be traced at short intervals for miles, with openings into them in several places. The lower one is the Marcian, passing in a more direct line, and further from Tivoli, and is generally cut in the rock as a tunnel; the upper one is the Anio Novus, and is in some places faced with brick or with *Opus Reticulatum*, where it has to cross an opening.

dum," for "Ad milliarium quadragesimum *sextum*."

[8] Dr. Fabio Gori, who is a native of Subiaco, claims the credit of being the first person to point out what this great work of Trajan really was. He also states that the Rivus Herculaneus, rising at thirty-eight miles on the Via Sublacensis, must have been a clear stream, which he finds on the left side of the river, opposite to the lake of S. Lucia and to this source of the aqueduct of the Claudia, called Acqua dell' Arco, or water of the aqueduct.

The Aqua Marcia here passes at a lower level below the road, with reservoirs at intervals, as already described.

At about three miles below Tivoli, and half-a-mile after passing one of the great reservoirs of the Marcia at the lower level, the Anio Novus is carried on an arcade across a valley and a small stream, at a place called after the arcade Arcinelli. The great Villa of Hadrian is nearly under this at the foot of the hill, perhaps a mile lower down. This was supplied with water by branches from the aqueducts, but without interfering with the main streams, which went on at the high level still at least five hundred feet above the level of Rome. From this high level the aqueducts led gradually down in a serpentine course, crossing several narrow valleys or gullies through the hills, along which some mountain-stream flows far below. At two important points, the aqueducts have to be carried across such valleys or gullies on fine arcades or bridges. The one nearest to Tivoli is called the bridge of S. Antony, from a small chapel made in the Middle Ages, probably in the fourteenth century, out of a portion of the *specus* of the Marcia, in one of the chambers of a *castellum aquæ* belonging to it, the rest of which has been destroyed. The *specus* of the Anio Vetus under it has also been destroyed, but the arcade is preserved for the use of horses and foot-passengers. This bridge is about eight miles from Tivoli. There is no carriage-road to it, but a tolerable path for horses or donkeys; it is one of the finest and most picturesque objects on the whole line of the Aqueducts, and is about 100 ft. above the water in the stream below which is called the *fosse* of S. Antony. This valley or gorge in the mountain, with the bridge across it, is not easily seen from any distance; but the site may be indicated by a medieval castle with a tall square brick tower, which is a conspicuous object for miles. This is distinctly seen from the bridge, and as it stands at the mouth of the valley, that object must be seen from thence on looking up the valley. This bridge is a really grand work; it is 373 ft. long, 16 ft. wide, and about 104 English feet high. The dome of S. Peter's at Rome is visible at a long distance from the hill above the medieval castle.

Following the direction of the aqueducts towards Rome for about a mile, along a very rough cross-country path, we arrive at a good carriage-road from Rome to Poli, and about a mile beyond that is another magnificent structure, as fine and more perfect than the last, called Ponte Lupo, one of the greatest works of all the Roman aqueducts. There are not so many open arches as at the bridge of S. Antony, but a greater extent of substructure and wall at each

end, and the height above the mountain-stream is even greater. Several of the arches seem to have been filled up for greater strength, at an early period; it is all work of the first century. Here the two *specus* of the Claudian and the Anio Novus are perfect, one upon the other, and serve as a lofty parapet to the road for horses, which passes across the valley along the side of them, the *specus* occupying about one-third of the width of the bridge. The two *specus* seem to have been first brought together at this point, and afterwards continue one upon the other for the rest of their course into Rome, interrupted only by the *piscinæ* and *castella aquarum* at intervals.

There are ruins of another arcade across the valley at a lower level by the side of this grand bridge, only a few yards from it, which can only be that of the Marcia. The Anio Vetus appears to be carried across under the Claudia and Anio Novus at a much lower level, and it is probably for this reason that the arches are closed instead of being left open. They pass upon four other bridges over the streams of S. Gregory and of the Inferno, before they arrive at the *piscinæ*. They all four meet at this point, and then diverge again for miles. This splendid work is about ten miles from Tivoli, half-a-mile from the carriage-road, five or six miles from the Villa of Hadrian, and out of the line of the direct road to Rome, but very near the road from Rome to Poli. After passing these great works, the aqueducts are continued at their respective levels in the direction of La Colonna and of the *piscinæ*, and are carried in tunnels through the hill, but these tunnels do not appear to be of any great length; they merely pass through part of one side of the hill. They bring us to the *piscinæ*, which are about six miles from Rome, where the arcades begin, and from this point the Marrana follows the same direction in the bed of the Almo, winding about but never very distant from the arcades, and always receiving the surplus water. This stream is here divided into two branches, one of which goes through Rome and into the Tiber at the Pulchrum Littus; the other passes through the valley of the Caffarella, and falls into the Tiber near the church of S. Paul beyond the walls, as is explained under the head of the Aqua Crabra and the Marrana.

The *specus* of the Anio Novus is always faced with brick or with *Opus Reticulatum;* it is carried *upon* the Claudian arcade, and the one *specus* always rests upon the other: what applies to one applies to both after the first junction. The aqueduct of Claudius has a stone *specus* carried on a stone arcade for the last five miles into

the city. It was begun by Caligula, and carried on by his successor; this portion was completed in fourteen years, a very short period for so enormous an undertaking. The Anio Novus was the most abundant of all the aqueducts, as stated by Frontinus[t].

The arches of aqueducts, stretching for miles across the open country and entering Rome at the eastern angle, are the first objects to attract the attention of strangers on approaching the city. These are the arches of the Claudian aqueduct, built of large square stones, with the angles chamfered off, and carrying the streams of the Aqua Claudia and of the Anio Novus.

Of the *Piscinæ* mentioned by Frontinus, the ruins of one remain at the place now called Porta Furba, where the aqueducts just mentioned meet again about two miles from the city. The lofty Claudian arcade passes over the Marcian arcade at this point, at one of the numerous angles, as it had previously done at the Torre Fiscale. From the Porta Furba to Rome, the Aqua Felice is carried against the side of the Claudian, or on the piers of the Marcian, as most convenient, frequently crossing from one to the other on arches over the road. The *specus* of the Felice is built in the roughest manner of old materials taken from the other two arcades. The Anio Vetus also passes underground at the Porta Furba. Immediately after the entrance of the Claudian *specus* into Rome at the extreme east end, in the gardens of the Sessorian Palace (now S. Croce), there are remains of at least four reservoirs or *castella aquarum* before it reaches the Porta Maggiore[u].

Nero was the immediate successor of Claudius, A.D. 54—69, and carried on the conduit into the city, on what are still called the arches of Nero, which are faced entirely with brick, and some of the most beautiful brickwork in the world. So gigantic a work as these aqueducts could not have been completed in the lifetime of a single emperor, however large the number of slaves he may have employed upon it.

The Neronian Arcade.

The arcade of Caligula and Claudius, which is entirely of stone, terminates at the Porta Maggiore, the Esquilina of Frontinus. The work of Nero includes the arches within the city from the wall close to the Porta Maggiore to the great *castellum* on the Cœlian,

[t] Frontinus, c. 72.

[u] The *piscina* made in one of the towers in the wall at the point where it enters Rome, has the four chambers visible, the inner wall of the tower having been destroyed.

over the arch of Dolabella. The *specus* of the Anio Novus is easily distinguished from the *specus* of the Claudia, as the latter is of squared stone.

The arcade of the Claudia has been considerably repaired with brick, and the arches filled up in several places with brickwork of the time of Septimius Severus and Caracalla, A.D. 193—217. This may be distinctly seen in that part of the arcade which is between two and three miles from the city, near the Porta Furba. It was again repaired by Pope Hadrian I. in 780, and several times by other Popes.

The remains of these two aqueducts, one above the other, are admirably seen in their course along the top of the Porta Maggiore; and at this spot their relative levels with regard to the Marcia, Tepula, and Julia, are also clearly exhibited, the latter entering the wall close to the gate, and almost at right angles to it. Thus, at one view, we are able to see the *specus* of five out of the nine aqueducts, mentioned by Frontinus, actually remaining. A sixth, the Anio Vetus, also passes under the Walls of Rome at the same point; the *specus* is half underground, and now concealed by the *restorations* made in 1869.

An inscription upon the face of the *specus* itself in the wall of the city over the archway, records that Claudius the son of Drusus, caused to be brought into the city the water of the Claudian conduit, from the springs called Cæruleus and Curtius, from 45 miles distance; also the water of the Anio Novus, from 62 miles, at his own expense[x]. These dates here given correspond with the year

[x] Inscriptions on the Porta Maggiore:—

TI . CLAVDIVS DRVSI F. CAISAR AVGVSTVS GERMANICVS PONTIF MAXIM TRIBVNICIA POTESTATE XII. COS. V. IMPERATOR XXVII. PATER PATRIÆ AQVAS . CLAVDIAM EX FONTIBVS . QVI VOCABANTVR CAERVLEVS ET CVRTIVS . A MILLIARIO XXXXV. ITEM ANIENEM NOVAM A. MILLIARIO LXII. SVA IMPENSA IN VRBEM PERDVCENDAS CVRAVIT.

IMP . CAESAR . VESPASIANVS AVGVST . PONTIF . MAX . TRIB . POT. II. IMP. VI. COS. III. DESIG. IIII. P.P AQVAS CVRTIAM ET CAERVLEAM PERDVCTAS A DIVO CLAVDIO . ET POSTEA INTERMISSAS DILAPSASQVE PER ANNOS NOVEM . SVA IMPENSA VRBI RESTITVIT.

IMP . T. CAESAR DIVI F. VESPASIANVS AVGVSTVS PONTIFEX MAXIMVS . TRIBVNIC POTESTATE X. IMPERATOR XVII. PATER PATRIAE . CENSOR . COS . VIII. AQVAS CVRTIAM ET CAERVLEAM PERDVCTAS A DIVO CLAVDIO ET POSTEA A DIVO VESPASIANO PATRE SVO VRBI RESTITVTAS . CVM A CAPITE AQVARVM A SOLO VETVSTATE DILAPSAE ESSENT . NOVA FORMA REDVCENDAS SVA IMPENSA CVRAVIT. (Orelli, vol. i. p. 77, Nos. 54—56.)

These inscriptions shew that considerable repairs were made by Vespasian and Titus to the Claudian aqueducts; and these repairs were continued by their successors, Nerva, Trajan, and Hadrian. Many parts and branches belong to the time of these Emperors.

798 of Rome, or A.D. 45. Great repairs were made by Vespasian and Titus to the Claudian aqueduct. The distance from which the Anio Novus is brought, according to this inscription[y], is 62 miles, which agrees with Frontinus[z].

The architect of the Claudian is believed to have been Claudius Annius Bassus, mentioned by Tacitus as chief engineer at Carthage under Marcus Silanus, the father-in-law of Caligula. The remains of the tomb of Bassus may be seen near Vicovaro. The tomb of another architect and his family, on the side of the *agger* upon which the arcade of Nero stands, near the Porta Maggiore, was excavated in 1865. From its situation immediately under the *Neronian Arcade* against the bank on which it stands, there seems no doubt that this Tiberius Claudius Vitalis, whose name is inserted on the front of the tomb, was the architect of the arcade; and it does infinite credit to him, for it is one of the finest pieces of brickwork in the world.

This arcade, commonly called the Arches of Nero, carried the *specus* of the Claudia[a] and Anio Novus combined. It first crosses the foss on a double arcade, one upon the other, to give more height across this wide and deep inner trench; it is then carried on a high bank, and therefore on a single arcade only to the Lateran, and on another bank across the foss between the Lateran and the City to the Cœlian, and along the north side of S. Stefano Rotondo to the reservoir and *piscina* over the arch of Dolabella. This arch was the principal entrance to that part of the Cœlian in which the *Claudium*, or courts and temple of Claudius, were situated. There are magnificent ruins of a large *castellum aquæ* over this arch, faced with the beautiful brickwork of Nero; in part of this the small church of S. Thomas in Formis has been made.

Another large subterranean reservoir remains perfect on the west side of this lofty brick *castellum* of Nero. This consists of three large vaulted chambers under the garden between the church of the twelfth century and the small monastery of the Redemptorists, now

[y] Vide "Delle vere Sorgenti dell' Acqua Marcia," &c., "trattato di Fabio Gori." Roma, 1866. An admirable map shewing the sources and the line of each of the Aqueducts, has been made for me under the direction of the author.

[z] Frontinus (c. 15) gives the length of the *specus* of the Anio Novus as 58 miles and 700 *passus*; add to this the length of the Piscina Limaria and of the three lakes, and we have the distance of 62 miles from Rome for this aqueduct.

[a] "Qui colles, (mons Cœlius et Aventinus,) priusquam Claudia perduceretur, utebantur Marcia et Julia. Sed postquam Nero Imperator Claudiam, opere arcuato altius exceptam, usque ad templum Divi Claudii perduxit, ut inde distribueretur, priores non ampliatæ, sed omissæ sunt: nulla enim castella adjecit, sed iisdem usus est, quorum, quamvis mutata aqua, vetus appellatio permansit." (Frontinus, c. 76)

(1872) all belonging to the Villa Mattei, or Celimontana. There is, through the crown of each of the vaults, a circular opening, or well, closed by a stone, which can be moved at pleasure for letting down buckets into the water; it is still used for the purpose of irrigation. From the low level of this reservoir, it must have belonged to the Aqua Appia. By the side of the garden over this, and above ground, in a line with the Arch of Dolabella, is a wall of the first century, faced with reticulated masonry, probably part of the *castellum* of that period, as new reservoirs have been built there for each successive aqueduct that came to this point. The highest, being that of Nero, was 50 feet above the level of the ground.

Thence the water was distributed in different directions, one branch to the Claudium [b], and thence again to the *stagnum* or pool originally of Nero, but afterwards retained under the Colosseum; a second to the Palatine, passing down the western side of the Clivus Scauri opposite to the church of SS. John and Paul. Then, after making one of the usual angles, it was carried across the valley on the arches attributed to Nero, but in this part really after his time, the lower portions of some of which remain. The third branch was to the Aventine. The plan for this was not carried out until the time of Trajan, when a lofty arcade was made across the valley from the Cœlian to the Aventine, passing over the Porta Capena above the Aqua Appia, which had previously been made in the same line, and with new reservoirs for it, generally by the side of the old subterranean ones. One great reservoir under the Cœlian occupies a considerable part of the space between the cliff and the present road, and is now turned into a gardener's house. The excavations made there in 1868 have been described in the account of the Appia; the piers of the tall brick arcade of Trajan remain on both sides of the road leading direct to the north end of the ruins of the Piscina Publica, on the other side of the Marrana, under S. Balbina; the upper part of this great building is of the time of Trajan. On the side of the Cœlian are remains of another large *castellum*, of two stories, of the same period. There are also remains of this

[b] The large square part of the Cœlian Hill, with scarped cliffs round three sides of it and part of the fourth, which had probably been originally the *arx* or citadel of the Cœlian when that was a separate fortress, and on which Claudius erected some great public building with a temple, is marked on the modern maps of Rome as a *castellum aquæ:* this is an exaggeration. A *specus* runs along the western side opposite to the Palatine in the wall, and goes straight towards the Colosseum, and there are remains of a piscina of the first century at the north-west corner of the Claudium, near the Colosseum, and the Meta Sudans; but this is at a low level, and does not agree with there being a large reservoir under the whole of that space.

aqueduct on the brow of the Aventine Hill, near the church of S. Prisca, in front of the monastery, now in a vineyard opposite to the Palatine, and overlooking the Circus Maximus.

The water both of the Anio Vetus and of the Anio Novus was of inferior quality, and was used chiefly for watering gardens, and for the more common purposes in the city; the Anio Novus, being higher than any of the others, and the water very abundant, assisted all the rest. Trajan endeavoured to improve the quality of the water by excluding the more turbid sources, and using only the most pure, as we learn from Frontinus, who was the person charged with the execution of the work [c]; and this inscription was put up, IMPERATOR CAESAR NERVA TRAJANVS AVGVSTVS.

The waters of the Claudian and Anio Novus are stated by Frontinus [d] to have been united after their entrance into the city, and then distributed to all the fourteen Regiones. Several subdivisions must therefore have been made at different points, and, wherever a division or a junction took place, a *castellum aquæ* was required. The union of the two streams was probably made in the large reservoir at the angle of the Sessorian gardens and City wall near the Porta Maggiore. Another great division was over the Arch of Dolabella; one branch was afterwards carried on by Domitian to the Palatine upon the lofty arches, some of which still remain, and into his reservoir at the south-west corner of the Palatine Hill, part of the baths or *thermæ* of his palace. The branch over the Via Appia to the Piscina Publica and the Aventine was not made until the time of Trajan and Hadrian. A great deal of work was done to the aqueducts at that period. The amazement of the people at seeing copious streams of water pouring over the arid heights and slopes of the Aventine, is recorded by a contemporary author. This was the branch of which a portion remains near Santa Prisca. The branch from the Palatine to the Capitol, of which two of the tall piers remain [e], was made by Caligula; this is sometimes called a bridge across the Forum. To convey the water to the other Regiones, the older conduits or *specus* were probably used.

In the fourth century, there were great complaints of the stealing of the Aqua Claudia by the farmers through whose lands it passed,

[c] Frontinus did not live to see this completed.

[d] Cap. 86, 91, 92, and 105.

[e] These are at present almost hid by modern houses built up against them, but it is expected that these modern erections will shortly be removed. The remains of the bridge project at a right angle from the palace of Domitian. It had the aqueduct at the top at a very high level, and a road for horses by the side of it at a lower level, as at the Ponte Lupo, Ponte S. Antonio, and other bridges of the aqueducts.

and several strenuous decrees against this practice were issued by the Emperors Arcadius and Honorius, A.D. 400. Similar edicts were issued repeatedly by these Emperors, and by Constantine[f].

The springs called Cæruleus and Curtius, to which (when united in this aqueduct) the name of Claudia[g] was given, as Frontinus tells us, are situated in a valley on the south side of the river Anio, thirty-eight miles from Rome, and eight miles below Subiaco (which is forty-six miles from Rome), and not more than half a mile from the source of the Marcia. Several streams issue from the rock under the present carriage-road, a *diverticulum* or branch of the ancient Via Valeria, and form a beautiful small lake of very clear water having a distinctly bluish tint. Another of these springs, the Albudinus, is still considered as equally good with the Marcia, or nearly so. The Anio here flows at the opposite end of this small valley, and both the lakes are now emptied into it. This valley is in the territory of Arsoli, so called from a neighbouring village on a height overlooking it, and the lake of S. Lucia. The spring called Curtius is another of these streams.

This valley is admirably calculated for the sources of aqueducts; the ground is full of springs of beautiful water, and the watery meadows have only to be dammed up a little to form lakes or reservoirs. Probably the water from these springs, which now runs into the river, was entirely intercepted and carried into Rome in the aqueducts. The Anio is in general such an abundant stream, that these additional springs would scarcely be missed, although in time of severe drought the water did sometimes run short[h].

[f] These imperial "Edicts" or "Decrees," or Laws and Constitutions, have been published in various works. The later ones relating to this subject are published by Polenus, in the Appendix to his edition of Frontinus, 4to. Patavii, 1722; and by Rondelet, as a supplement to Frontinus, who had published those issued up to his time. See Commentaire de Frontin sur les aqueducs de Rome, 2 parts, 4to. and atlas folio, Paris, 1802; and Rondelet, Opere, 6 vols. 4to. Mantova, 1841, tom. vi. p. 117, &c.

[g] This water was celebrated for its coolness, as mentioned in the life of Alexander Severus by Lampridius, c. 30.

[h] The new company for bringing these springs into Rome again, under the name of the Aqua Marcia-Pia, has been obliged to make compensation to the town of Tivoli for the possible injury to the manufactories established there, which depend upon the force of the water, although the damage was in a great degree imaginary. This new aqueduct brings the water of the Marcia only. The water is nearly of the same quality as that of the Claudia, and is still found as cool as it was in the time of the early Empire, notwithstanding that it is brought into Rome in metal pipes for the last ten miles. A number of shops for the sale of this cool water have been opened in different parts of Rome. Nature never changes, and the same qualities of particular springs which prevailed two thousand years ago, prevail still. It is said by persons who have witnessed the experiment tried, that in the hot summer weather of Italy, when the thermometer of Fahrenheit stands above 100, the contrast between the heat of

The *piscinæ*, mentioned by Frontinus, were large subterranean reservoirs and filtering-places, at seven miles from the old City or from the inner gates, and six from the outer gates: the portion of Rome outside of the walls of *the city* was considered as the suburbs only, until the time of Aurelian, when the City was made to extend to the outer wall, then newly raised and fortified, but this was long after the aqueducts were made. The present appearance of these two *piscinæ* of the Claudia and the Anio Novus is merely that of earthen mounds or tumuli. They are situated about midway between the old Via Latina, which now in this part is made into a carriage-road to Frascati, and the Via Appia Nova. The distance from one road to the other is about a mile, and the *piscinæ* are about half-a-mile from each. The stream, which was originally a branch of the Almo, and now conveys the water of the Marrana and the Aqua Crabra united, runs near them, and received the surplus water from all the aqueducts on this line. It is divided into two parts near the *piscinæ*, one branch going through the valley called the Caffarella, and falling into the Tiber near the church of S. Paul's outside of the walls; the other keeps near the arcades and reservoirs, and coming through Rome, passes on the south side of the Cœlian. This branch had come from the *piscinæ* nearly parallel to the aqueducts; it winds about a good deal, but is never distant from the line of the latter, now on one side and then on the other. A further account of this will be found under the head of the Marrana, in the second part of this chapter.

the air and the coldness of the water is so great that if a glass tumbler is suddenly put into the water near its source, the glass will break in the same manner as a glass tumbler will break in England if boiling water is poured into it in frosty weather.

THE NINE AQUEDUCTS IN THE TIME OF FRONTINUS.

HAVING sketched the general history of each one of these aqueducts, and the circumstances under which they were erected, it remains to refer briefly to some of those details which Frontinus has handed down to us, of the mode of management of the water. These details apply equally to the whole series. First of all, the position which he and his predecessors in office held was a very important and honourable one. He had the entire responsibility of the water supply, and the absolute control of seven hundred men employed to attend to their proper working, to clean the *piscinæ*, and to repair the channels and pipes when needed. Of these, 240 were appointed by the City, and the remaining 460 by the Emperor. The channels in which the main stream of water was carried, and the reservoirs (*castella*), and the *piscinæ*, were always lined with a particular kind of cement, called *Opus Signinum*.

It has also been observed that the base of the channel is constantly broken up by inequalities, or dips, if they may be termed so, as if purposely introduced to agitate the water in its course, and, consequently, to aërate it. No doubt also the inequalities, provided they were rugged, would tend to check the passage of any earthen matter held in solution by the water. Of most importance, however, and shewing still more remarkably the engineering qualities of the builders of the Aqueducts, were the ventilating-shafts which were introduced at proper intervals. Such shafts were often used as wells also, to let buckets down for water, and steps were cut on the sides for the *aquarii* to descend and remove obstructions. At about every half-mile the *specus* forms an angle to break the force of the water, and at such points there is usually a reservoir also. Advantage was taken of these angles for the later aqueducts to be carried over the older ones, as at the Torre Fiscale and the Porta Maggiore. These precautions, combined with the system of *Piscinæ*, rendered the water constantly fresh, pure, and wholesome.

From some considerable remains of the *Piscinæ*, the system can be clearly made out. The building consisted of four chambers, two beneath and two above. Supposing, for the sake of illustration, in the annexed diagram, the letters 

represent the four chambers. The channel of the aqueduct, coming at a tolerably high level, enters the chamber A. Thence the water passed (possibly over a large waste-pipe) into the chamber beneath, B. Between B. and C. there were small holes communicating through the wall (possibly provided with fine grating). Through the roof of C. there was a hole, and the water passed upwards, of course finding the

same level in D. at its exit, as in A. at its entrance; on leaving the *piscina* the water was carried off into another *specus*. By the aid of sluice-gates the water could be transferred direct from chamber A. to chamber D. Access was obtained by an opening to the chambers beneath, and the mud was from time to time cleaned out. Curious details of the sluices, &c., have been found; but it is not easy to determine their age, as the aqueducts have undergone so many repeated alterations.

As a typical example of the size of the *specus*, or channel of the Aqueducts, the Marcian may be taken, which measures in the opening five Roman feet in height, two and a-half in breadth, and the thickness of the wall on each of the two sides one foot. The roof of the Marcian being surmounted by the Tepulan and Julian, no great solidity was needed; but so far as can be ascertained, the roofs were generally of considerable thickness, to prevent, as much as possible, the heat of the sun spoiling the coolness of the water. The channels and general structure of the Anio Novus and Claudian were larger in every respect, those of the Tepulan and Julian somewhat smaller, as shewn by the accompanying diagrams.

It will be seen that the period of the construction of the nine aqueducts which have been described, embraces some four centuries, as Frontinus was employed in surveying them towards the close of the first century after Christ, and the first aqueduct was commenced more than three centuries before the Christian era. If we omit the Alsietina, which was on the other side of the river, and which ought scarcely therefore to be taken into account, the order of level follows almost exactly the order of construction, the only exception being that of the Virgo. This increase of height of level as each new aqueduct was added, is pointed out by Frontinus in his eighteenth chapter.

It will be perhaps convenient to have the several aqueducts already described represented in a tabular form, shewing the dates when they were made, and the order as to level, together with the distances which they traversed.

The aqueducts, especially those which were mostly underground, it will be observed, made long detours, as compared with the direct line of road; as, for instance, in the first on the list, the distance by road was but eight Roman miles, but that by the channel of the aqueduct was eleven miles. The total length of all the channels of the aqueducts, constructed in less than four centuries, was upwards of 285.610 Roman miles, of which 242.697 miles were cut beneath the surface, and 42.918 miles carried on substructure, arched or not, as the case required, above the surface of the ground.

DATE.	No.	Order as to Level.	NAME.	LENGTH OF CHANNEL.[1] Above ground. m.	Above ground. p.	Under ground. m.	Under ground. p.
B.C. 312	I.	8th	AQUA APPIA	0	60	11	130
,, 263	II.	6th	ANIO VETUS	0	221	42	779
,, 145	III.	5th	AQUA MARCIA	7	463	54	247½
,, 126	IV.	4th	,, TEPULA	7	0	6	0
,, 34	V.	3rd	,, JULIA	7	0	8	426½
,, 21	VI.	7th	,, VIRGO	1	240	12	865
,, *c.* 10	VII.	9th	,, ALSIETINA	0	358	21 ? in channel	714
A.D. 33	VIII.	2nd	,, CLAUDIA	10	176	36	230
,, 33	IX.	1st	ANIO NOVUS	9	400	49	300
Totals according to computation of Frontinus				42	918	242	692

Of the above, six are carried to Piscinæ on the Via Latina.

The three { V. JULIA / IV. TEPULA / III. MARCIA } carried from the same reservoir on the same series of arches.

The two { IX. Anio Novus / VIII. Aqua Claudia } carried on higher arches, which end after the Pallantian gardens.

The one II. Anio Vetus, has a reservoir on the Via Latina.—(*Fron.*, c. 19.)

No.	SUPPLY. As given in the Commentaries. quin.	SUPPLY. Measured at the head. quin.	SUMMARY OF DISTRIBUTION. Outside City. quin.	Inside the City. quin.	Regiones served.	No. of Castella.
I. APPIAN	841	1825	5	699	II. VIII. IX. XI. XII. XIII. XIV.	20
II. ANIO VET.	1541	4398	573	1508½	I. III. IV. V. VI. VII. VIII. IX. XII. XIV.	35
III. MARCIAN	2162	4690	261½	1472	I. III. IV. V. VI. VII. VIII. IX. X. XII. XIV.	51
IV. TEPULAN	400	445	114	331	IV. V. VI. VII.	14
V. JULIAN	649	1206	206	548	II. III. V. VI. VIII. X. XII.	17
VI. VIRGO	652	2504	200	2304	VII. IX. XIV.	18
VII. ALSIETINE	——	——	392	——	Outside the city and the XIV. in the Naumachia.	—
VIII. CLAUDIAN	2855	4607	685	3498	United within the city, and distributed throughout the XIV. Regiones.	92
IX. ANIO NOV.	3263	4738	728			
	12,363	24,413	3164½	10,360½		247

[1] In the above the *m* = to the Roman mile = 1,000 Roman passus.
p = to the Roman passus = 5 Roman feet.
The Roman mile (*mille passus*) = 1,618 English yards.
The Roman passus = 4 English feet 10·428 inches.
The Roman foot = 11·6496 English inches.

	DETAILS OF DISTRIBUTION.			DETAILS OF THE PUBLIC SERVICE.							
	Imperial.	Private.	Public.	Castra.		Public Works.		Munera.		Lacus.	
	quin.	*quin.*	*quin.*		*quin.*		*quin.*		*quin.*		*quin.*
I.	151	194	354	1	4	14	123	1	2	92	226
II.	66½	490	503	1	50	19	196	9	88	94	218
III.	116	543	439	4	41	15	41	12	104	113	253
IV.	42	237	50	1	12	3	7	—	—	13	32
V.	18	196	383	3	69	10	181	3	67	28	65
VI.	509	338	1167	—	—	16	1380	2	26	25	51
VII.	354	138	—	—	—	—	—	—	—	—	—
VIII. IX.	1793	1506	1012	9	149	18	384	12	107	226	482
	3049½	3642	3908	19	325	95	2312	39	394	591	1327

Buecheler, in his edition of Frontinus, pp. xi., xii., xiii., explains the mathematical part of chap. 78 differently from Poleni and Dederich[j].

In order to regulate these several aqueducts, so that deflection in any part should be easily ascertained, means were provided for estimating the abundance of the water, and in this respect for its minuteness and clearness the treatise of Frontinus stands unrivalled, when compared with any work of ancient or even modern times. The mode of measurement is to take the area of a vertical section of the water flowing along the *specus*,—the object being to test each aqueduct by itself, and to see whether its proper supply was given or not. Had he been called upon to estimate the actual supply of the water, and not the relative, other points would have had to be taken into account, namely, the average fall of the aqueduct, from which to gather its velocity. On this, however, he does not touch. It must be borne in mind, also, that when Frontinus was appointed, the system had been long in force, and he had to follow the traditions and rules of his office. He made no revolution, he was simply a reformer. He tells us that in examining the books belonging to the office, he found certain measures given to certain aqueducts; these he had to verify, and a great part of his work is taken up in the

[j] The Roman foot was nearly as long as our own, being, according to the most accurate estimate, about 11½ English inches (11.6496).

account of his operations. To begin with, he is much troubled as to the measures employed. The *digitorum modulus* (i.e. a pipe with a given measured orifice) is uncertain. There is the square digit and the round digit (in other words, a square pipe of which each side is one digit, and the round pipe of which the *diameter* is one digit). As an instance of his accurate and clear expression, it may be worth while to quote his words on this point [k]:—

"The measurement of the *Moduli* is taken either by digits or inches. In Campania and in many places in Italy, the digit is used; in Apulia, the inch [l]. The digit, as all agree, is the sixteenth part of a foot; the inch, a twelfth part. But just as there is a different usage of inches and digits, so also there is no uniformity in the simple computation of the digit itself. There is one which is called the square digit, another the round digit. The square digit is *three-fourteenths greater* than the round; the round is *three-elevenths smaller* than the square, because the angles are taken off."

In this we obtain a key to most of his calculations [m], because they depend throughout upon the computation of the area of the circle.

The base measure chosen was the "quinary," so called (according to the most natural derivation) because its diameter was five quarter-digits. And to this basis are reduced some twenty different *moduli*, to which the names were given of senary, septenary, octonary, denary, duodenary, and so on up to centenary. The reduction of these seems to be tolerably accurate according to the system which he pursues, and making allowance for transcribers' errors. But either the relation of the circumference to the diameter of a circle had not been worked out to the same extent to which it has been in later times, or Frontinus considered the ratio adopted sufficient for his purpose. One of his calculations stands thus: he is measuring the Appian at a point where it is joined by a later branch; it had been assigned in the register as giving 841 quinaries: he says—

"I found the depth of the water five feet, and its breadth one foot and three quarters, which gives an area of eight feet and three quarters. This is equal to twenty-two *centenaries* and a *quadragenary*, which make 1,825 *quinaries*, or 984 quinaries more than is given in the Commentaries [n]."

Each centenary is shewn elsewhere to contain 81 quinaries and a fraction, and therefore 22 would give 1,792 in quinaries and a frac-

[k] Frontinus, c. 24.

[l] Dederich reads "unciæ in popularibus rationibus adhuc observantur," which seems better. The *uncia* was an Italian, the *digitus* a Greek measure.

[m] It is evident from his making the square of the diameter $\frac{3}{14}$ greater than the area of the circle drawn upon the same diameter, that he takes the ratio of the area to the diameter as $\frac{11}{14}$ to diameter 1. This is very near to the truth. The converse as given by him also agrees, as is seen by $\frac{11}{14} + \frac{3}{11}$ of $\frac{11}{14} = 1$.

[n] Frontinus, c. 65.

tion. The quadragenary is marked to contain 32 quinaries and a fraction. Together, therefore, the 1,825. Now the area of each quinary, according to the system of Frontinus, would be the square of its diameter (i.e. $1\frac{1}{4}$ digit), multiplied by $\frac{11}{14}$ (the ratio already ascertained). This equals $\frac{275}{224}$, which, multiplied by 1,825, produces $2{,}240\frac{1}{2}$ digits (nearly). Finally, the area of $8\frac{3}{4}$ square feet, reduced to square digits, gives 2,240 °.

This calculation illustrates his mode of computation from absolute measure of the water; but the ordinary way was to affix the *moduli*, which were of brass, or rather of bronze, to certain openings. Provided the *modulus* was placed perfectly level, the water flowed at its ordinary rate; and when the *moduli* were sufficient to prevent the water rising in the reservoir or channel, and, on the other hand, not too numerous or too large to reduce the mean level of the water, the sum of them represented the amount of water.

We next come to the question of distribution. On examining the registers, Frontinus says that he found that there were assigned to the nine aqueducts 12,755 quinaries; but it appeared that the distribution amounted to 13,470 quinaries. To account for this discrepancy, the whole were re-measured. In the annexed table the measures of each aqueduct are given separately, and by adding together the results of each, as calculated from the data which Frontinus gives of the water measured at the head, the total, as the table shews, comes to 24,413 quinaries. The fact was that in process of time some of the channels had fallen into decay, and the water was wasted. In other and more numerous cases, it had been abstracted by persons for their own use without authority; in addition to which there were no doubt errors in the computation, which had crept into the books, and if we are to believe Frontinus, these errors had been turned to the profit of his predecessors.

In the table of distribution will be seen the number of quinaries distributed outside the wall of the city; next, the Regiones which they serve within the city; thirdly, the measure of water so distributed within the city, and the number of *castella*, or reservoirs, used for that purpose. These reservoirs, at least such as remain, will be described in the several Regiones in which they occur. That over the arch of Dolabella on the Cœlian Hill, and the so-called Castellum Aquæ Juliæ on the Esquiline, are the most prominent. Many, no

° It is of little consequence, but perhaps it may be interesting to know more accurately the result of the calculation. If we take 1.25 as the diameter of the quinary, and multiply the square of this by 0.7854 (the corrected ratio), we obtain the result in square digits, 1.22718. This multiplied by the 1825 gives 2239.6, that is, the result within one digit as given by Frontinus.

doubt, were of much smaller size, and merely large cisterns, as the total number was 247.

The supply of 13,470 quinaries is thus accounted for. Outside Rome 3,164 quinaries were distributed, inside 10,306; of that outside Rome 1,718 quinaries were used "in the name of the Emperor," that is, to supply the imperial villas and gardens, &c., while 2,345 were charged to private persons. Inside Rome 1,707 were charged to the Emperor for his palaces, &c., while private persons used 3,847 quinaries, leaving 4,401 quinaries, which were for the "Public Service." These, together, account for the 9,955 distributed within Rome.

In the details of the distribution, we learn how much water was employed in the palaces, &c., in the service of the Emperor and his household (*nomine Cæsaris*), how much was carried into houses for the use of private persons, and how much was used in public buildings and the public reservoirs or fountains which were established in all convenient positions, and generally accessible to the population.

It may, perhaps, be interesting to examine more carefully the distribution for the "Public Service." We have four classes of recipients, and we know from Frontinus how much was served to each class from each aqueduct. There were first of all 19 *castra* or barracks, in which the army were kept when not out on service, and in which also the guards were stationed. These required in all 279 quinaries. There were next, 95 different Public Establishments which used 2,401 quinaries, and 39 theatres and places of entertainment (*munera*) which used 386 more. Lastly, there were 591 open reservoirs (*lacus*) for the service of all comers, using 1,335 quinaries. These reservoirs were what we usually speak of as fountains, and some hundreds are in use to this day, many probably on the site of the older ones. There were very stringent laws respecting their use. Heavy penalties were inflicted upon anyone dipping a dirty bucket or other vessel into the reservoir; there were also laws respecting the "overflow," as the fountains of course were constantly running. These were the most important to keep in order, as all the poorer classes depended entirely upon them for their supply of water.

The more wealthy had water brought into their own private reservoir in the court, with buckets and windlasses for drawing the water to the upper story, and this is the case to the present day[p].

[p] An Anglo-Roman company has now (1872) brought the Aqua Marcia (III.) again into Rome at so high a level, that it will supply cisterns at the tops of the houses. At present a number of ingenious contrivances are in use for sliding small buckets of water from the well or reservoir in the courtyard,

These details, while giving us an insight into the social state of the city, go to shew how thoroughly the supply of the water was under control. The pipes supplying every one of these 744 points of distribution were all registered, and their sizes being known, the system of computation, as explained by Frontinus, was brought into play: thus every part was checked, and any irregularity could be traced to its source.

It may be asked what amount of supply, in gallons, would the water represent, in order that a comparison can be made between the supply of towns at the present time, and that of Rome at the time at which Frontinus wrote. The answer is not easy. As said before, we have not sufficient data for an accurate determination; still we may attempt an approximate estimate. It is easy to compute the section of water given by the 24,805 quinaries. This being just upon 120 square feet, we can form some notion of the vast quantity, if we picture to ourselves a stream twenty feet wide by six feet deep, constantly pouring into Rome at a fall six times as rapid as that of the river Thames. It has been computed by a French engineer that, together with one or two additional aqueducts which were added between the time of Trajan and Aurelian, the supply of water to Rome was 332,306,624 gallons *daily*. If we assume the population to have been a million souls—and it is scarcely probable that there were more—we find that the rate was 332 gallons per diem for each person. In our own day we consider 40 gallons sufficient, and many think this excessive, including the use of water in manufactures, &c. No wonder, with the facilities for drainage which the rapid Tiber afforded, and with this plentiful supply of really good water, the great city was rendered, in spite of overcrowding and an unhealthy situation as regards its neighbourhood, comparatively free from those epidemics which are so fatal in all densely-populated towns.

One part of the system which Frontinus seems to have been the first to adopt was this: he had 247 *castella*, or main reservoirs, from which the pipes were carried to the smaller cisterns and fountains, and he so arranged the supply of water to these that the several aqueducts could be interchanged. A net-work was established, so that when one channel, from whatever cause, failed, whether from requiring to be cleansed or repaired, another could supply its place. But this was not all. He tells us, cap. 87, that many of the parts

to the upper windows and galleries round the central courts of the old houses or palaces. These reservoirs, whether large or small, are called *lacus* by Frontinus and in the Regionary Catalogue.

of the city which were dependent on one source for their supply, were, by careful distribution of the water, able to avail themselves of a second in case of need; and he gives as an instance that the Marcian was made available in the Aventine, by being carried across from the Cœlian [q]. He also speaks of the improvements which were made in keeping the water pure. Hitherto a very slight shower had made many of the streams muddy, although at their source they were pure [r].

The least pure, however, before the time of Trajan, were the Anio Vetus and Anio Novus. This arose from the banks which, being soft, gave way, and the stream, even in fair weather, thus became muddy. He points out that hitherto, by the mixture of the waters which had been adopted to prevent failure in supply, proper skill had not been shewn, and these new streams were allowed to destroy the purity of others [s]. His object, therefore, was to keep the pure streams separate, and in addition to that, arrange that they should be used for drinking purposes only; while the water which was less grateful to the taste, and which was subject to be at times muddy, should be used for cleansing the city, or watering the gardens, or other ordinary purposes, which it might fulfil equally with the fresher and purer water. In considering the supply of water to our large towns, which is one of the great problems which at the present time has to be solved, it is not too much to say that—the plan adopted by the Emperor Trajan, by the advice of Frontinus, the head of the *aquarii*, and of that department of the government of Rome which had charge of the aqueducts, the importance of which in that climate can hardly be over-estimated—is worthy of more attention than it has received [t].

[q] The expression *reddita* would imply that originally the Marcian had supplied the Aventine, and that, it having been superseded by the Claudian, it was now restored and used in addition to the other. See the extract—Frontinus, c. 76.

[r] Frontinus, c. 89.

[s] Ibid., c. 90, 91.

[t] The division of the surface water from the sewerage, in the question of the drainage of large towns, is meeting with much favour, as it appeals to reason that what is good for the purposes of manure, is destructive to the healthy condition of the river, while the surface water, which finds its proper place in the river, interferes with the proper distribution of sewage. In Rome, there is frequently a small *specus* or channel for pure water, contrived in the vault or upper part of the great *cloacæ* or drains for the refuse water. Could not the same plan be adopted in London with advantage? But while this is canvassed, it seems singular that we hear little of the division of the *supply*, which, on the same principle, should certainly be divided. There are several towns so situated, that a fair supply of pure water might be brought very acceptable for drinking, but not in sufficient quantities to be applicable to other offices. The words of Frontinus are very concise and pointed :—

"Marciam ut ipsam, splendore et frigore gratissimam, balneis ac fullonibus et relatu quoque fœdis ministeriis deprehenderimus servientem. Omnes ergo discerni placuit, tum singulas ita

The Curator Aquarum.

The care of the aqueducts was assigned by Augustus to a Curator Aquarum, of whom Marcus Agrippa was the first, and held the office for life. Frontinus, to whom we are indebted (as we have seen) for nearly all that we know respecting the early history of the aqueducts, held this office under Domitian, A.D. 94; he remained in office under Nerva, wrote his treatise at that time, and died under Trajan, A.D. 107. The office continued to exist till the third century, in the time of Diocletian, when it was superseded by the magistrates called *Consulares Aquarum,* a title changed in the fifth century into *Comes Formarum Urbis.* These several magistrates had 700 servants, charged with the superintendence, repair, and distribution of the water from the aqueducts, divided into *familia publica* and *familia Cæsaris;* the former, comprising 240 persons paid by the State; the latter, 460 paid by the Emperor. Agrippa supplied the city with 700 *lacus*, 105 fountains, 130 *castella* for distributing waters, and 170 gratuitous baths for public use. These structures were adorned with 400 marble columns, and 300 statues of marble or bronze. After the devastations caused in the Gothic wars, under Vitiges and Totila, only the most important aqueducts were restored, either by Belisarius or Narses. Ruin and neglect again undid much of what had then been restored to use. At the beginning of the ninth century, the only aqueducts supplying water were the Appian [I.], and Marcian [XII.], then called Jobia or Iopia, by corruption from "Jovius," the name assumed by Diocletian.

During both the eighth and ninth centuries, indeed, various repairs for maintaining the aqueduct of Trajan [X.], which carried water from the lake Sabatinus (di Bracciano, Acqua Paola), are mentioned by Anastasius; and in 786 the "Jovia" aqueduct was restored by Hadrian I. In the twelfth century, the Aqua Lateranensis is mentioned as still in use, being that part of the Claudian aqueduct carried upon the arcade called the Arches of Nero near the Lateran, where the *specus* is very conspicuous. The aqueduct of Trajan [X.], and that of Agrippa [VI.], continued to supply water, though but scantily, for about two centuries later. The Appia [I.] has long

ordinari, ut in primis Marcia potui tota serviret, et deinceps reliquæ secundum suam quæque qualitatem aptis usibus assignarentur, sicut Anio Vetus pluribus ex causis, quo inferior excipitur minus salubris, in hortorum rigationem atque in ipsius urbis sordidiora exiret ministeria." (Frontinus, c. 91, 92.)

been supposed to have been gradually stopped up by the deposit of clay, and thus rendered useless[u]; and so total was the failure of all these waters in the fourteenth century, that the population (said to have been not more than 17,000 during the absence of the Papal Court at Avignon) were without any supply of running water, except from the Tiber[v]. The first restoration, in the fifteenth century, was that of Agrippa [VI.], by Nicholas V., whose aims and efforts were renewed by Sixtus IV., and by later Pontiffs. Sixtus V. [Felice Peretti] determined to restore to Rome the water then supposed to be the Marcia, but really of Hadrian [XIII.] The arcade of the Claudian [VIII.] and Anio Novus [IX.], was the most magnificent of all, and conveyed its several streams along a distance of forty-six miles. This had been restored by Vespasian and Titus, by Trajan, Septimius Severus and Constantine; but, in the greater part, especially within the first few miles from Rome, the existing stone arcade is of the time of Claudius, with repairs in the brickwork of the Flavian emperors. At the beginning of the ninth century, it was certainly still serviceable, and was known by the name Forma Claudiana. The piers of this arcade were used by the engineers of Felice to carry that *specus* on the part near Rome; but the greater part of the Marcian arcade, and considerable parts of the Claudian, near Rome, were used as a stone-quarry by them. The channels through which the Anio and the other streams flowed, were the first, 9 ft. in height and nearly 3 in breadth, the second 6 ft. by 3, as seen in their ruins at the Porta Maggiore. The more ancient portion is not in brickwork, but of enormous squared blocks of tufa and peperino.

The popular notion that all these aqueducts were a mere waste of money, arising from the ignorance of the ancient Romans of the simple fact that water will rise to its level, is altogether erroneous. Vitruvius gives directions for taking the levels for carrying water through valleys, where, he says, there should be standing or upright pipes (*columnaria*), now called respirators, to let off the confined air (*spiritus*[w]), and explains how to bring the water on by earthenware, lead, and even leather pipes.

Within the last few years a large leaden pipe of great antiquity,

[u] See C. C. J. Bunsen's *Beschreibung der Stadt Rom.* Stuttgart und Tübingen, 1830, 8vo.

[v] The mother of Cola di Rienzi was one of those who gained a livelihood by selling water in the streets.

[w] The ruined *castellum* at the Porta Furba, two miles from Rome, (previously mentioned,) seems to have been of this description; it rises considerably above the level of the conduits, vertically, as if either for water or air to rush up it.

not less than two feet in diameter, was found under the Via de' Condotti, encased in ancient brickwork, evidently shewing that they were afraid to trust to the strength of the lead. The force of the water running in a strong current from such great distances, required to be broken at frequent intervals, by being turned at a sharp angle, and then allowed to return again to its course by another angle. This arrangement occurs continually along the line of the aqueducts, generally at each half mile, with a *piscina* or a *castellum*, or both filtering-place and reservoir, at each of these angles. The great object of constructing these magnificent aqueducts was to bring the water to the highest levels in the city, from which it descended by a succession of reservoirs (*castella aquarum*), some with *piscinæ* or filters, others with fountains, each one below the level of the preceding one. The lower town along the valley, or Campus Martius, was also supplied by other aqueducts at a much lower level. The ancient Romans had abundance of leaden pipes to convey the water to the baths or *thermæ*, and bronze stop-cocks, as may be seen at Pompeii, and silver ones for the emperor; but they had no pumps. From each *castellum* there were pipes to supply the neighbouring baths or palaces, with moderate pressure; also wells or cisterns in the court-yard of each house, which had frequently a fountain. On the Janiculum, the water of the aqueduct passing from one *castellum* to another, has sufficient force to turn several mill-wheels.

A letter of King Theodoric, printed in Cassiodorus [x], addressed to the Roman Senate, enjoins them to assist Joannes in his enquiries after those who have diverted the water from the aqueducts for their own uses, and those who have stolen the brass and lead, or those who have helped them. This proves that they were not destroyed by the Goths, and that they were in use in the sixth century.

[x] Cassiodori Var., lib. vii. 6, and iv. 31.

CHAPTER IV., PART II.

THE LATER AQUEDUCTS.

X. Sabatina, A.D. 110; Trajana and Paola, A.D. 1540.

The Aqua Sabatina came from the springs which supply the lake Sabatinus, now called di Bracciano (in the Middle Ages it was, and is still often called, Anguillara), on the side opposite to Rome, about twenty-four miles from the city, in a tunnel at a considerable depth. It arrives at the line of the tunnel of the Aqua Alsietina in about three miles. (See Aqueduct VII.)

The line of this aqueduct, which is chiefly subterranean, can be traced backwards by the respirators of Paul V., who repaired it, from his fountain on the Janiculum in Rome across Monte Mario to La Storta, and a little beyond it to the junction of the roads from Viterbo and Bracciano. Here the present road follows a winding course for the sake of better gradients, but the old one (*Clodia*) followed a more direct line in a cutting through the hill, to the left of the present road, as may be seen by the old paving-stones at intervals; and here, instead of the clumsy respirators of Paul V., are wells only, one of which is near the present road at the junction. The respirators are built over old wells, and serve to shew that Paul V. restored the *specus* from La Storta to Rome only in this part. There are no respirators beyond that point for some distance, but the *specus* may still be traced by the wells descending into it. About two miles further on, this *specus* is carried on an arcade across a valley, and it may be traced from thence to the point where Nibby explored it in 1826, near the lake of Bracciano. From the Osteria Nuova (fifteen miles from Rome) to La Storta (ten miles from Rome), the rough pyramids continue along the line of the aqueduct, and at the Osteria itself there are two of different dimensions close together at the end of the house or *castellum aquæ;* one is nearly double the size of the other, and both are of very rough construction. Probably one of these is of the time of Trajan, the other of the time of Pope Paul; these wells, with the smaller pyramids over them, are continued to near La Storta; here a change takes place, and the respirators are modern, as has been said.

Procopius expresses his amazement at the quantity of water thus brought to the top of the Janiculum, and poured in torrents over the whole of the region of the Trastevere. This is still the case, and

the fountains in front of St. Peter's and in the gardens of the Vatican, are also supplied from this aqueduct. The water is so abundant that it is even brought over the bridge and supplies a fountain on the other side.

Paul V. also mentions (in his inscription at the fountain above S. Pietro in Montorio) that it had been previously restored by one of his predecessors, Hadrian I., A.D. 774. This was after it had been damaged by the Lombards under Astulfus, as recorded in the Pontifical Registers of Stephen III., Hadrian I., and Gregory IV., in whose time (A.D. 830) the work was completed. The Saracens again destroyed it in 846, and it was again restored by Nicholas I. (A.D. 860). It continued in use in the fifteenth century; but in the sixteenth it was much out of repair, and the branch to the Janiculum almost entirely failed. That to the Vatican continued to flow in 1561, and was repaired by Pius IV., as recorded on an inscription in the garden of the Vatican. In 1618, it had become almost entirely ruined, and was restored in a more thorough manner at great expense by Paul V., a member of the wealthy Borghese family, from whom it is now commonly called the Aqua Paola. The Orsini family, to whom the lake Bracciano belonged, contributed 2,000 ounces of water daily from that lake. Hadrian I., who had made the first great restoration of this water-course, was a Colonna, so that three of the greatest medieval families of Rome have contributed towards it.

The cascade which now falls down the face of the Janiculum, in a *specus*, turns the water-wheels of three mills in its course; this is mentioned by Procopius, they having been destroyed by the Goths, and their place supplied by other mills made in the Tiber by Belisarius, which continued in use for a long period. The ruins still visible in the river, opposite the mouth of the Cloaca Maxima, are supposed by some to have belonged to these mills. They were of wood only[y], and may have been built on the stone foundations; but these ruins in the river more probably belonged to the fortifications at the head of the Port of Rome, where there was a chain across the river to prevent boats from being carried down by the rapid stream into the Port[z].

[y] Procopius, de Bello Gothico, lib. i. c. 19.

[z] This is shewn by the large corbels in the wall on the bank of the river at this point, opposite to the Cloaca Maxima, which are pierced with holes through them, in which a pole was placed to attach the chain. These corbels remain perfect on the western side; on the eastern side, they have been destroyed, or covered over by medieval houses. Those which remain are carved into the form of gigantic lions' heads, of the character called Etruscan, but are of the time when the Port of Rome was made in the Tiber, B.C. 180.

Immediately outside of the Porta S. Pancrazio the *specus* forms the boundary of the beautiful garden of the Villa Pamphili-Doria, on the northern side, for about a mile. It is faced with fine reticulated work of the time of Trajan, excepting where it has been clumsily repaired with brick in the time of Paul V., and it has a wall built upon it. Shortly after passing the limits of the garden, it arrives at the old junction or fork where the stream was divided into two branches, one going to the fountains in front of S. Peter's and the Vatican, the other to the great fountain rebuilt by Paul V. above S. Pietro in Montorio, as before mentioned. In this part the *specus*, being above ground, had been much mutilated, and the engineers of Paul V. found it more convenient to change its course and make a new *specus* for a short distance, than to repair the old one. The ancient reservoir and the fork in the *specus* were abandoned, and new ones made about a hundred yards off, on rather a higher level. The old reservoir or *castellum aquæ* was turned into a farm-house, by piercing the walls with windows and doors, and putting on a new roof. The original arrangement for the separation of the great stream into two smaller ones may still be seen in the farm-yard. The old *specus* is here just below the level of the ground, with its reservoir, but there is an opening into it. A portion of it can also be seen under the Villa Spada, just within the Porta di S. Pancrazio. From the point of junction, or rather of division, to La Storta, and nearly all the way to the lakes, the *specus* is underground; but the line of the branch added by Trajan can be traced by the respirators as far as the junction, ten miles from Rome, where, in the year 1830, an inscription [a] was found on the Via Claudia, near the tavern of La Storta, stating that Trajan had carried this water into the city at his own expense in A.D. 109. In the inscriptions put up by Paul V. after his repairs, A.D. 1611 [b], the Alsietina, Sabatina, and Trajana are all considered as the same.

[a] IMP. CAESAR DIVI
NERVAE F. NERVA
TRAIANVS AVG
GERM. DACICVS
PONT. MAX. TR. POT. XIII
IMP. VI. COS. V. P.P
AQVAM TRAIANAM
PECVNIA. SVA
IN VRBEM PERDVXIT
EMPTIS LOCIS
PER LATITVD. P. XXX

[b] PAVLVS V. PONT. OPT. MAX
FORMIS AQVAE ALSIETINAE
OLIM AB AVG. CAES. EXSTRVCTIS
MOX COLLAPSIS. AB. ADRIANO I. P.M
INSTAVRATIS
IISDEM RVRSVS OB VETVSTATEM
DIRVTIS. OPERE SVBTERRANEO. ET
ARCVATO AQVAM EX AGRO
BRACHIANENSI DITIONIS VRSINORVM
SALVBRIORIBVS FONTIBVS DERIVATAM
IN VRBEM PERDVXIT
ANN. SAL. MDCXI. PONT. SVI VII.

XI. Trajana or Hadriana[c](?), (A.D. 120).

"In the time of the Emperor Nerva the health of the eternal city was sensibly improved by the increased number of castella, public works and buildings, and cisterns. Nor was his generosity less for the benefit of private individuals, so that those who had previously timidly obtained water in an unlawful manner were now allowed to do so by his favour. Lest some of the waters should perish uselessly great cleanliness was adopted, and there was better ventilation, and the causes of the bad climate for which the city was formerly infamous were removed. I must not pass by the necessity for a new distribution of the waters; but this, with the increased quantity we have added, can easily be arranged, that is, when the work is completed[d]."

These and other passages in the work of Frontinus shew that great works were carrying on under his direction, not then completed, their object being to improve the quality of the water, and to supply an additional quantity in case any of the existing aqueducts should fail, as they did occasionally, and to increase the power of distributing it, with a view to improving the climate. This is a proof that Malaria existed at that time[e], and that the best remedy for it was an abundant supply of water in the hot weather, for which the subterranean aqueducts were most useful. The improvement of the Aqua Alsietina, and the addition of the Sabatina, were not sufficient for both these purposes; and, as they supplied the district of the Trastevere only, this could not be all that was intended by Frontinus in describing the great works begun by him under Nerva, carried on by Trajan, and completed by Hadrian. The only work which will correspond to this account is the great aqueduct called

[c] In the life of Hadrian by Spartianus (c. 20), we are told that a number of aqueducts were made in his time and called after him. But his name is not retained in the Regionary Catalogue.

[d] Frontinus, c. 88.

[e] We have seen before that Eadmer mentions the malaria in Rome as early as the twelfth century. (Historiæ Novor., lib. ii. ad calcem S. Anselmi operum, p. 51, D. Lut. Par. 1675, fol.) In the following century, the author of "Sir Bevis of Southampton" gives a strange account of the fevers arising from the Pontine Marshes into the Campagna di Roma. There were, says he, two dragons there; one having fled to Toscan [Tusculum?],—

"That other dragoun 'is flight nome (took)
To Seinte Peter 'is brige of Rome:
Thar he schel leggen ai (lay for ever)
Til hit come domesdai;
And everi seve yer ones,
Whan the dragoun moweth (moves) 'is bones,
Thanne cometh a roke (reke, smoke) & a stink
Out of the water, under the brink,
Than men therof taketh the fevere,
That never after mai he kever (recover);
And who that n'el nought leve (believe) me,
Wite (know, inquire) al pilgrimes that ther hath be;
For thai can tell yow, I wis,
Of that dragoun how it is."

(Weber, "Metrical Romances," &c., vol. iii. p. 315. Edinburgh, 1810, 12mo.)

by modern writers the Aqua Alexandrina, and erroneously attributed to Alexander Severus only.

The sources of this aqueduct are about three miles from Gabii in a watery meadow, nearly under La Colonna, the ancient Labicum. The reservoir of the Aqua Felice is in the same meadow, very near that of Hadrian. Several of the springs that supplied that of Hadrian were intercepted by the engineers of the Aqua Felice, who mistook these springs for those of the Aqua Marcia, shewing their ignorance of the line of the aqueducts. One of the streams, which is rapid and has a considerable body of water, is not used, because the water is of bad quality, and is so full of chalk that it is a petrifying stream. The first central *castellum* and *piscina* of Hadrian remains nearly intact, lined with the usual brickwork of that period, but much disguised in outward appearance. It is divided in the inside by a rough stone wall, as was frequently the case; the upper chamber to it has an external staircase added, and windows pierced in it, giving it now the appearance of a mere farm-house. Here the *specus* is perfect, and from hence it goes at first on a substructure, then on an arcade across the fields, and along the line of arcade to the Cento Celle. The part near the reservoir is destroyed, as is the opposite end near that place, but great part of the arcade in the intervening portion remains nearly perfect, and is one of the finest arcades of the aqueducts, extending for miles across the country between the Via Gabina and the Via Labicana. In some places it is double, one arcade over another, to cross a low valley or a stream. At about a quarter of a mile from the source, the *specus* is open in two places, so that a man can walk along it, being nearly six feet high and three wide. Small openings have been left on the sides of the *specus* at regular intervals to let the chalky water escape; and in falling from above it has left the marks of a small cascade in each place, in the form of stalactite, a solid deposit of chalk or lime or tartar against the side of the piers, down which it ran. These petrifactions continue all along the line as far as Cento Celle, and near that point there is a part where the stones and bricks of the arcade have been carried away for building-materials, and the masses of hard chalk remain standing up from the ground, in small pyramids, having very much the appearance of concrete respirators belonging to a subterranean aqueduct; but this appearance is deceitful. There is no pipe in them; they are merely petrifactions formed by the deposit of the chalk from the water.

By the side of the line there are some fine *piscinæ* and reservoirs, of *Opus Reticulatum*, at intervals, belonging to the time of Trajan

or Hadrian. Some of the arches near the sources seem to be earlier. The brickwork is so fine that it appears more like the work of Nero; but most of the work agrees well with the time of Hadrian, and Visconti states that an inscription of Hadrian[f] was found at the reservoir in his time, towards the end of the eighteenth century, and given up to the Borghese family, the proprietors of the ground, who also drained the lake of Gabii, with the aid of Canina the architect. This inscription is believed to have been sold to the French, with other things.

The character of the construction of the *castella*, or reservoirs, does not agree with the time of Alexander Severus, but suits perfectly well with those of Nerva, Trajan, and Hadrian, whose works are so well known. It is work of the first or second century, not of the third. It does not follow the line of the Via Gabina, but is carried at once to the south of it, towards the Via Labicana, and passes nearly parallel to it between those two roads until it crosses the Via Labicana at five miles from Rome, at the place called Cento Celle.

The bad effect of the petrifying stream was noticed by the engineers of the Aqua Felice, and, as that stream was carefully excluded by them, it now runs to waste through the meadows. This discovery was probably made before the third century, and the *specus* being then found to be choked up with stalactite, was restored to use on a higher level by Alexander Severus. Although the *castella*, or reservoirs, are all of the time of Trajan and Hadrian, the *specus* and the arcade to carry it is of two periods, the later portion of it being of the third century. The principal intention of this aqueduct has been originally to supply the great villa of Hadrian at Cento-Celle, but a branch of it does appear to have been brought into Rome. Although it is very difficult to trace it for the last two miles, this may arise from the general use of all the aqueducts near Rome as quarries, by the engineers of the Aqua Felice. In the excavations made in 1871, in the high ground near the Minerva Medica, between the Porta Maggiore and the Porta di San Lorenzo, by the

[f] The fragment of an inscription relating to this aqueduct was found near Gabii, and is described by E. Q. Visconti in his *Monumenti Gabini*, Roma, 1797, 8vo. maj., p. 14.

IMP. CAESAR DIVI TRAiani
(Parthici filius Trajanus Hadrianus)
AVG. PONTIF[ex Maximus]
AQVAE DVCTVM GABINIS . . .
QVAM . . . . .

The second line appears to be an interpolation of the editor, but this is not material. The aqueduct begun by Nerva was not finished till the time of Hadrian. The aqueduct of Gregory XIII. and Sixtus V. (Felice) (A.D. 1572—1590) receives the water of this aqueduct, but at Colonna other springs are collected and added to it; this was the work of Fontana.

side of that portion of the Marcian arcade that has been mentioned as found there, was also part of another arcade of an aqueduct of the third century, which may have belonged to this, and it was in that neighbourhood that the inscription belonging to the aqueduct of Severus was found.

About a mile nearer to Rome, at the Torre Pignattara[g], or Mausoleum of S. Helena, there is a branch from the Marrana, passing under the Aqua Marcia, apparently to convey water to an imperial villa. The construction of the arcade of this branch to the south of the road is not of the same period as that of the other arcade on the other side to the north. It is usual for modern topographers, following Fabretti, to consider this branch a continuation of the Aqua Alexandrina; but as the water from the Marrana, which is at a considerably lower level than the Aqua Marcia, runs *down* the gentle incline of this arcade towards the road and the Mausoleum of S. Helena called Torre Pignattara, this is impossible. The construction is chiefly of the fourth century. The Mausoleum of S. Helena is on lower ground than this part of the Marrana.

Constantine is said to have built a villa for his mother near her tomb; but there are no remains of an imperial villa nearer than those called the Cento Celle, a mile further along the road, or the one called "Torre de' Schiavi[h]," i.e. Tower of the Slaves, about a mile across country, on another road, but on the same level. A milestone for the third mile, found opposite this mausoleum, with an inscription of the time of Maxentius, has been published by Ciampini. This indicates that some works were going on there at the end of the third century, and the arcade may be of that period.

A large and a very remarkable reservoir of the time of Trajan or Hadrian remains a little to the west of the mausoleum, and on rather higher ground. This was probably to receive the water for a branch to the imperial villa, afterwards taken possession of by the Gordiani, who built at that place their great family mausoleum, on which a tall medieval tower was afterwards erected; of this, very picturesque ruins remain, under the title of Torre de' Schiavi.

[g] The Torre Pignattara is so called from the earthenware pots (*pignatte*) of which the vault was built. Other remains of buildings of importance have been found near the Mausoleum of S. Helena, and there is some reason to believe that another imperial villa was situated there during the first three centuries.

[h] Some say the popular name is *Torre de Scavi*, or of the excavations from some great works of excavation made there in the twelfth century.

There are at the same place other large reservoirs of the time of the Gordiani, shewing that the great imperial villa was still supplied with water from the Marcian aqueduct in the third century.

No water under the name of Hadrian is mentioned in the Regionary Catalogue of the fourth century, it is therefore evident that this great aqueduct was not called then after that emperor, although we are told in his life by Spartianus, that many were made in his time, and were at first called after him (as we have said[1]). At the first reservoir, the starting-point, there was an inscription of Hadrian, and the other reservoirs belonging to it are also constructions of the same period. It may be that this water did not come into Rome at all, but that the aqueduct was made to supply the great villa in the place now called "Cento-Celle," to which it leads in a direct line, and where it appears to terminate. If any alterations were made, these may have been done in the time of Alexander Severus, and this may now represent the so-called Aqua Alexandrina, as Fabretti thought, although he was certainly mistaken in one part of his account of it. The branch which went by the Mausoleum of S. Helena, and which apparently ran underground to the Villa of the Gordiani, was not a branch of the aqueduct to convey water into Rome, but a branch from the great aqueduct for the villa or villas, as it now does from the Marrana at a lower level. This short arcade is of the time of Constantine. The great and long one that leads to the Cento-Celle is of two periods, the earlier part of the time of Hadrian, the latter of the third century. It is quite possible that the original *specus* had become choked up with stalactite in the course of a century, and that it was restored to use for a time by Alexander Severus, and so called after him.

The Branch of Trajan on the Aventine.

It has been mentioned in the account of the Anio Novus (IX.) that, after the main conduit reached the great reservoir at the arch of Dolabella, it was divided into three branches, and that one of these was not completed until the time of Trajan and Hadrian. This important branch was carried over the valley between the Cœlian and the Aventine on a lofty arcade, built upon the *agger* of Servius Tullius, and over the Aqua Appia, also passing over the Via Appia upon the arch of the Porta Capena to the Piscina Pub-

[1] Note f, p. 88. "Aquarum ductus nuncupavit." (Spartianus in Hadriano, etiam infinitas hoc nomine (Hadriani) c. 20.)

lica. It then ran along the edge of the cliff to the north of S. Balbina, and crossed again the valley between the Pseudo-Aventine and the Aventine itself, a little further to the west, by the side of the road which goes down the hill towards S. Prisca. In the vineyard of S. Prisca a portion of the *specus* remains perfect, at a very high level [k]. From thence it was carried across the hill to the cliff above the Tiber, where the monastery and garden of S. Sabina are now placed. These are on the site of a palace of the time of the early Empire. Some extensive and important excavations were made there in 1855—57, by the Dominican monks of S. Sabina, and among the discoveries then made were an extensive series of conduits, with a *piscina* and a *nymphæum* of the same period,—of the end of the first and the beginning of the second century of the Christian era. A cascade *specus* served to conduct the surplus water down to the more ancient cave reservoir at the mouth of the Aqua Appia, at the Salaria. An account of these excavations was drawn up by M. Descemet [l], and published in the Memoirs of the Institute of France, with an excellent plan and section. Several brick-stamps, of which the words are given in that work, with the names of the consuls, and some terra cotta water-pipes, with the name of Trajan, were also found here. Others were discovered on the Aventine and near the same spot by Fabretti, who was puzzled by them, because they did not agree with his theories about the aqueducts. Donatus also mentions some of the same facts as known in his time. Some of the bricks were made at the kiln (*figlina*) of Annius Verus, said to have been on the Aventine, near the Salaria; and, if this is correct, that was the spot where they were found. Others have the stamp of Trajan himself. Another is the work of an Arabian servant of Q. Servilius Pudens, A.D. 139, when the Emperor Antoninus Pius and C. Bruttius Præsens were consuls. A piece of leaden pipe, with an inscription upon it, AQVA TRAIANA, was also found on the Aventine.

[k] It is immediately opposite to the Palatine, and there is a remarkably fine view from the portion of the *specus* that remains, the vault of which has been removed, and it is used as a terrace.

[l] Mémoire sur les fouilles exécutées à Santa Sabina. Paris, Imprimerie Impériale, 1868, 4to.

XII. Aurelia, A.D. 185, and XIII. Severiana, A.D. 190.

The Aqua Aurelia of the Regionary Catalogue must be the one made by Marcus Aurelius to convey water to his villa on the Via Appia, usually called the Villa de' Quintilii, where a brick-stamp of the time of Marcus Aurelius (A.D. 162) was found on the aqueduct itself by Fea in the eighteenth century [m]. This water was afterwards conveyed to Rome by his successors, Ælius Aurelius Commodus and Septimius Severus, to supply the great *thermæ* begun by Commodus and finished by Septimius Severus, which were in the first Regio just inside of the Porta Latina, and must have been begun about A.D. 185 [n].

The Aurelia was an important aqueduct, and there are slight remains of its *piscina* just outside of the Porta Latina on the southern side: its *specus* was traced nearly to that point in the excavations made in 1871. The modern road is cut through this old *piscina*, forming a foss-way in this portion: the aqueduct there passes underground, and has been destroyed or is not visible in this part; but, about a mile from Rome, it can be seen on the bank in the western cliff of the valley of the Caffarella. The *specus* remains as a tunnel for a short distance, and this was laid open at both ends in 1872 under my direction; it had been concealed and covered over with Pozzolana sand, which had fallen over it from the cliff above, but it can now be seen again. The greater part of the *specus* has been destroyed, and used for building the large modern farm-house on the opposite side of the valley, the building material having been good brick. As it would not pay to destroy the tunnel, that was let alone.

These remains of the *specus* are near the well-known tomb called Dio Ridicolo. To this point it runs along the bottom of the valley at the foot of the hill on the side of the small stream or Marrana, here artificial, and parallel to that branch of the river Almo. This open conduit was probably made in the twelfth century, at the same

[m] EX . FIG . . . . AEAM . . AVGVS . RVST . IT . ET . AQVI . . (Ap. Fea, Fasti Consul., p. cxviii. No. 62.) Junius Rusticus et Aquilinus were Consuls, temp. Marci Aurelii, A.D. 162.

[n] Commodus was emperor from 180 to 192, but was slain at the early age of 31; and it is probable that this great work was left unfinished, and was completed by his successor, Septimius Severus. In the Regionary Catalogue they are mentioned together, and there was probably no division between them.

time that the other branch of the Almo, which runs through Rome, was altered and made into a canal or mill-stream where necessary, in order to keep up a constant supply of water, and to avoid its being wasted in floods.

Let us now trace this aqueduct *backwards* from Rome, in that part near the city. At the Nymphæum, called the fountain of Egeria, it turns at a sharp angle up to another small *castellum aquæ*, close to the church of S. Urbano, which is usually mistaken for a tomb; but the walls are lined with *opus signinum* or *coccio-pisto*, the invariable test of an aqueduct. At this point it turns again towards another fine *castellum aquæ*, at the end of the Circus of Maxentius and of his son Romulus. It comes on there from the head of the valley of the Caffarella, and to that point from the villa of the Quintilii in the Via Appia Antiqua. Thus far we have traced its course *backwards* from the *thermæ;* in order to identify it more clearly, we will now go to the sources, and bring it down to the same point to which we have traced it from the *thermæ*.

The sources or springs are on the side of the hill of Marino, below Grotta Ferrata, in the same swampy district as those of the river Almo, and of the old aqueducts of the Tepula and the Julia. Several springs are collected into a central reservoir; and, as is usual with other aqueducts, they are then brought into a *specus*, at first underground to the foot of the hill, then upon an arcade, of which there are considerable remains at the Torre di Mezza, Via di Albano, about seven miles from Rome. This fine arcade of the third century goes on to the villa of the Quintilii, and was no doubt built under Aurelius Commodus, after he had obtained possession of that great and fine villa. In various parts of that great building are remains of reservoirs for this aqueduct, and of baths connected with them[o]. About half-a-mile nearer to Rome is, at an angle, as usual, another large reservoir, which has been turned into a farm-house; and the appearance of a medieval chapel or church has been given to it, by building a tower at one end. Possibly it was used for that purpose in the Middle Ages. From thence to the head of the valley of the Caffarella is but a short distance. Where the *specus* has been carried on an arcade above ground, it has been destroyed as a quarry for the good old bricks; where the ground is higher and the *specus* is underground, it has been traced in parts only.

[o] It was usual to take advantage of the *castella aquæ* of the great aqueducts to construct bath-chambers of various kinds, both for hot and cold and swimming baths.

THE THERMÆ of Septimius Severus and Commodus were close to each other, and probably connected. They are mentioned together in the Regionary Catalogue as in the first Regio, and there are remains of them under the small hill, called Monte d'Oro, probably, from the golden colour of the sand in its original state, which is situated just within the Porta Latina, between that and the Porta Metronia. Some excavations were made there in 1870 by the Archæological Society, and large subterranean chambers and corridors were found similar to those under the Thermæ of Antoninus Caracalla. The *specus* of an aqueduct was also followed for a considerable distance in the direction of the Porta Latina. This must have been for the Aqua Severiana. Just outside of that gate are remains of two *piscinæ* or *castella aquarum*, one on either side, and on different levels. One of these belonged to the Aqua Aurelia, the other to the Severiana. The course of this latter is more doubtful, but it was probably only a branch from one of the great aqueducts, and would appear to have come in the bank on which that part of the wall of Aurelian was built, from the Porta Metronia to the Porta Latina. It arrived at the bridge over the Almo (on which the gateway-arch of the Porta Metronia is built), from the great *piscina* and *castellum aquæ*, on the cliff of the Cœlian, near the Porta Capena and the Camenæ, where two aqueducts are now visible, having been brought to light by the excavations of the Archæological Society. The construction of one of these aqueducts agrees with the time of Septimius Severus.

XIV. Antoniniana, A.D. 215.

This aqueduct enters Rome at the south-east corner near the Porta di S. Sebastiano, and passes over the arch of Drusus; a part of the arcade is visible by the side of it. The *specus* can be seen both in the wall of the city, through which it passes, and over that arch, and one of the arches of the arcade remains on the east side of it. It was carried in that manner for some distance across the valley or foss, until it reached the high bank of earth on which the Wall of Aurelian is built, near the Porta di S. Sebastiano, and then along the edge of that bank, which is the great *agger* of the ancient earthworks, against the outer side of which the Wall of Aurelian is built. The inner side of the bank is supported by a low wall here as in many other parts, and upon or against that inner wall the *specus* of the aqueduct is carried. It is sometimes on an arcade, in other parts it is carried on the wall to the Thermæ of Antoninus Caracalla. The demolition of part of this arcade in modern times is recorded by contemporary authors.

The *specus* passed upon an arch over the road in the old foss outside the wall into a garden on the opposite side, where it can be seen on the level of the ground; thence it can be traced through that large garden or vineyard as far as the railway, which passes on the outer side of it in a deep cutting. The remains of the brick arcade here form a wall between this garden and another. It is covered with shrubs, and looks like a hedge, from which circumstance it has hitherto escaped observation. The wall is cut through by the railway, but can be traced on the other side of it along the bank of a narrow deep lane, like what we call in England a Devonshire lane. This lane goes parallel to the Via Latina, on the southern side of it, for about a mile; the aqueduct then leaves it, turning short to the left. Near to this angle, at about half-a-mile outside of the Porta Latina, is a large reservoir belonging to this aqueduct. It is built against the western cliff of the valley of the Caffarella, the top of it level with the summit of the cliff, and therefore is not visible from above, as a person standing on the higher ground looks over it. It is also hidden by a clump of trees; but it is very distinctly visible from the valley below, and from some parts of the Via Appia, and is readily seen to be a *castellum aquæ* by the boldly-projecting buttresses to support the wall with the weight of water behind it. The Aqua

Antoniniana ran along the edge of the cliff, and supplied this large reservoir, which is oblong as usual, and divided down the middle by an arcade, similar to the fine one of the Marcian near Tivoli, and many others. This has been plastered over, and made into a cow-house. It is far above the level of the Aqua Aurelia, which runs below along the side of the valley of the Caffarella. The Aqua Antoniniana clearly came from the higher aqueducts in the main line; and, according to the Einsiedlen Itinerary, it was a branch of the Marcian which went to supply the Thermæ of the Antonines called that of Caracalla. Part of the brick arcade, with the *specus* upon it, is here visible in another garden against a cliff; it then passes underground for a short distance, but soon emerges again, and can be traced against another cliff as far as the Via Latina, which is here upon a bank, or rather on the edge of higher ground, with the remains of a *piscina* by the side of it. The *specus* then again passes underground for some distance, and the next point where we have been able to find it is an old stone quarry, the vault of which fell down in 1870, and revealed this *specus*, which was not visible before. This is in the garden behind the Albergo de' Spiriti, on the Via Appia Nova, about two miles from Rome, and near the point where it crosses the old Via Latina[p].

A large reservoir remains near the Porta Furba, about a quarter of a mile nearer to Rome, and just two miles from the Porta Maggiore. Here we excavated (in 1871) this large subterranean reservoir, near the Claudian arcade on the southern side, but not very close to it, rather nearer to the road to Tusculum (Frascati), which passes near the Porta Furba. This reservoir appears to have belonged to the Anio Vetus, which agrees with the account in Frontinus, of a branch of the Anio Vetus at two miles from Rome, going in the direction of a new road. The *specus* crosses the Via Appia Nova near the Albergo de' Spiriti, and the Via Appia Nova was probably a new road in the time of Frontinus, as indicated by the tombs of the first century along the side of it.

[p] This is also mentioned in our account of the Anio Vetus (II.), as the branch at the second mile from Rome according to Frontinus. From the low level, it is more probable that this branch came from the Anio Vetus than from the Marcia, and an itinerant pilgrim of the eighth or ninth century may have been mistaken on this point.

XV. Alexandrina, A.D. 225.

The Aqua Alexandrina is distinctly mentioned by Lampridius in his life of Alexander Severus (c. 25), as made to bring water to his *thermæ*, which were near those of Nero, and therefore near the Campus Martius and the Pantheon in Regio IX. This could only have been a branch from the Virgo [q], as there is no aqueduct of the third century along the Cœlian, and no trace of a branch from the Palatine or the Capitol.

There is no probability in the theory of Fabretti, that the great aqueduct coming from Gabii, on the eastern side of Rome [r], was the one mentioned in the life of Alexander Severus as made by him to carry water to his *thermæ*, near those of Agrippa, in the Campus Martius, on the northern side of Rome. A branch from the Virgo on the Pincian, or from one of the great reservoirs on the eastern side of Rome, could be made at a tenth part of the cost. There is some reason to believe that there was such a branch passing near the Barberini palace.

Another branch may very well have been made from the great aqueducts between the Porta Maggiore and the Porta S. Lorenzo, to the Nymphæum of Alexander Severus, on the Esquiline in Regio V. An inscription relating to this is said to have been found at the *piscina* in the garden of S. Croce [s]. It is far more probable that this inscription was found on the wall of the great reservoir, on the other side of the Via di S. Maria Maggiore, near the Minerva Medica, where other reservoirs of extensive *thermæ* of the third century are visible [t]. These were supplied with water from other reservoirs just within the Porta Maggiore belonging to the different aqueducts; the Anio Vetus, the Marcian, and the Claudian,

[q] This was probably the branch that now runs under the Via dei Condotti. The main line to supply the Thermæ of Agrippa has been traced beyond the fountain of Trevi to the Piazza di S. Ignazio, very near the Pantheon, which was the entrance-hall to these *thermæ*. Those of Nero and Alexander Severus were more to the north.

[r] See Aqueduct XI. Trajana.

[s] HERCVLI . CONSERVATORI
INVICTO . COMITI
D. N. SEVERI . ALEXANDRI
PII . VICTORIS . SEMPER
AVG. AC. OPTIMI . PRINCIPIS
M. AVRELIVS . PRISCILLIANVS
V. C. CVRATOR . NYMPHAEI
DEVOT . NVM . M. Q. E.

[t] The great Thermæ of the third century in the Esquiliæ, where the building known as the Minerva Medica stands, and to which the other building, called after the Trophies of Marius, is supposed to have been the entrance; this has been identified as a Nymphæum of Alexander Severus, by the representation of it on one of his coins.

all appear to have contributed their share. The one specially called Alexandrina was probably the lofty one carried upon a tall arcade, from the reservoir of the Claudia near the Baker's tomb,—forming part of the present city wall. The lower part of the piers of the arcade of this period may be seen built up in the wall; the arches lead to another reservoir between that and the building called the Temple of Minerva Medica, and are there brought to an end, just on the south side of the new arches made for the railway. The *specus* or conduit, and the arches for it, on these brick piers of the third century, have been rebuilt for the Aqua Felice, in the same rough way as that *specus* is usually built; but, as that conduit is carried on to the Porta S. Lorenzo in the wall, and as these piers of the third century cease exactly at the point where the conduit of that period would naturally turn off, there seems every probability that this was the Aqua Alexandrina, which was merely a branch from the Claudia and Anio Novus united to supply these *thermæ*, just as the Aqua Antoniniana was a branch from the Marcia to supply the *thermæ* of Antoninus Caracalla.

The *specus* of this branch was carried over the Julia on the Marcian arcade to the point where it terminates, which is exactly in a line with a lofty *piscina* and *castellum aquæ*, now a gardener's house, between the wall and the Minerva Medica, and there are remains of the tall arcade from one to the other; the last pier which joins to that building looks like a large tall buttress to it.

The Temple of Minerva Medica is a brick building of the third century, agreeing with the time of Alexander Severus, and there has evidently been a fountain of importance in the middle of it, with an aqueduct to carry water to it from the large *castellum* near to it. Upon this *castellum aquæ* a villa of the sixteenth century has been built; but the vaulted chambers, with the tartar deposit of water, remain in the lower part of this building, and there is a tomb or *columbarium* of the third century at one end of it.

The dedication of a temple to Minerva Medica, in connection with an aqueduct, is natural, and that this was not an isolated example is shewn by an inscription found near Subiaco[u], and published in 1830 by Martelli, in his work on the Antiquities of Sicily[x]. The Regionary catalogue of the fourth century gives, in the fifth Regio, which contains the Esquiliæ, the Nymphæum of Alexander and the

[u] SOPRA TREBIA (TREVI) VICINO ARCINAZZO (upon Trevi, near Arcinazzo).
MINERVAE . MEMORI
COELIA . IVLIANA
INDVLGENTIA . MEDICI
NARVM . INFIRMITATE . EIVS
GRAVI . SANATA . D. P

[x]

Minerva Medica, all which agrees with the existing remains of this Nymphæum. In the same vineyard, to the north-west or opposite side of the Minerva Medica, and very near to it, are the ruins of another building, called by some "a *nymphæum*," now also a gardener's house, under which the marble pavement remains very evident, the construction belonging to the period of Alexander Severus[y].

Both the Pantheum or hall for the men, and the Nymphæum or hall for the women, had images in the niches round them, and frequently an altar also, so that they were temples at the same time that they were used as waiting-rooms for the baths. The Pantheum of Agrippa was the entrance to his *thermæ*[z]; the building usually called *the Temple* of Minerva Medica, from an image found there, is called in the Regionary Catalogue Minerva Medica only. A Nymphæum and a Pantheum equally required a *castellum aquæ* to supply it with water for the fountains and the stream that ran round it, and there are remains of bath-chambers and niches outside of many of the larger reservoirs, as in this instance.

During some extensive excavations, which were carried on in the spring of 1871 by a company, with a view to building new streets in the eastern part of Rome, considerable remains of the lower part of the walls of these great *thermæ* of the third century were found on both sides of the road made in the sixteenth century, from S. Maria Maggiore to S. Croce. The company bought two large vineyards, in one of which stands the fine ruin called Minerva Medica, which was evidently one of the halls of the *thermæ*; the ground is full of ancient reservoirs for water at different levels, some underground, others at a considerable elevation, turned into houses; they may be traced at intervals all along the line within the Wall of Aurelian, from the Porta Maggiore to the Porta S. Lorenzo, which is itself here built against the Marcian arcade, and in one part the outer wall of the large *piscina* and *castellum aquæ* of the Tepula is incorporated with the wall, of which it now forms part. This ground had been at one period the Esquiliæ or great burial-ground, and afterwards the garden of Mæcenas, so that remains of great works for the supply of water at different periods were likely to be found there, as was the case.

[y] There is a subterranean reservoir under it, and there are several other subterranean reservoirs in this ground.

[z] This great Pantheum was a temple of all divinities, and also a hall for the men, being connected by a large vaulted passage at the back with the *thermæ*, of both of which there are visible remains.

XVI. The Algentiana, A.D. 300.

This aqueduct is said by some to be only a branch from the Aqua Marcia from the *castellum* or *piscina* at the Porta S. Lorenzo, to the Thermæ of Diocletian, and to have been made by him. Considerable remains of the large *piscina* for these Thermæ were found when the railway station was built, a plan and section of it was preserved by Visconti; it was not destroyed, but was built over and effectually hidden. The aqueduct was continued, A.D. 330, by Constantine to his Thermæ on the Quirinal, now in the Colonna gardens. Others say that the Algentiana comes from the Mount Algidus, near Tusculum. In the Campagna between Frascati and Rome, there are remains of large reservoirs or *castella aquarum* of the third century, which do not appear to belong to any of the aqueducts hitherto described. They are usually said to be only reservoirs for the supply of the adjacent fields; but they are all on the highest points, and it is difficult to see how the water was conveyed to them. There appears to be a regular line of them, not indeed a straight line, (the nature of the country would not admit of that,) but still a line of them at comparatively short intervals, always within sight of one another. It seems probable that the Aqua Algentiana was brought in a subterranean channel or *specus* from the great reservoir at Tusculum, which is on very high ground, and that the water was permitted to run into these reservoirs at frequent intervals, instead of being carried on an arcade across the country, as had been done in the case of the earlier aqueducts. It is beyond dispute that the ancient Romans were well acquainted with the principle of the syphon, and that they were quite aware that water will rise to its level after a very considerable distance: they may have therefore thought it expedient in this aqueduct to avail themselves of that principle. It is difficult to explain how water could be supplied to these numerous high reservoirs in any other manner.

XVII. Aqua Crabra, and Marrana, A.D. 1124.

This stream was brought into Rome in the bed or foss of the river Almo (Flumen Almonis), mentioned in the Regionary Catalogue as in Regio I., and not otherwise accounted for in this enumeration. The water now comes from the Marrana, which has its source near Marino, and from the Aqua Crabra, which comes from Rocca di Papa, near the lake of Albano, some miles further up the hill; the waters of these two streams are united before a part of them is carried through the tunnel of the Aqua Julia to a point of junction with the bed of one of the many branches of the small river Almo. The Almo itself comes also from the hill of Marino, but from a different part of it, and is divided into many branches when it arrives on the low ground of the Campagna. One of these was made use of for this mill-stream, a canal being carried in banks of clay in straight lines, where the old bed of the river passed through low ground, and had been therefore liable to floods; but this old bed or foss was used, to save expense, where it passed through higher ground in its old winding course.

Originally that part of the branch which passes through Rome was alternately wet and dry, as many of the other branches are, and was liable to floods after heavy rains. The main branch of the Almo turns off to the south near the Torre Fiscale, following nearly the same line as the cross-road from the Via Appia Nova to the Via Appia Antiqua, and passing under this road twice. In this part of its course it is generally dry in dry weather; but when it arrives at the head of the valley of the Caffarella, several other springs that never fail run into this old deep foss. One comes from near the villa of the Quintilii, another is called the fountain of Egeria, a third the Aqua Santa, from its medicinal qualities. There is a bath-house built over that spring. The original springs on the hill of Marino bring little water in dry weather, not more than sufficient to supply ponds near to them for the cattle; but, in wet weather, the water runs off in the old deep winding foss, which also drains all that part of the country.

The sources of the Marrana are about a mile above Marino, and nearly three miles from Albano; they are in a long, narrow, deep valley in the rocks, and the water gushes out in several places at short intervals on both sides of this valley, which continues on under the rock on which the small town of Marino is built. Close

under the town is a tall medieval tower, and at the foot of this is a *piscina* of rude early character, the lower chamber of which is still full of water. A *specus* cut in the rock as a tunnel is also visible at this point. On the side of the valley opposite to the town are the splendid ancient quarries of *peperino*, called by Vitruvius *lapis Albanus*, because Marino was in the district of Alba Longa. The stream flows on in the same deep valley, winding down the hill, and, at the foot of it, the Aqua Crabra, coming from Rocca di Papa, is united with it shortly before it is crossed by the bridge on the road to Grotta Ferrata, ten miles from Rome and near the tunnel through which flows part of the united water, the main body going on straight to the river Anio; the part which is carried through the tunnel turns at a sharp angle to the left, or west, towards Rome. At each end of the tunnel is a loch of early character, partly cut in the rock and partly built of travertine, with the grooves of flood-gates. Over the exit from the tunnel is a piece of old wall faced with *Opus Reticulatum*, of the same rude early character as that of the Aqua Julia.

After the water emerges from the tunnel, it passes in a deep bed to a bridge over the stream of the Marrana, near the *piscinæ*, six miles from Rome. At this point the deep foss of the river Almo is close to it. This is dry in dry weather, but has abundance of water in wet weather, and here the foss is dammed across; this appears to have been done originally to effect a junction with the water of the Marrana, which from this point flows in the foss of one of the many branches of the Almo that intersect the Campagna in this part. This mountain-stream is a very uncertain one; sometimes the deep foss is full of water, flowing at the rate of five or six miles an hour, at other times it is dry. Numerous winding streams are collected into one at the head of the valley of the Caffarella, near the church of S. Urbano. Here it passes through swampy ground at a place called Aqua Santa, on the cross-road from the Via Appia Nova to the Via Appia Antiqua; here also several springs fall into the deep bed, one of which is miscalled the fountain of Egeria[a]. In dry weather this branch of the river Almo appears to begin here, and from thence to the mouth of this branch near S. Paul's, mentioned by S. Gregory as the Almo, the water never fails. All the other branches are deep, dry fosses after dry weather, and the branch that now flows through

[a] This spring is considered by some authors as the one source of the river Almo; but it is only one of many, and it falls into the deep bed of the river, coming from some miles beyond that point.

Rome must originally have been frequently dry, and at other times liable to floods [b].

To remedy this evil, a branch was made from the stream, consisting of the Marrana and Aqua Crabra united, which never fails; and, in those parts where the water passes over low ground liable to be flooded, it is carried in a bank of clay covered with sand, and planted with canes. In such a bank it is carried from near the ford in the natural bed of the river at Roma Vecchia to the Torre Fiscale. Between these two points there is a loch with a flood-gate and a lasher, over which the water falls into one of the deep beds or fosses of the Almo; but this deep bed of a mountain-stream has no other beginning than this same stream, here raised in a bank of clay, into which the water of the Marrana has been turned. In other parts where the ground is high, and consequently the water is below the level of the ground, it follows its ancient, natural, winding course in a deep foss. This is the case both near the original point of junction before reaching the ford at Roma Vecchia, again after passing the Porta Furba, and again under the walls of Rome near the Lateran. From Roma Vecchia, passing by the Torre Fiscale to the Porta Furba, it is carried in a bank of clay many feet above the level of the meadows; but after passing the Porta Furba, it again falls into the old deep foss for about a mile at the foot of the Claudian arcade, winding about sometimes on one side, sometimes on the other, then near to a part of the road to Frascati. For the last half-mile to the Porta S. Giovanni, this road is modern on a large bank of earth across the valley or great foss outside the Wall of Aurelian, and for most part of this line the Marrana is carried in a small bank of clay against the side of the larger bank of the road; but before it reaches Rome it falls again, that is, the earth rises on the terrace under the wall, and the Marrana falls into the old deep bed near the Porta Asinaria, after passing through two mills built on bridges, one on the line of the old Via Asinaria, the other of the old Via Lateranensis.

This small stream enters Rome under the Porta Metronia, which is built on a bridge over it [c]. This bridge has a brick arch of the

[b] In the valley of the Caffarella, a stone *specus* has been made by the side of the natural bed of this branch; it is open at the top, has lochs in it, and is on a higher level than the natural stream. The object of this was obviously to keep a supply of water from the springs in dry weather.

[c] The two arches of the Porta Metronia remain, both built of brick of the time of Aurelian. The outer arch is visible in the city wall; the inner one is concealed by a medieval tower built up against it. In the year 1871, Signor Rosa made a new gate on the east side of the Porta Metronia for his carts to

time of the early Empire, partly concealed by a medieval arch in front of it. Shortly after entering Rome the stream passes at the north end of what is now the nursery-ground of the city, called Orto Botanico, and under a bridge on which another mill is built; by the side of it is the road into that large garden, known to have been that of Crassipes, the son-in-law of Cicero, who mentions in one of his letters a flood of this stream carrying wooden shops from the bank in front of it to the Piscina Publica [d].

This is exactly the direction that the stream takes, as it turns at a sharp angle to the north directly after crossing the Via Appia, and passes close to the Piscina Publica; while the Tiber flows from north to south, and a flood of that river would have carried the shops the other way (if it reached that level at all). There is another mill near the angle on the Via Appia. The stream then passes along a curve at the southern end of the Circus Maximus, (washing the foot of a lime-kiln,) then under the slope of the Aventine and through the gas-works on the site of the Carceres of the Circus, then underground and through another mill in the Via della Marrana near the Bocca della Verità. The eighth and last mill is on the bank of the Tiber, and is built over the mouth of the stream, the back of the building resting on the old tufa wall, called the Pulchrum Littus of the Kings, in which an aperture was left for the Almo when that wall was built. The front of the mill is built on medieval arches standing in the bed of the Tiber.

This alteration of the bed of the Almo may have been made at an early period, of which we have no record, and restored to use in 1124, under Pope Calixtus II., or it may have been entirely made out of the remains of the old aqueducts at that time. We have distinct records of the work done then; but in one of these the expression used is *reduxit*, that is, he "led again" the water from the old arches. In any case, a great benefit to the city was made at that time, and the account of it fairly belongs to the history of the aqueducts, from which it was made. The following account of it is given by the Cardinal of Arragon, in the time of Pope Calixtus II., A.D. 1124:—

"He (the Pope) also brought water from the ancient arches, and conducted it

pass through, in which the earth, excavated from the Palatine, is carried out into the meadow beyond, outside of the walls. This is certainly better than continuing to fill up the valley between the Aventine and the Pseudo-Aventine, and thereby concealing more of the Wall of the Kings under S. Balbina and burying more of the Aqua Appia, than has already been done under his orders.

[d] Cicero, Epist. ad Q. Fratrem, lib. iii. ep. 7.

to the Porta Lateranensis, where he formed a lake to receive it, for watering horses. He also built several mills on the line of the same stream of water, and planted many vines and fruit-trees round the borders of this lake with great care [e]."

Another writer of the same period, called Pandolph of Pisa, relates the same thing:—

"He *reconducted* a stream of water into the city, and made mills, with vines near a lake [f]."

The ancient aqueduct which was made use of for the purpose was the Julia (V.), (which see,) and the ancient arches mentioned probably mean the tunnel through which the water of the Aqua Crabra and the Marrana united is brought. Its course has been already described, the great reservoir or lake (*lacus*) opposite to the Porta Lateranensis is very distinctly visible in the vineyard by the side of the stream, between that and the Aurelian wall. It is still swampy ground, and is planted with canes; when these are cut at the end of the month of January, it can be clearly seen, and the remains of the lake intercept the path on the bank of the stream. This reservoir might be restored to use with great advantage to the neighbourhood, and at little expense.

There are two mills on bridges across the stream on the side of this lake, and several other mills on the line of the stream, as has been mentioned. The water must always have flowed out of the lake in the old deep bed of the small river Almo, and passed under the bridge on which the Porta Metronia is built, into Regio I., and then under the foot of the Aventine by the side of the Circus Maximus into the Tiber, as before described. The tower built in the twelfth century, against the inside of the gate and the bridge, conceals this from view.

[e] "Hic etiam derivavit aquam de antiquis Formis, et ad Portam Lateranensem conduxit, ibique lacum pro adaquandis equis fieri fecit. Plurima quoque molendina in eadem aqua construxit, et multas vineas cum fructiferis arboribus secus ipsum lacum plantari studiosissimè fecit." (Muratori, Rerum Italic. Script., tom. iii. p. 420, col. 2, E.)

[f] "Aquam ad Urbem reduxit, molendina cum vineis juxta lacum aptavit," &c. (Pandolphus Pisanus, ibid., p. 419, col. 1, E.

XVIII. Aqua Felice, A.D. 1587.

This aqueduct is named after the Pope, Felice Peretti, whose title was Sixtus V.; he brought it from a place near La Colonna, the ancient Labicum, about twelve miles from the city, to the fountain of Moses (now so called from a statue) at the Termini on the Esquiline, as recorded on an inscription[g]. It is still in use, supplying the fountains at the Termini, near the Thermæ of Diocletian, of Monte Cavallo, near those of Constantine, and the whole of the upper town. The waters of the Aqua Hadriana were united with some others in the territory called Pantano, at about twelve miles from Rome, where they emerged from the mountains. All these sources or springs of water were collected during the pontificate of Gregory XIII., A.D. 1572—1585, in an immense reservoir, repaired in 1869, with several other smaller ones subservient to it for purification. The aqueduct was built in the time of Sixtus V. (A.D. 1585—1590), but the reservoirs were not completed until the time of Urban VII. or VIII. [1623—44]. From this point the water is carried into the canal or channel through an opening called the *fistula Urbana*, made in a piece of marble. According to Fontana, this water was brought to the Porta Maggiore on a new arcade made out of the materials of the old aqueducts in a very clumsy manner. It was the intention of the Pope to have made use of the canal or conduit of the Aqua Marcia, but that was found to be at too high a level, and his clumsy engineers were obliged to make a new arcade at immense expense. He availed himself, however, of the old arcades as far as he could, by building his new conduit up against the side of the piers of the old ones, sometimes on the Marcian, as may be seen at the place called *Sette Bassi*, and near the Porta Furba, sometimes against the Claudian as near Rome. After bringing it into the city in this canal of rough stone, the water was carried in leaden pipes into the old subterranean channels, as may still be seen in the deep *specus* on the Cœlian, and the metal pipes pass through the tall brick piers of the arcade of Nero,

[g] SIXT. V. PONT. MAX. PICENVS.
AQVAM . EX . AGRO . COLVMNAE.
VIA . PRAENEST . SINISTRORSVM.
MVLTARVM . COLLECTIONE . VENARVM.
DVCTV . SINVOSO . A. RECEPTACVLO . MIL. XX.
A. CAPITE XXII. ADDVXIT.
FELICEMQVE . DE . NOMINE . ANTE PONT. DIXIT.
COEPIT . ANNO . PRIMO . ABSOLVIT III. M.D. L. XXXVII.

and are supported on flat arches across from one pier to the other, with a rapid descent over the first or ancient road from S. Croce to the Porta Maggiore, and into the Specus Vetus underground, before arriving at the second or modern one from S. Croce to S. Maria Maggiore. The point of descent is marked by a respirator.

Pantano is about two miles from Gabii, and this reservoir is still in use. It is very near to the ancient *castellum aquæ*, which was made originally by Hadrian[h] for his aqueduct, as is shewn by an inscription found there. The other streams coming from Tivoli are said to have emerged also near this point, and the first engineer of the Felice, Matteo da Castello, considering the Claudian and Marcian lines as the best, followed those to the *piscinæ;* but having made a mistake in the levels, instead of using the Marcian *specus* and arcade from the *piscinæ* into Rome, and merely repairing it as the Pope had intended, Fontana was obliged to rebuild it entirely of the materials of the old Marcian arcade, with the help also of those of the Claudian, all the way to Rome. This was done in great haste and in a very clumsy manner[i].

From the Porta Maggiore one branch of the Aqua Felice is carried across the great foss to the Lateran, through the piers of the arches of Nero, and down a cascade-pipe into the old *specus* of the Appia, and along that to the fountains and reservoirs at the Lateran. This is the branch that goes straight on from the corner of the Sessorium to the west. Another more important branch of the Aqua Felice turns short to the north from the same angle and over the Porta Maggiore, along the city wall to the Porta S. Lorenzo, in a new channel very badly and clumsily built of rough stone from the materials of the old aqueducts, making use of the piers of the Claudian arcade as far as they go, and then of the inside of the wall of Aurelian over the Marcian arcade. The Aqua Felice having here been brought to a higher level, that is to say, the descent from the *piscinæ* being less rapid than that of the Marcia, after passing the Porta Maggiore, goes over the Marcia upon the Arch of Augustus at the Porta S. Lorenzo. There is a *castellum aquæ* for it in the wall just to the south of the Porta S. Lorenzo, where the water may be heard rushing through, and the surplus water runs off into an ancient drain on the outside of the wall. With the rapidity of all the public works under that energetic Pope, the under-

[h] See Aqueduct XI.

[i] The Pope insisted on the work being completed at the time originally fixed, notwithstanding that the blunder of his engineer made it necessary to rebuild the whole arcade for seven miles.

taking, a decree for which he had signed in April, 1585, was completed in two years, by the labours of from 2,000 to 3,000 men, and the waters were seen to gush from their sculptured fountain in the Piazza di Termini, on the 15th of June, 1587. The Aqua Felice was conducted for fifteen miles underground, and for seven miles upon arcades. Besides the Aqua Felice, the Via Felice and the Via Sistina (Sixtus) in continuation of it, and many other great works were inaugurated by the same Pope, who has been called the real founder of modern Rome. Other old subterranean conduits are employed to carry the pipes of the Felice where convenient for the purpose of conveying water to different parts of the town.

Junctions of the arcade of Sixtus V., or Aqua Felice, with that of the Claudia, take place at an angle where the Torre Fiscale has been built, and again at another angle where there is an archway called the Porta Furba, about two miles from Rome, and a most picturesque ruin of a *piscina*, with a tall tower by the side of it, in which is the ventilating-shaft of the conduit. The difference of construction and of level is very evident, and the three conduits carried on the same arches may be seen distinctly. The construction of the Claudia (VIII.) is of large square blocks of stone. The Anio Novus (IX.) is merely an additional brick conduit, the work is part of that of Claudius and Nero, and is carried over the original one at a great height from the ground. Near the city only small portions of this upper conduit remain here and there, as, for instance, over the Porta Maggiore, and in a few places on the wall. In some places, the arcade of the Aqua Felice runs parallel to the Claudian for a considerable distance, and is joined to it at both ends, as near the Porta Furba. This lower arcade carried part of the conduits of the Aqua Marcia, Tepula, and Julia, which ran from the Porta Furba into the city parallel to the later one of Claudius, at a lower level.

Where the Aqua Felice enters the city, it is carried on the piers of the arcade of Claudius, from the junction with the arches of Nero, over the Porta Maggiore to the old *castellum* at the corner of the wall, where it turns at a sharp angle. Here the arches of Claudius cease; but the conduit of the Aqua Felice is continued along the city wall, of which it forms part, upon the ancient embankment as far as the Porta S. Lorenzo, and over the archway of Augustus there, using one of the older conduits. It then makes a sharp turn to the west, and after being carried along the north side of the road for a short distance, crosses it again on an archway built for the purpose by Sixtus V., as recorded by an inscription upon it; then it turns sharply

to the west again, and is carried on an arcade between the road on the north and the railway on the south, to the great inner *agger*, which it reaches at a point near the Thermæ of Diocletian and the railway station. It is then carried in an old *specus* in that bank along the east side of the Thermæ, and turns at an angle to the north, at the Via Nomentana, near the Porta Nomentana, a little to the south of the modern Via di Porta Pia; then along the north side of the Thermæ till it arrives at the great reservoir behind the fountain of Termini. The *specus* is three feet wide, and the water in it is usually from three to four feet deep, running with a rapid current about five miles an hour, and constantly flowing day and night. Thence it is carried in pipes to the different reservoirs and fountains of the upper town. It also supplies the lower part of the city from the Ghetto to the Marmorata, along the bank of the Tiber.

SUMMARY.

FRONTINUS, who wrote in the time of Nerva and Trajan, mentions (as we have seen) nine aqueducts[k], reckoning as distinct several branches, or additional channels, subordinate to others more important. There is one more important record to which reference has not hitherto been made, namely, the summary at the end of the *Curiosum* and *Notitia*, in which nineteen are enumerated.

The entry in the Summary of the Regionary Catalogue is as follows:—

Aquæ XIX.

I. Traiana [X.]
II. Annia (or Anio Vetus?)[II.]
III. Attica (Anio Novus) [IX.]
IV. Marcia [III.]
V. Claudia [VIII.]
VI. Herculea [XVII. Almo?]
VII. Cerulea [IX.]
VIII. Julia [V.]
IX. Augustea [I.]
X. Appia [I.]
XI. Alseatina [VII.]
XII. Ciminia (?).
XIII. Aurelia [XII.]
XIV. Damnata (Cloaca Maxima?).
XV. Virgo [VI.]
XVI. Tepula [IV.]
XVII. Severiana [XIII.]
XVIII. Antoniana [XIV.]
XIX. Alexandrina [XV.]

Those not previously mentioned are (1.) Attica, (2.) Herculea, (3.) Cerulea, (4.) Augustea, (5.) Ciminia, (6.) Damnata.

1. Attica is supposed by Fabretti to be the same as Alseatina [VII.], but then how is the number of nineteen to be made up? It was probably the Anio Novus, as already described. [See IX.]

2. Herculea. This is mentioned by Frontinus[l] as receiving a part of the Aqua Marcia after its entrance into the city[m]. Another stream of the same name, thirty-eight miles from the city, was added to the Anio Novus[n]; but it seems most probable that the stream here intended is the Almo, which enters Rome under the Porta Metronia, and conveys the water of the Marrana, or Aqua Crabra, coming from

[k] "Nunc autem in urbem influunt: 1. Aqua Appia, 2. Anio Vetus, 3. Marcia, 4. Tepula, 5. Julia, 6. Virgo, 7. Alsietina (quæ eadem vocatur Augusta), 8. Claudia, 9. Anio Novus." (Frontinus, 4.)

[l] Id., c. 19.

[m] See Aqueduct III.

[n] Frontinus, c. 15, in both cases called by him, Herculaneus.

these two mountain-streams united, as already described. This is always a very strong stream. It follows the line of the aqueducts for miles towards Rome, and received the surplus water in many places, where there were *piscinæ;* it passes very near to the point where the aqueducts enter Rome at the Porta Maggiore, and may very well have received the surplus water there also of the Marcia, as stated by Frontinus.

3. Cerulea. This is the name of one of the branches of the Claudia, among its sources, and is mentioned in the inscription at the Porta Maggiore; but again, this does not account for one of the nineteen Aquæ.

4. Augustea. A stream was added to the Aqua Marcia by Augustus, and called after him[o]; but that would not account for another stream in Rome here indicated as one of the nineteen Aquæ. It is more probable that the water here intended is the Augustan branch of the Aqua Appia, which was united at the Gemelli within the outer wall of Rome. Frontinus (c. 4), indeed, mentions that the Alseatina was also called Augustea, but that would not account for another of the nineteen streams[p].

5. Ciminia, another name for the Sabbatina [X.], according to Onuphrius Panvinius; but the sources of the Sabbatina are very distant from the Monte Cimino. Ciminia is perhaps written for Curtia, another source of the Claudia; but again, this does not account for another of the nineteen streams.

6. Damnata. This may be the stream that comes from the Quirinal and the Palatine, and which formed the lake of Curtius, whence it was conveyed into the Cloaca Maxima, as it still is. It was therefore *condemned* to serve for washing out a drain only.

There is reason to believe that some of these nineteen streams are the natural watercourses, and others merely branches from the great aqueducts, as has been said.

There were 1,452 *lacus*, that is wells, or cisterns of water, supplied by the aqueducts in Rome, according to the *Horum Breviarium* of the *Notitia*, or Catalogue of the fourth century, and they must in many instances have been very near together. A reservoir for the distribution of the water was almost a necessary termination of an aqueduct, and at a junction it was equally necessary.

Rutilius describes the aqueducts about A.D. 417, in such terms

[o] Frontinus, c. 12. [p] Id., c. 5.

as shew that they were not destroyed in the first siege of the Goths [q]. Cassiodorus represents them as perfect, about twenty years before the siege carried on by Vitiges [r]. At the time of the siege by that king, Procopius (i. 19), writing in the sixth century, records only the fourteen aqueducts already mentioned [s].

[q] "Quid loquar aërio pendentes fornice rivos,
Qua vix imbriferas tolleret Iris aquas?
Hos potius dicas crevisse in sidera montes,
Tale giganteum Græcia laudat opus.
Intercepta tuis conduntur flumina muris;
Consumunt totos celsa lavacra lacus."—(Cl. Rutilii Itiner., l. i, v. 97, and following.)

[r] "In formis autem Romanis utrumque præcipuum est ut fabrica sit mirabilis et aquarum salubritas singularis. Quod enim illuc flumina quasi constructis montibus perducuntur, naturales credas alveos soliditates saxorum, quando tantus impetus fluminis tot sæculis firmiter potuit sustineri. Cavati montes plerunque subruunt, meatus torrentium dissipantur, et opus illud veterum non destruitur, si industria suffragante servetur."—(Cassiodori Variar., l. vii. c. 6.)

[s] It is possible that the number of nineteen was made up by adding the different branches that supplied the Thermæ of the later Emperors, (Septimius) Severus, Antoninus, Alexander (Severus), (Aurelius) Commodus, Constantinus.

To these must now be added the two modern aqueducts, the Marrana and Aqua Crabra [XVII.], united and brought through Rome in the twelfth century in the bed of that branch of the river Almo, and the Aqua Felice [XVIII.], made in the sixteenth; also the Aqua Marcia-Pia, made between 1860 and 1870, which now brings the water of the Aqua Marcia into Rome by a different line.

APPENDIX.—AQUEDUCTS.

SINCE this chapter was printed, the great excavations that have been carried on in Rome have brought to light many remains of the old Aqueducts in places where they were not previously known or thought of. These are so numerous that we can do little more than mention them, beginning at the Sessorium, where the principal aqueducts entered Rome. In the Sessorian or Palatian gardens, now those of Santa Croce in Gerusalemme, a pit was dug in the reservoir which was used for the Thermæ of S. Helena, which is a large cistern of two narrow chambers, with others similar under them; this was ascertained by digging this pit. Remains of other reservoirs along the line of the north wall of the garden, which is made out of the old aqueduct, were brought to light more clearly. Just outside of this garden is the road from the church of Santa Croce to the Porta Maggiore[a], which is carried on a bank of earth that was the boundary of the Sessorian garden, and on the outer side of it, this bank is supported by a wall of the time of Constantine, no doubt built when his mother, S. Helena, resided there. Just beyond this bank, and in the great foss of the ancient fortress, are two large reservoirs close together, one on either side of the foss. These appear to correspond with the *Gemelli*, or twin reservoirs of Frontinus; an excavation made here was stopped by water, but enough was seen to make it evident that there were other chambers under them, and that they were very deep, but have probably been used for one of the later aqueducts, at a higher level also. It was very usual to carry one aqueduct nearly over another, in order that the older subterranean reservoir might receive the surplus water of the later and higher ones. It is probable that in this instance the Claudia and Anio Novus had each a reservoir here on the higher level, and that the water of the two was here united and carried on along the Cœlian Hill in one *specus*, on the arches of Nero, to the middle of the city.

The inscriptions on the Porta Maggiore record the distances from the sources of the aqueducts to this point, clearly shewing that this

[a] This was also the principal gate of the Sessorian Palace, and was sometimes called the Porta Sessoriana.

was the entrance into Rome in the outer wall, though not into the CITY, until the boundary of the city was extended to this outer wall by Aurelian, in the third century. On the northern side of this great gate remains of the Marcian arcade were found going from this point, where the three aqueducts pass through the outer wall at one of the angles, and go straight on to the high bank on which the wall of Aurelian was afterwards carried, to the Porta Tiburtina (now di S. Lorenzo), and the reservoirs there. The *specus* passes underground for some distance, about half-way between the two gates, and is carried on arches near the gates. The fine building called Minerva Medica was full of fountains, as was all the great public garden in which it stands, and all the fountains in Rome were supplied by the aqueducts. Between this building, of the third century, and the wall, is another large reservoir, turned into a house, where considerable excavations have been made. The later aqueduct, called Aqua Alexandrina, was carried in the wall over the earlier ones, to a point just opposite, to the remains of the Minerva Medica. The piers of the arches that supported the *specus* can be seen in the wall, both outside and inside, as far as this, but they go no farther. This point, where they cease, is close to the place where the railway passes through the wall. Beyond these arches other excavations were made by the archæologists near the Porta di S. Lorenzo, and the arches that carried the Marcia, etc., were shewn. There are remains of two reservoirs near this point; the outer wall of one now forms part of the city wall, and is foolishly called "the house of Cicero;" the other is just within the line, but still on the bank, with the wall of Aurelian built close against it on the outer side. There are remains of another reservoir on the other side of the gate, and one branch goes on from thence to the Prætorian Camp, passing by the Porta Chiusa, where the *specus* was shewn in some other excavations of the archæologists; and near to it, on the south side, is a large reservoir on the bank, cut through the middle by the wall of Aurelian. This proves that the great bank of earth was there, and had the aqueducts carried upon it, before the time that the wall of Aurelian was built. The *specus* then goes upon the bank round this camp, but is for the most part concealed; it is visible again on the northern side, which is the only perfect part of the fortification of the camp by Tiberius, and his wall stands upon the earlier *specus* of the aqueduct; the latter is faced with *opus reticulatum* where perfect; the wall is of fine brickwork.

The branch that goes from the Porta di S. Lorenzo to the other reservoir, under the Trophies of Marius, is carried on a fine arcade

of the first century; this has been brought out far more clearly than it had been for many centuries. The remains of the reservoir at this very high level are also made visible. Signor Ernest de Mauro, the surveyor who took the levels, considers this branch so high, that the only water that could reach it was that of the Claudia and Anio Novus united, which we know from Frontinus was carried into all the fourteen Regiones of Rome, but it was considered by Fabretti to have belonged to the Aqua Julia; the difference of level between the two aqueducts is only ten feet. At this high point the water was divided, and carried in different directions; one branch, of which part of the *specus* is visible, went to the other great reservoir called the Sette Sale, which supplied the Thermæ of Titus and Trajan on the Esquiline, and the surplus water passed on to the Colosseum and to the fountain called the Meta Sudans. From the other great division of the aqueducts, at the corner of the Sessorian gardens, near the Porta Maggiore, the well-known arches of Nero go along the bank to the Lateran, and from thence along the Cœlian Hill to the great central reservoir of Nero, over the Arch of Dolabella. At that point it has been already shewn that several of the aqueducts met, and were divided into three branches, one straight on to the Palatine, on a double arcade across the valley from the Cœlian, of which there are considerable remains of the lower tier of arches, and one arch of the upper tier, which forms a sort of back gate to the palaces of the Cæsars. A second branch passed over the Porta Capena to the Aventine, at different levels; the earliest and lowest, the Aqua Appia, is the one that can now be the most distinctly traced. After passing over the short *agger* of Servius Tullius it goes underground under the cliff, at the north end of the Pseudo-Aventine, and at the further end under the hill on which S. Sabba now stands; a series of stone-quarries have been made by cutting away one side of the *specus*, leaving the wells to give air to the quarry.

At this point excavations have repeatedly been made by the archæologists, and as often filled up again by the workmen in the summer months, until 1876, when an arrangement was made with the proprietor to make a more complete excavation, and put up a door to protect it. In this part, which is just before the *specus* crosses the last road on its way to the Tiber, seven different branches of other aqueducts cast their surplus water into this earliest and lowest; in many parts this was only a tunnel cut in the bed of tufa, and generally half full of a deposit of clay, left by the water which comes from the clayey fields of Lucullus, but in one

part it is built of large blocks of tufa, like the walls of the Kings; it is here six feet high and two feet wide; on each side of it is a terra-cotta water-pipe of very early character, and bringing different water in the same tunnel [b].

Near this point it crossed *over* the road on a bridge (?), or perhaps from the low level *under* it, at the site of a gate where the four roads meet, to another old stone-quarry of the same kind nearly under Santa Prisca, where the *specus* was visible in 1874, but is now concealed by some of the vault having fallen in; and from that it has been traced through another series of old stone-quarries to the mouth on the bank of the Tiber, in the very curious cave called that of Picus and Faunus, and Hercules—having previously passed through another reservoir, with water still in it knee-deep, remaining at a considerable distance under the hill, with a *specus* from thence to the cave at the mouth, partly a natural channel for the water to escape, and partly cut when the aqueduct was made.

The third great branch from the Arch of Dolabella went direct to the Colosseum, and two subsidiary springs still flow there, one under the garden of the Villa Celi-Montana, the other under the garden of the monastery of SS. John and Paul, near to the Colosseum, the latter a very abundant stream, bubbling up copiously; and there are three small pools supplied by it in that quarry, which was formerly called the *Vivarium*, and supposed to have been the place where the wild beasts were kept, but this was a mistake [c]. From that reservoir another branch went in a *specus* at a considerable depth under the garden of the Marchese Rappellini, behind the monastery of S. Gregory. In this garden there was a landslip in the spring of 1876, and the Marchese thought it probable that the palace of Scaurus had stood there, as it is close by the sloping road called the Clivus Scauri; I thought it more likely to have been the aqueduct which had fallen in, but agreed that the archæologists should excavate it, which was done in May. It turned out to be an old stone-quarry that had fallen in, at the depth of more than 20 ft., but the *specus* of the aqueduct had passed through the quarry, and remained visible in the pit coming from the cave called the *Vivarium*, and going over the Porta Capena. There is, however, so little of interest left, that the pit was filled up again, after a plan and sketch had been made by Signor Cicconetti.

Another branch of the three aqueducts (Marcia, Tepula, and

[b] See Diagrams III. and XIX.
[c] See the Plans and Sections of this, Plate XXI.

Julia) went from the Porta di S. Lorenzo along the side of the road or *via*, so called, partly in the bank, by the side of it; the upper *specus* is now visible, the other two are under it. The whole were underground until the levels were altered in the arrangements for the new city. This branch led straight to the *Mons Justitiæ*, in the centre of the great *agger* of Servius Tullius. Near this point the four young princes found in their excavation, in 1870, two *cippi* near together, with inscriptions upon them, stating that the *three aqueducts* passed between them, and the *specus* of the upper one, the Julia, was brought to light; the other two, Tepula and Marcia, remained underground. Not much more than a hundred yards from this, another *cippus* had previously been found, on the top of a well, recording that it descended into the Anio Vetus, which therefore ran under the others, at a great depth in this part, on account of the different levels of the ground, and was then carried along the inner side of this great bank both right and left. The one to the right, or north, going to the gardens of Sallust, or at least a branch from one of the three, went along the horn-work at that corner of the old city, and had a reservoir under the house (now rebuilt by Mr. Spithœver), and then to the *nymphæum* at the end, and (to the east) of the *Porticus Milliarius* of Aurelian. In the opposite direction, the left, or south, it went along the inside of the *agger*, on which a row of houses of the first century had been built. It has been found at intervals in several places, one of which is close to the house of Mæcenas. Another branch of an early aqueduct has been found in the tufa rock behind the houses, near the great church of S. Maria Maggiore, on a high level, at the south end of some great building of the first century, or earlier, which was formerly called the *Porticus Liviæ*, and an account of it was published under that name, but the fragment of the Marble Plan of Rome, with the plan of that building and the name upon it, clearly shews this to have been an error. The *Macellum Livianum*, or meat-market of Livia, was found in these excavations near the arch of Gallienus, but there is no connection between the *Macellum* and the *porticus*, which is represented as an oblong platform, with steps up to it at one end, and with a grand double colonnade all round it. Nothing like this was found near the *Macellum*, and as the earth was carried away to the depth of several feet, if it had been there it must have been found.

In the third century, when nearly all the temples in the Forum were rebuilt, the great public building which forms the north end of that Forum (by whatever name it may be called), was also very

much altered in many ways; the main fabric, at the west end, is still original, as it was in the time of Varro, when it was justly mentioned as one of the oldest buildings in Rome. But in the interior great alterations were made, and amongst these, at the west end of the Ærarium (or bank-vaults as they might have been called), the arrangement was entirely altered; the public treasury was transferred to the imperial offices on the Palatine, in what are called the palaces of the Cæsars, and at the west end of the Ærarium an aqueduct was introduced, with a reservoir and a well. A *specus* of brickwork of the third century is visible, but to which aqueduct it belonged is not easily ascertained; from its level it would agree with the Marcia; it is not high enough for the Anio Novus carried over the bridge of Caligula, though that must have passed near this point; and it is too high for the Anio Vetus, although remains of this have been found also at a short distance; but on lower ground, under, and at the back of a wine-shop in the Via del Consolazione, but quite at the east end of it, and near the corner of the steps that ascend from it to the door of the Municipio, on the level of the Tabularium, a reservoir that must have belonged to that aqueduct has been found, and the *specus* traced at the back, parallel to the street, apparently cut out of the tufa rock. Two doors further from the steps the *specus* is again visible at the back of the shop; and at the same point, but going in an opposite direction, a subterranean passage, which also appears to be cut in the tufa rock, going in the direction of the Piazza del Campidoglio, and said to go as far as the statue of Marcus Aurelius. Whether this had any connection with the aqueduct, or what its object was, is at present not known.

The Plan and Section of the Aqueducts at the Claudium which is also at the end of the arches of Nero, on the Cœlian Hill, the point from which the water was divided into three branches, have been partially shewn in this work, but this could not be done completely until the explorations were made in 1875 and 1876. Subsidiary springs were continually used for the old aqueducts, that no water might be lost that could be used. Of these springs two were found in the space indicated in this Plan, one under part of the garden of Baron Hoffman, near the Navicella, the other under the garden of the monks of SS. John and Paul, in the cave or old stone-quarry which was formerly called a *vivarium*, but which really was a reservoir of the old aqueducts, and this is the most copious spring of the two. It seems almost certain that the water from both these springs found its way into the Colosseum, after the great

excavations were made there in 1874-75. To get rid of this water is now (in 1876) a great object. The Government and the Municipality propose, at an enormous expense, to make a new drain from the Colosseum to the Tiber at a great depth. Careful enquiries have been made of the workmen employed in repairing the original drain of the time of Sylla and Scaurus; it was found in a very bad state, and the workmen were afraid to go along it without putting a wooden centering under the old vault, as they were made to fear lest the earth should fall in behind them. This was done for the whole length of the Colosseum, nearly as far as the Arch of Constantine, but the men were then obliged to give up this examination of it for want of air. They state that the main body of the water appeared to come in from under the road from the Navicella, and to run in a continuous stream as if from an aqueduct, and not to bubble up out of the earth as in a spring. This led to the exploration shewn in Plate XXXVI., to ascertain where the water came from[d]. The two springs above mentioned are both on a much higher level than the Colosseum, as will be seen by the Section; and as both are good drinking water, always fresh, it is certain that they must each have some outlet, or they would soon be stagnant and putrid. Every probability seems in favour of these being the springs that supply the inundation of the Colosseum, and if they could be turned off in another direction, as suggested in this Plan, the chief difficulty would be removed. A steam-engine would soon pump the water out, if it did not come in again. The so-called *vivarium*, under the Claudium, is marked on the excellent map of Nolli, in the eighteenth century, as a reservoir for water, which probably had been true; there are three small reservoirs there now which might easily have been united, and the whole be filled by closing the outlet.

Frontinus tells us that the aqueduct of Nero terminated at the temple of Claudius, which was in the centre of the Claudium; this was in fact the sacred enclosure round his temple. A fragment of the Marble Plan of Rome also confirms this, but it is equally clear

[d] The water pumped out by the steam-engine employed by Signor Rosa was always good clear drinking water, and had all the appearance of coming from an aqueduct; it was sent along an open channel the whole length of the Colosseum, and made a great swamp round the arch of Constantine for several months in the spring of 1875, the outlet for it being made on the outer side of the drain under that arch, which had been constructed by the Municipality about 1866. At last it was observed that an aperture into that drain might easily be made on the inner side, and so avoid the swamp in the road, and washing the foot of the arch. Soon after this the steam-engine was stopped on account of the enormous expense of it, after it had gone on for more than a year, always pumping out good drinking water, and sending it to waste.

that soon after the time of Claudius and Nero the water was carried on in three branches, one to the Aventine, another to the Palatine, and the third to the Colosseum, as has been before stated, and there are remains of the arcades of each in all three directions. The *specus* found in April, 1876, under the garden of the Marchese Rappini, must have come from the reservoir mis-called the *vivarium*, but it had been long out of use.

Many other remains of the aqueducts within the walls of Rome have been found during the great excavations of 1874—1876, in different parts of the city. Some of these have been already mentioned.

Dr. Fabio Gori has sent me an important notice of some excavations recently made between Subiaco and Vico Varo, which throw new light on the line of the *specus*, or channels of the aqueducts, in several places.

On p. 13, note h, it is stated that "the Anio Vetus has its source in the district called *La Connotta*, and passes under the hill of Marano;" but it now appears that the aqueduct in La Connotta belongs to the Anio Novus, because they have discovered at the sources of the Aqua Marcia another aqueduct on a lower level, which must be the Anio Vetus. This is on the opposite side of the river Anio, and passed over the river on the bridge at Vico Varo, of which the great stone piers remain in the bed of the river. He could not find the sources of the Anio Vetus at the fortieth mile, near the bridge of Agosta (twenty miles above Tivoli), because the torrents, in time of flood, have brought down such a quantity of stone in the bed of the river Anio, and the valley through which it flows, that the level of the ground, and of the bottom of the river in this part, is now nearly twenty feet higher than it was when that aqueduct was made.

At p. 60, it is said that Dr. Gori had found the *Piscina Limaria* of the Anio Novus, made by Claudius, "at the *Prata della Cartiera* of Subiaco;" that was written when they had found a large aqueduct by the side of the *Emissarium Barberini;* but the recent excavations have shewn that the water for that aqueduct came from the third loch, near the bridge of S. Mauro, where the opening at the entrance to the *specus* was found, covered with an iron grating. From this it was inferred that there was a special aqueduct with a private *specus* to supply the baths and thermæ of the *Villa Neronis Sublacensis.* A quantity of marble of very rare kinds, from this

villa, on the margin of the river, has been found, and in the bed of the river the foot of a colossal bronze statue.

The question of the true site of the *Piscina Limaria*, of Frontinus, still remains to be settled, and with it the beginning or source of the great Aqueduct of Claudius, called the *Aqua Claudia*. After carefully examining the bank of the river at a quay at the forty-second ancient mile of the Via Sublacensis, that is to say, between three and four modern miles below Subiaco (which is forty-five miles from Rome), they found the remains of an aqueduct called the *Muraccio*, almost always washed by the water of the river, which enters into it, and then turns at an angle.

On entering into the *Muraccio*, Dr. Gori became convinced that it was the Piscina Limaria of Claudius, as described by Frontinus, c. 15, because the water enters freely into the lower chamber, and to the right the *specus* of the Anio Novus is seen. The water, according to Frontinus, between the entrance from the river and the *specus* (*inter amnem et specum*), was stopped and purified in the same chamber, before it entered into the conduit. Considering also that between the three lochs, where the water is now pure, and this piscina, there is a considerable distance. In the rainy season the floods bring down a considerable quantity of earth from the neighbouring fields, which makes the water of the Anio Novus muddy; for which reason the Emperor Trajan began, as Frontinus states, to lengthen that aqueduct to the second upper loch, above the Villa Neroniana Sublacensis. Dr. Gori has found that this work of Trajan was completed, by tracing the whole line of it along the left bank of the river Anio.

Another Aqua Augusta.

At a meeting of the "Institut de Correspondance Archéologique," in 1873, the Commendatore G. B. D. Rossi gave an account[e] of another Aqua Augusta, the springs and source of which have been found with that inscription, in the district called *Le Macchie di Rocca di Papa.* This aqueduct appears not to have gone to Rome, but descending into the meadow called the Camp of Hannibal, it went on to the imperial villa at Tusculum, where the magnificent piscina of the time of Trajan or Hadrian is miscalled the House of Cicero.

[e] This article will be found in the *Annales de l'Institut de Correspondance Archéologique*, 1873.

ERRATA ET CORRIGENDA.

THE AQUEDUCTS.

Errata.	*Corrigenda.*
p. x. Julia (v.) Sources on Mons Algidus (near Tusculum), Frascati, and Grotta Ferrata.	The Sources are near Grotta Ferrata, not Tusculum : see p. 42.
p. x. *col.* 1. (vii.) Lacus Alsietina.	Lacus Alsietinus.
col. 2. Lacus Sabatina. At the Cariæ. Casale Bianca.	Lacus Sabatinus. At the Careiæ. Casale Bianco.
b. xi. *col.* 1. (x.) Lacus Sabatina.	Lacus Sabatinus.
col 2. (xi.) Torre de' Scavi.	Torre de' Schiavi.
Ibid. (xii., xiii.) Villa de Quintilii.	Villa de' Quintilii.
p. xii. (xvi.) (Algentiana). The water is said to have been brought by a branch from the Marcia at the Porta di S. Lorenzo.	That opinion is not correct (?). The name of *Algentiana* given to the water is from the Mons Algidus, near Tusculum. This water now supplies the Villâ Aldobrandini at Frascati.
p. 3, *note* h. loco nomen respondenti Gemellarum.	Gemellorum.
p. 5, *note* m. Torre de' Scavi.	Torre de' Schiavi.
p. 10, *note* t. under the monastery of S. Maria del Trinita di Malta.	*for* Monastery *read* S. Maria Aventinense, or il Priorato di Malta.
p. 27. (i.) et ... novum ramus Augustæ, hac tres.	... novum, i. 5 ... hac tres ... fluentes ad Viminalem usque portam. i. 19.
Ibid. (iii.) que vocantur ... hi directe.	qui vocantur ... hi directi.
Ibid. (iv.) intra portam exquelinam.	intra portam exquilinam.
Ibid. (v.) que locus infra.	qui locus est infra.
p. 35, *note* *. Delle varie Sorgenti.	Delle vere Sorgenti.
p. 41, *line* 32. Squaricarelli.	Squarciarelli.
p. 42, *line* 8. Canina cleared out the ancient *specus* of the Julia.	That *specus* was of the Aqua Algentiana, and not of the Julia. The source of the Angelosa is not that of the Julia but of the Aqua Crabra.

Errata.	*Corrigenda.*
p. 43, *line* 8. Near Rocca di Papa an arcade, ... probably a part of the Julia. This arcade is called *Arcioni.*	This arcade was of the *Aqua Algentiana.* See Canina, tom. v.
p. 50, *line* 20. *Cariæ.*	*Careiæ.*
Ibid., *line* 22. *Lacus Alsietina.*	Lacus Alsietinus.
Ibid., *line* 30. Strachia Capra.	Stracciacappe.
Ibid., *line* 32. Lacus Alsietina.	Lacus Alsietinus.
p. 51, *line* 5. from the Alsietina Lake.	from the lake Alsietinus.
Ibid., *line* 8. Lacus Sabatina.	Lacus Sabatinus.
Ibid., *note* l. This lake, called Sabatina ... from the names of the proprietors.	This lake is called Sabatinus ... from the names of those villages, *Anguillara* and *Bracciano.*
Ibid., *note* m. ALSEATINA.	ALSIETINA.
p. 52, *line* 1. Cariæ.	Careiæ.
p. 53, *line* 5. Lacus Sabatina.	Lacus Sabatinus.
Ibid., *line* 8. Cariæ.	Careiæ.
Ibid., *note* s. Lacus Alsietina.	Lacus Alsietinus.
p. 89, *note* h. *Torre de Scavi.*	*Torre de' Schiavi.*
p. 90, *note* i. Aquarum ductus etiam infinitas.	Aquarum ductus etiam infinitos.
p. 100, *line* 2. from the Aqua Marcia.	The Aqua Algentiana really comes from Mons Algidus, near Tusculum.
p. 106, *line* 19. *fistula Urbana*, made in a piece of marble.	the fistula Urbana is of lead, not marble.
p. 110. (xi.) Alseatina.	Alsietina.
p. 118, *line* 33. Garciano.	Carciano.
p. 121, *line* 33, *col.* 2. Torre d' Scavi.	Torre de' Schiavi.
p. 122. (vii.) ALSEATINA.	ALSIETINA.
Ibid. Cariæ.	Careiæ.
p. 132, *line* 6. Alseatina.	Alsietina.
Ibid. Pantana.	Pantano.

LEVELS OF THE AQUEDUCTS, TAKEN BY ERNEST DE MAURO, 1871.

THE SEVEN SPECUS AT THE PORTA MAGGIORE, ARRANGED ACCORDING TO THE LEVELS ABOVE THE SEA.

I. Anio Novus, 65.000.

II. Claudia, 62.336.

The *specus* at the Trophies of Marius, 59.936.

III. Felice, 59.560.

Specus on the high ground, between the Porta Maggiore and S. Lorenzo, 59.100.

Reservoir at the fountain of Termini, 58.600.

IV. Julia, 58.192.

Reservoir behind the wall near the Porta S. Lorenzo, 53.000.

V. Tepula, 56.712.

Reservoir in the wall near the Porta S. Lorenzo, 49.525.

VI. Marcia, 54.788.

Specus at the Porta S. Lorenzo, 54.405.

VII. Anio Vetus, 45.688.

Reservoir near Porta Furba, two miles from the Porta Maggiore, 47.193.

Reservoir in the Vigna Berardi, 41.731 [n].

Reservoir between the Porta Asinaria and the Amphitheatrum Castrense, 34.030.

Reservoir in the Vigna Mangani, near the Minerva Medica, 47.735.

Two small *specus* in the Via Labicana, 43.857 [o].

Antoniana—*Specus* in the City wall and over the Arch of Drusus, 40.374.

Aurelia—Reservoir on the south side of the Porta Latina, 36.000.

Severiana (*l*) — Reservoir on the north side of the Porta Latina, 33.400.

Aqua Marcia Pia [p], 60.088, at the Porta Pia.

[n] Near the Porta Maggiore, and under the arches of Nero. There are two large reservoirs close together in this vineyard, probably the Gemelli of Frontinus.

[o] *Descending* from the reservoir into the old *specus* under the arches of Nero.

[p] The Aqua Marcia was brought again into Rome by a new water company in the year 1870, after several years of very arduous work, and overcoming many difficulties. The company who made this great aqueduct consisted chiefly of English shareholders, with a mixture of French and Italian. It was long under the direction of the late Mr. Shepherd, an Englishman, whose loss was much regretted in Rome, and latterly under a Belgian engineer.

HISTORICAL PHOTOGRAPHS OF THE AQUEDUCTS.

[*The numbers refer to Mr. Parker's Catalogue.*]

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*Those marked with * are from drawings, valuable for historical purposes,* but not as photographs.

In his admirable treatise on the Aqueducts, Frontinus mentions in his first book, as an introduction, that before they were made, the Roman people, for the space of 441 years after the foundation of the City, were content with the water from the Tiber and from certain natural springs which from their salubrity were supposed to be sanctified.

One of the springs, called Aqua Argentina, deserves special attention; it comes out of the rock in a considerable body, and with much force, under the north-west corner of the Palatine Hill, at a great depth, in the cave called the Lupercal, which from its situation may very well have been a wolf's cave at the time of the foundation of Rome. (702* is the plan and section of this). It falls into the larger stream that comes from the Quirinal and Capitoline Hills, and now runs in the Cloaca Maxima (690*). The point of junction of these two streams can be seen in an opening where the vault has been destroyed (158), near the arch of Janus and the church of S. Georgio in Velabro, which was the silversmiths' quarter in Rome, as is shewn by the arch they erected in honour of Septimius Severus near this spot, the inscription on which remains.

The stream that comes from the foot of the Quirinal, and now runs through the Cloaca Maxima, emerges in a cellar under a house at the back of the church of S. Hadrian, and a great body of water rises with considerable force. Such a spring is no doubt in its original place. Another spring that runs into this stream is the one that rises in the crypt under the church of the Crucifixion, at the foot of the Capitoline Hill, called the Prison of S. Peter, which is another natural source.

Of the wells or reservoirs of rain-water, we have one remarkable example still preserved; it is on the Palatine Hill, at the north-west corner, just behind the most perfect part of the Wall of Romulus, and at one corner of his *arx* or citadel, called Roma Quadrata, and there are certain peculiarities about it. It has *specus*, or subterranean conduits, to carry water to it from different parts of the hill. The cistern itself is seven feet high, of about the same width, and of considerable length. Into this reservoir descend certain wells of a peculiar and unusual form, like a hollow cone with the wide mouth downwards. This form of well is said to be common in the east; but the only examples known in this part of Italy are this one on the Palatine under the *arx* of Romulus, and one at Alba Longa, under the corner of the *arx* or citadel of that ancient city, from which the Romans are said to have been originally a colony. This is certainly a remarkable coincidence, if it is nothing more. One of these wells is shewn in 764 and 765 from nature, and in 366*,

384*, from a drawing. 1630 is a view of the reservoir at Alba Longa (miscalled the Prison). 1940* is from a drawing of the two compared.

The remains of the aqueduct and reservoir at Tusculum (shewn in 1903) are of *opus quadratum*, of very early character, and seem to shew that the inhabitants there had aqueducts before the Romans. Frontinus, indeed, makes no claim to invention, nor were the Romans generally inventors, they rather turned to useful account the inventions of other people whom they had conquered.

I. THE APPIA—was made by the Censor, Appius Claudius Crassus (Cæcus[a]), in the year of Rome 441, B.C. 312, and has its origin in and near to the Latomiæ or Stone Quarries of the time of the Kings of Rome, on the bank of the river Anio, in which one of the sources of this aqueduct is found. 865, 866, 867

The Caves of Cervaro are a continuation of these Quarries, shewn in 1557.

1155* and 1968* are plans of the sources of the Aqua Appia and Aqua Virgo, in the Meadows of Lucullus, near Collatia.

These meadows are now known by the medieval towers called La Rustica, Sapienza (1551), and Cervaro (1552), and the lines of the aqueduct, crossing them from different springs and meeting in a central reservoir, can be traced by the clumps of shrubs over each well. The aqueduct itself being at a great depth, but still having water in it for the greater part of the year, and moisture always, the line of these wells is thus distinguished. From the central reservoir, in which the water was collected, the *Specus* or Conduit was carried into Rome, always at a great depth.

The spring of the Augustan branch (added A.D. 10) is found under a cottage (1550), near the town or castle of Cervelletta.

The *Specus*, or Conduit of each of the aqueducts, is distinguished by a slight change of form, and often of size also. Sections of fifteen of these are given in the map, and shewn in the photographs of it, 1982*. That of the Appia being the lowest, and always at a great depth, has been the most difficult to distinguish; but within the walls of Rome it passed along the Cœlian Hill[b] (691*, 890*), and then across the short space between the Cœlian and the Aventine, upon the bank or Agger of Servius Tullius (1100, 1136, 1164, 1165, 1289, 1288, 1166), and very near to (*proxima*) the Porta Capena (1138*). After passing the Piscina Publica, and serving as a drain for the surplus water, it is continued at the foot of the cliff of the Pseudo-Aventine, under S. Balbina and S. Sabba, to the mouth of it (84*) on the bank of the Tiber, under the Priorato near the Marmorata and the Porta Trigemina. The *specus* is here distinctly visible, filled up with the clay deposit to one-third of its height (1116); the view in the stone quarry and a section of one of the wells is shewn in 889*. A Plan of the stone quarry under S. Sabba shews several aqueducts meeting in it, and throwing their surplus water into the

[a] See Frontinus de Aqueductibus, c. 5.

[b] There is a large and deep reservoir for it near the arch of Dolabella, under the garden of the Villa Mattei, now called the Villa Cœlimontana, and from thence it passed, still underground, to the cliff of the Cœlian, opposite to the Aventine. A short tunnel was made from this deep reservoir to a Nymphæum under the Cœlian, now S. Stefano Rotondo, called of Septimius Severus. The ruins of it are shewn in 895; a *specus* has been traced from one to the other.

Appia, as the lowest (this is given in 834*, 1941*).

The Reservoirs of this most ancient and very deep aqueduct were first in the quarries before mentioned, and even in Rome were chiefly also in quarries, as at the mouth; but just within the Porta Maggiore, and close to the gardens of S. Croce, formerly the Sessorian Palace, are two large reservoirs very near together, supposed to have been the Gemelli or twin reservoirs mentioned by Frontinus, and these are so deep that they appear to have belonged to the Aqua Appia. Some excavations attempted in them in 1867 were stopped by water (410, 411, 695*). This aqueduct is believed to have entered Rome on the northern side of these gardens, and to have been first received in the reservoir afterwards called after S. Helena, which is very deep, and in this situation (546).

II. Anio Vetus, made in the year of Rome 481, B.C. 272[c].

The Anio Vetus and the Anio Novus are in fact branches of the river Anio, which falls into the Tiber a short distance above Rome. The water is there seen to be much more pure than that of the Tiber, and after it falls into the muddy Tiber its clear water can be distinguished for a long distance. Several of the aqueducts, as the Appia and the Virgo, are springs, that fell into that river; but part of the water was intercepted and brought into Rome, each in its own distinct *specus*. This was the case with the Anio Vetus, at a much higher level above Tivoli, but below Subiaco. The river itself may be considered to belong to the system of the Aqueducts, and the series of magnificent cascades by which it falls from its high level, are partly artificial, are connected with them, and illustrate their history. Those in Tivoli (1545, 1546, 1547, 1548), the engineers had great difficulty in avoiding. The one near Vico-Varo (1544), above Tivoli, is near the point from which the aqueduct was taken, which is near the valley called Arsoli (1549). It can be seen in the valley of the Arches, two miles above Tivoli, at the foot of one of the piers of the Marcian Arcade (1054), and the one seems to have followed the other all the way into Rome. It passes along with it over the Ponte di S. Antonio, which is one of the finest bridges on the whole line of the Aqueducts, eight miles below Tivoli, across the valley and mountain stream called S. Antonio (1530). This aqueduct can generally be distinguished by being half-underground, or very near the surface. It was repaired or restored by Augustus and Trajan[d], and most of the remains now visible are of their time, and both the *specus* and the *castella* can generally be known by being faced with *opus reticulatum*, so much used at that time. There is a fine reservoir or *castellum* for it near Tivoli, with very peculiar work of this description, and extremely picturesque (950). Another is against a bank, and half underground, near the Torre Fiscale, three miles from Rome, and close to the foot of the Claudian Arcade (896, 1028, 1029). Remains of others may still be seen at the foot of the Wall of Rome in several places, they were distinctly visible in 1870, when these photographs were taken; but have been almost obliterated since in the *restoration* (?) of the wall by the municipal architect. One is near the Porta Metronia (983), and another

[c] See Frontinus de Aqueductibus, c. 6.

[d] Ibid., c. 125, and 93.

at the Porta Latina (985). Remains of other *piscinæ* are visible near the Amphitheatrum Castrense, on the rock at the foot of the wall (868, 969, 970); at this point one branch of it seems to have been brought into Rome along the line of the Via Appia Nova, which runs near the spot, and entered Rome just beyond, by the Porta Asinaria. It can also be seen at the foot of a wall by the side of the Via Labicana, near the Porta Maggiore, and readily distinguished by the usual reticulated work (1337). One branch enters Rome at the foot of the Marcian Arcade, close to the Porta Maggiore (59), and the *specus* was visible at that gate, until it was concealed by a brick wall by the modern builders. It passes through the City Wall there, and is visible on the other side in the inner road, in the wall of the garden still under the level of the Marcian Arcade (1876). Here it forked off, one branch went to the left, along the line of the wall of the garden, to a great reservoir for it at an angle close to the junction of two roads, one called the Via Labicana the other the Via di Porta Maggiore, coming from the church of S. Maria Maggiore. At this spot there is a very large and fine reservoir in several chambers at a considerable depth, corresponding to the level of the Anio Vetus; 538 is a view of it, and 700* is a section of it. From this great reservoir two small *specus* in this part appear to have gone into the *specus* of the Appia in the Cœlian, under the Arches of Nero, and are visible going into the bank on which this fine arcade stands (854).

Another important branch turns to the north upon the high bank of the Kings, on which the Wall of Aurelian was afterwards built. There are remains of *castella* for it near the Porta S. Lorenzo (869), and further to the south near the Porta Nomentana (871), after passing the Prætorian Camp. It had previously gone under the Porta Chiusa, which was shewn in the excavation of 1868, and in the photograph 1057. The *specus* runs under the wall of the Camp all round. It is still visible on the north side, faced with the reticulated work under the fine brickwork of Tiberius (870). There was an opening into it at the north-east corner of the camp, into which a dog or a boy might be sent (981, 982), until it was closed in the recent *restoration*. Remains of it may still be seen at the foot of the wall in several places by experienced eyes. The general plan of this aqueduct is shewn in Nos. 1970*, 1971*, 1976*, 1977*, and 1967*.

III. Marcia, made in the year of Rome, 608, B.C. 145 [e].

This aqueduct was made in the year B.C. 145, and has its source a few miles below Subiaco; the springs are collected in a small lake called Aqua Serena (1537), the water from which flows into the river Anio; but a portion of it was intercepted for this aqueduct, and is now again taken from the same spot and brought into Rome. It has always been celebrated for its extreme coldness and great purity. The old *specus* or viaduct was found in 1870 in this lake, having long been concealed by being under water; but by drawing off some of the water it was brought to light, and the engineer of the new company decided on carrying his new *specus* up to this point. The previous plan had been to draw the water

[e] Frontinus de Aquæductibus, c. 6.

from another lake nearer to Rome, which is nearly equally good water, but not the real Aqua Marcia so much prized, and this is now again brought into Rome. The source of the old aqueduct is celebrated for its extremely picturesque character, as well as for the fine construction of the arcade of large square stones, and the scientific arrangement of the reservoirs (*castella aquarum*) and filtering-places (*piscinæ*). The sources in the Aqua Serena are shewn in Nos. 1538, 1539. Another source for an additional supply was on the lake of the Mole d'Agosta, 1543.

In the earlier part of its course the *specus* is underground; but on arriving at the valley called the Valley of the Arches, about two miles above Tivoli, it emerges upon the fine arches which give the name to the valley, and is here carried across the river Anio. These arches are in two series, and are among the most picturesque objects in the neighbourhood of Rome; the effect is improved by a medieval tower built upon the first pier of the bridge. This is shewn in Nos. 1053, 1054.

It then appears again on the other side of Tivoli, on the road called the Promenade of Garciano, which is on the edge of the hill looking towards Rome, and above the winding road up the hill; S. Peter's is visible from this point. On this platform there are a number of fine remains of the *specus* and of the *castella* of the Aqueducts, some of the finest of which are of the Marcia. The Plan and Section of a very fine Reservoir and Piscina here is given in No. 535*.

Another very fine one has a wall on the edge of the cliff of the character called Cyclopean (Nos. 1513 and 1528). Chambers of this remarkable early reservoir are shewn in Nos. 1520 and 1521.

A considerable part of this aqueduct was rebuilt by Augustus[f] (B.C. 11), and again about a century afterwards by Trajan[g], and of the *specus* of that time we have examples in 1524 and 1525, shewing a very peculiar kind of the ornamental construction called *Opus Reticulatum*. Another reservoir of this time is shewn in 1526, and an earlier one belonging to the original construction of the kind called *Opus Incertum*, which probably belongs to the earlier period, is shewn in 1527.

From Tivoli the Aqueducts again pass underground for some miles, gradually winding down the hill from the high level to that of Rome on the Campagna, at about seven miles distance. They were carried upon bridges, some of which are very fine and picturesque, across the gorges of the hills and the mountain streams. At the place where they arrive at the lower ground, there are large reservoirs and filtering-places for them, and the locality is called from them the Piscinæ.

From thence they are carried on the fine and celebrated arcades across the Campagna, presenting some of the finest pictures in the neighbourhood of Rome.

At the Piscinæ, the Tepula and Julia, from the Alban Hills near Marino, were added to the Marcia, and carried on the same arcade. The greater part of them was destroyed, and used for building materials by the engineers of the Aqua Felice in the sixteenth century; but there are some very remarkable and picturesque remains of the arcade at intervals, the more interesting because so little is left of it. One fine piece remains

[f] Frontinus, c. 125.

[g] Ibid., c. 93.

at a locality called Sette Bassi and Roma Vecchia, five miles from Rome (1435), where a small portion of each of the three Aqueducts on an arcade can be seen in Nos. 1006 and 536, and the Piscinæ near to it, 534, 1434, 1438.

This arcade is seen again at the Torre Fiscale, a medieval tower built upon the aqueducts at one of the points of junction, and at one of the angles, which they made at every half mile. Here the more lofty arcade of the Claudia and Anio Novus is carried over that of the Marcia, Tepula, and Julia; while the Anio Vetus runs underground at the foot of it, and the Felice is built up against it; so that at this point seven aqueducts cross each other, and have a tall medieval tower built on the top of them[h]. The Torre Fiscale, with this remarkable junction, is shewn in Nos. 528, 529, 530, 531, 532. A plan and section of it are given in 689*.

There is another angle and crossing at the Porta Furba, half-a-mile nearer to Rome, which makes another very picturesque point of view (shewn in Nos. 551, 552). A small portion of it remains built into a gardener's cottage at another angle, about a mile from Rome, and a fine large reservoir near to it. The ground then rises, and the arcade is buried for some distance; the upper part of the arches of brick, as rebuilt by Trajan, are then visible by the side of the old road that runs close to the northern side of the great Claudian arcade, on the line of the Marcian, which was parallel to the Claudian for some miles into Rome.

It then occurs again very conspicuously at the last angle, close to the Porta Maggiore, where the Claudia was again carried over it, and afterwards incorporated in the City Wall of Aurelian. Here the last pier of the arcade remains with the three *specus* of the Marcia, Tepula, and Julia passing through the wall at a right angle (31, 59). Inside the wall a part of the first arch remains with the *specus* upon it (60); on the other side of the road, the pier of the same arch remains built into the wall of the garden; and a little further on in the garden or vineyard, a gardener's house is made out of another reservoir or *castellum aquæ* (538; section, 700*).

It then passes again underground parallel to the city wall for a short distance, and near the Minerva Medica it runs into the bank on which that great wall is carried. A portion of this underground arcade was brought to light in some excavations in 1871, but is now covered up again (2320). After passing underground in the bank on which the wall stands for some distance, it emerges near the Porta Tiburtina, now called Porta di S. Lorenzo (see a plan and section of this in No. 1938*). As the ground here is lower it is on an arcade, one arch of which is made into the gate (21, 1870), and a portion of the *specus* is very distinctly visible on the southern side of the gate, with an opening into it by which persons can go inside of it (shewn in Nos. 69, 572*, and 1487).

After passing the Porta Tiburtina, it went on upon the bank or outer *mœnia* of Rome to the Prætorian Camp, and there was a large reservoir for it near the Porta Chiusa, remains of which were visible in the excavations of 1868, with the wall of Rome built across it (shewn in 1059).

[h] They remind English people of the Clapham Junction of the railways near London, where trains crossing each other at different levels can be seen.

From this reservoir the three aqueducts, Marcia, Tepula, and Julia, were carried along the side of the old road to the inner gate in the great *agger* of Servius Tullius on the Viminal, where the railway station has now been made, and where the three Roman princes carried on excavations in 1869, in which they found the upper *specus;* that of the Julia, which was left open for a time, passing between the *cippi* or boundary-stones, with inscriptions upon them, recording that *the three aqueducts* passed there between them.

Another division of the Marcia went along the same line as the Arches of Nero to the Cœlian, and along that hill as far as the great reservoir over the arch of Dolabella; then turning to the left or south, it came to an end above or over the Porta Capena[1]. These words may mean—either, in the reservoir on the cliff of the Cœlian Hill just *above* the gate, rebuilt in the time of Trajan, of which the remains are shewn in 1147*;—or, in the reservoir in the valley close to the west side of that gate (also rebuilt in the time of Trajan, and now a gardener's house, as before mentioned). In that case it must have passed over the gate, and the *specus* that is cut in the wall of the western tower belonged to it (710*).

The general plan of the Aqua Marcia near its source is shewn in 1972*, and the line of its course in 1981*, 1982*; the bridge for it in 1983*.

In the early part of its course, above Tivoli, the new aqueduct for this water, called the Aqua Marcia Pia, is carried on a stone *specus* upon an arcade, after the same fashion as the old one (a portion of this new arcade is shewn in No. 1553).

IV. The Tepula, and V. The Julia, being carried on the same arcade as the Marcia for the seven miles into Rome, have left remains visible in some places, especially at the Gates of Rome, the Porta Maggiore (31), and the Porta Tiburtina (21, 572*); in other places, they have generally been destroyed. Near the Sette Bassi, there is a portion of the *specus* of the Julia visible just at the surface of the ground, the other two being then subterranean, as the level is rather higher in this part than usual. This portion has been examined by Signor Moraldi, at a junction whence a branch was carried to supply a reservoir at the great villa called Sette Bassi, and there are remains of the loch in the channel to turn off the water, shewing the same arrangement as in a modern canal. (A plan and section of this is given in 696*.) The *specus* near this point, built of concrete faced with brick, is also shewn in 1006. The *specus* of the Marcia is always of squared stone, so that one is readily distinguished from the other. There are remains of a *castellum aquæ* or reservoir for the Tepula, near the Porta Tiburtina, or Porta Viminalis of Frontinus, now called Porta di S. Lorenzo. This is shewn in the Plan of that Gate, Nos. 1111* and 1238*, and a view of it in No. 25. It is a remarkable building of brick of the first century, and has on a level with the *specus* a series of small corbels projecting from it, evidently intended to carry a *hourd*, or wooden balcony as a passage for the Aquarii, and perhaps for defence also. It is incorporated in the great Wall of Aurelian. It projects slightly from the line of that wall, and the end of the *specus*, with its triangular head, is visible in the angle.

[1] Supra Portam Capenam, F. i. 19.

V. Julia.

Between this building and the gate, but within the wall, though on the bank on which it stands, are slight remains of another *castellum aquæ*, supposed to have been for the Julia (Nos. 26, 869, 1873), which has its external face in the direction of the wall, and must have been concealed by it when that was built. This is also of the first century, as is shewn by the brickwork, and it seems to have been a *castellum aquæ* by the disproportional size of the buttresses used to support the weight of the water, one of the invariable marks of such a structure. The other mark is the peculiar cement with which the wall is lined, called *Opus Signinum* in Latin, *Coccio Pesto* in Italian, which is made of broken pottery, and is the hardest cement that is known; it is often impossible to break it, even after it has been exposed to the weather for centuries.

A plan and section of the ground between the two gates, called by Frontinus Esquilina (S. Lorenzo) and Viminalis (Maggiore), shew the difference of level, and the three aqueducts passing underground in the middle between the two gates, and carried on arches at both ends near the gates (see No. 1938*).

The plan of the ground at the sources of the Tepula and Julia is given in 1980*.

VI. The Virgo (now called Aqua di Trevi) was made in the year of Rome 732, B.C. 21.

This aqueduct has its sources in the meadows of Lucullus, on the banks of the river Anio, on the old Via Collatia, eight miles from Rome, about a mile further than the Aqua Appia, not at the same level, but comparatively near the surface. There are several springs, each of which has its own separate reservoir just below the surface of the ground; in some of them the vault is scarcely perceived. These are also called conduit-heads (864, 863, 862). From each of these small reservoirs a conduit runs into the central reservoir (860, 861), which is considerably larger, circular in form, surrounded by a wall, lined with the cement called *coccio pesto*, and one part of this central reservoir under the road now remains. This is near Salone, with its medieval tower. (See the Plan, 1155*.)

From this large central reservoir the surplus water is carried off by short conduits into the country ditches, and so into the river Anio. The main *specus* into Rome begins at the central reservoir, and runs generally underground along the line of the old Via Collatina, now called Lunghezza. The course of the aqueduct can be clearly traced by the small pyramidal or conical structures over the wells at regular intervals, called Respirators (660*), or which might have been called Ventilators, as they give air to the *specus* below. It runs in the high bank of the old road for two or three miles, behind the ruin called Torre d' Scavi, supposed to be the Thermæ of the Gordiani, in a direct line towards the Porta Maggiore; but about half-a-mile before arriving there, it turns sharp to the north along the bank of the great *foss* or valley, and being underground is traced by the Respirators. Further to the north, beyond S. Agnes, at some little distance, the old line can be traced in the catacomb of S. Priscilla on the Via Salaria, where the *specus* is visible, half filled up with the deposit of clay (1109*, 1466). In the road on the bank on which the Wall of Aurelian is built, near the Porta Salaria, it can be traced by the low arcade at the

foot of the wall which is built upon it (5).

But when the line was altered, it was carried still further to the north, and it enters Rome under the garden of the French Academy (the Villa Medici); it here is marked by two *cippi* (2088, 2089), with inscriptions upon them, and under the garden is a large reservoir very deep, level with the ground in the great foss on the outside, and with the Campus Martius inside the walls. It was then divided into two branches, one of which went along the Via de Condotti, the other along the Via del Nazzareno (83, 1108*) to the Fountain of Trevi, rebuilt in A.D. 1735 (1356); originally, it went to the north end of the Septa, near the Pantheon. Some remains of this were shewn in 1871 in the Piazza di S. Ignazio (2326). The *specus* can be seen, with an inscription upon it recording repairs by the Emperor Claudius (82), in the yard behind a house near the Palazzo del Buffalo.

The plan of the ground at the sources of the Aqua Virgo (or de Trevi), is given in 1968*, and Sections of it in 1979*.

VII. The Alseatina.

This aqueduct was made by Augustus in the year of Rome 763, A.D. 10, to bring water for his great Naumachia, or sham naval battles in the Trastevere; the water was not good for drinking[k]. It was brought from the lake called Alseatina, in the hills on the western side of Rome. It is altogether distinct from the great series of aqueducts on the eastern side. The source can be seen in the bank of the lake, and the *specus* or subterranean conduit can now be entered, the water of the lake having recently been drained, and reduced to a much lower level.

To these was added from another lake about three miles distant from the Alseatina, another branch called the Sabatina The two conduits were united after a few miles near the old city of Cariæ, at a *castellum aquæ* or reservoir, now made into a house, and called the Osteria Nuova. The Alseatina was at the lowest level of all the aqueducts, and it is now very difficult to see any remains of it, except the *specus* in the lake at its source.

Trajan afterwards adopted the Aqua Sabatina, but omitted the Alseatina, and carried the Sabatina at the highest level instead of the lowest (see Aqua Sabatina, Aqueduct X.) Pope Paul V., who restored these aqueducts to use, went back to the Alseatina lake, and his *specus* can be seen there on a different side of the lake to that of Augustus; both are now left dry. There is, near the junction at the Osteria Nuova, a remarkable flight of steps for the use of the *aquarii*, or the men who had charge of the aqueducts. It passes through the upper *specus*, and goes down to the lower one (No. 2959*). The respirators of these two lines can be seen and traced; they are of a different size and form. The two can be seen close together at the Osteria Nuova (No. 2960*). The *specus* is also seen in No. 2961*.

VIII. The Claudia, and IX. The Anio Novus, A.D. 38—52.

These two aqueducts were made together, or were so closely connected that we cannot separate their history, although they were not the same water; the Anio Novus came from some miles higher up the river Anio

[k] See Frontinus de Aquæductibus, caps. 11, 18, 22, and 71.

than the Claudia. The latter was, like the previous aqueducts, taken from springs, that were intercepted before they fell into the river Anio; but the Anio Novus was part of the river itself, in which a gigantic loch was made by building a great wall across it, about a hundred yards in front of a natural waterfall, and forcing the water to flow over it, forming a magnificent cascade, and at the same time causing some of the water to flow through the *specus* which was cut in the cliff by the side of the river, at a rather lower level than the top of the wall. The sources of the Claudia are below this cascade, those of the Anio Novus are above it. The line of each of these aqueducts is distinct in all the early part of its course; but after they come down to the valley of the Campagna of Rome, at the Piscinæ, the two are carried on the same fine lofty arcade into Rome.

These were the highest, and passed over the Marcian arcade with the three aqueducts upon it. They form the finest feature in the landscape on the eastern side of Rome. The sources are above Subiaco, and in what is considered by artists as some of the most picturesque scenery in the world. The photographs illustrating this are very numerous, the subjects being some of the best that can be imagined for this purpose. The history of these two most important aqueducts can now be better seen in this series of photographs than in any other manner, and better understood than by any written description of them, after the outline of their history is once given.

They were begun in the year of Rome 789, A.D. 38, under the Emperor Caius Cæsar, or Caligula; carried on and completed by his successor, Claudius, in the year of Rome 803, A.D. 52. They were therefore fourteen years in construction, according to Frontinus[1]; but Nero was then married to Octavia, he was the actual governor of Rome, and he carried on the great work upon what are called the Arches of Nero, along the Cœlian Hill, as far as the arch of Dolabella, where a large reservoir for this water was built. This work was afterwards carried on by his successors in three branches, one to the Colosseum, a second to the Palatine, and over it to the Capitol, and a third to the Aventine. Frontinus himself, who has left us his admirable treatise on the subject, had the direction of these works for many years; he was Curator Aquarum under the Emperors Nerva and Trajan, and some of the greatest works were done in his time,—at his suggestion, and according to his plans.

Some of the sources of the Claudia were in the lake of S. Lucia, below Subiaco, between that and Vico Varo (see 1536). In its course through the hills the *specus* is almost entirely underground, and cannot be shewn in photographs; but the line of its course is shewn in the map of the aqueducts from Rome to Subiaco, reduced by photography in Nos. 1967* to 1984*, especially in Nos. 1976*, 1978*, 1979*, 1981*. It crosses mountain streams on the bridges called Ponte Lupo (1532) and Ponte di S. Antonio (1530); and an inscription relating to it, of A.D. 88, is given in No. 1976*.

When it reaches the level ground of the Campagna, nearly on the same level as the hills of Rome, the *piscina* for it is subterranean, and only the summit of this is visible, looking like a *tumulus* only (688); but from this the *specus* is seen to emerge, at first only just above ground, but gra-

[1] Frontinus de Aqueductibus, cap. 13, 14, 18, 20.

dually getting higher (or the soil, in fact, is getting lower), until it is carried on the grand series of arches or arcades across the country, which remain nearly perfect for some miles, as far as the Sette Bassi and Roma Vecchia. In 1002, a long line of this arcade is shewn with the Claudian *specus* upon it, and the Anio Novus over that in many places; the two can readily be distinguished, by the Claudian being built of large blocks of stone (with the edges chamfered off), and the Anio Novus being faced generally with brick, occasionally with *opus reticulatum*. Nearer to Rome, this fine arcade has been very much damaged, or carried off altogether as building material by the farmers, and by the engineers of Pope Sixtus V. to build the Aqua Felice; but some portions of the old arcade remain, and are shewn in No. 1006, where the distinction between the two *specus* comes out very clearly. In 1005, two of the brick arches with which it had been strengthened by Trajan are shewn, the stone-work having all been carried away.

In 689*, a plan and section of the Torre Fiscale is shewn, with the crossing of six aqueducts. 528 is a view of this tower and of the arches of the aqueducts crossing each other under it, with the Aqua Felice in the background. 529 shews the arch of the Claudia separately, and the construction of it, with the Aqua Felice passing under this arch of the Claudia. 530 gives very distinctly the arch of the Marcia, Tepula, and Julia, with that of the Claudia passing over it. 531 and 532 are more distant and general views of that tower, and the aqueducts passing under it. 1439 is a side view of it, and of the old tombs on the Via Latina in that part. 1004 shews the arches of the Claudia and Anio Novus in perspective, and the opening into the *specus* of the Claudia. In 550, another fine portion of the arcade is shewn, with brickwork of Trajan. The Porta Furba and a long line of the arcade is seen in the distance. 548 shews the Porta Furba at another crossing, with the fountain, and a portion of the arcade of the Felice; with the Marrana in the bed of the river Almo passing under it.

62 is a portion of the Claudian arcade, about half a mile nearer to Rome, with the arches filled up with brickwork of the time of Trajan; at this point there is another crossing. 63 shews a portion of the brickwork of Trajan, originally built to strengthen the stone arcade; but the latter has been carried away by the engineers of the Felice. 549 shews some interesting repairs of the time of Nero, with massive square buttresses faced with reticulated work. 70 is a mediæval tower at the angle of the garden of the Sessorian Palace, now of the monastery of S. Croce, near the point where the aqueduct enters the wall.

547 shews the interior of the Tower and a *piscina*, at the entrance into Rome, the four chambers of which are visible, the inner wall of this tower having been destroyed; and into the interior of this the water of the Claudia entered in the first chamber and went out at the fourth. This photograph also shews the remains of a large *castellum aquæ*, now forming part of the Wall of Rome, on the north side of the garden, with a continuation of the arcade in the Wall of Rome in this part. In 544 the *specus* of the Claudia is plainly visible on the top of the wall, and remains of the Anio Novus over it. In the distance are seen some of the arches of Nero, across the valley and foss (?), from the angle near the Porta Maggiore to the Cœlian Hill. This garden might very naturally be called by Lampridius "The Garden of the

Specus," for the *specus* in the time of the Emperors must have been the most conspicuous object in it, or visible from it (542).

412 shews another of these reservoirs in the same garden, with repairs in brick by Trajan. The arcade of the Aqua Felice, built against the outside of the Wall, is also seen through the arches of the Claudia.

31. The exterior of the Porta Maggiore, with the *specus* over it, the lower one the Claudia, the upper one the Anio Novus. (The inscription of A. D. 404 is given in 1872.) Under these, but still on the top of the wall, the *specus* of the Aqua Felice may be seen, built as usual of rough stone concrete. To the right or north of this may be seen the three *specus* of the Marcia, Tepula, and Julia, passing through the wall in the opposite direction, now under the Felice, and originally under the Claudia and Anio Novus. These three *specus* are carried upon one of the piers of the Marcian arcade, built into the great wall. Just beyond these, further to the right, is part of the last tower of the Claudian arcade.

32. The Porta Maggiore, with the *specus* on it, seen sideways, and the north side of the Baker's tomb.

The last tower and *piscina* of the Aqua Claudia; it stands at an angle of the wall projecting from it, and shews clearly that it stood there when the wall was built by Aurelian, and then incorporated into it. When the fortifications of Honorius at this gate were destroyed in 1833, the inscription relating to the aqueduct was preserved and built up to the right or south of the gate (shewn in 1872) Within the wall, behind the tower, is a large reservoir or *castellum aquæ*, of which there are slight remains, shewn in 967 and 968.

A panoramic view of the line of the Claudian arcade, on the north side of the Sessorian gardens, taken from the extreme end of them at the west, is shewn in Nos. 542 and 543. On the left hand is the beginning of the arches of Nero, going across the foss towards the Cœlian; then the Porta Maggiore is seen sideways, with the two *specus* on the top of it. Under this is part of one of the two great reservoirs believed to have been the Gemelli of Frontinus. Then comes the western wall of the Sessorian gardens, rebuilt by S. Helena, the construction being of the time of Constantine. To the extreme right is the ruin of the Basilica or Great Hall of the Sessorian Palace, repaired by him. This is miscalled a temple of Venus and Cupid on some of the maps.

Having thus traced the Aqua Claudia from its sources into Rome, we must now do the same for

THE ANIO NOVUS,

which in its early part is distinct from it, as we have said.

1514. Sources of the Anio Novus above Subiaco. The river Anio in the highest point, with which the aqueducts are connected, is seen winding through a gorge in the rocky mountain, with remains of the bars or dams, across the river, forming the two upper lakes or lochs. The celebrated monasteries of S. Scholastica and S. Benedict are visible on the hill to the left.

1515. The River Anio, a little lower down, with remains of the second barrage or dam across it, forming the third loch or lake, with the modern bridge built upon the ruins of the old wall that formed the bar. Chapels of the monks of S. Benedict are visible on the hill to the right.

1534. The Bridge of S. Francis, over one of the branches of the Anio that meet near the rocks before mentioned, above Subiaco.

1517. Remains of a great reservoir or *castellum aquæ*, of the time of Trajan,

on the bank of the lake or loch before mentioned. The wall is faced with *opus reticulatum*, with layers of brick at intervals, the usual construction of the time of Trajan.

1518. The modern bridge, far below, and remains of the old high wall on which it is built, are seen under it; below are the cliffs of the third lake or loch, cut into a circular form. In the bed of the stream are large stones fallen from the wall or bar across the river.

1519. Remains of another *castellum aquæ* above Subiaco, and the mouth of a cave connected with the aqueduct.

1555. *Specus* of the Anio Novus cut in the cliff of the valley of the Anio. This is below the level of the great bar, and the water was forced to go through the *specus* into Rome by the bar being higher than the *specus*. A modern winding road has now been cut here, and the rock has been in part cut away, shewing an opening into the *specus*, which is six feet high and two feet wide. Above is seen a tower and an embattled wall of the modern Villa Gori.

1516. Part of the *specus* of Trajan, who repaired this aqueduct. The *specus* is cut as a tunnel in the cliff, with a reservoir by the side of it.

1556. A view of the gorge in the mountains above Subiaco, where the three lakes are situated.

1536. A small lake at the source of the spring called Fons Novus Antoninianus, one of the sources of the Anio Novus.

1558. Cascade at the Paper Mill, on the site of a *piscina* of the Anio Novus, above Subiaco.

1057. Arches of the bridges of the Marcia and Anio Novus, in the Valley of the Arches above Tivoli.

1052. Arch of the bridge on the Anio Novus, in the Valley of the Arches above Tivoli, with a medieval tower built upon it, forming one of the most picturesque objects in the neighbourhood of Rome.

1522. Specus of the Anio Novus below Tivoli, on the road to Garciano, called the Promenade, with openings into it, and an old tomb in front of it. This promenade is through an olive wood, and the roots of the olive trees run into many of the ruins.

1523. One side of a *castellum aquæ* of the aqueduct above the road to Garciano, faced with *opus reticulatum*.

1529. A bridge across a valley that passes the road to Garciano. This bridge is above the road on the left, in the valley called the Arcinelli.

1531. Ponte de S. Antonio, a fine bridge for the aqueduct below Tivoli, across a gorge. It is seen from above looking down upon it, with the chapel of S. Antony at the end of it, and a medieval castle in the distance. The road for horses, and the remains of the *specus* by the side of it, are here visible.

1532. Ponte Lupo, near Poli, west side, below Tivoli, the finest of all the bridges of the aqueducts. It crosses a valley from one cliff to the other, and is a solid wall for part of the way, the rest on arches. The two *specus* are here visible, as seen from below on the west side.

687. Arrived in the valley of the Campagna, the great *piscina* of the Anio Novus and that of the Claudia, which is near to it, is underground, and the summit of it only is visible, appearing like a tumulus. It is near the old Via Latina, and below the present roads to Albano, Frascati and Marino.

74 and 75. After leaving the great *piscinæ*, the two *specus* are carried on the fine arcade, of which a panoramic view is here given, shewing its general effect for some miles.

554. Passing by the remains of Roma Vecchia to the Torre Fiscale and the Porta Furba (given under the head

of the Aqua Claudia), the *specus* rises to a remarkable reservoir, which from its great elevation must have belonged to the highest of the aqueducts. It is a most picturesque one, near the Mausoleum of S. Helena, but is earlier than her time; it belongs rather to that of Trajan, being faced with fine reticulated work, with layers of bricks on the exterior. The interior is distinguished by remarkably solid central buttresses, to support the wall against the pressure of the water (553).

926. Another large reservoir of the same period and style, and at nearly the same level; it occurs about a mile further from the main line of the aqueducts, at the place called Torre de' Scavi, where the Thermæ of the Gordiani were afterwards made. This appears also to have belonged to the Anio Novus, as no other aqueduct is high enough for the water to have reached it.

Arches of Nero.

At the great reservoir inside the Porta Maggiore (the Porta Esquilina of Frontinus), the water of the Claudia and the Anio Novus was united for the general use of the City. This aqueduct entered on the highest ground in Rome, and the water supplied the deficiencies of any of the other aqueducts in case of need. Being a part of the river Anio, it never failed. It was forced to come through Rome, as has been shewn by the arrangements in the bed of the Anio above Subiaco. This united water was carried to all the fourteen Regiones of Rome, and in order to ensure an abundant supply, it was conveyed in the great stone *specus*, on the fine arches of Nero along the whole length of the Cœlian Hill for more than a mile; at the west end of the Cœlian an enormous reservoir was built for it on the level of the *specus* at the top of these arches, so that the base of the reservoir was fifty feet from the ground, and the road passed under it. From this great central reservoir, at a very high level, the water was distributed in various directions.

Before arriving at the Cœlian Hill, it had to be conveyed to and along the Cœliolum (now the Lateran Hill). It had come through the gardens of the Sessorium, as we have seen, in the two separate *specus*, after it had entered Rome at the extreme eastern corner, on the north side of these gardens, which are nearly half a mile long. These are *the palace gardens* mentioned by Frontinus. The Sessorium with its gardens (now the monastery of S. Croce in Gerusalemme) had been one of the two Prætorian camps, this one being at the south end of the great *agger* of the Tarquins, which formed the outer *mœnia* of Rome on the eastern side. The one, called the Prætorian Camp, is at the north end of the same great bank.

Each of these fortified camps was surrounded by a great wide and deep foss or trench. These great banks and trenches are usually mistaken for natural hills and valleys; but natural hills and valleys are not merely high banks fifty feet high and perhaps a hundred feet wide, nor are natural valleys long narrow trenches of the same dimensions, running on each side of the great banks, being in fact the trenches from which the earth has been thrown to form the banks. Such a bank with such trenches can be clearly traced all round Rome by eyes that are accustomed to examine such things, although modern buildings have disguised them so much that an ordinary observer does not see them. People cannot see over modern walls of twelve feet high, still less over the great Wall of Aurelian fifty feet high,

and they do not think of comparing the level of the ground on each side of that wall, nor can they easily do so. These great ancient earthworks were extremely convenient for the engineers of the Aqueducts, which were brought upon the high banks at the farthest corner. They were carried along the bank on the north side of the Sessorium, from its north-east corner to the south-west angle, where the great bank of the Tarquins joins on to it. Some branches of the Aqueducts, perhaps the main stream in some cases, were then carried along this high bank of the Tarquins to the north, as far as the other Prætorian Camp, and beyond it along the outer wall of Rome, as we have seen in the case of the Anio Vetus, the Marcia, Tepula, and Julia. These did not pass through the Sessorium, but parallel to it about a hundred yards on the north of it. The Claudian arcade had been at about that distance on the north of it, all the way from the Piscinæ into Rome. The Marcian arcade was made nearly over the Anio Vetus, which ran between that arcade and the Claudian, but much nearer to the Marcian.

On entering Rome, this main stream went straight on through the great bank to the large reservoir on the inner side. The reservoirs for the Tepula and Julia were much to the north, near the Porta di S. Lorenzo (the Porta Viminalis of Frontinus), as we have seen; that of the Marcia was much closer to the Porta Esquilina. The two great reservoirs, called by Frontinus the Gemelli, were made in the great foss between the Sessorium (S. Croce) and the Cœliolum (the Lateran). They had probably been originally made for the Aqua Appia and the Anio Vetus, being both at a low level, though one was much deeper than the other. Advantage was taken of these ancient reservoirs to erect the higher one required for the reception of the waters of the Claudia and Anio Novus over it, or by the side of it, as was very usual throughout Rome. The later reservoirs are always made nearly over the old ones. This is equally the case here at the entrance into Rome and at the other end of the Cœlian. The great high reservoir of Nero is close by the side of, and really over, the great subterranean reservoir of the Aqua Appia (now under the garden of the Villa Cœlimontiana, as described in the account of the Appia).

The foregoing explanation seems necessary to explain the photographs that now follow, belonging to the Arches of Nero. The first of these (No. 77) shews the junction with the Porta Maggiore; the two *specus* that pass over that great gate are visible to the right of the photograph. The beginning of the Arches of Nero is then seen, where they have to cross the great wide and deep foss of the Sessorium, and were therefore strengthened by sub-arches, as seen in No. 76. A more close view of these arches, nearly at the same point, is seen in 66.

These arches were used by the engineers of the Aqua Felice whenever they suited their purpose, and cut about or destroyed without mercy; they also made use of an old *specus* to carry their metal pipes whenever it was convenient to do so, and the *old specus* that ran along the Cœlian was very convenient for that purpose. 1295* is from a drawing made to shew this. The *specus* of the Aqua Felice was first carried on the lower arches of the double arcade of Nero, the upper part of the arcade being destroyed. The metal pipes were then carried down into the old subterranean *specus* (*the Specus Vetus* of Frontinus). This is in the same garden or vineyard

as the Gemelli, in the great foss between the Sessorium and the end of one of the banks of the Tarquins, (on which the garden of the Villa Volkonski has been made, and along which the Arches of Nero run.) A portion of the grand arcade, with the *specus* very visible on the top of it, is shewn in 759. This is close to the Scala Santa of the Lateran; the arcade carrying the aqueduct passed along the bank on the north side of the Lateran fortress on the Cœliolum, and supplied that with water.

On the western side of the Lateran fortress is another great foss, between the Cœliolum and the east end of the Cœlian Hill. It was either thought more convenient to make a bank across that great foss for the aqueduct to rest upon, or this bank which traverses that great foss had been made before for an upper road, and was used first for the Aqua Appia and the Anio Vetus, and afterwards by Nero. The existence of such a foss between the east end of the Cœlian Hill and the Cœliolum is denied by those who have not paid attention to the subject, and have not been into the gardens and vineyards to examine it; but the fact is a matter of demonstration. The tomb of the first century (miscalled the House of Verus, probably a tomb of the great Lateran family), being on the western bank of that fortress and the eastern bank of the foss, and the other tomb of the first century also, in the garden of what was the Museum of Campana (*under* an arch that carries the modern road), on the western side of that great foss, are a demonstration that there was such a foss on the east side of the City of Servius Tullius, i.e. that the Cœliolum and Lateran did not form part of the City at that time. (See my chapter on the Tombs, and the photographs of these two tombs, 174 and 1942).

The Arches of Nero remain on the Cœlian in many parts of the line, by the side of the road from the Lateran to S. Stefano Rotondo and the Navicella, with the arch of Dolabella, which was under the great reservoir of Nero, and formed the entrance of the Claudium. The Arches of Nero are faced with the finest brickwork in the world (ten bricks to the foot, as usual at that period, and are chosen as typical examples). This is well shewn in 78, and the internal construction of rubble, faced only with the fine brickwork, in 358. A line of these, shewing the picturesque effect, is shewn in 131 and 357. The aqueduct formed one of the usual angles between the Lateran and the arch at the west end of the Cœlian. It has been destroyed in this part; but this accounts for the arches being sometimes on one side of the road and sometimes on the other.

We have now arrived at the arch of Dolabella, built when he was consul, A.D. 10, as an entrance to that part of the Cœlian Hill which had been the keep when it was a separate fortress, and was afterwards made the Claudium. This arch is of very simple construction, of travertine, the same construction as the early part of the Basilica Julia, built by Julius Cæsar and Augustus. It was used by the engineers of Nero as a foundation for their great reservoir, or rather for one corner of it, as we clearly see in 72. The work of the time of Nero terminated here, but the design was carried on by his immediate successors. The water was then divided into three branches; the one on the right hand, to the north, went to the great reservoir between the Cœlian and the Esquiline, called the *Stagna Neronis*, and was used for the sham naval battles. Around these Stagna the Colosseum was afterwards built. A portion of the arcade on which

the *specus* was carried is visible in the garden of the monks called the Passionists of SS. John and Paul, and is well shewn in No. 1773, looking towards the east, with the ruins of the reservoir over the arch of Dolabella, and the church of S. Stefano Rotondo in the distance. There are remains of a reservoir for this, of the third century, in the garden of the monks on the terrace of the Claudium, opposite to the Palatine, shewn in No. 1765. The ruins of the fine arcade of the Claudium stand on this terrace; the *specus* also is in a wall here, behind the arcade. A portion of another reservoir or *piscina* for them can be seen at the foot of the cliff of the Claudium, at its north-east corner, opposite that part of the Colosseum near the Meta Sudans; this is also shewn in No. 1743, with *opus reticulatum* of the time of Nero. This branch continued in use in the third century; for there are remains of another reservoir for it, again at the foot of the Claudium opposite to the Colosseum, but more to the east, near the north-east corner of the Claudium, and near to the eastern end of the Colosseum. The remains of this reservoir are shewn in No. 1735. A colonnade carrying the *specus* from this reservoir to the second story of the Colosseum, is shewn on one of the coins of Septimius Severus, who probably built this reservoir. In the corridors of the Colosseum are open stone troughs lined with the cement for water. These carried water from this aqueduct in a constant running stream to cool the air. They are work of the third century, with old inscriptions on some of them, shewing that they were made of old materials.

Another branch from the great reservoir went straight across to the Palatine, and from thence to the Capitol; it first follows the line of the road down the Clivus Scauri, on the left or southern side, and a fragment of it is visible opposite to the church of SS. John and Paul, as seen in No. 305. At the foot of the Clivus Scauri it formed an angle, and passed against the cliff on which the apse of the church was afterwards built; it now forms the lowest and last of the series of arches that are carried across the road to support the side of the church. Then, after this angle to the north, it resumes its course to the west upon the arches across the valley to the Palatine, which was a double arcade; but the lowest tier of it only remains, as is shewn in 116. A portion of the upper tier is also visible at the end of it; an arch of this upper tier remains, which, having been made into a back gate of the Palatine, has been suffered to remain, and is shewn in No. 72. A large reservoir for it was made at the south-west corner of the Palatine, on which the palace of Commodus was afterwards built; part of this reservoir and *specus* is shewn in 683 (made from a drawing). The *specus* went across the middle of the Palatine, and has been found more than once in some of the recent excavations, but not understood. It was then carried on the bridge of Caligula to the Capitol, a small portion of which remains connected with his palace, as is shewn in Nos. 1447 and 1451.

The third branch from the great reservoir over the arch of Dolabella on the Cœlian was made in the time of Trajan, to carry water to supply the thermæ on the Aventine, called after Sura, the cousin of the Emperor; these thermæ were closely connected with the private house of his family, rebuilt in his time, and called in the Regionary Catalogue "Privata Trajani," of which there are considerable remains, now subterranean. The first place where this

branch of the aqueduct is visible is in another reservoir (1147) against the cliff of the Cœlian, opposite to S. Balbina. This is partly above the level of the hill, and has been thought part of the Palace of Commodus, on the Cœlian (which may possibly have been built over it, but the existing remains are of the time of Trajan). The lower part is under this, and is excavated in the cliff. These were brought to light in the excavations of A.D. 1868 (559, 1008, 1009, 1010, 1011). The plan and section of it are to be seen in 1150*, 692*. Against the cliff the aqueduct formed one of the usual angles towards the north, and this was carried across the valley on the *agger* or bank of Servius Tullius, first passing over the arch of the gate of the Porta Capena, above the Aqua Appia, on a much higher level, and on an arcade, probably a double arcade, like the Arches of Nero near the Porta Maggiore, on account of the great height at which the water had to be carried from one hill to the other. All that remains of this lofty arcade is a line of brick piers passing across from the Cœlian to the Aventine, over the Aqua Appia, before described, and passing by the north end of the Piscina Publica, as rebuilt in the time of Trajan over the old one, which had belonged to the older aqueducts. There are considerable remains of the walls of this period, that divided the chambers shewn in 557, 558, 1288.

This arcade can then be traced against the cliff of the Pseudo-Aventine, on the north side of S. Balbina, though partly concealed by the filling up of the space against the cliff before mentioned. The tall arcade then crosses the valley from the Pseudo-Aventine to the other part of the Aventine, and from the garden of S. Balbina to that of S. Prisca, and, in the latter garden, there are considerable remains of it on the cliff opposite to the Palatine. At the north end is the *specus* upon the arcade (the top is open, and there is a walk upon it), 79. A small portion of the Thermæ of Sura is also shewn, with the *specus* in front of the ancient wall of tufa, called the Wall of the Latins (833).

From the *piscina* and reservoir on the cliff of the Cœlian another branch went to the south, over the spring of the Camenæ (?) 692, and near that of Egeria (?); it was carried over the Porta Metronia, and on the bank of the City Wall as far as the Porta Latina.

Another fine arcade of the time of Nero (No. 1317) leads to the Nymphæum before mentioned, where the Trophies of Marius were hung. The elevation shews that this water must have come from the highest of the aqueducts, the Anio Novus; and the remains of the reservoir near the Porta di S. Lorenzo, supposed to have been for the Aqua Julia, being on high ground, may have been for this branch, which conveyed water to the Thermæ of Titus.

X. Sabatina Trajana.

Great works for the aqueducts were carried on in the time of Trajan. One great work of his time was to bring water from the lake Sabatina to the top of the Janiculum. Augustus had previously brought water from that lake, supplementary to his aqueduct, from the lake Alseatina (VII.), to supply his Naumachia in the Trastevere; but the Aqueduct of Augustus was on the lowest level, that of Trajan on the highest. It does not appear that Trajan made use of the old *specus* of Augustus; but his aqueduct was afterwards made use of by the engineers of Pope Paul V. for the Aqua Paola, although

they also brought a branch to it from the Alseatina, as Augustus had done.

That of Trajan is chiefly subterranean, and has been described under the head of the Alseatina (VII.), but nearer Rome it is above ground, and is carried on an arcade against the wall of the Villa Pamphili-Doria, near the Porta di S. Pancratio. Both the arcade and the *specus* are faced with the *opus reticulatum* of that period. (664* is from a drawing, 1065 from nature.) In some parts, one side of the *specus* has been cut away (1063). Just on the outside of that garden a large *castellum aquæ* of this aqueduct has been made into a farm-house, and in the yard of that house a branch from it can be seen (665*), apparently for the purpose of irrigation; or, as some think, this was formerly the point of division, one branch going to the Vatican, the other to the great fountain on the Janiculum (960), above S. Pietro in Montorio. The division now takes place at a short distance from this point. Procopius, writing in the sixth century, admires the enormous quantity of water brought by this aqueduct to the highest point in Rome; as it descends the hill, it turns the wheels of the flour-mills. After it arrived at the low level of the ground in the Trastevere, the respirators of the pipes for this aqueduct are carried in tall pyramids resembling chimneys (540). Part of the arcade and *specus* rebuilt by Paul V., near the garden before mentioned, is shewn in 1064, with the inscription of A.D. 1609 above it.

XI. Hadriana (?), Trajana (?) or Alexandrina (?).

The next great work of the period of Trajan or of Hadrian, on the eastern side of Rome, was probably begun in the time of Trajan. It brought water from springs under Labicum, now La Colonna, the same that is now brought for the Aqua Felice. The water from several springs was collected in a central reservoir, on which an inscription of Hadrian was found by E. Q. Visconti in the eighteenth century. This is between Pantana and Gabii, in the valley under La Colonna (1540). There are several other reservoirs of the time of Trajan or Hadrian along the line (1637, 1638). This aqueduct was considered by Fabretti to be of the time of Alexander Severus, and since his time it has usually been called the Aqua Alexandrina. It may have been partly rebuilt and brought into use again in his time, after having been choked up with stalactite, one of the springs used proving to be a petrifying spring.

Near the sources this arcade is low and much damaged, and the *specus* where it remains is nearly filled up with stalactite (1541, 1542). In some parts of the line the stalactite has all the appearance of a petrified cascade, and is evidently formed by the water oozing out and dripping and petrifying as it fell (1436). Further on there is a fine arcade for it across the country in the direction of Cento-Celle; and in some places the arcade is double to raise the *specus* to the necessary level, as in the Arches of Nero (1428, 1429). A portion of the arcade, where it is broken off, is seen in 1427, with the tower of Cento-Celle in the distance. Another portion of this fine arcade is shewn in 1640. It is of two periods; the upper part is of the third century, and may have been rebuilt by Alexander Severus (as has been said). At Cento-Celle the ground is high, and the aqueduct passes underground for some distance, along the side of the road towards Rome.

About a mile nearer to Rome, there is a branch aqueduct from the foot of the Marcian arcade, in the direction of the Mausoleum of S. Helena, which Fabretti considers as part of the same aqueduct; but it is difficult to see upon what grounds. There is a fine arcade here also for about a quarter of a mile; but it is of the time of Constantine, and I have not been able to trace any connection between this and the other. This arcade has been originally double, and the lower one only now remains, with a modern *specus* made upon it (555 and 556); but the water now flows *from* the Marrana, at the foot of the arcade of the great aqueducts, which were here on higher ground, and *runs down* upon this arcade to the garden and small monastery of S. Peter and Marcellinus, at the Mausoleum of S. Helena, called the Torre Pignattara, from the earthenware pots of which the vault was made.

XII. Aurelia, A.D. 185, and XIII. Severiana, A.D. 190.

These two aqueducts were made to convey water to the Thermæ of Commodus and Severus in Regio I., of which the remains were found in the excavations of 1870, just within the Porta Latina. The first part was originally made by Marcus Aurelius, for the use of his great villa on the Via Appia, called the Villa dei Quintilii, and the great reservoir and thermæ connected with it remain (2346, 2349, 2350, 2351, 2352). From thence it was brought into Rome by his successor, Ælius Aurelius Commodus. The water came from the Alban hills, near Marino (2358, 2359, 2360, 2361, 2362, 2363), at first underground, and then on an arcade, of which there are considerable remains near the Torre di Mezza Via di Albano (1626 and 1627).

From the Villa dei Quintilii it went parallel to the Via Appia. One of the reservoirs of it nearer to Rome is made into a farm-house, with a tower to it, and has the appearance of a church at a little distance; it is called the Casale di S. Maria Nuova (2348); it then passed again underground. Near the head of the valley of the Caffarella there remains a *piscina* for it nearly perfect (1372); this is very near also to the Circus of Maxentius and his son Romulus. There is another *piscina* or small reservoir for it near the church of S. Urbano, often mistaken for a tomb; here it again forms an angle, and the *specus* descends (plan and drawing, 831*) to the Nymphæum, or so-called Fountain of Egeria (262). The *specus* is then continued in the cliff of the valley of the Caffarella, from that fountain towards the tomb of the first century called Dio Ridicolo. Nearly opposite to that tomb the *specus* is visible in the cliff, with large openings into it, between which it passes underground. Wherever it was above ground it has been carried off as building materials and destroyed, so that it has not again been found until it arrives at the remains of a *piscina*, just to the south of the Porta Latina (984). It then entered the city of Aurelian through the bank on which his wall is built, and supplied the Thermæ of Commodus within that gate (as has been said), 1485, 1486.

XIV. Antoniniana, A.D. 215.

This aqueduct was used to supply the great Thermæ of the Antonines, now called after Antoninus Caracalla. It is more easily traced backwards, passing along the inner side of the bank on which the Wall of Aurelian is built, then upon an arcade which has been destroyed in this part, but of which remains are visible inside of the Porta Ardeatina (986), by the side

of the Arch of Drusus, just within the Porta di S. Sebastiano (73, 1772, 1202). It then passes underground through the bank, and emerges in the city wall at the angle between the Porta di S. Sebastiano and the Porta Latina (539, 883). It here crosses the road, and is visible in the garden on the opposite side (884).

XV. Alexandrina, A.D. 225.

The Aqua Alexandrina is mentioned by Lampridius in his life of Alexander Severus, but it was probably a branch from the Anio Novus only, as the Nymphæum engraved on one of his coins[m] has been identified with the ruins near S. Maria Maggiore (2126, 2127). This stands on very high ground, and the only aqueduct that could reach it was that of the Anio Novus. This branch can be traced in the wall by the piers of the arcade, which have been built into the Wall of Aurelian near the Porta Maggiore (80 A, B). The *specus* and the arches were destroyed by the engineers of the Aqua Felice; the piers only remain, and these cease just before we arrive at the point where the railway now enters Rome through the wall (99). They come to an end directly in a line with a large reservoir, now a gardener's house, near the Minerva Medica, almost between that and the wall, but a little to the south of it; one pier, however, of the tall arcade of the third century remains, as a sort of buttress, against that side of the fine building of the same period called the Temple of Minerva Medica (537). There are great remains of thermæ and fountains in the large vineyard in which this building stands. Some of these are of an earlier period; but a considerable part of them are of the third century, and of the time of Alexander Severus. The Nymphæum before mentioned was at the north end, and is a fine picturesque ruin, with very evident remains of the aqueduct in it (61, 963, 964). The water was here divided into several branches, of which we see portions of the *specus* going in different directions. One of the most important of these goes to the great reservoir of the Thermæ of Titus and Trajan, called the Sette Sale. This was made long before the time of Alexander Severus, who only rebuilt the Nymphæum; and there is an arcade of the first century leading to this Nymphæum from a reservoir near the Porta di S. Lorenzo.

At a short distance to the south of this celebrated Nymphæum is another very curious reservoir, now in a very bad state, having been turned into a gardener's house, but which must have been of considerable importance, and probably belonged to the thermæ of the third century (2322, 2323). There is a *cippus* with an inscription, which indicates that the building was a *castellum aquæ* (2324).

XVI. Algentiana, A.D. 300.

This aqueduct was made to supply the great Thermæ of Diocletian on the Viminal Hill, but is believed to have been entirely subterranean, so that little is known about it. There was a reservoir for it on the eastern side of the Thermæ, under the present railway station. Drawings and a plan of this were preserved by Visconti[n].

[m] Cohen. Méd. Imp. Alex. Sev., (Nos. 239, 334).

[n] This water is not mentioned in the Regionary Catalogue, and its whole history appears doubtful. Some think the name is a corruption of Argentina, the short stream that rises in the Lupercal or Wolf's Cave, under the north-west corner of the Palatine, as before mentioned.

XVII. The Aqua Crabra, the Marrana, A.D. 1124, and the River Almo.

These three may all be treated as one aqueduct for the supply of Rome, partly natural and partly artificial. They all come from the Alban Hills; the first from near Rocca di Papa on very high ground, the second from about a mile above the small and very picturesque town of Marino; the third lower down the same hill. They are all mountain streams, and partake of the usual character of such streams; in dry weather the springs that supply the Almo bring so little water, that it is only sufficient to fill some ponds for cattle at the foot of the hill. The deep bed of the river, which winds about the Campagna for miles, is therefore dry for a great part of the year, but the other two streams never fail; they are united at the foot of the hill, not far from the place where the Aqua Aurelia came from. The greater part of their united waters runs into the river Anio, but a portion of it is diverted near the ruins of the ancient fortified village or *pagus*, called *Centroni* (2315, 2316, 2317, 2318, 2319), on the road to Tusculum, (now Frascati,) about eight miles from Rome. This branch to supply Rome is first brought through an ancient tunnel of the Aqua Julia, at each end of which remains can be seen of the stone *specus* and the flood-gates (2310, 2311, 2312, 2313). The water is then conveyed in a bank of clay for about a mile, and then in the bed of one of the many branches of the mountain stream called the river Almo, and so brought into Rome (1309, 1318), under the Porta Metronia, which is built upon a bridge over it. The stream passes under some other bridges with mills upon them, and eventually falls into the Tiber through an aperture left for it in the Pulchrum Littus, or fine tufa wall of the Kings (drawing, 1235*; plans, 368*, 1234*; views, 77, 166, 157).

Another branch from it is carried from the junction or separation between the Torre Fiscale and Roma Vecchia (1937*) by the side of the cross road from the Via Appia Nova to the Via Appia Antiqua. Sometimes in the bed of the Almo, and in other parts, where the ground is low and the stream is liable to floods, an artificial canal is made for it, which may be seen in the valley of the Caffarella. This excellent plan was carried out in the most economical but effectual manner by a company in the twelfth century. This is really an aqueduct, though not usually so called; it is kept in repair by the present Water-Company, and is of great importance for Rome; as the floods to which the Almo was always liable along its whole line, and within the walls of Rome, (as is mentioned by Cicero,) are effectually kept out of Rome, and a constant, regular supply of water is obtained.

XVIII. Aqua Felice, made A.D. 1587 by Pope Sixtus V. (Felice Peretti).

The sources of it are the springs under the hill on which La Colonna stands. The same water had been used long before, and brought into Rome by the aqueduct (XI.) of Hadrian and Trajan before mentioned. The large reservoir for the water now in use is very near to the remains of the old one of Hadrian. The construction of this aqueduct is very rude and rough, of concrete and rubble-stone only, and this stone consists entirely of old materials; still the large scale of the work, and the height at which the *specus* is carried upon the arcade, give it a grand effect. At a little distance, the inferior construc-

tion is not seen, and this almost modern aqueduct is frequently mistaken by strangers for one of the old ones of the time of the Empire, of which it is only an imitation. It is seen in several of the views of the older aqueducts in the Campagna, especially those at the Torre Fiscale (531, 1028, 1029) and the Porta Furba (68, 1437). Here it crosses the road to Frascati on an arch, with an inscription upon it. In the latter part of its course it is made on the piers of the Claudian arcade, and it enters Rome at the same point, the north-east corner of the gardens of S. Croce. After passing along the north side of them, it is divided into different branches by a reservoir at the angle, close to the south side of the Porta Maggiore (30). The principal stream then passes along upon the Wall of Aurelian (80 A, B, 81), on the same high bank as the earlier aqueducts had done; it was cut through in making the railway, but a new bridge over that road was built for it (29). Near this it can be seen that it is carried on the piers of an older aqueduct for some distance (28). See Alexandrina (XV.)

Further on towards the Porta di S. Lorenzo the ground is higher, and in order to keep the level necessary for the *specus*, it is brought within the wall, and built up against the inside of it (1871). The Marcia, Tepula, and Julia, over which it is carried, as is seen at the two gates where their arcade is visible *under* the *specus* of the Aqua Felice, are here still under it, but *underground* also, owing to the higher level of the ground. It passes over the Porta di S. Lorenzo to a reservoir on the north side of it, and then turns to the west by the side of the road, which it crosses upon an arch, with an inscription upon it, at a short distance within that gate (81). The principal termination of it is at the Fountain of the Termini (called of Moses,) 71. Behind the fountain is a reservoir after the old fashion, which is illustrated by a plan and section (704*). The celebrated Fountain of the Triton (1196), in the Piazza Barberini, is also supplied by this aqueduct, as well as all the upper terraces upon the hills. The lower range, on the Campus Martius, is chiefly supplied by the Virgo. Another branch goes from the reservoir at the Porta Maggiore along the bank on which the Arches of Nero are carried, to the Lateran, where the fountains are supplied by this water. The old aqueduct was used according to the custom of the time, and there is a cascade *specus* from the level of the Marcia to that of the Appia (shewn in 541).

The *specus* of each of these old aqueducts was used to carry the metal pipes of the Aqua Felice, when it was convenient to do so (1295*), as has been previously mentioned.

THE AQUA MARCIA PIA was made by a Company between 1860 and 1870, and has been mentioned under the head of the Marcia (a part of it is shewn in 1553).

THE AQUEDUCTS.

ANIO NOVUS.—THE RIVER ANIO.

DESCRIPTION OF THE PHOTO-ENGRAVINGS.

PLATE I.

SOURCE OF THE AQUA APPIA, IN A VERY ANCIENT STONE-QUARRY of the time of the Kings, in the meadows on the bank of the river Anio, formerly called the meadows of Lucullus. They are not far from Lunghezza, the site of the ancient city of Collatium. This cave has two springs of water in it, and the two streams meet at the mouth of the cave in a channel, which is at first open at the top, and crosses the low meadow with the appearance of a ditch only, to a central reservoir, also in a cave, from which the tunnel *specus* begins that runs on, into and through Rome. Three streams meet at the same central reservoir, and their united water goes through the *specus*. Each *specus* can be traced by the line of bushes in the meadows, each bush being over one of the wells; these descend at regular intervals into the *specus*. These wells are also called respirators or ventilators, as they give air to the current of water, or as the people say, enable it to breathe. This cave is easily overlooked, and any person passing on the higher ground over it, is almost sure not to see it. It is scarcely visible until close to it. The ancient quarry from which it comes is earlier than others in the neighbourhood. The celebrated Caves of Cervaro are also ancient quarries; they are about a mile from this point, and although very early, are not quite so early as this, which is more distant from the river Anio. It seems probable that this was one of the quarries for the city of Collatium, before the time of Servius Tullius.

ANCIENT QUARRY OF THE KINGS.

PLATE II.

SOURCE OF ANOTHER SPRING OF THE AQUA APPIA, in another ancient stone quarry on the bank of the river Anio. This is one of a fine series of ancient quarries, now caves, about a mile higher up the river than the Caves of Cervaro. These are believed to have been the quarries from which the large blocks of tufa for the walls of the Kings of Rome were taken, especially the great wall of Servius Tullius, which was a mile long, fifty feet high, and in some parts twelve feet thick, and which would require an enormous quantity of stone. This was probably floated down the Anio on wooden rafts, which served for timber also. The pool at the source of this spring appears as if it came from the water dripping through the rock above, which serves for a roof; but the old shepherds, who have watched it for years, say that the water never fails, and that it is a natural spring, although the quantity of stone refuse thrown into it makes it impossible to see exactly where it rises. These caves are extremely picturesque, more so even than the Caves of Cervaro, though these are the favourite resort of the German artists in their annual festival.

ANCIENT QUARRY OF THE KINGS.

PLATE III.

1. THE AQUEDUCTS ABOVE SUBIACO.
2. RIVER ANIO, THE UPPER LOCHS.
   ——— THE THIRD LOCH AND THE BRIDGE.

THE water for the aqueducts of Rome was chiefly drawn from the river Anio, or from springs or tributary streams that fell into that river. It rises in the high mountains above Subiaco, which are generally covered with snow for the greater part of the year, and the supply of water never fails entirely, though it is not always equally abundant. It is generally a clear, bright mountain stream, coming through rocks, but it is liable to sudden and violent floods, which bring down a great deal of mud, and therefore great precautions are taken for filtering it. The latest and most important of the great aqueducts were the Claudia and Anio Novus; the latter was the most abundant of all, being in fact a branch of the river compelled to pass through Rome by clever engineering. A series of great lochs was made by building dams across the river, with cascades from one to another. There were three of these about two miles above Subiaco, and about forty-two miles from Rome. The uppermost one of them is seen in the upper part of the plate, but in the third loch, the lowest of the three (shewn in the lower part of the plate), the bed of the river is so deep, that the water is not seen. The country through which it passes is celebrated as among the most beautiful in Italy.

RIVER ANIO THE UPPER LOCHS

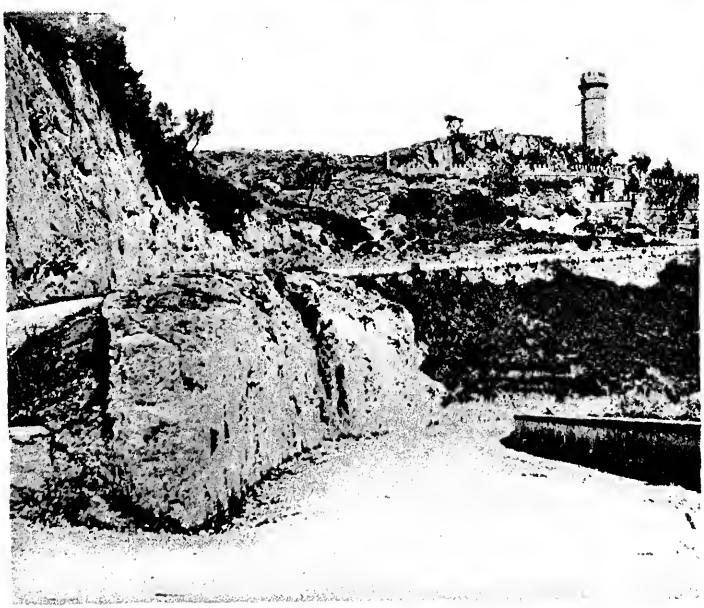
THE THIRD LOCH AND THE BRIDGE

PLATE IV.

1. ANIO NOVUS, THE THIRD LOCH, as seen from below, where the dam, that formerly kept up the water and formed a great cascade, has been thrown down, and appears only as rocks in the stream; the modern bridge seen in this view is built upon the two ends of the old dam.

2. ANIO NOVUS, SPECUS. The *specus* is here a tunnel cut in the cliff, on the side of the valley on which the town of Subiaco stands; it is six feet high, and only eighteen inches wide (an opening into it may be seen in the cliff, on the left-hand side of the view). The round tower, seen on the right, is that of the Villa Gori, about a mile above Subiaco.

ANIO NOVUS, THE THIRD LOCH



ANIO NOVUS, SPECUS CUT IN THE CLIFF

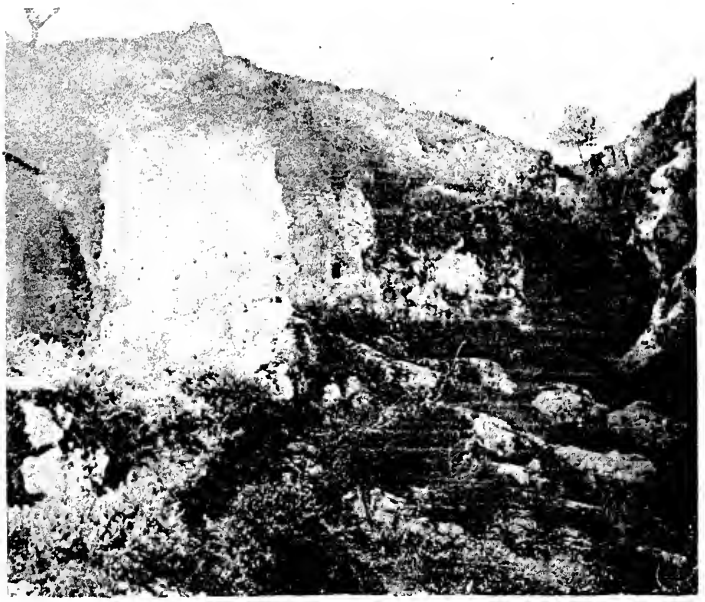
PLATE V.

AQUEDUCTS ABOVE SUBIACO—ANIO NOVUS, CASTELLUM.

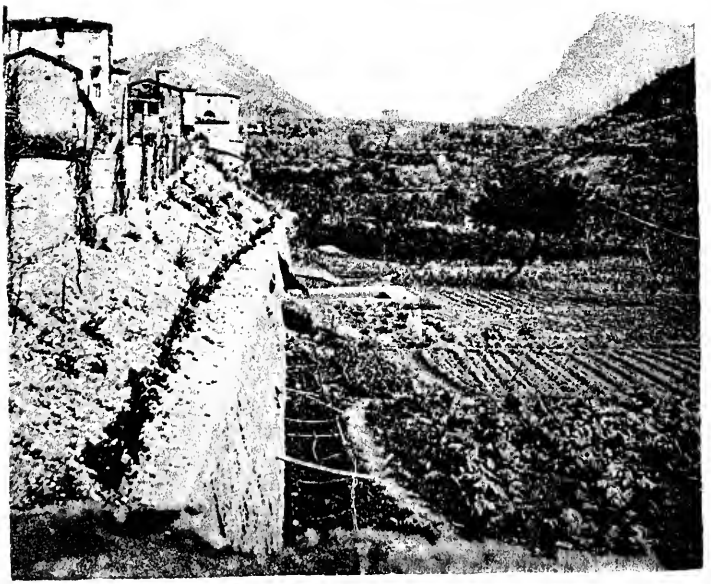
THIS is the loch below the modern bridge, which is made upon the remains of the old dam across the river, destroyed in the fourteenth century by making a hole at the bottom to let the water escape from a flood in the upper country. The force of the water once let loose soon destroyed the dam, and the large stones of which it was built are still lying as rocks in the river, and are seen in the photograph and the photo-engraving.

LINE OF THE SPECUS OF THE ANIO NOVUS. It is here carried in the cliff of the valley of the river Anio, seen on the left of the picture. Both of these views are continuations of those seen in Plate IV., and one helps to explain the other. The *specus* continued in this way for many miles underground, in one sense, when seen from above, but not underground when seen from below. When it has to cross the mouths of the small subsidiary streams that fall into the Anio, it has to be carried over bridges or arches, at other times it is cut in the rock or cliff.

AQUEDUCTS ABOVE SUBIACO



ANIO NOVUS, CASTELLUM



LINE OF THE CIRCUS OF ANIO NOVUS

Photogravure Dujardin, Paris

PLATE VI.

THE CLAUDIA, ANIO VETUS, AND NOVUS, AND MARCIA IN THE VALLEY OF THE ARCHES ABOVE TIVOLI.

THIS valley is about two miles above Tivoli, where there is a junction of another stream with the Anio, in rather a wider valley than the usual valley of the Anio only. One arch of the lofty Claudian arcade is left on the side of the valley next Tivoli, and on the top of this a medieval tower has been built, which has an extremely picturesque effect. Through the arch may be seen a small portion of the Marcian arcade, and at a few yards to the left the Anio Vetus, which there passes half-underground at the foot of the tall arcade of the Anio Novus.

IN THE VALLEY OF THE ARCHES, NEAR TIVOLI.

PLATE VII.

TWO OTHER VIEWS OF THE RUINS OF THE ARCADES OF THE CLAUDIA AND ANIO NOVUS, in the Valley of the Arches above Tivoli. In the foreground, the Marcian seen through the arch, and the Anio Vetus again through the arch of the Marcian. These views are celebrated for their picturesque character, as indeed is all the country about Tivoli and Subiaco.

ANIO NOVUS. MEDIEVAL TOWER

IN THE VALLEY OF THE ARCHES

Photogravure Dujardin, Paris

PLATE VIII.

AQUEDUCTS AT TIVOLI. CASCADES OF THE ANIO, WITH THE ROUND TEMPLE OF THE SIBYL AT THE TOP.

THIS cascade shews the character of the country through which the aqueducts had to be carried, but the waters of the aqueducts taken out of the river Anio were necessarily confined each within its own *specus*, here in tunnels, which are carried in a zig-zag course gradually down the hill to the level of the Villa of Hadrian in the valley below.

TEMPLE OF THE SIBYL AND CASCADES

CASCADES OF THE ANIO

PLATE IX.

AQUEDUCTS BELOW TIVOLI.

THE MARCIA, A GREAT CASTELLUM AQUÆ OR RESERVOIR ON THE VIA DI CARCIANO. This is sometimes called the "Promenade" of Carciano, being a favourite walk on the brow of the hill, from which there is a distant view of S. Peter's at Rome. This fine reservoir (of which two sides are here shewn) is of the time that this aqueduct was made, B.C. 145. It was probably from this reservoir that a branch *specus* descended to the Villa of Hadrian below, to which there is a bridle-road from near this point.

MARCIA ON THE VIA DI CARCIANO

MA[illegible] CASTELLI [illegible]

PLATE X.

AQUEDUCTS BELOW TIVOLI. AQUA MARCIA, RESERVOIR.

THIS is another of the great reservoirs to receive and retain a supply of water on the edge of the hill, both as one of the many such reservoirs for the supply of water to Rome, and for the purpose of local irrigation. It consists of two large chambers, divided by an arcade, which is the usual plan, and is probably part of the original construction of B.C. 145. These reservoirs are remarkably picturesque and finely situated.

AQUA MARCIA RESERVOIR

RESERVOIR OF AQUA MARCIA INTERIOR

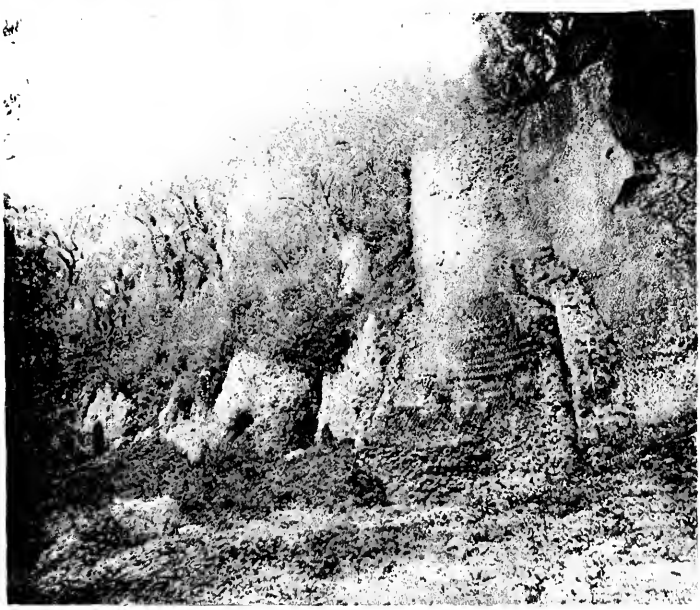
PLATE XI.

AQUEDUCTS BELOW TIVOLI. ANIO NOVUS, CASTELLUM.

THIS is another of these fine reservoirs, about a mile further on; it is faced with the reticulated-work of the first century, and is part of the original work of the time of Nero.

MARCIA, CASTELLUM OF TRAJAN, who repaired the aqueducts in several places, as is recorded by inscriptions. The reticulated-work with which this is faced is very peculiar, and is believed to be unique, at least it has not been observed elsewhere.

ANIO NOVUS, CASTELLUM



MARCIA, CASTELLUM OF TRAJAN

PLATE XII.

THE CLAUDIA AND ANIO NOVUS IN THE CAMPAGNA OF ROME, NEAR ROMA VECCHIA.

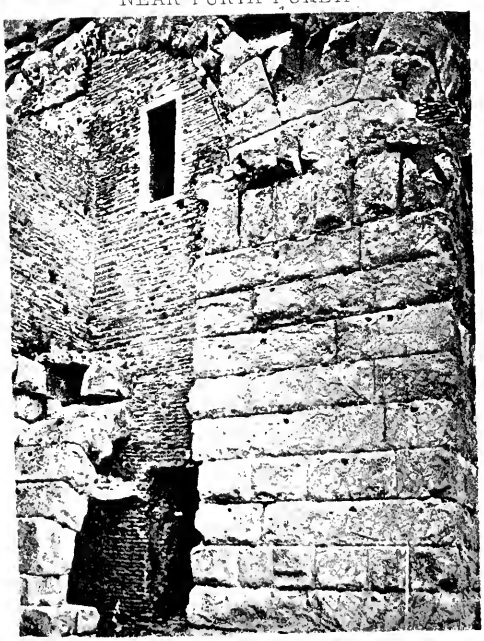
THIS grand arcade is the most perfect part of this finest of the aqueducts, and extends for about a mile, from near the farm-house called Roma Vecchia, about four miles from Rome, to the piscinæ where the arcade becomes gradually lower as the ground rises towards the foot of the hills. The two *specus* are clearly seen with their usual characteristics, the Claudia built of large squared stones; the Anio Novus is visible, faced with brick in most parts, but here is faced with reticulated-work. In the first part of this view are seen the ruins of one of the enormous reservoirs, or Castella Aquarum, at one of the angles which occur at each half mile along its course. The object of these very numerous reservoirs probably was two-fold, one for local irrigation, the other for keeping up a constant and never-failing supply for Rome, even in the hot season, when many springs cease to flow.

IN THE CAMPAGNA NEAR THE PISCINAE AND ROMA VECCHIA.

PLATE XIII.

THE MARCIA, TEPULA and JULIA passing under one of the arches of the CLAUDIA and ANIO NOVUS, now under the TOR FISCALE. A medieval tower built upon the celebrated crossing of the aqueducts, where seven aqueducts crossed each other at different levels. The Anio Vetus passes under it just underground, and the AQUA FELICE by the side of it. The *specus* of the Aqua Marcia, built as usual of squared stone, is seen upon the arch that carried it; the others are concealed by a modern wall, but can be traced passing under the stone arch of the Claudian. The other view in the upper part of the plate shews another crossing, at one of the angles made to break the force of the water. The Marcian and the Claudian arcades running parallel to each other at a short distance only, the angle of this goes across the intervening space, and then changes sides for a time. The road which here runs between the two arcades passes under the arches at both ends of this junction, near the Porta Furba, which is seen in the distance. The character of the brickwork of the arch in the foreground indicates the time of Trajan, with later repairs, which were made at all periods in this arcade.

NEAR PORTA FURBA.



UNDER THE TOR FISCALE MARCIA & CLAUDIA.

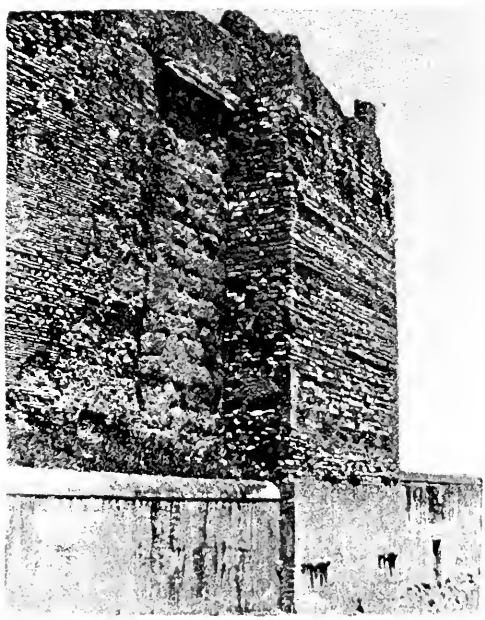
Photogravure Dujardin, Paris

PLATE XIV.

THE upper view represents the stone *specus* of the Aqua Marcia at the PORTA TIBURTINA, now of S. Lorenzo, just within the gate, and in the wall on the southern side, with an opening by the side of it, through which a man can now walk into the *specus* and along it. To the right of this, still in the wall, is a Castellum of the Aqua Felice, which is here, as at the Porta Maggiore, above the Marcia, Tepula and Julia, and below the Claudia and Anio Novus.

In the lower view is the Claudia and Anio Novus, at the north-east angle of the gardens of the Sessorian Palace (now of S. Croce in Gerusalemme). One of the stone piers of the Aqua Claudia is seen just within the projection of the tower at the angle, which is an addition of a later period. Within this portion of the City wall is a great Castellum Aquæ, extending from the corner to the tower, through which the aqueducts entered Rome. The interior of the tower is a piscina, which is shewn in another plate.

MARCIA AT PORTA TIBURTINA



CLAUDIA AND ANIO NOVUS AT ANGLE OF THE SESSORIUM

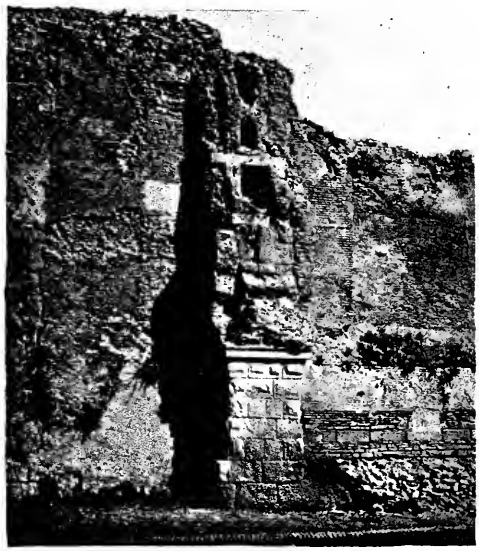
PLATE XV.

AQUEDUCTS AT THE PORTA MAGGIORE. THE MARCIA, TEPULA, AND JULIA ENTERING ROME.

THE upper view shews the exterior of the wall, with the three *specus* passing through it, under an arch of the Claudian arcade, now destroyed. These are carried upon one of the piers of the Marcian arcade, built of squared stone, as the part near Rome always was. In the left lower corner of this view may be seen the Anio Vetus, half underground, as usual for this aqueduct. [This opening has been built up since the photograph was taken. The demolition of all traces of the old aqueduct as far as possible was part of the plan of the architect, who directed what were miscalled the *restorations* of the City wall.]

The lower view represents the *specus* of the Aqua Marcia, of squared stone, carried on one of the arches of the Marcian arcade through the wall, within it at the same point as that of the exterior shewn above.

AQUEDUCTS AT THE PORTA MAGGIORE.



MARCIA TEPULA JULIA ENTERING ROME

MARCIA ETC. WITHIN THE WALL.

PLATE XVI.

CLAUDIA AND ANIO NOVUS.

I. OVER THE PORTA MAGGIORE. In the lower view the two *specus* are seen endways, built of squared stone, as part of the gateway. The point of view for this is nearly the same as that of Plate XV., looking south instead of west. The curious tomb of the Baker Eurysaces is seen on the left, with the stone kneading-troughs of which it is built.

II. The upper view is one corner of the great reservoir of Nero on the Cœlian, near the west end, over the Arch of Dolabella, which is seen built of well-cut stone, and perfectly plain. This has an inscription, with the names of the Consuls of the time of Augustus (A.D. 10), forty years afterwards; the arch, which was the eastern entrance into the Claudium, was used by the engineers of Nero as a substructure for the corner of the great reservoir of water for the supply of that part of Rome, which was carried at the height of thirty feet from the ground. Some small square windows are seen in the wall, which belonged to the chapel of S. Thomas *in formis* (or in the arches), made in the remains of the arcade in the eighth century, and removed in the twelfth for a larger chapel, now in the garden of the Villa Celi-montana near to it. At the left-hand corner of this view is seen the gateway of the small monastery of the Redemptorists, with the celebrated mosaic picture over it, representing Christ between a black and a white slave, shewn in another plate of this work.

ANIO NOVUS IN THE CAELIAN

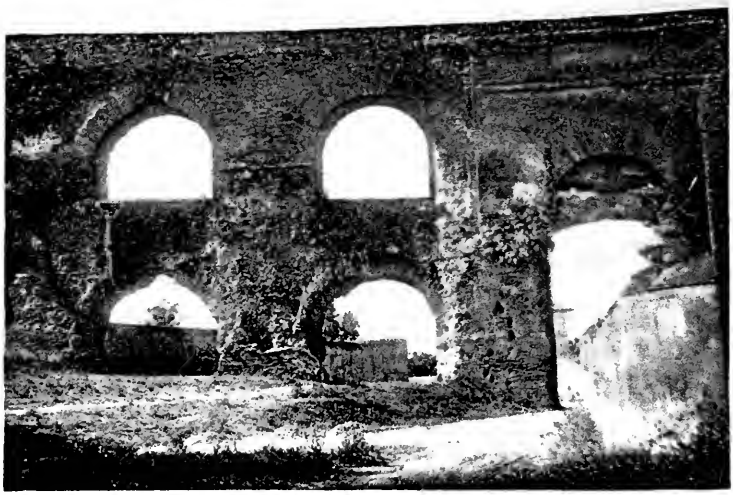
CLAUDIA AND ANIO NOVUS OVER THE PORTA MAGGIORE

PLATE XVII.

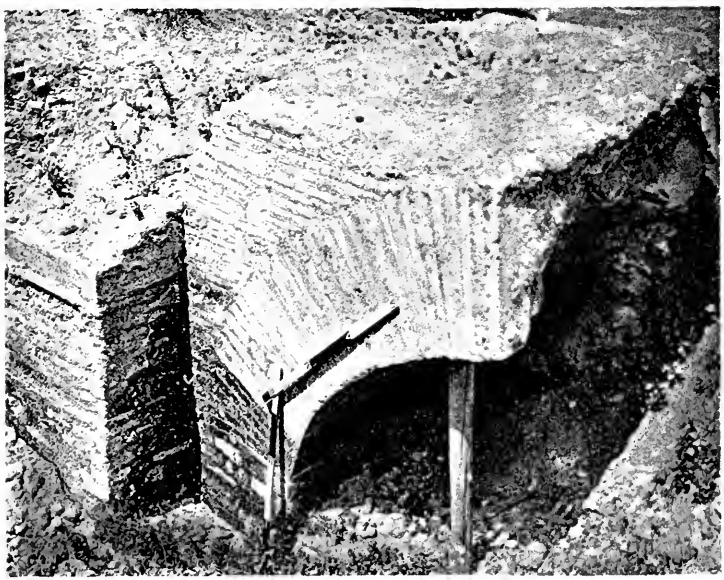
ARCHES OF NERO WITHIN THE PORTA MAGGIORE.

THIS double arcade crosses the valley or inner foss of the Sessorian Palace. It was built on this plan for greater strength, as the piers are of a great height. This arcade is a continuation of the one that forms the northern wall of the Sessorian gardens, in a direct line to the west, over the Cœlian to the great reservoir over the Arch of Dolabella (shewn in the last plate). The *specus* was carried at the top, and conveyed the water of the Claudian and Anio Novus, *united* at *the Gemelli* (a great twin reservoir which was close to that point, and at the north-west angle of the Sessorian gardens). The Claudian as a separate water turns at a sharp angle, and goes on to the Porta Maggiore, with the Anio Novus over it, and terminated at another tower just to the north of the place where the Marcia, Tepula, and Julia pass through the wall. But they left a considerable part of their water at that angle to be united to that of the Anio Novus at the Gemelli.

The lower view represents a fragment of the Aqua Marcia, as repaired and restored by Trajan, to the north of, and near the Porta Maggiore, in the vineyard in which the Minerva Medica stands, which has been the Exquiliæ, and afterwards the gardens of Mæcenas. This, which is parallel to the City wall, is joined to it a little further on. It was accidentally brought to light by some excavations in 1871, and is now buried again.



WITHIN THE PORTA MAGGIORE.



AQUA MARCIA, WITHIN THE PORTA MAGG. 1871.

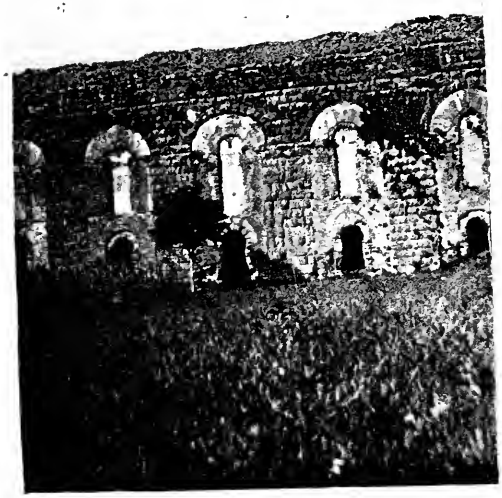
PLATE XVIII.

THE CLAUDIAN AND THE ANIO NOVUS, IN THE NORTH WALL OF THE SESSORIAN GARDENS, NEAR THE PORTA MAGGIORE.

THE wall for about a quarter of a mile is entirely made out of this arcade, with the arches filled up, but it is built upon the old earth-work of the Sessorium, probably of the time of the Kings. The arcade extends from the angle at the north-east corner, where the aqueduct entered Rome, to the north-west angle near the Porta Maggiore, which was called Porta Sessoriana, because it entered into the Sessorian gardens.

The lower view represents the NYMPHÆUM OF ALEXANDER SEVERUS, WHERE THE TROPHIES OF MARIUS WERE HUNG.

This is identified by a representation of it on one of the coins of that Emperor. It is commonly miscalled a Castellum of the Aqua Julia, but it is on too high a level for that water, and there is no other but the Anio Novus which is high enough; this was brought along the wall to another reservoir near the Porta Tiburtina, and then by a branch arcade to this point, where there is another large reservoir on high ground, from which the water was dispersed in different directions. One branch went to supply the great reservoir called the *Sette Sale*, which supplied the Thermæ of Titus and Trajan on the Exquiliæ, and from thence went on to the Colosseum and to the Tiber. Another branch supplied the Thermæ of Constantine, on the Quirinal.



CLAUDIA AND ANIO NOVUS IN THE WALL OF THE SESSORIUM.

NYMPHAEUM OF ALEXANDER SEVERUS
WHERE THE TROPHIES OF MARIUS WERE HUNG.

PLATE XIX.

RESERVOIR ON THE ARCHES OF NERO OVER THE ARCH OF DOLABELLA.

THIS Plate is almost a repetition of Plate XV., but from a different point of view, and this great reservoir is of so much importance for the history of the aqueducts in Rome, that it was necessary to shew it as clearly as possible. Without repeating what has been said before, we may add that the arch seen to the right in this view is the beginning of an arcade which led to the Colosseum. Another branch in a more direct line led to the Palatine, after passing first along the north wall of the garden of the Villa Celimontana, then by the western side of the Clivus Scauri, parallel to the church of SS. John and Paul, and at the foot of the hill passing across the road, and under the apse of the church; then turning again southwards on an arcade across the valley to the Palatine, of which there are remains; afterwards passing along the whole length of the Palatine underground, it is visible at the mouth of a tunnel on the platform opposite to the Capitoline Hill, and went across the Forum Romanum over the bridge of Caligula. The work of Nero stopped at the Arch of Dolabella, but it was taken up and completed by his successors.

Another branch went also to the left, on the west wall of the garden of the Villa Celimontana, to the valley between the Cœlian and the Aventine. There is a large reservoir for it on the cliff of the Cœlian, partly below and partly above it, and in the garden of the monks of S. Gregory. It then went on a tall arcade, over the Porta Capena and the *agger* of Servius Tullius, to the Piscina Publica, and from thence, again crossing the valley between the two parts of the Aventine, to the Thermæ of Sura, and the private house of Trajan, and the temples on the edge of the Aventine, and to the mouth of the aqueducts in the cave under the Priorato at the Porta Trigemina, and so to the Tiber.

OVER THE ARCH OF DOLABELLA

THE AQUEDUCTS.

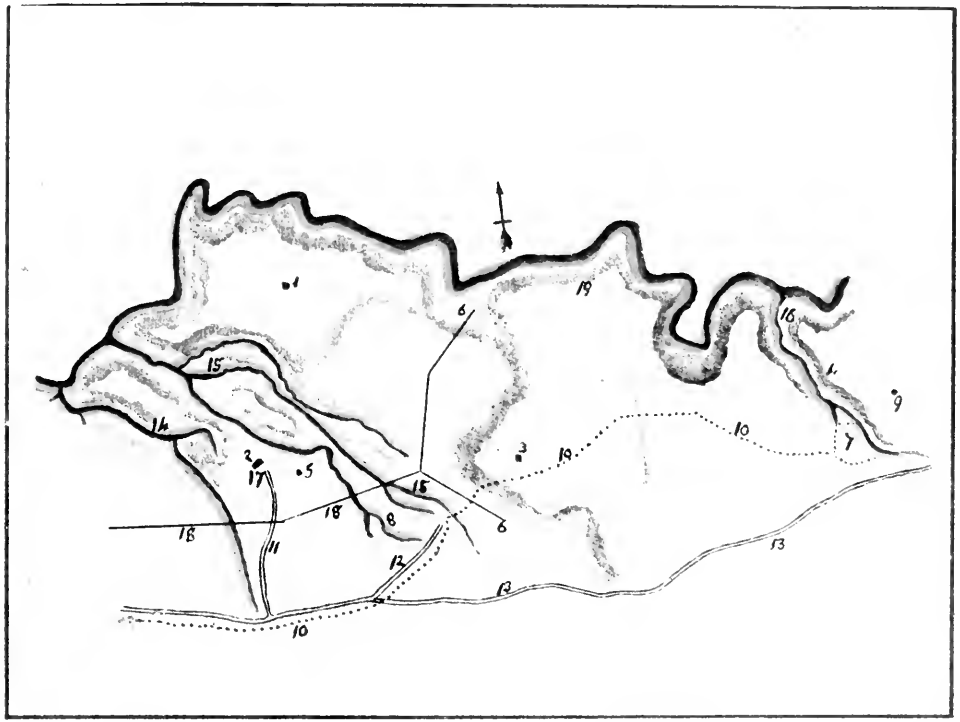
DESCRIPTION OF THE DIAGRAMS.

PLATE I.

PLAN OF THE SOURCES OF THE APPIA (I.) AND VIRGO[a] (VI.)

1. Farm-house of Cervaro.
2. ——— ——— Cervelletta.
3. ——— ——— La Rustica.
4. ——— ——— Salone.
5. Church.
6. Sources of the Aqua Appia.
7. ——— ——— Virgo.
8. ——— ——— Augusta.
9. Tombs.
10. Aqueduct of the Virgo.
11. Road of Cervaro.
12. ——— La Rustica.
13. ——— Prænestina (?).
14. ——— Collatia.
15. Bed of the stream of the Fontanille.
16. ——— ——— ——— of Tor Sapienza.
17. ——— ——— ——— of Ponte Nono, the Rivus Herculaneus.
18. Direction of the Aqueduct of the Appia.
19. Stone-quarry of Collatium and Necropolis.

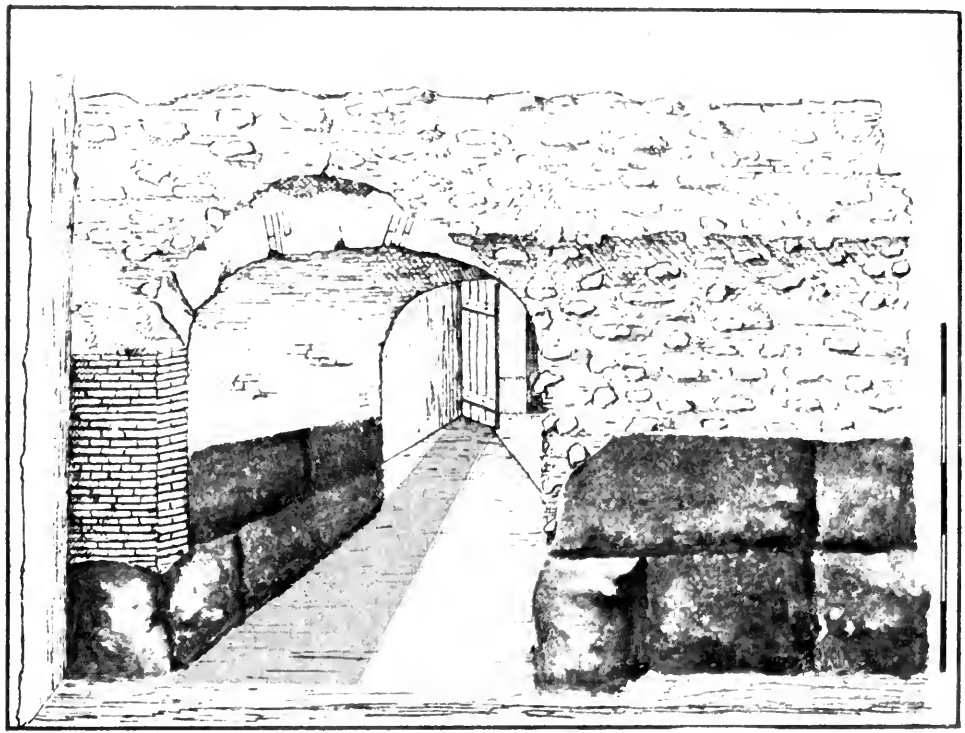
[a] These sources are on the cliffs above the river Anio, at from five to seven miles from Rome, and two miles from Ponte Nono, in swampy meadows called "the meadows of Lucullus," and some in old stone quarries.



PLAN OF THE SPRINGS AT THE SOURCES IN THE MEADOWS OF LUCULLUS, ON THE BANK OF THE RIVER ANIO, EXCAVATED IN 1868

PLATE II.

THE APPIA (I.) at the PORTA CAPENA, in the eastern tower of the gate, now in the house of the gardener of the monks of S. Gregory. The *specus* is built of large blocks of tufa, and the lower part of it cut in the tufa wall of Servius Tullius; it was distinctly visible in the excavations of 1870, when this drawing was made. The line of the aqueduct upon the short *agger* between the Cœlian and the Aventine was also visible for several yards, and in three different places, where pits were dug fifteen feet deep, the last was where a branch was carried into the Piscina Publica. The middle pit was in waste land on the western side of the present south road through the gate of S. Sebastian, or the modern line of the Porta Appia. It was to this pit that his holiness Pius IX. was taken to see it by the Cavaliere Guidi, and he said there was no denying that this was part of the wall of Servius Tullius, but he was surprised that his Roman friends had not discovered this. The greater part of the pits that he opened might have been left open, if it had not been for the prejudices of the subordinate officers of the Government. The particular pit in question was in waste ground by the side of the road, and might have been left open without any inconvenience.

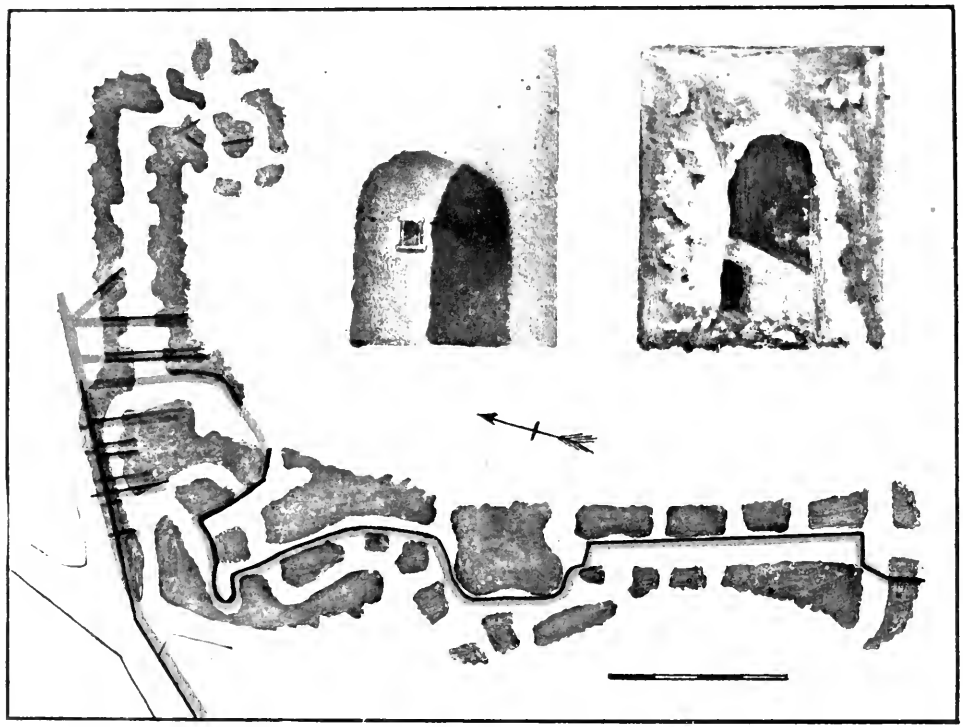


In a Tower of the Porta Capena, under the Cœlian, now a Gardener's Cottage, Excavated in 1868.

PLATE III.

THE Appia (I.) under S. Sabba, in an old subterranean stone quarry. Several branches of other and later aqueducts here cast their surplus water into the *specus* of the Appia, the earliest and the lowest (as shewn in the plan). The *specus* is also visible in several places, filled up to one-third of its depth by the deposit of clay left by the water, which comes from swampy meadows on the bank of the river Anio, in which the soil is clay, upon tufa rock, called the "Meadows of Lucullus."

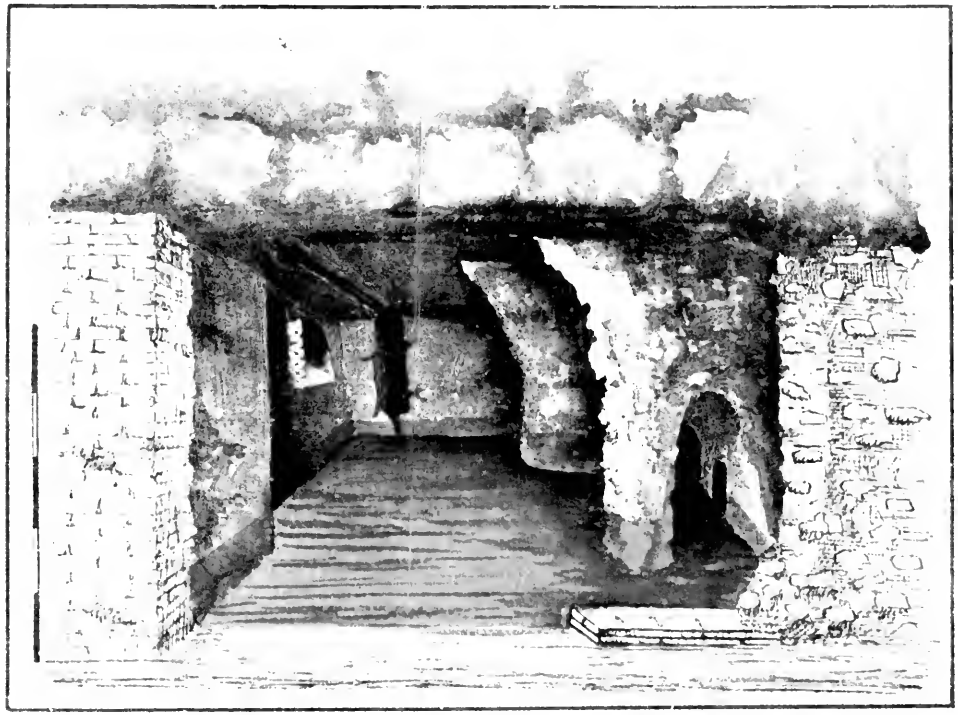
Over the plan in this plate are two sections of the *specus;* in the one to the right the clay deposit left by the water is shewn, in the one to the left a small pipe coming into the *specus*, probably part of the system of irrigation, which was one great use of the aqueducts; the green lines winding through the quarry represent the lines of the various streams of water coming at different levels, sometimes with a very rapid descent, and all falling into the old deep *specus* of the Appia, before that was carried across the last road that it had to pass. In this instance it was probably carried under the road, and not over the arch of the gate. At this point four roads meet, which is almost a certain indication of the site of a gate. In most cases the *specus* was carried over the gate, but here the level seems too low, unless the old foss-way has been filled up even more than the usual fifteen feet. The *specus* is visible again in another subterranean stone quarry under S. Prisca, in the same large vineyard formerly of the Jesuits, now of Prince Torlonia, in which, at a higher level, are also the remains of the Wall of the Latins on the Aventine, and of the Thermæ of Sura and the private house of Trajan. Another aqueduct passed over this to supply the Thermæ; this is on a very high level, and was carried on a tall arcade across the valley, from the Cœlian to the Aventine, passing over the Porta Capena and on the old *agger*. There are remains of the tall brick piers in several places, and of the arcade and *specus* on the hill near S. Prisca, visible from the Palatine.



In a Stone Quarry under S. Sabba, on the Aventine, where Seven Branches of Later Aqueducts cast their surplus water into the Appia, Excavated in 1868.

PLATE IV.

MOUTH of the Appia (I.), in a cave under the Priorato or Priory of the knights of Malta on the Aventine, near the Marmorata and the Porta Trigemina. At the back of the cave, and connected with it by a natural tunnel, is a large reservoir of water in the heart of the hill, supplied by a natural spring, which was added to the water brought by the aqueduct for distribution. The latter part of this cave, behind the part here shewn, is under the garden of the monastery of S. Alessio, and the cave belonged to those monks. A plan and section of it is given in another plate. In the inner part of the cave is the natural spring, so that it is always knee-deep in water. This seems a likely place to have driven cattle into for concealment; there is no other natural cave under the Aventine, and this is close to the Porta Trigemina. The idea that there was a cave near the Forum Boarium seems to have arisen from a misunderstanding as to the exact site of the Porta Trigemina, which was supposed to be close to that Forum, instead of being a quarter of a mile from it, and close to the Sublician, or wooden bridge, where some remains of it have been found. The *specus* of the Aqua Appia leads directly into this cave, and other aqueducts also meet there. The surplus water of the Trajan, far above this level, descends into it by a vertical pipe of terra cotta. Piranesi, in the last century, recognised the cave as the mouth of the Aqua Appia, and gives one of his admirable etchings of this part of the Aventine, with the cave at its foot. He was in advance of his time, but a great deal of fresh evidence has come to light since that period.



In a Cave of the Aventine, under S. Alexio, at the Porta Trigemina, near the Marmorata, Excavated in 1868.

Plate V.

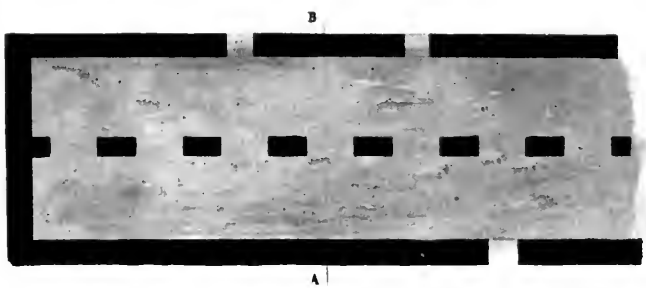
I. Aqua Appia.

The Aqua Appia (I.) is at so great a depth near the Porta Maggiore (which stands on very high ground), that it is difficult to trace it, but the *specus* was found in making the railway in a deep cutting about half-a-mile outside of that gate, and was described in the *Bulletino di Correspondenza Archæoligia* at the time it was found. There is reason to believe that it entered Rome under the wall on the north side of the Sessorian Gardens, and was received in a reservoir, of which there are remains at a considerable depth, especially the lower story. This is near the reservoir of the great Basilica or Hall of the Palace, of which the apse remains. The plan and section of this reservoir are shewn in this diagram. The *specus* from this point turned to the west, and passed along the Cœlian Hill at a low level, nearly under the arches of Nero; but before arriving at these, it passed through another large and deep reservoir to the south of the Porta Maggiore, now in a vineyard, with another large reservoir close to it. These two are believed from the situation to be the Gemelli of Frontinus. An inscription was found on the one in the garden of the Sessorium relating to the Thermæ of S. Helena, who resided in that palace, and probably the water for her bath-chambers was taken from this reservoir.

RESERVOIR IN THE GARDEN OF THE SESSORIUM, NOW OF S. CROCE, CALLED THERMÆ OF S. HELENA.

A

B

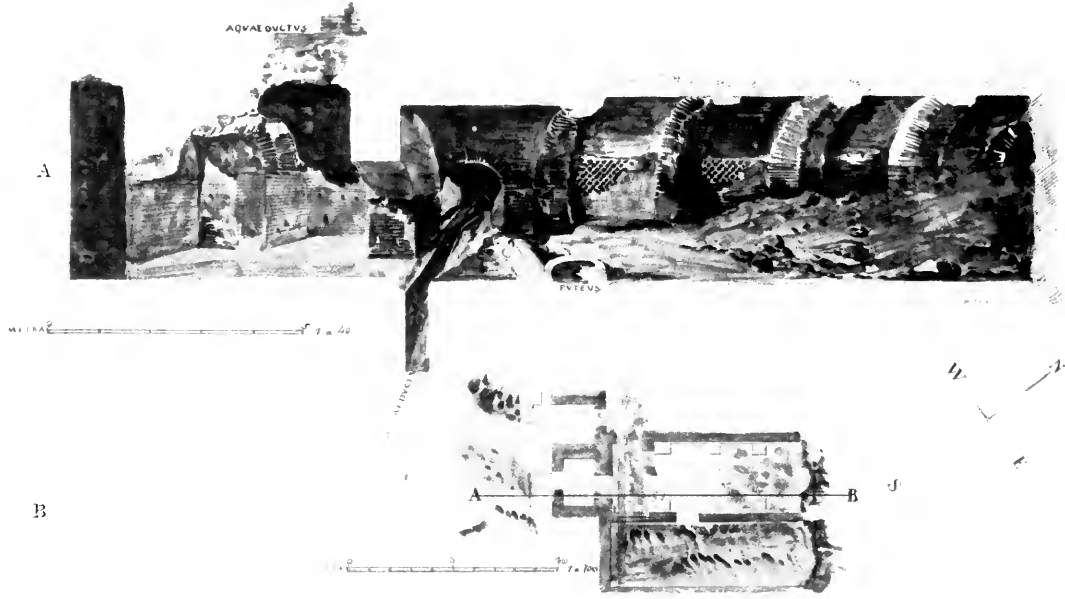


A. SECTION. B. PLAN.

PLATE VI.

II. ANIO VETUS.

THE reservoir, of which the plan and section are given in this plate, is situated at about a quarter of a mile from the Porta Furba, near the junction of the old Via Latina with the Via Appia Nova. It is just two miles from Rome, and so agrees with the text of Frontinus. It seems clear that at this point part of its water was carried by the Octavian *specus* to the Porta Maggiore, while the main stream went on along the side of the Via Appia Nova to the Asinian Gardens, just within the Porta Asinaria. It was shewn in some excavations made under my direction in 1871. We had long been looking for it, and the gardener informed us that there was a vaulted chamber under part of that garden or vineyard, where we found it, a few feet underground, and about a hundred yards from the arcade of the great aqueduct on the southern side, nearer to the present road than the reservoir.



A. Section, shewing the depth underground.

B. Plan of the two Chambers and the Entrance.

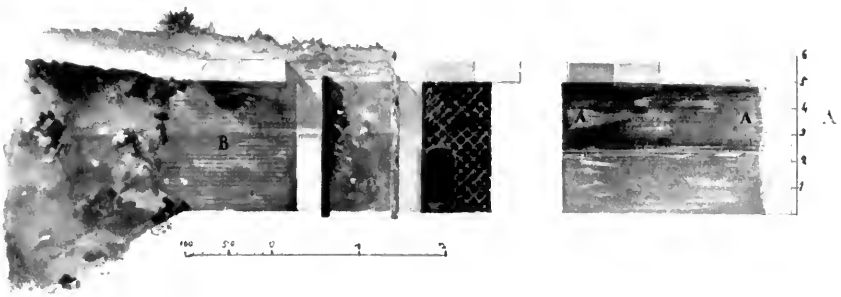
PLATE VII.

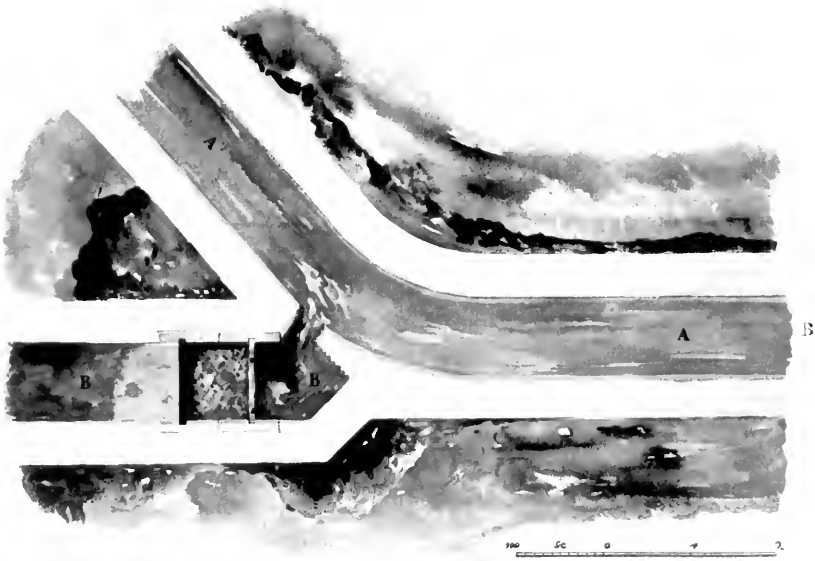
LOCH IN THE AQUA JULIA, NEAR THE IMPERIAL VILLA, CALLED THE SETTE BASSI (SEPTIMIUS BASSUS?).

THE Aqua Julia at this point, which is about four miles from Rome, is just underground, and this loch and branch to supply the Villa was discovered about 1850 by Signor Moraldi, when he was making a map of the Aqua Marcia, with a view to having it brought again into use; which has since been done, but by a different line.—To save carrying it so far round as the old aqueduct was carried (in order to avoid the mouths of the many streams that run into the river Anio), the modern engineers used metal pipes in this part. Above Tivoli they built a stone *specus* after the old fashion, as in that stone country they found it the cheapest and the best plan. They now say they regret that they did not continue the stone *specus* over the level Campagna also, as the metal pipes are continually bursting from the force of the water. Previous to this discovery of Signor Moraldi, it was not known that there were lochs in the aqueducts, though it is obvious that when branches had to be taken from them, such an arrangement would be required. The Tepula and the Marcia are underground in this part. The Julia, being the uppermost of the three, was close to the surface. This was also the case on the side of the great *agger* of Servius Tullius near the railway station, where the Julia only was excavated, with two cippi, on which were inscriptions stating that *the three* aqueducts passed there.

A Loch in the Aqua Julia, near the Villa called Sette Bassi.

Plan and Section.





A. Section of the Branch. B. The Specus.

B. Plan, shewing the Division and the Loch. A. A. The Specus.

B. The Loch for the Branch.

PLATE VIII.

AQUEDUCTS AND RIVER ALMO, NEAR THE PORTA FURBA.

A. Arcades of the Marcia, Tepula, and Julia; the Claudia and Anio Novus at one of the angles and crossings; and the Aqua Felice, which is carried first on one and then on the other of the old arcades. Also, there is an indication of the situation of the great tumulus and tomb called "Monte del Grano," in which the fine sarcophagus was found which is now in the Capitoline Museum, and was long supposed to be that of the Emperor Alexander Severus and his wife Mammea. This is given to indicate the situation. The river Almo is seen crossing the two arcades near the gate or arch over the road.

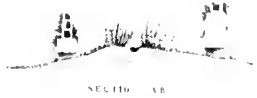
B. The same two arcades, at about a quarter of a mile nearer to Rome, or just two miles, with the river Almo winding between them; and a Section to shew the elevations.

C. Plan of the junction of the old Via Latina, with the modern road to Albano, at two miles from Rome, shewing the situation of the aqueduct in a stone-quarry at the back of the "Albergo dei Spiriti," near C.

D. Plan and Section of the reservoir, at two miles from Rome, near the Porta Furba.

A

C



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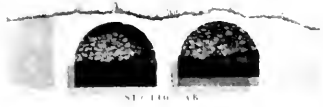


D

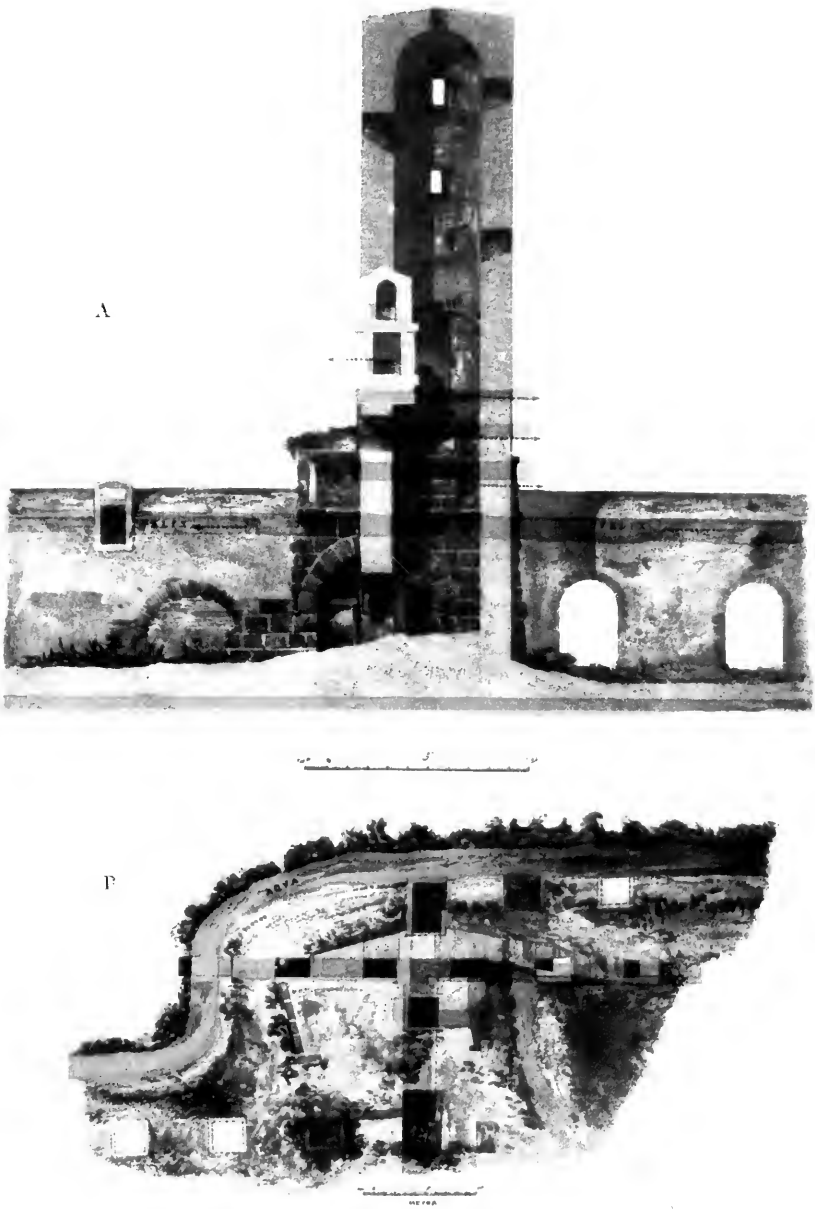
A. Plan at a Crossing. B. Plan and Section at another point. C. Plan and Section in the Quarry at the Albergo de' Spiriti. D. Plan and Section of Reservoir near the same.

PLATE IX.

THE SEVEN AQUEDUCTS AT THE TOR FISCALE.

AT this important junction and crossing of the aqueducts the Marcian arcade originally made one of the usual angles. The more lofty arcade of the Claudia and Anio Novus was then carried over it, with the Anio Vetus half underground, nearly on the same line; and the modern aqueduct, called the Felice, is here carried against and partly upon the old Marcian arcade. The medieval architects took advantage of this crossing to build a tall tower upon it; the five conduits or *specus* can be seen inside the tower, and half arches abutting against it in a very picturesque manner, all of which are shewn in the Section in the upper part of the plate, and in the Photo engravings.

The Plan in the lower part of the plate shews the arrangement, and also the small river Almo, now called the Marrana, winding round it.



A. Section. B. Plan, shewing the crossing of Five Aqueducts in the Tower, and two under it.

PLATE X.

PISCINA OF THE ANIO NOVUS at the entrance into Rome, in a tower of the Wall of Aurelian, and of the gardens of the Sessorian Palace, now of S. Croce in Gerusalemme.

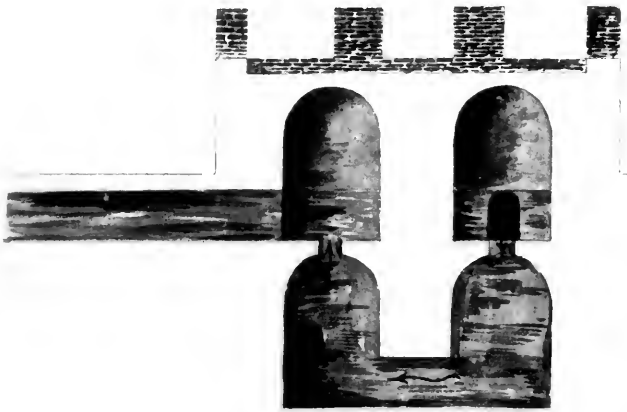
A. The Section.

B. The Plan.

By a singular coincidence it happens that the inner wall of this tower has been destroyed, so that the whole of the interior is displayed, and shews exactly what an ancient piscina was. The water comes into the right-hand upper chamber, it then descends into the chamber under it, as is marked by the arrow in the drawing, it then passes through small holes in the partition wall into the left-hand lower chamber. [The artist has represented a *large* opening through this wall, but this must be a mistake, owing to the wall being partially broken away; there are always *small* holes through this partition wall.] The space between this tower and the corner of the wall in the Sessorian gardens, where it turns sharp to the west, was a large reservoir, or Castellum Aquæ, for the Claudia; it is not at a sufficiently high level for the Anio Novus.

ENTERING ROME IN A TOWER OF THE SESSORIUM.

A



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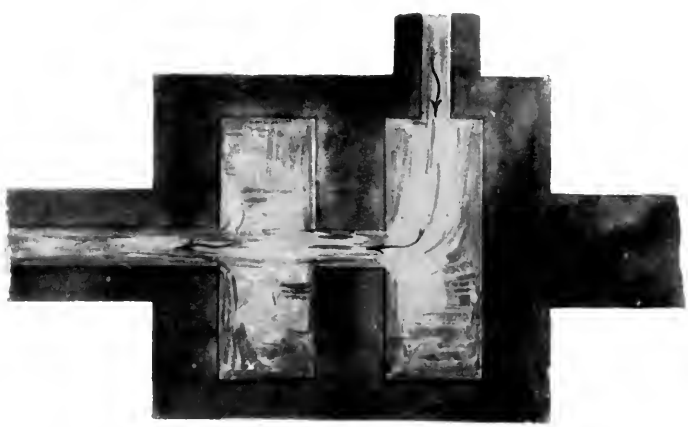
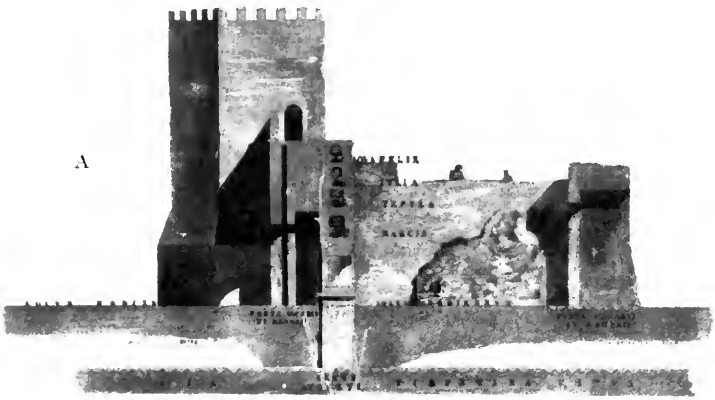


A. SECTION. B. PLAN, OF THE PISCINA MADE IN THE TOWER.

PLATE XI.

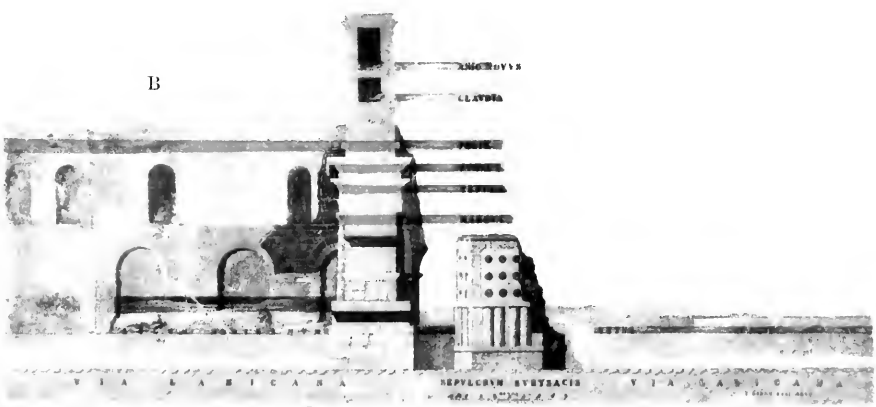
THE AQUEDUCTS AT THE PORTA MAGGIORE AND THE PORTA TIBURTINA.

IN the lower part of this plate is seen the Wall of Rome on the northern side of the Porta Maggiore, with the tomb of Eurysaces the Baker in front of it. The wall here makes an angle, and the section of it is shewn just beyond the gate; the Claudia and Anio Novus (which here passed over it) are shewn in section, the *specus* of the Claudia being nearly square, that of the Anio Novus over it considerably higher in its proportions. The Marcia, Tepula, and Julia here pass under these at a right angle, and through the wall, which in that part is made by filling up the arches of the Claudian arcade of the aqueducts. A pier of the Marcian arcade is shewn in the lower part of the section. The Aqua Felice is carried between the Julia and the Claudia, and it continues on to the Porta Tiburtina, always at the same level, over the Marcian arcade, but between the gates it passes through higher ground, and is therefore in that part underground, but emerges on arches at the two ends, near the gates, as Frontinus mentions. The Claudian arcade terminated at a tower in an angle of the wall, just to the north of this view, and with a great reservoir within the wall. In the upper view the Porta Tiburtina is shewn, with the Marcia, Tepula, and Julia passing over it. The different levels of the old road and the new one are also shewn. The arch on which the aqueducts are carried has inscriptions upon it of the time of Augustus, A.D. 10, and is of his time; it is buried up to the springing of the actual arch; the jambs are entirely buried by the filling up of the foss-way, but the two arches of the time of Honorius, A.D. 405, are tall arches, standing on the ground at its present level; the raising of the level of the road, therefore, took place between A.D. 10 and A.D. 400.



A. Marcia, Tepula, Julia, and Felice.

THE AQUEDUCTS.—AT THE PORTA MAGGIORE.



B. Marcia, Tepula, Julia, and Felice; Claudia and Anio Novus crossing over them.

PLATE XII.

ANIO NOVUS—NYMPHÆUM, WHERE THE TROPHIES OF MARIUS WERE HUNG.

A. SECTION OF THE TOWER AND ARCHES.

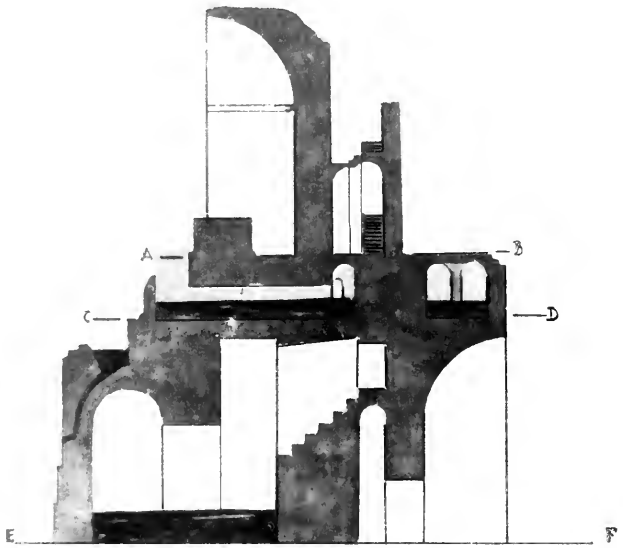
B, C. PLANS OF THE THREE STORIES.

This Nymphæum is represented on one of the coins of Alexander Severus, and belonged to the great Thermæ of the third century on the eastern side of Rome, which, having been long in progress, are called by the names of different emperors of that period. The ground had been originally the Exquiliæ, the great burial-ground of the time of the Republic, afterwards the garden of Mæcenas; it is full of aqueducts of different periods, and at different levels, and there are several reservoirs for them, some underground, others at a higher level. This one was formerly considered to have belonged to the Aqua Julia, but on taking the levels it appears that the only water in Rome that is high enough to reach it is the Anio Novus, the highest of the aqueducts, and the water has been brought from a reservoir belonging to that, near the Porta Tiburtina; having just been brought along the high bank on which the Wall of Rome stands, part of an arcade of an aqueduct leading to it remains, coming from that gate. Near the Porta Maggiore there are also remains of an aqueduct at a very high level, coming from the Anio Novus, but the construction of the arcade is of the third century. It is now part of the wall.

This Nymphæum or reservoir at that high level has several branches leading from it, one of which goes in the direction of the other great reservoir on the Esquiline Hill, called the *Sette Sale*, and this, from the high level, probably supplied the Sette Sale and the Thermæ of Titus and Trajan.

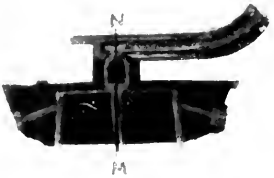
AT THE NYMPHÆUM, WHERE THE TROPHIES OF MARIUS WERE HUNG.

A



B

C

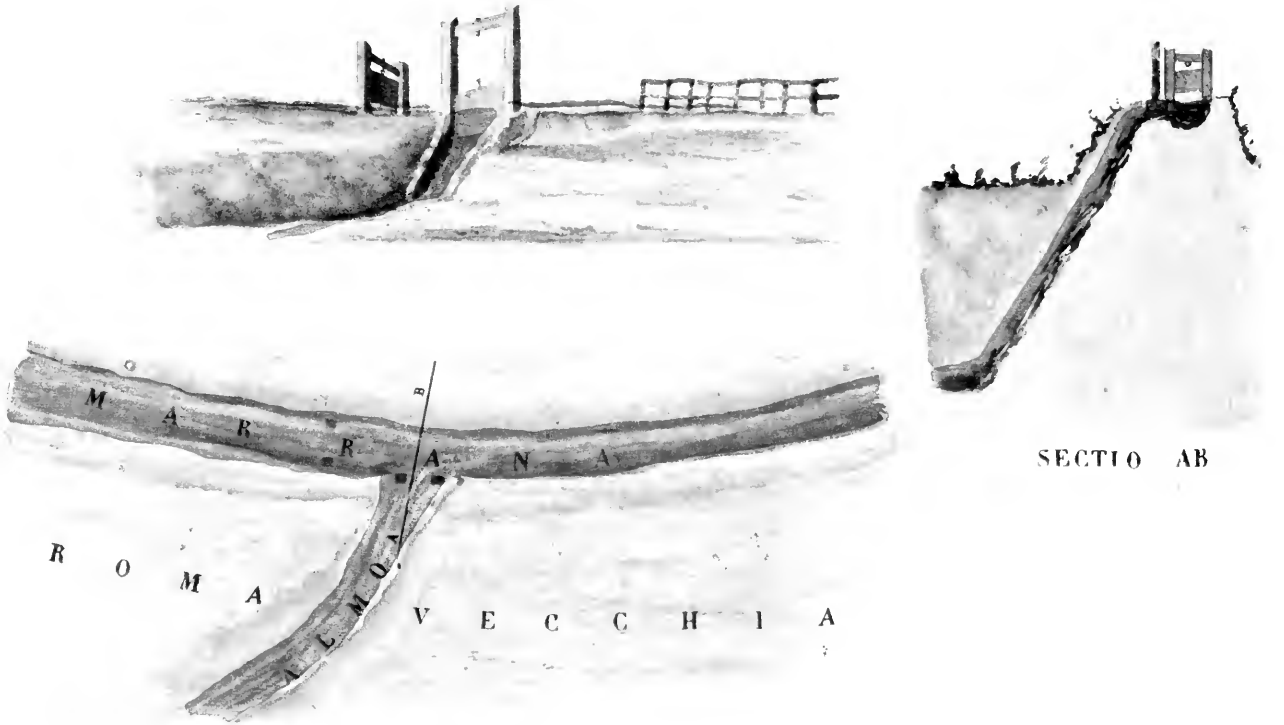


A. SECTION OF THE TOWER AND ARCHES. B, C. PLANS OF THE THREE STORIES.

PLATE XIII.

RIVER ALMO. DIVISION INTO TWO BRANCHES, NOW A LOCH OF THE MARRANA.

THIS loch is situated about half-way between the Tor Fiscale and the farm-house called Roma Vecchia, rather more than three miles from Rome, and a quarter of a mile to the left of the Via Appia Nova. The Almo is a mountain stream coming down from the Alban hills, often flooded in the rainy season and dry in the hot season, with a very deep bed called a foss. This bed was convenient for the engineers who made the mill-stream, now called the Marrana, in the twelfth century, and they used it when the ground was high and the foss deep; but in other parts, when the ground was low and liable to be flooded, they banked up the stream, or made a new channel for it on a raised bank, for sometimes half a mile together, then joined the old winding bed again for perhaps another mile. At the point where the division into two streams takes place, one branch is banked up and comes through Rome, the other remains in the deep bed and receives the surplus water from the loch, made at this point, and this second stream runs through the valley of the Caffarella, and has its mouth near the church of S. Paul f. m. The Plate shews the plan at the division, one section of the loch, and the lasher. The second stream has no other beginning than this division, and the deep bed or foss can be traced in its winding course by the side of the cross-road from the Via Appia Nova to S. Urban, at the head of the valley of the Caffarella.



DIVISION INTO TWO BRANCHES, NOW AT A LOCH OF THE MARRANA. PLAN, VIEW, AND SECTION.

PLATE XIV.

RIVER ALMO, NOW THE MARRANA.

ENTRANCE INTO ROME UNDER THE PORTA METRONIA.

A. Elevation, with the bridge under the gate.

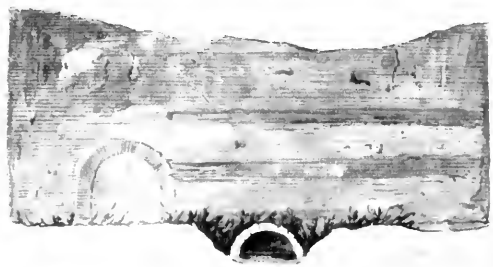
The lower bridge under the modern road is of the time of the Early Empire, and can be seen, though not without some little difficulty, by climbing upon the bank of the mill-stream, which now runs in the deep winding foss of the Almo, and makes a bend under the gate, as is seen in the small plan in the centre, marked M.

B. Plan and sections, longitudinal and transverse, of the bridge, with the gate upon it. The longitudinal section A B has the line of it, marked on the small plan M; the transverse section is marked C D.

C. Map of the corner of the Wall of Rome, shewing the great bend that it makes to the south at this point. The wall is indicated by the towers at short intervals, and the stream of water by its winding course. The roads within the walls, and the road on the outside under the wall are also indicated. The house shewn in the lower part, to the left in the plan, is believed to be on the site of that of Crassipes, the father-in-law of Cicero, near the Via Appia. The stream after passing the road turns sharply round to the north, under the cliffs of the Aventine, and runs through the Vallis Murcia, in which the Circus Maximus was made, first having passed by the Piscina Publica, under that part of the Aventine on which the Reformatory of S. Balbina now stands.

ENTRANCE INTO ROME UNDER THE PORTA METRONIA.

A



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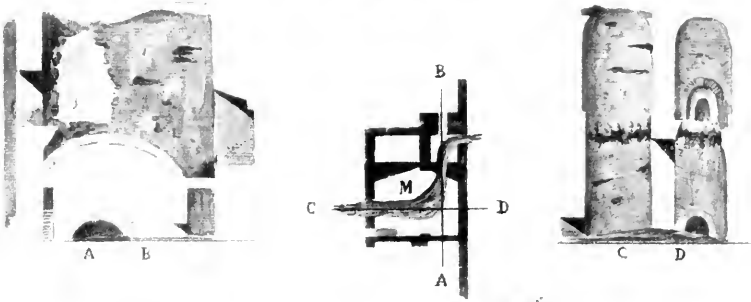


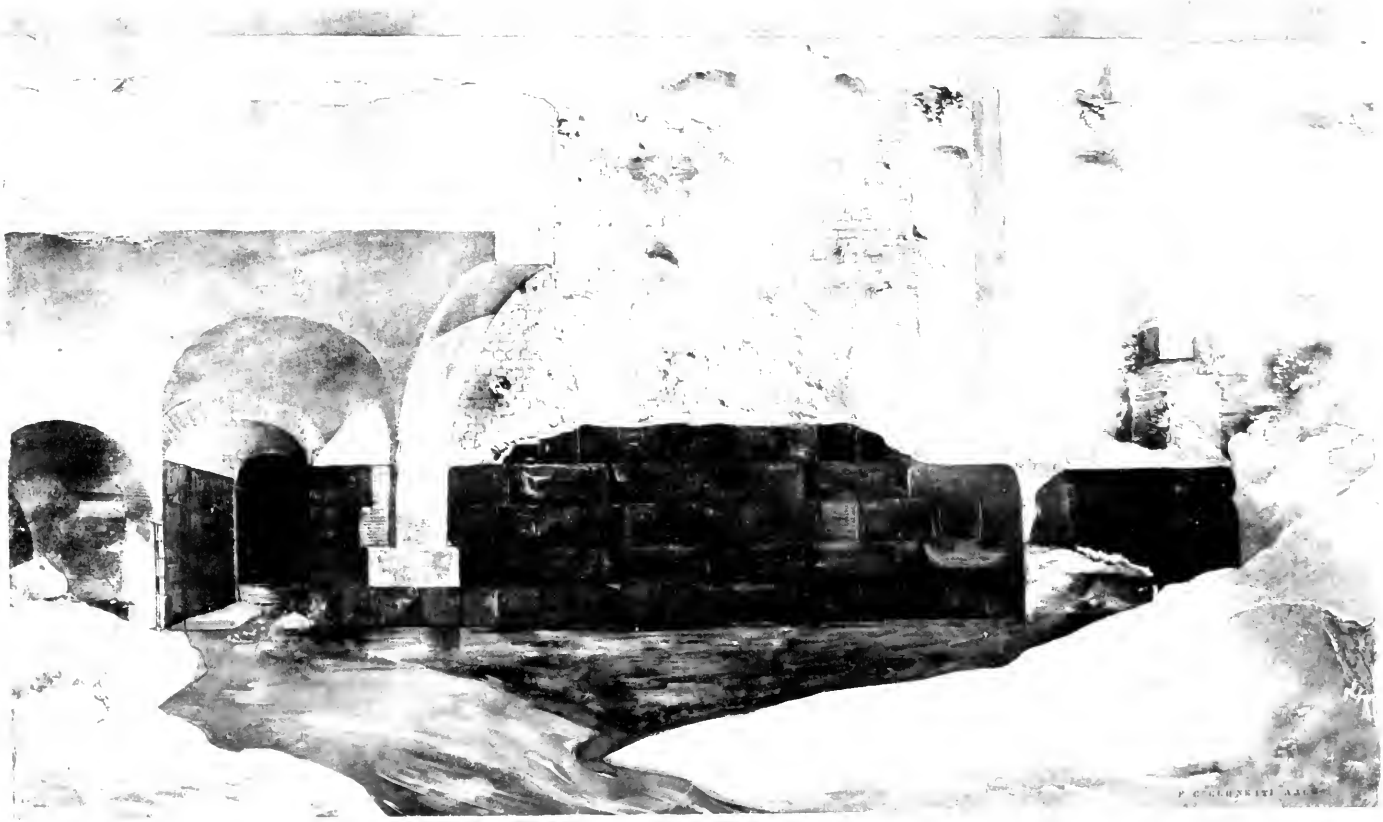
C

A. ELEVATION, WITH THE BRIDGE UNDER THE GATE.
B. PLAN AND SECTIONS—A. B. THE BRIDGE; C. D. SECTIONS.
C. PLAN OF THE GROUND WITHOUT AND WITHIN THE WALL OF ROME.

PLATE XV.

RIVER ALMO. MOUTH IN THE PULCHRUM LITTUS. VIEW.

THIS is the mouth within the Walls of Rome from the earliest period, and it was here in all probability that the priests washed the blood off their knives, and not at S. Paul's, a mile outside the town. The remains of the early wall of tufa in this part are well shewn in the drawing, and the mouth for the stream to pass through, left when the wall was built. This was part of the second Wall of Rome, built when the peace was made between the Romans and the Sabines. The construction of that period, of the usual large blocks of tufa with very fine joints, is clearly shewn in the drawing.

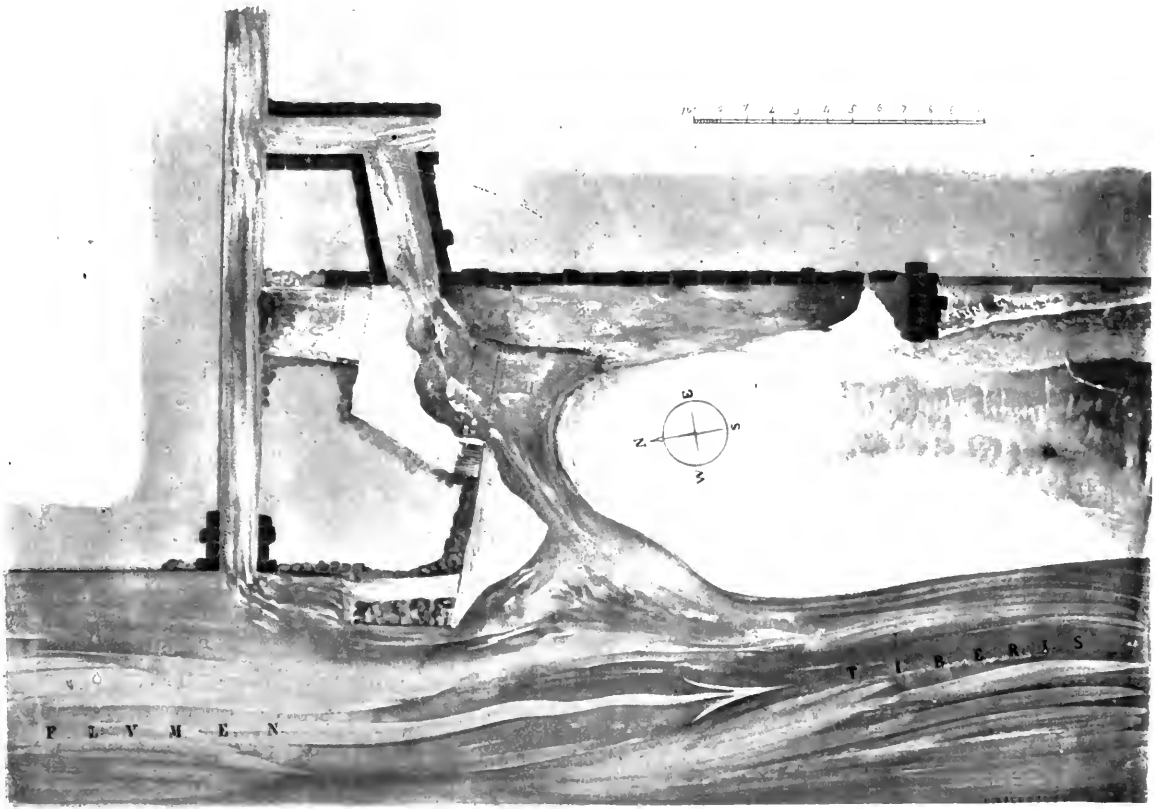


MOUTH IN THE PULCHRUM LITTUS. VIEW.

PLATE XVI.

RIVER ALMO. MOUTH IN THE PULCHRUM LITTUS. PLAN.

IN the Plan the old arrangement is clearly shewn, and the division of the stream into two branches, one of which now turns a mill-wheel, and is probably part of the alterations in the twelfth century, —this is the straight line. The other is probably the original end of the stream, or at least of this branch of it. The frequent change of the sand-banks by the great floods of the Tiber sometimes obscure this part. Advantage was taken of the water being low in the Tiber to get this plan and the view in Plate XV.



PLAN OF THE MOUTH IN THE PULCHRUM LITTUS.

THE AQUEDUCTS.

PLATE XVII.

PLANS AND DIAGRAMS.

SOURCES OF THE AQUA APPIA.

DESCRIPTION OF PLATE XVII.

SOURCES OF THE AQUA APPIA[a].

A. SPRING in a very ancient stone-quarry on the bank of the river Anio, probably one of those from which Servius Tullius had obtained the stones for his great wall, which had been floated down the river on rafts. The spring is so filled up with broken stones that it looks like merely a pond formed by drippings from the roof and the earth above, but the shepherds are certain that it is a spring, and the water never fails.

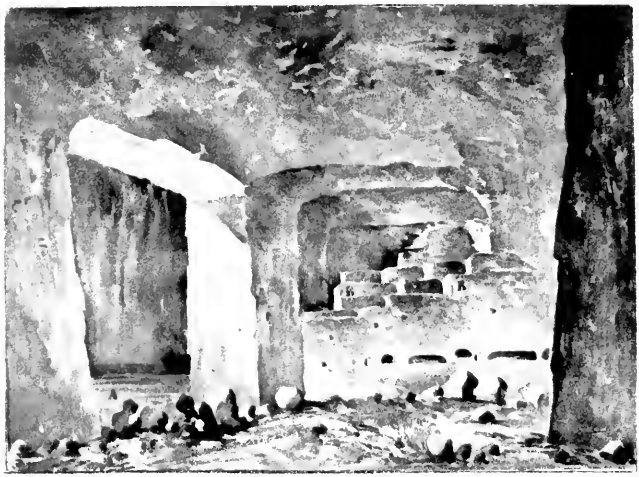
B. Central reservoir where two streams meet and are united in one *specus*, which conveyed the water into Rome. The aperture in the rock above is not original, or it has been greatly enlarged. This was probably a well to draw water for the cattle, and to give air to the *specus*.

C. Two streams coming out of a sort of double cave, and meeting at the mouth of it, from whence they are carried across the meadow in a *specus* open at the top for a certain distance, and having the appearance of a ditch only; but the water from this spring also never fails, and these two streams united gave a certain steady supply to the aqueduct. The meadow through which these streams flow has a clay soil, and the water is always liable to be muddy after rain, and left a large deposit of clay in the *specus*, as is shewn in other plates.

[a] See also the Photo-engravings, Plates I. and II.; and Historical Photographs, Nos. 865, 866, 867.

SOURCES OF THE AQUA APPIA

A



B

C

THE AQUEDUCTS.

PLATE XVIII.

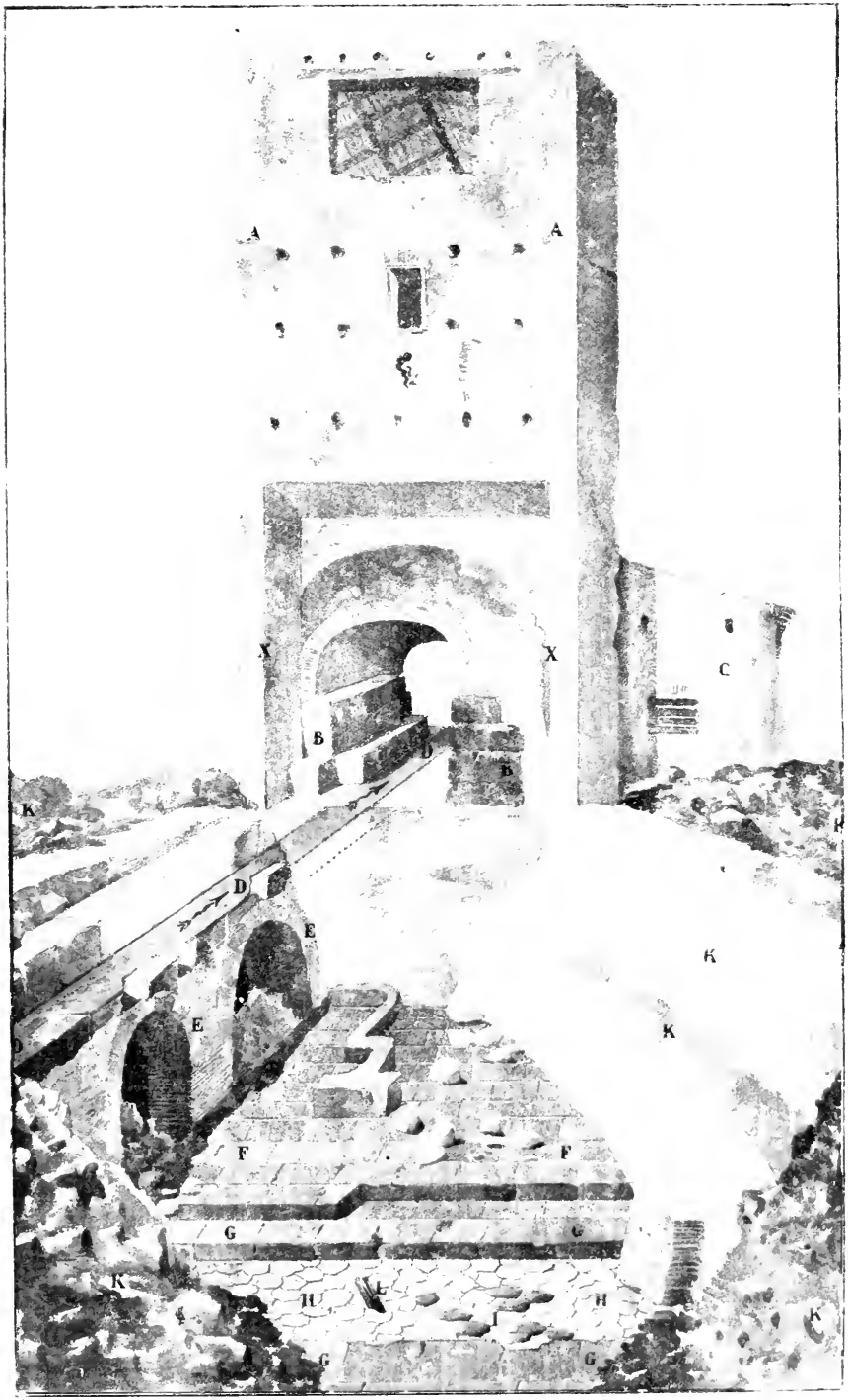
AQUA APPIA, OR APPIAN AQUEDUCT.

DESCRIPTION OF PLATE XVIII.

AQUA APPIA, OR APPIAN AQUEDUCT.

CROSSING the valley from the Cœlian to the Aventine upon the *agger* of Servius Tullius and over the Porta Capena, this was the only part that was above ground, as we are told by Frontinus[b]. In this view the pavement of the Via Appia is seen in the foreground, then the wall of Servius Tullius, twelve feet thick, (as usual with the walls of the Kings;) by the side of this, to the left, is seen the arcade that carried the *specus* of the aqueduct; this goes as far as the branch of the river Almo (now called the Marrana), which runs through the valley. On the further side of the stream the land is high, and the aqueduct is again underground, but it has been traced not only across the valley, but under the cliff on the northern side of the Pseudo-Aventine, with a branch to the left to supply the Piscina Publica, which was an enormous swimming-bath for the whole population of Rome at that period, extending as far as the north end of the Thermæ of Caracalla, where the hollow with the bank round it can still be seen, and where a great reservoir remains, lined with the cement called *opus signinum* (or *coccio pisto*). The ruins of another great reservoir rebuilt in the time of Trajan are at the north-west corner, nearly under the Aventine, and are called the Piscina Publica.

[b] See page 3, and Historical Photographs, Nos. 632, 710, 1138, 1139, 1140, 1141, 1142, 1253; and Plates X. and XI. of the Supplement to Part I.



THE APPIAN AQUEDUCT PASSING OVER THE PORTA CAPENA
AND THROUGH THE TOWER

THE AQUEDUCTS.

PLATE XIX.

PLAN AND SECTION IN A CAVE IN THE AVENTINE.

DESCRIPTION OF PLATE XIX.

PLAN AND SECTION IN A CAVE IN THE AVENTINE.

THIS is the same cave on the Pseudo-Aventine, nearly under the church and monastery of Santa Sabba, which has been before described when partially excavated (Plate III.[c]), but which has now, in 1875-6, been more thoroughly examined and made accessible.

A A. General Plan of this part of the *specus* of the Aqua Appia, made into a stone-quarry for many years, and part of it still in use for that purpose, but another large part has been long out of use[d].

B. Entrances to the two parts, the steps distinguish that leading to the part excavated.

C C. Section of part of the cave-quarry.

D. View of that part of the *specus* of the Aqua Appia which is built of squared stones, and has a terra-cotta water-pipe on each side of it.

E E. Longitudinal Section of this part.

F. Transverse Section of the same.

DETAILS OF THE PLAN A.

a a. Entrance to the cave or quarry.

b b. Via di San Paolo, the carriage-road to that gate.

c c. Via di Santa Sabba, the carriage-road up the hill to the south.

d. Via di Santa Prisca, the road up the hill to the north.

e e. The most perfect part of the *specus* where it is built, and not merely a tunnel cut in the bed of tufa, as in other parts.

f f f f. Windings of the tunnels for the Aqueducts.

g g. Water-pipes of terra-cotta, by the side of the *specus* in the part where it is built, and not merely cut out of the tufa.

h. The *specus* half filled up with the deposit of clay.

i. Steps made to give access to the cave.

[c] See Photos., Nos. 1116 and 889.

[d] This is now, in 1876, taken possession of by the British and American Archæological Society, with the consent of the owner of the ground, who has allowed a door to be put up at the entrance.

AQUEDUCTS — PLAN AND SECTIONS IN A CAVE IN THE AVENTINE

THE AQUEDUCTS.

PLATE XX.

THE JUNCTION AT THE WEST END OF THE CŒLIAN, NEAR THE CLAUDIUM.

PLAN AND SECTION.

DESCRIPTION OF PLATE XX.

THE JUNCTION AT THE WEST END OF THE CŒLIAN, NEAR THE CLAUDIUM.

PLAN AND SECTION.

A B C. Line of the Section.

a. Colosseum.

b. Claudium.

c. Arch of Dolabella.

d. Reservoir and Spring of water.

e. Aqueduct of Nero.

f. Cave-reservoir and Spring, with ten wells down into it, erroneously called a *vivarium*.

g g g. Porticus of the Claudium.

h. Church of SS. John and Paul.

i. ——— S. John of Mata.

k. ——— S. Maria in Domnica.

l. ——— S. Gregory.

m. Clivus Scauri.

n. House of the family of S. Gregory the Great.

o. Villa Celi-Montana (formerly called Villa Mattei).

p. Vineyard of Marchese Rappini.

q. Ground called Orto Botanico.

r. Place of S. Gregory.

s. Arch of Constantine.

t. Meta Sudans.

u. Via Sacra.

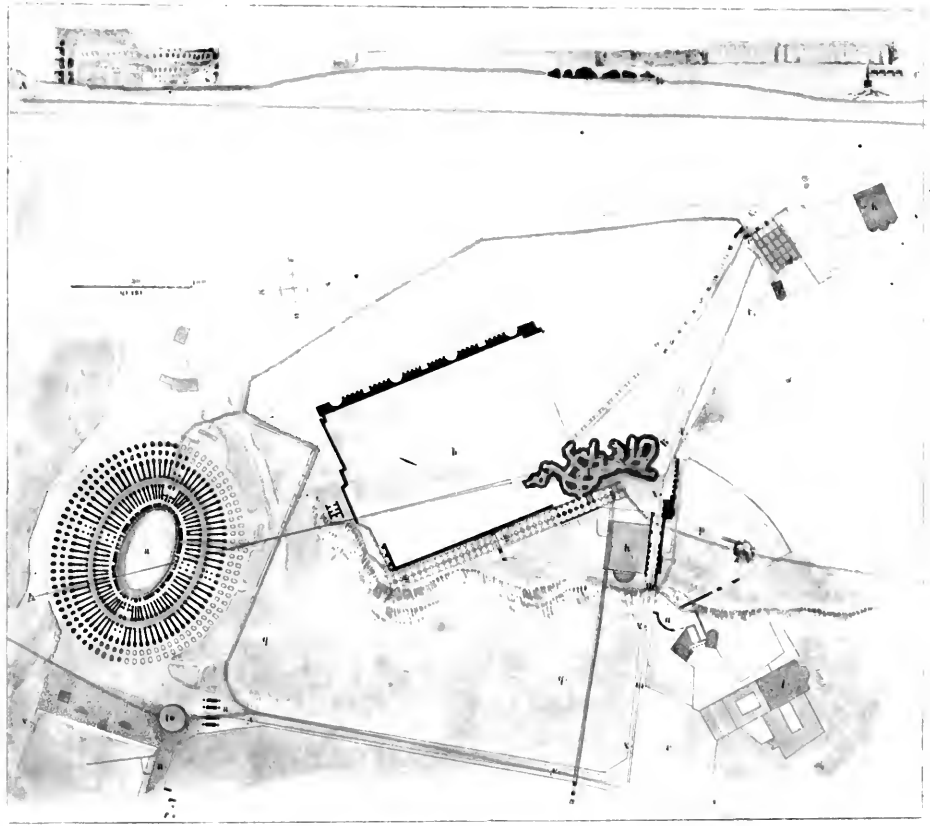
v. Summa Sacra Via.

x. Proposed Drain, for turning off the water of this spring from the Colosseum.

y. Branch of an existing subterranean drain under the Via di S. Gregorio, between the Cœlian and the Palatine.

z. Excavation made in 1876 in the Vigna Rappini, in consequence of a land-slip; but nothing was found beyond an old quarry of tufa, at a great depth, and a branch of an aqueduct at nearly the same depth, the water having come originally from the spring in the cave (?) or quarry (?) called a *vivarium*.

AQUEDUCTS AT THE WEST END OF THE CELIAN



THE AQUEDUCTS.

PLATE XXI.

SECTIONS OF THE SPECUS OF EACH OF THE FIFTEEN AQUEDUCTS OF ROME.

DESCRIPTION OF PLATE XXI.

SECTIONS OF THE SPECUS OF EACH OF THE FIFTEEN AQUEDUCTS OF ROME.

THE names of each are given under the section of it, and it will be observed that no two are alike; this was no doubt done in order that the workmen might always know which aqueduct each belonged to, at the points where they cross each other, so that if there was any obstacle in one of them it might be readily removed. Some of those which came from a clay soil, as the Appia and the Virgo, were liable to get choked up by the quantity of deposit left by the water, and it was necessary to have them cleared out from time to time, as is still the case with the Virgo, now called the Aqua di Trevi. One of the small streams that were collected to form the Aqua Hadriana, which comes from near Gabii, was a petrifying spring, which quite choked up the *specus* in the course of a century. It was restored by Alexander Severus, but the same water seems still to have been used. The Aqua Felice comes from the same sources, but the petrifying spring was carefully excluded, and now runs in a ditch, giving a coat of stone to the sticks and the weeds.

SECTIONS OF THE SPECUS OF EACH OF THE 15 AQUEDUCTS OF ROME

PLAN OF THE AQUEDUCTS.

ON THE CŒLIAN.

PLAN OF THE AQUEDUCTS.

On the Cœlian[e].

Three branches diverge from the great central reservoir at the Arch of Dolabella,—one goes straight on, nearly due north to the Palatine, the second north-east to the Colosseum, and the third west to the Aventine.

And on the Esquiline.

From the other great reservoir called the Sette Sale, or the Thermæ, and from thence to the Colosseum.

A.A.A. The drain under the road between the Cœlian and the Palatine, now called Via di S. Gregorio, leading to the Via Appia.

B. Arch of Constantine.

C. Meta Sudans.

D. Thermæ of Titus on the Esquiline, with the great *piscina* called Sette Sale, and the aqueduct leading from it to the Colosseum.

E. Monastery and Church of S. Gregory.

F. Site of the Porta Capena, with the aqueduct over it, leading to the Piscina Publica under the Aventine: and on to the mouth at the Porta Trigemina, in the bank of the Tiber.

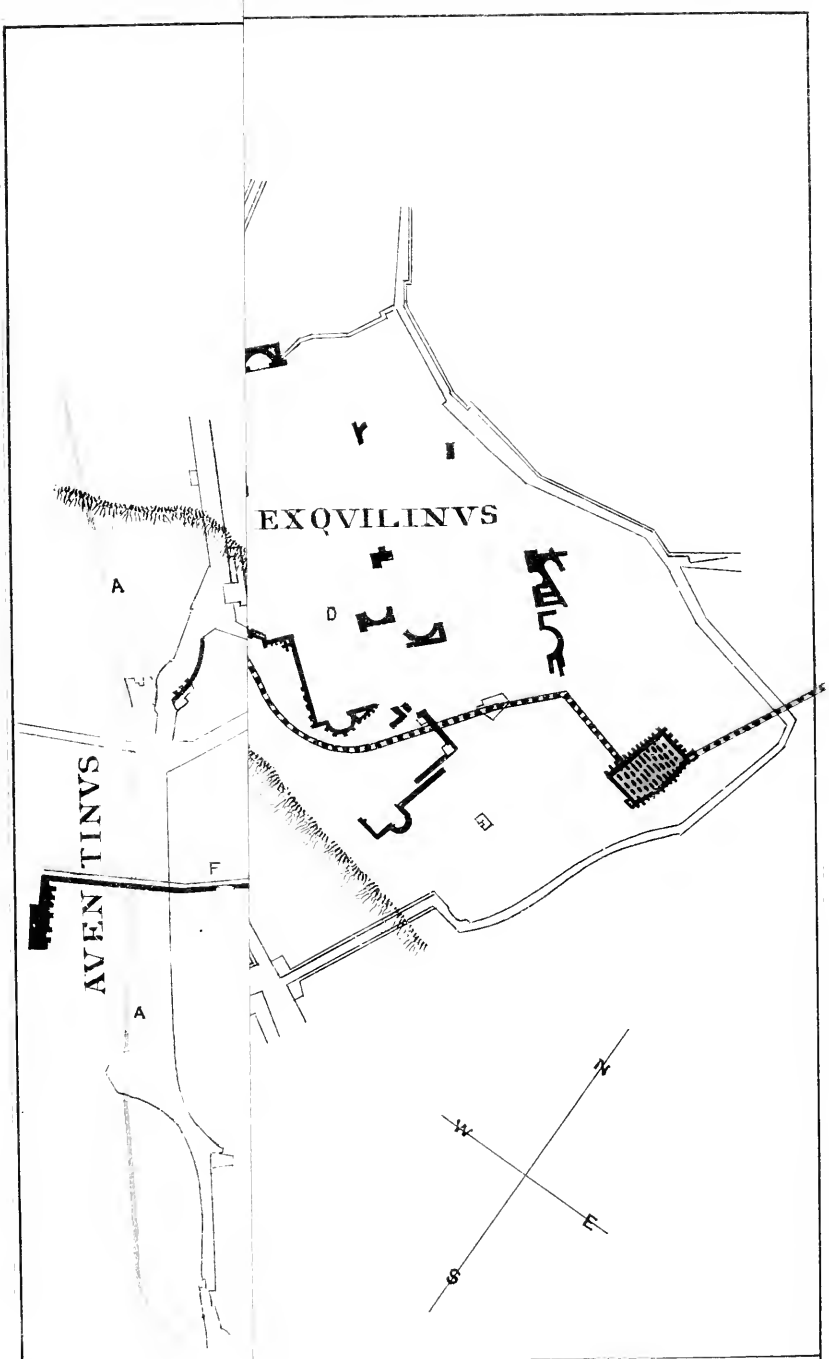
G. Church and monastery of SS. John and Paul.

H. Church and monastery of S. Clement.

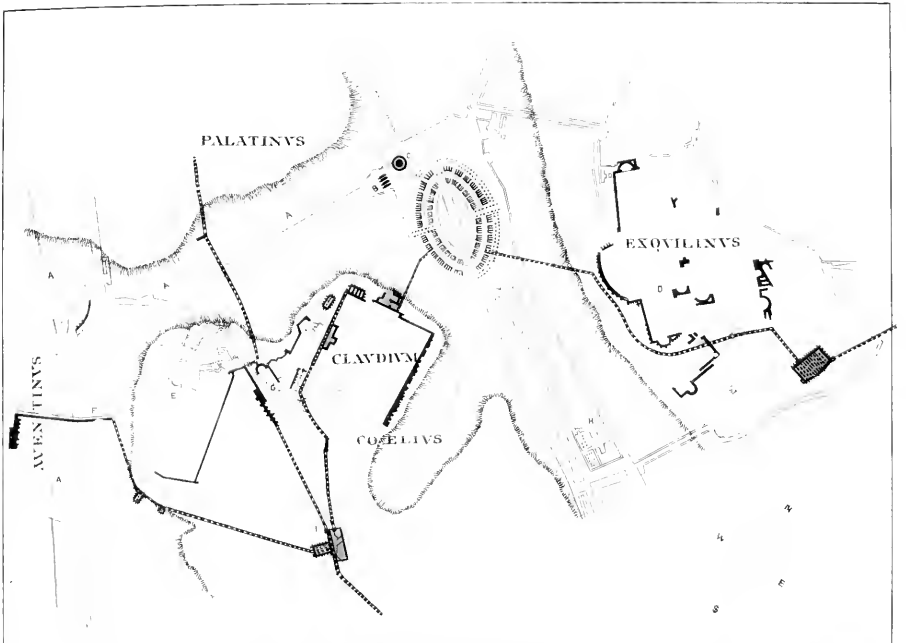
I. The great reservoir and Piscina of Nero over the Arch of Dolabella, and reservoir of the Aqua Appia to the left of it; this is underground in the garden of the Villa Celimontana, and from thence the *specus* goes underground to the cliff of the Cœlian, where another *piscina* is shewn, near the bottom of the plan, to the left.

Under that part of the Cœlian Hill on which the Claudium stood are seen four *piscinæ*, two on the western side opposite to the Palatine, and two on the northern side opposite to the Colosseum; of these latter the one at the corner is of the time of Nero, that in the middle of the northern front is of the time of Alexander Severus, when the upper storey of the Colosseum was building of stone.

[e] See also Plate XX.

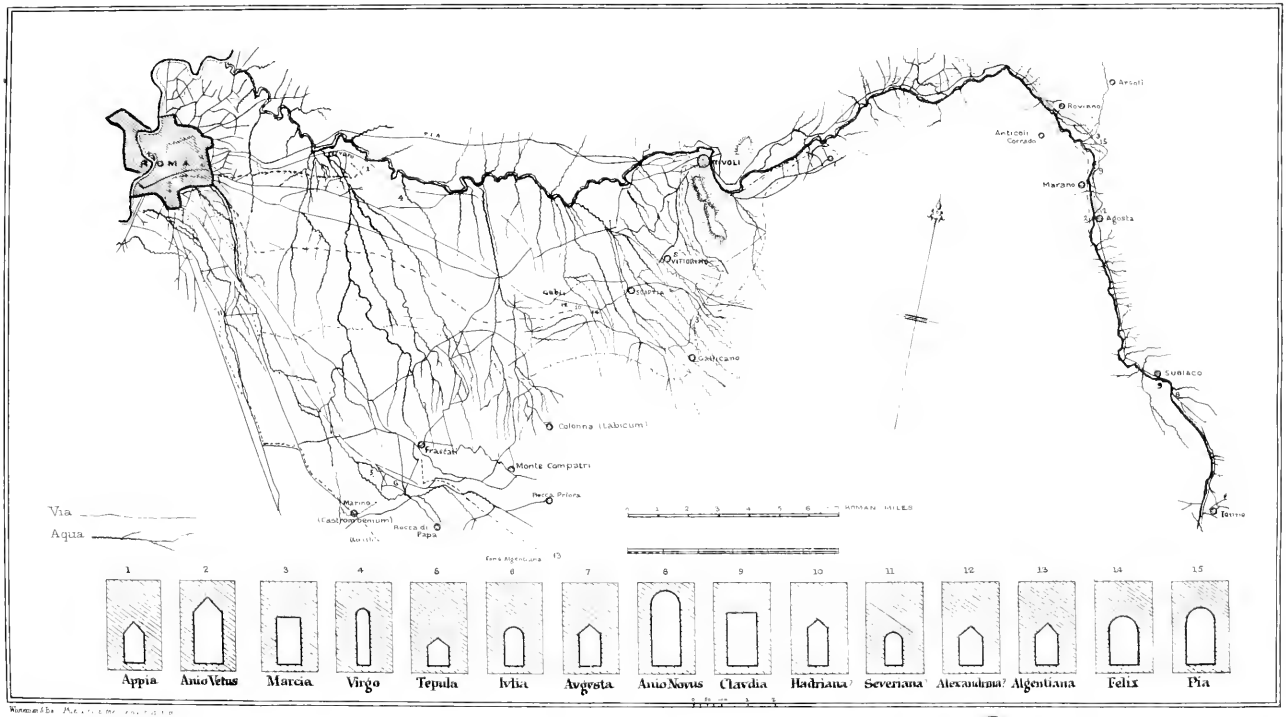


AQ TO THE COLOSSEUM.



AQUEDUCTS ON THE CŒLIAN AND ESQUILINE LEADING TO THE COLOSSEUM.

MAP OF THE AQUEDUCTS ON THE EASTERN SIDE OF ROME.



MAP OF THE AQUEDUCTS

ON THE

EASTERN SIDE OF ROME.

THIS map is reduced by photography from one made for this work on a very large scale, which was thought necessary in order to shew the line of the course of each aqueduct, which, being to a large extent subterranean, are not shewn in the usual maps of the country. In the immediate neighbourhood of Rome the lines are so complicated that they could only be shewn on this large scale. (At the Tor Fiscale, for instance, they remind English travellers of the railways at Clapham Junction near London. There are many coincidences between the aqueducts and the railways; both are carried at different levels in order to cross each other; both are in some parts in tunnels, and in other parts carried on embankments, or on arches). This map was made by Signor De Mauro, an engineer and surveyor, who took much interest in the work, and is generally very careful and accurate, under the direction chiefly of Dr. Fabio Gori, who is a native of Subiaco, near which the principal aqueducts have their sources. The author of this work went with them from time to time to verify what they had done, but as it was a work of several months, and necessarily done in the summer, it was not practicable for him to do more than to go to the source of each aqueduct and follow it down to its mouth. The large map, which covers one side of a room, being 135 ft. long and 90 ft. wide, has been reduced by photography to three different sizes; the first makes eighteen photographs of the usual size, called the "normal size," and the whole on this scale is about 15 ft. long and 10 ft. wide; this again has been reduced to two sheets[1], 21 ins. long and 14 ins. wide; and then to the same size as this outline; but on this small scale the lettering requires a powerful magnifying-glass, and therefore the bare outline has been taken from it to shew the general features of the line of the great aqueducts. The reservoir at the source of each is marked by a dark circle, and from each of them the line can be traced into Rome. Within the walls a separate and careful examination was required,

[1] This map is to be had on either of these two larger scales, for those who require more minute information.

as so much of the work is subterranean; this examination has been made, and the line of each of the aqueducts has been traced to its mouth. It will be observed that the *specus* or conduit of each aqueduct is of a separate form, and this was no doubt necessary to distinguish one from the other, as they frequently intersect and cross one another in a very singular manner, and in case of repair being necessary, it would have been very difficult for the workmen to know which aqueduct was at fault, or how to find the part that wanted repair, without this arrangement.

1. The earliest aqueduct, the APPIA[g] (B.C. 312), being entirely underground at a considerable depth, is marked by a dotted line. It comes from old stone quarries on the bank of the river Anio, just beyond the Caves of Cervaro, about eight miles from Rome, near the ancient Via Collatina, called by Frontinus Prænestina, because in his time the road to Præneste went through Collatia.

2. ANIO VETUS[h] (B.C. 272), comes also from the bank of the river Anio, but at a much higher level than the Appia, between Tivoli and Subiaco, near the village of Agosta, twenty miles from Rome, but the winding course makes the whole length of the aqueduct 42 miles, 779 paces underground, and 221 paces (about 350 yards) above ground on a substructure. It is brought at a considerably higher level than the Appia, but still underground for the most part, though near the surface, and sometimes only half underground. It was not legal to build over an aqueduct anything but another aqueduct, consequently the later aqueducts are all brought on the same line, each on a higher level, so that the line of the Anio Novus, carried on the arches of Nero, shews at the same time the line of the Anio Vetus nearly under it.

3. MARCIA[i] (B.C. 145). This stream also comes from near Subiaco, 39 miles from Rome, 36 on the Via Valeria, and 3 off it on a cross-road, near the village of Arsoli. There is a small lake 38 miles from Rome on the same road (which is another source of this aqueduct), into which the water gushes out from under the limestone rock; it is intensely cold in all weathers, and the water is of a light green colour in the lake. "The length of the course is 61 miles 710 paces, of which 54 miles 247 paces are underground, 7 miles 463 paces above ground, on an arcade for 6 miles 472 paces, on a substructure for 528 paces," and in several places on bridges across the gorges in the hills. This water was brought into Rome again in 1860—70 by a new line, and was then called Aqua Marcia Pia, from Pius IX.; the name of Pia has since been dropped.

[g] See p. 3. [h] See p. 13. [i] See p. 32.

4. VIRGO[k] (B.C. 21), made by Agrippa for his Thermæ, restored to use by the popes in the eighth century, and frequently repaired; now called the Aqua di Trevi, from the fountain so named. The source is on the Via Collatina, 8 miles from Rome and 1 mile beyond the source of the Appia. There are several springs, each with a separate small reservoir, collected in one large reservoir, now under the road. "The length of the course is 14 miles 105 paces."

5. TEPULA[l] (B.C. 126). The sources of this are 12 miles from Rome, near Grotta Ferrata and Marino, 2 miles from the old Via Latina.

6. JULIA[m] (B.C. 34). This source is on the cross-road from Grotta Ferrata to Marino, on the old Via Latina, 14 miles from Rome, and also 2 from the Via Latina (there are still washing-places at each of these two sources). The two streams, when they arrived on the level ground at the foot of the hill, were carried on the same arcade as the Marcia for 6 miles into Rome.

7. AUGUSTA[n]. This name is a mistake of the artist for Aurelia; it is the aqueduct made by Marcus Aurelius for the Villa de Quintilii on the old Via Appia, and united with the Severiana to supply the Thermæ Aurelianæ et Severianæ in Rome.

8. ANIO NOVUS[o] (A.D. 52). "The source of this is 42 miles from Rome, on the Via Sublacensis; the length of the channel is 58 miles 700 paces, of which 49 miles 300 paces are underground, 9 miles 400 paces above ground, 2 miles 3 paces in the upper part and near the City, 609 paces on substructure, 6 miles 491 paces on an arcade of the highest arches, in some places 109 ft. high." This stream was part of the river Anio itself; a great dam was made across the river in a rocky part, about 2 miles above Subiaco. A great loch (*lacus*) was formed between this dam and a natural cascade about a hundred yards higher up the river, and a *specus* was cut in the rock by the side of it at rather a lower level than the top of the dam, so that the water of the river must go into the *specus* and so into Rome, before any of it could fall over the artificial cascade made by the dam. From this cause the water of this aqueduct never failed in the hottest and driest weather, but it was sometimes muddy after a flood in the upper country, and had many *piscinæ* or filtering-places for that reason; there is usually one at each half mile in the arcades near Rome, and a *castellum aquæ* or reservoir along with it, at each of the angles, made to break the force of the water.

[k] See p. 46. [l] See p. 39. [m] See p. 41.
[n] See p. 92. [o] See p. 55.

9. CLAUDIA [p] (A.D. 38). The source of this is 38 miles on the Via Sublacensis, just above Subiaco, about 2 miles nearer to Rome than the Anio Novus. They are carried in two distinct *specus* as far as Tivoli and to the foot of the hill, but on the level ground; both *specus* are carried on a lofty arcade, which turns at an angle at every half-mile, and there has a *piscina*, and at each of these points it was carried across the lower arcade, which served for the Marcia, Tepula, and Julia.

10. HADRIANA or TRAJANA [q] (A.D. 120), and ALEXANDRINA (?). The sources of this are under La Colonna, about three miles from Gabii. The *specus* is carried on a fine arcade for two or three miles between the two great roads. The same water was afterwards used for the Felice, with the exception of one of the springs, which was found to be of a petrifying quality, and had choked up the *specus* of the old aqueduct. It seems probable that the stalactite produced by the petrifying spring had choked up the *specus* of Trajan and Hadrian before the time of Alexander Severus, that he restored it to use, and it was then called by his name. The construction of the Piscina and Castella Aquæ near the source is distinctly of the time of Hadrian, but in some parts the arcade which carries the *specus* is of the time of Alexander Severus.

11. SEVERIANA [r] (A.D. 190). The sources of this are in a swampy ground on the lower part of one of the Alban Hills, under Marino and Grotta Ferrata, nearly the same as those of the small river Almo, and the Tepula and Julia. The course is at first underground as far as the Torre di Mezza Via di Albano; from thence it is carried on a fine arcade of the third century to the Villa de Quintilii, and from thence into Rome for the Thermæ of Aurelius Commodus and Septimius Severus, near the Porta Latina.

12. ALEXANDRINA (?) [s]. There is some doubt about the source and the line of this aqueduct.

13. ALGENTIANA [t]. This aqueduct went to the Thermæ of Diocletian, where the *specus* has been found, but it is almost the same as the last. Both were probably branches from the great early aqueducts.

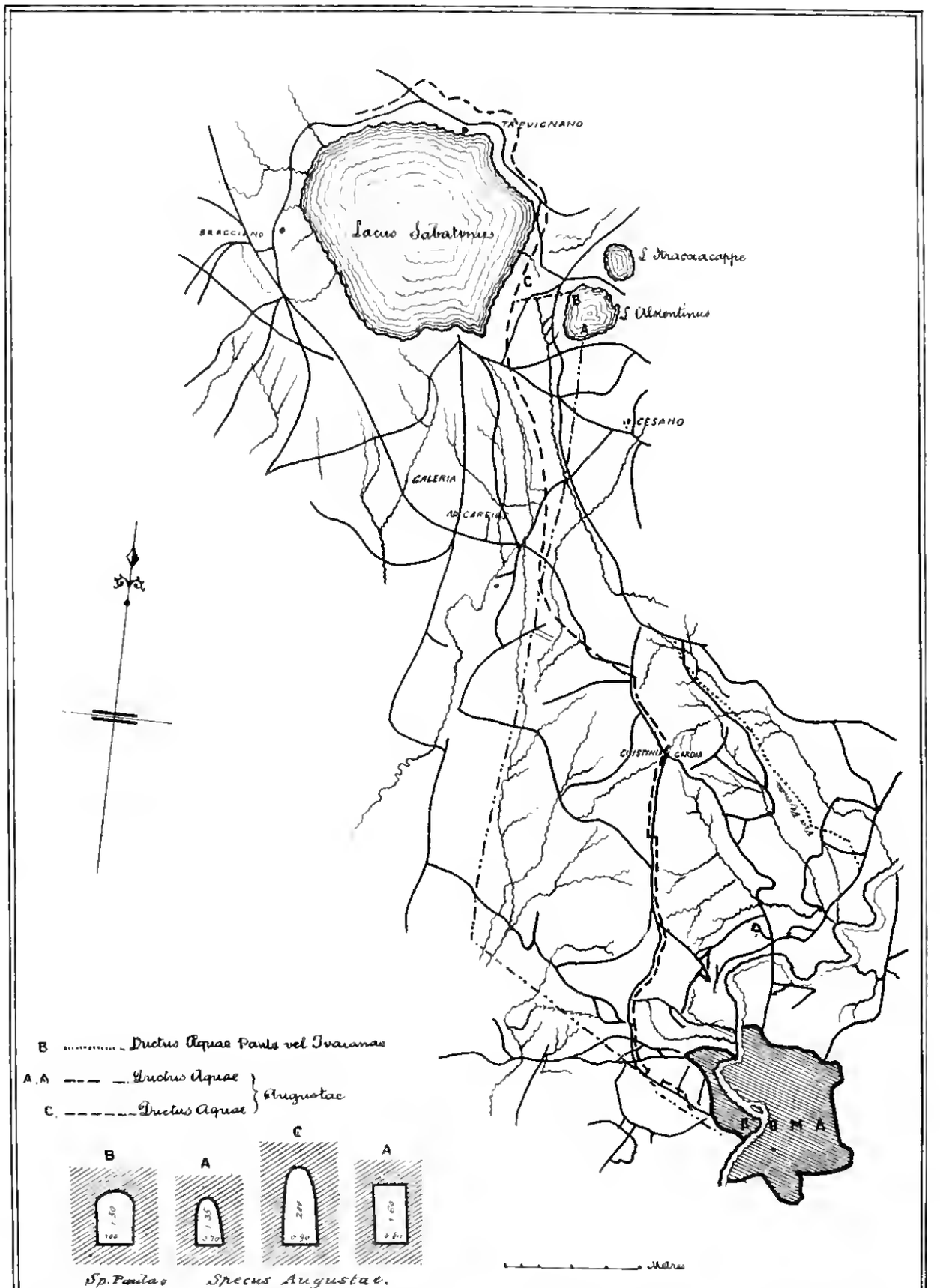
14. AQUA FELICE [u], A.D. 1587. Made by the Pope, Felice Peretti, or Sixtus V. Its source is the same as that of the Hadriana, which was mistaken in his time for the celebrated Aqua Marcia.

15. AQUA MARCIA PIA. The real old Marcian water was brought into Rome by a Company in 1860—70. The course as far as

[p] See p. 54. [q] See p. 86. [r] See p. 92. [s] See p. 97.
[t] See p. 100. [u] See p. 106.

Tivoli is in a stone *specus*, like the old aqueduct, but after it reaches the level ground it is carried in cast-iron pipes on the other side of the river Anio, and passes under it by a great syphon. This was to avoid repeating the great circuit made by the old aqueduct, and was also done to escape the necessity of crossing the mouths of the number of small streams that fall into the river Anio and drain the Campagna; these are often flooded in the wet season, and would have been likely to injure the bridges of the aqueducts where they crossed the stream; the iron pipes avoid them by being on the other side of the river.

Map of the Aqueducts on the Western Side of Rome.



Whiteman & Bas Photo-Lithe to the Queen & H.R.H. the Prince of Wales

MAP OF THE AQUEDUCTS

ON THE

WESTERN SIDE OF ROME[a].

THE account given of the map of the eastern side of Rome applies almost equally to this, but the difficulty to be surmounted was here greater. Neither Dr. Gori, nor Signor De Mauro, nor the author knew the ground; we had only Frontinus and Fabretti to help us, and the course is much more subterranean on this side than on the other. There are none of the great arcades to carry the *specus* for five or six miles; the only portion where they are carried on an arcade for any distance is on the side and upon the wall of the garden of the villa Pamphili-Doria, and there the arcade as seen is the work of Pope Paul V. (Borghese), who restored them to use in the sixteenth century, making use of the old subterranean *specus* and the ruins of the old arches, which can be seen against the wall of that garden. From this point they are mostly subterranean, we traced them to the three lakes which served as reservoirs for them. The first *specus* on this side of the Lacus Alsietinus has been kept separate from the one on the other side. In the time of Augustus the water came from the two upper lakes, but it was brought at a very low level, and the water from these being always muddy and bad, Frontinus, under Trajan, rejected it, and brought the water only from the Sabatina; Pope Paul returned to the use of the upper lake, Alsietina.

This map is also reduced by photography from one on a much larger scale, though not so large as the one for the eastern side, as that was found inconveniently large, and on this side there was less complication to examine and explain. Great credit is due to Signor de Mauro for the tact with which he traced the subterranean lines. He found that there are wells and air-holes at intervals, not always regular, but nearly so, and that when they are in grass-land or barren land, shrubs have always grown over the top of each well on account of the moisture that remained in it, and by means of these shrubs he was able to follow the line.

These aqueducts, which supplied the fountains in the Trastevere, all come from the lakes on the hills. The Alsietina of Augustus comes from the lake of that name (now called Martignano), between

[a] See No. VII., p. 50.

the Via Claudia and the Via Aurelia, but not very near to either, being 6½ miles from the Via Claudia at the fourteenth milestone, as Frontinus states. This was made to supply the Naumachia of Augustus, which were near the present monastery of S. Cosimato in Trastevere; the water was very abundant, but not fit for drinking. It entered Rome at a lower level than any of the other aqueducts, because the Naumachia were very little above the level of the Tiber. At the small town called the Cariæ (near the present Osteria Nuova), about fifteen miles from Rome, it received an additional supply of water from the Lacus Sabatinus. Trajan restored to use that part which came from the latter lake; this is better water than the Alsietina. Pope Paul III., A.D. 1540, again restored this to use, and it is now called Aqua Paola. His engineers brought the water from three lakes, the two before mentioned, and a smaller one above the Alsietina, called Stracciacappe. The object of bringing the water from this very high level, 500 ft. above Rome, was to supply the splendid fountains in front of S. Peter's, the water of which rises to a great height. This lake was drained in 1870, and at the same time the water in the Alsietina was also much lowered, by which means the three *specus* were brought to light on the bank, and the sites are shewn on this map. The Aqueduct of Trajan was carried at a much higher level than that of Augustus, and entered Rome on the top of the Janiculum. Procopius, in the sixth century, admired the profuse supply of water at that point; and the water was then, as it is now, used for a series of mills on the slope of the hill. The engineers of Pope Paul made use of the water of all the three lakes, and a most abundant supply still flows into Rome through the Fountain, above the Church of S. Pietro in Montorio. How far the old *specus* was used it is difficult to tell, but most probably that of Trajan was used for a large part of the distance; it is almost entirely underground until the last mile into Rome, where it was carried on an arcade of the time of Trajan. The Aqua Paola is there also carried on an arcade, parallel to it and near to it, but not the same.

THE

AQUEDUCTS OF ANCIENT ROME.

THE

AQUEDUCTS OF ANCIENT ROME,

TRACED FROM THEIR SOURCES TO THEIR MOUTHS,

CHIEFLY BY THE

WORK OF FRONTINUS;

VERIFIED BY A SURVEY OF THE GROUND.

BY

JOHN HENRY PARKER, C.B.

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AND ASSISTANTS.

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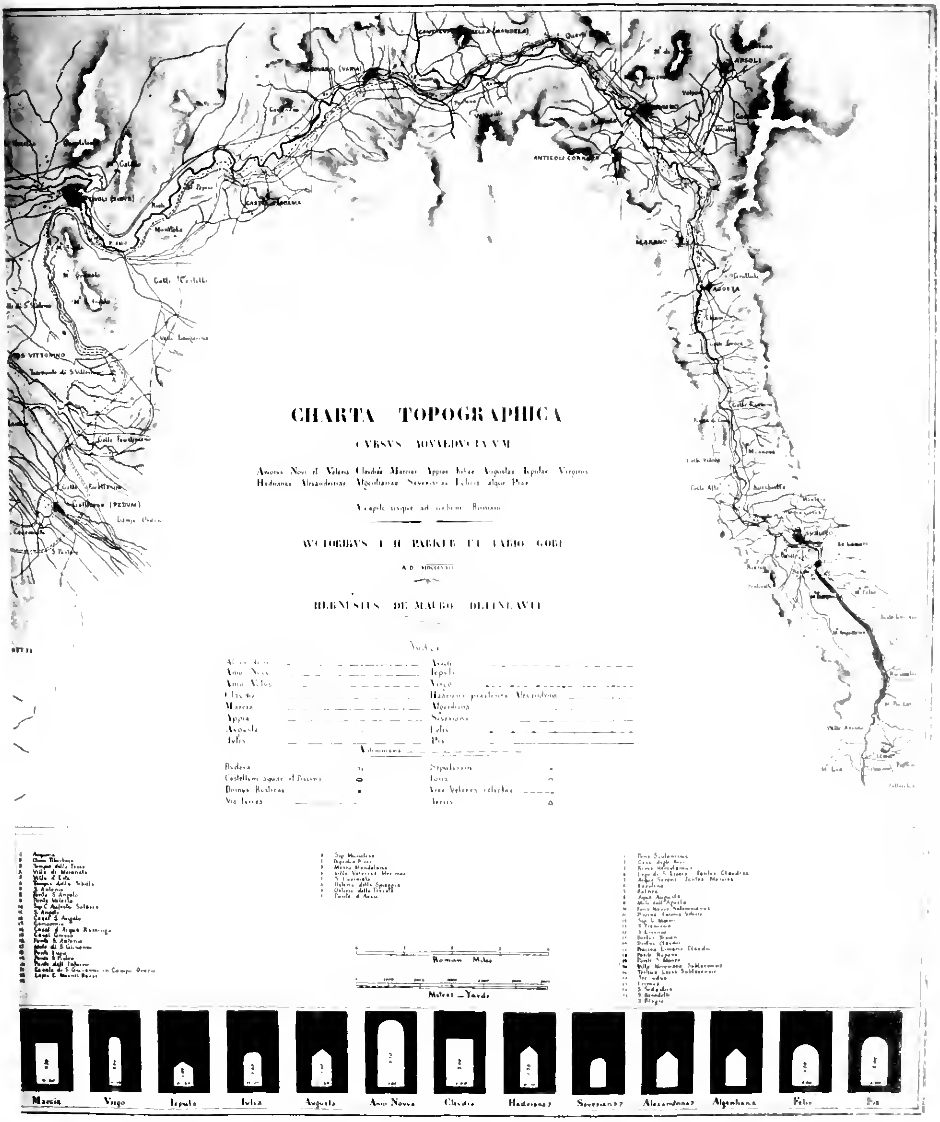
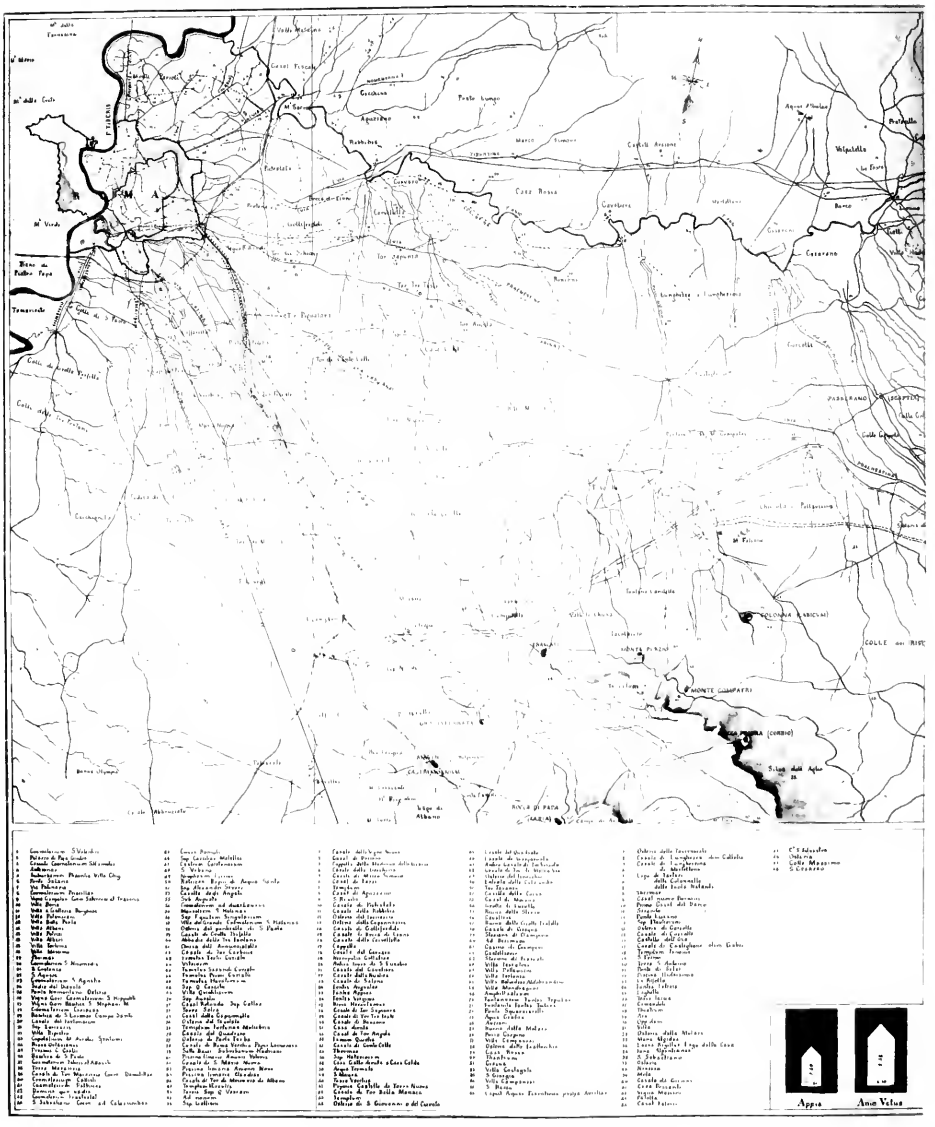

CHARTA TOPOGRAPHICA
ARSOLI
ANTICOLI CORRADO
AGOSTA
Roman Miles
Metres _ Yards
Marcia
Virgo
Iulia
Augusta
Anio Novus
Claudia
Felix


Appia
Anio Vetus