

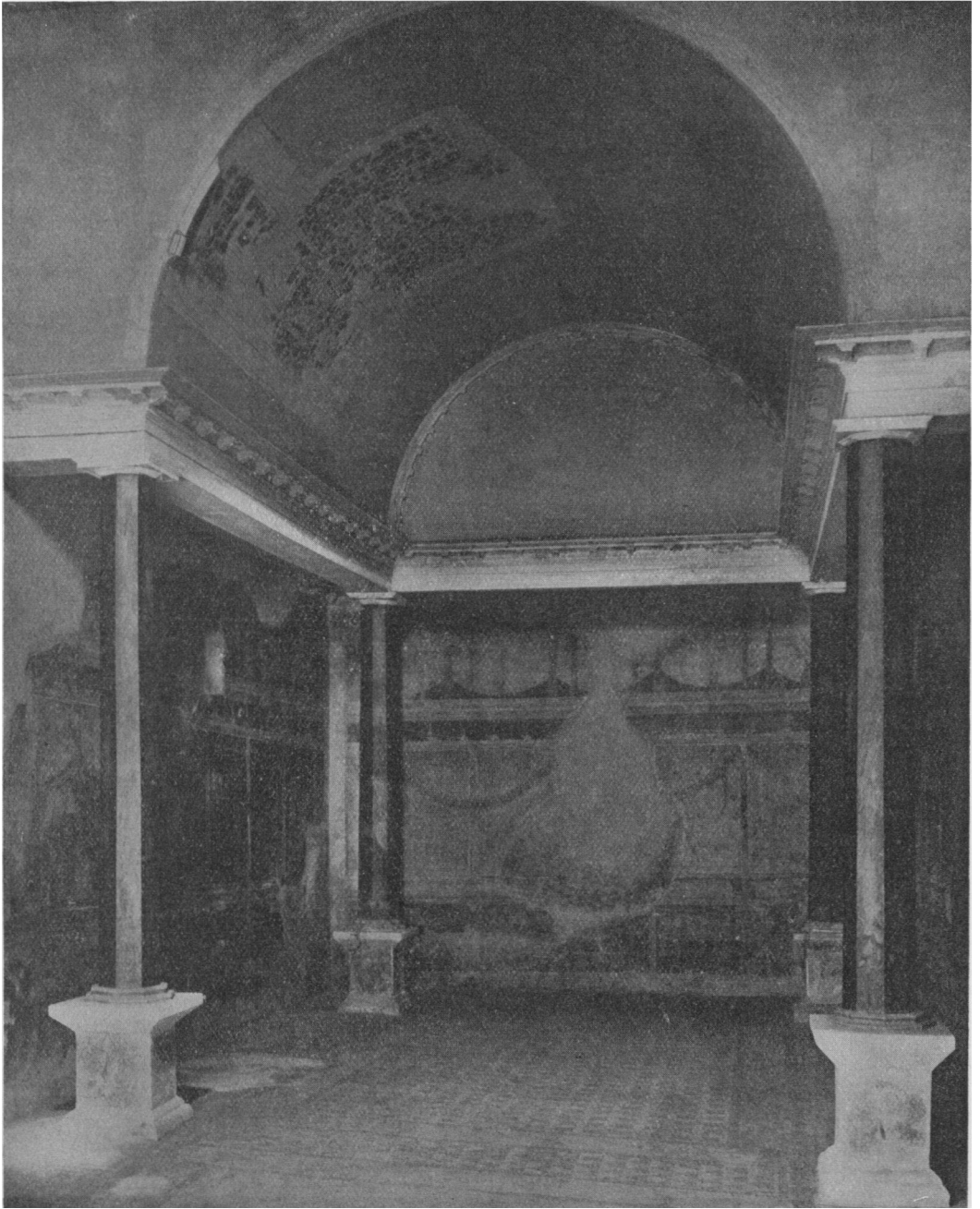
THE TECHNIQUE OF STUCCO CEILINGS AT POMPEII.

(Plates xx-xxiii.)

By A. W. VAN BUREN.

The buried cities of Campania occupy a unique position as sources for a knowledge of the material aspects of classical antiquity. The rain of pumice-stone and ashes first concealed and then preserved many classes of objects and structures that at other points in the ancient world would have been doomed to perish at the hand of man, or through the disintegration due to atmospheric agencies. The dry climate of Egypt, as of certain tracts of Hither Asia, has spared papyri and textiles from the destruction due to damp, but even in those exceptional regions nothing has been found in the nature of classical remains comparable to the houses of Pompeii for the manner in which circumstances have preserved the stucco facing of the walls; hence it is that for information as to ancient house-painting and kindred subjects we must go first to Pompeii.

The present article is concerned with certain matters of the technique of construction and decoration for which Pompeii is practically the only source to which we may look for material. The main facts as to the treatment which the inhabitants of the Roman period, and their predecessors the Samnites, gave to the stucco-faced walls of the interiors of their dwellings, are to be found in the handbooks of Pompeian and in general of Roman antiquities, and may be presumed to be matters of general information among scholars and decorators. Not so, however, their methods of constructing the ceilings over these same rooms, methods which normally involved the use of wooden rafters from which was suspended a framework of furring-strips, to which in turn the stucco adhered. In most instances, the wood has entirely disintegrated, but the adjacent stuccos survive, unless reduced through breakage to too fragmentary a state, until excavation. Such perishable and frail materials, however, were not likely to arouse the interest of the earlier excavators, who accordingly paid slight attention to the fragments of stucco ceilings which, we may be certain, they uncovered and destroyed or allowed to perish; and it was not until the last decade of the nineteenth century was well advanced that a systematic policy was adopted for preserving the fragments of these ceilings, attaching them on frames, and replacing them in their original positions. Commendable adherence to this policy through a series of years has yielded excellent results, and the student to-day at Pompeii has abundant opportunity



[Alinari photograph]

FIG. 18. POMPEII: *Casa delle Nozze d'Argento, oecus.*
The mouldings and vault are largely restored.

to form his own impressions as to the appearance and character of such ceilings, so far as this can be done with these restored structures in place.¹ Not only in the recently excavated dwellings on both sides of the Strada dell' Abbondanza, for which the right of first publication belongs to the Italian government, but in some of the houses excavated between 1895 and 1909—the *Casa dei Vettii*, *Casa di Lucrezio Frontone*, *Casa degli Amorini Dorati*, *Casa delle Nozze d'Argento*,²—are these reconstructed ceilings to be seen. Three classes can be distinguished: those that are perfectly flat, those that are vaulted (and in many of these the vault is exceedingly slight), and those that present a combination of the two forms; to which should perhaps be added eccentric shapes such as the conch-shells which are felicitously used to grace the openings of small circular windows, though these are more likely to be inset in solid masonry, belonging, therefore, strictly to the category of masonry vaults, with which we are not here concerned.³

So far at least as regards the vaulted ceilings, a valuable literary source for the principles and practice of the ancients is extant in Vitruvius VII, iii, 1–4 (ed. Krohn, 1912):—

Cum ergo camerarum postulabitur ratio, sic erit faciendum. asses directi disponantur inter se ne plus spatium habentes pedes binos, et hi maxime cupressei, quod abiegni ab carie et ab vetustate celeriter vitiantur. bique asses, cum ad formam circinationis fuerint distributi, catenis dispositis ad contignationes, sive tecta erunt, crebriter clavibus ferreis fixi religentur. eaque catenae ex ea materia comparentur, cui nec caries nec vetustas nec umor possit nocere, id est e buxo, iunipero, olea, robore, cupresso ceterisque similibus praeter quercum, cum ea se torquendo rimas faciat quibus inest operibus. asseribus dispositis tum tomice ex sparto hispanico harundines graecae tunsae ad eos, uti forma postulat, religentur. item supra cameram materies ex calce et arena mixta subinde inducatur, ut, si quae stillae ex contignationibus aut tectis ceciderint, sustineantur. sin autem harundinis graecae copia non erit, de paludibus tenues colligantur et mataxae tomice ad iustam longitudinem una crassitudine alligationibus temperentur, dum ne plus inter duos nodos [alligationibus] binos pedes distent, et haec ad asses, uti supra scriptum est, tomice religentur cultellique lignei in eas configantur. cetera omnia, uti supra scriptum est, expediantur. cameris dispositis et intextis imum caelum earum trullissetur, deinde arena dirigatur, postea autem creta aut marmore poliatur.

Cum camerae politae fuerint, sub eas coronae sunt subiciendae, quas maxime tenues et subtiles oportere fieri videbitur; cum enim grandes sunt, pondere deducuntur nec possunt se sustinere. in hisque minime gypsum debet admisceri, sed ex creta marmore uno tenore perducere, uti ne praecipiendo non patiaturo uno tenore opus inarescere. etiamque cavendae sunt in cameris † priscorum dispositiones, quod earum planitiae coronarum gravi pondere independentes sunt periculosae. coronarum autem sunt figurae <aliae purae>, aliae caelatae. conclavibus autem, ubi ignis aut plura lumina sunt ponenda, purae fieri debent, ut eo facilius

¹ There have been a few instances at Ostia also, where fragments of stucco ceilings were preserved through the circumstances of their fall, in such a manner as to enable the capable personnel attached to those excavations to achieve feats of restoration comparable to those of their Pompeian colleagues.

² The oecus of this splendid house is illustrated on our fig. 18, from Alinari's photograph no. 34511; see also *N.d.S.* 1910, p. 320 (illustration), pp. 322 f. (description, by G. Spano).

³ In a small room of the baths of the *Casa del*

Laberinto there is an interesting masonry barrel vault, covered with stucco, and a beautiful conch-shell window opening.

Probably of masonry construction also is the almost perfectly preserved vault in a room behind the atrium of VII, iii, 21: it has never been replaced.

The decorative treatment of such ceilings, whether of masonry or on a wooden framework, is appreciatively described by F. von Duhn, *Pompeii, eine hellenistische Stadt in Italien*, third edition, pp. 86 ff.

extergeantur; in aestivis et exhedris, ubi minime fumus est nec fuligo potest nocere, ibi caelatae sunt faciendae. semper enim album opus propter superbiam candoris non modo ex propriis sed etiam alienis aedificiis concipit fumum.

In Morgan's translation (following in general the text of Rose, 1899):—

'When vaulting is required, the procedure should be as follows. Set up horizontal furring strips at intervals of not more than two feet apart, using preferably cypress, as fir is soon spoiled by decay and by age. Arrange these strips so as to form a curve, and make them fast to the joists of the floor above or to the roof, if it is there, by nailing them with many iron nails to ties fixed at intervals. These ties should be made of a kind of wood that neither decay nor time nor dampness can spoil, such as box, juniper, olive, oak, cypress, or any other similar wood except common oak; for this warps, and causes cracks in work in which it is used.

'Having arranged the furring strips, take cord made of Spanish broom, and tie Greek reeds, previously pounded flat, to them in the required contour. Immediately above the vaulting spread some mortar made of lime and sand, to check any drops that may fall from the joists or from the roof. If a supply of Greek reed is not to be had, gather slender marsh reeds, and make them up with silk cord into bundles all of the same thickness and adjusted to the proper length, provided that the bundles are not more than two feet long between any two knots. Then tie them with cord to the beams, as above described, and drive wooden pegs into them. Make all the other preparations as above described.

'Having thus set the vaultings in their places and interwoven them, apply the rendering coat to their lower surface; then lay on the sand mortar, and afterwards polish it off with the powdered marble.¹ After the vaultings have been polished, set the impost mouldings directly beneath them. These obviously ought to be made extremely slender and delicate, for when they are large, their weight carries them down, and they cannot support themselves. Gypsum should by no means be used in their composition, but powdered marble should be laid on uniformly, lest gypsum, by setting too quickly should keep the work from drying uniformly. We must also beware of the ancients' scheme for vaultings; for in their mouldings the soffits overhang very heavily, and are dangerous.

'Some mouldings are flat, others in relief. In rooms where there has to be a fire or a good many lights, they should be flat, so that they can be wiped off more easily. In summer apartments and in exedrae where there is no smoke or soot to hurt them, they should be made in relief. It is always the case that stucco, in the pride of its dazzling white, gathers smoke not only from its own house but also from others."²

It has appeared advisable to deal with this matter at some length, since, as has been implied above, Pompeii is the only place in the ancient world where these ceilings can be studied in a variety of specimens, and in a state of good preservation, due allowance being made for the necessary restoration and maintenance. For a knowledge of their construction, however, these well-preserved and restored ceilings require to be supplemented by the observation of the traces left in the adjacent walls through the disintegration of other ceilings of the same class and their frameworks and supports; for, although this is not stated by Vitruvius, the ends of the furring-strips would naturally be inserted in the masonry of the walls, and, in fact, it is

¹ The traditional reading *creta aut marmore* of Krohn's text would mean apparently 'with terracotta or marble'; but on technical grounds the emendation *creta marmore* seems required.

² This passage is treated by Choisy, in his edition, I, pp. 55 f.; III, pp. 22 f.; IV, plate 10; and by Prestel, in his edition, pp. 352-354, and plate LIX.

probable that in some instances this insertion sufficed to hold the furring-strips in place with little or no hanging from the beams above. The precarious state of most of the structures in question, which makes it doubtful if they will still be in existence for many more years, renders urgent the compilation of a record of this sort.

The following, then, is a list, not complete, but making some approach to completeness, of the traces still to be seen in the Pompeian houses, outside the new excavations in the Strada dell' Abbondanza, of the rafters and furring-strips, which were laid in a curved section to serve for the suspension of a stucco ceiling of curved or partly curved surface; the traces of the beams of a normal upper floor, which obviously served the same structural purpose with reference to the flat ceiling of the lower story, are too numerous and too obvious to require the mention of every instance, but a few of the more interesting examples have been included. Plates xx to xxiii, figs. 18, 19, should suffice to convey an idea of the appearance of these details.¹

In this connexion, the technique of the cornice mouldings—the *coronae* of Vitruvius—in some of the houses, is worthy of attention. The most carelessly made of these are the most instructive, as they show clearly the use of a stamp, which was pressed into the raised strip of moist stucco and then applied to successive sections along the line: a procedure which is more properly to be described as manufacture than as art, and is in striking contrast to the best usage of the Capital, although some even of the Farnesina stuccos have similar border mouldings.² In some instances, the falling away of the outer layers has revealed the presence of a series of metal rods or nails which served as a framework for the stucco core; it is possible that the latter was cast separate and then attached to the metal framework, after which would take place the surface treatment.

In the list which follows, I have included some of the more instructive instances of these mouldings; to have enumerated them in a separate list would have entailed excessive repetition. Examples will be seen in all the illustrations, except fig. 19.

IV. iv, 62³ (*Casa delle Forme di Creta*). Bedroom NW. of *atrium*. There is a lunette in the W. half of the room, over the recess for the bed, with four round holes above it; also a stamped and painted moulding, carefully executed.

V. i, 15. Room NW. of *atrium*. The East end of the N. wall shows one small round hole above the lunette on the same wall.

V. ii, the fourth house to the South of the NW. corner of the

¹ These photographs, with the exception of fig. 18, are due to the skill and enthusiasm of Signor Cavaliere Giuseppe Giordano of Torre Annunziata; authorisation and facilities were liberally granted by the authorities of the excavations.

² Described by E. L. Wadsworth, in *Memoirs of the Amer. Acad. in Rome*, iv, 1924, p. 95.

³ In this list, the first set of figures refer to the *Regio*, the second to the *Insula*, and the third (where there is a third) to the number of the house entrance.

insula. Bedroom at the back of the house. A practically perfect series of both the lower round holes (at the E. end of the room) and the upper square ones (at the N. and S. sides), extending along the inner two-thirds of the room. The latter holes, on the S. side, are largely enclosed by modern stucco, but they are surely ancient themselves.

V. ii, the third house to the South of the NW. corner of the *insula*. The room in the SE. corner of the house. There was a flat ceiling to this room, but (although there has been considerable modern re-pointing) it is most instructive to observe the square upper holes on the N. and S., and the round holes (the middle part is modern restoration) on the E. wall.

In the same room there is a stamped and painted moulding of rather careful execution.

V. iv, *Casa di Lucrezio Frontone*. A room SE. of the *atrium* contains all the elements for a study of the technique of cornices: the cornice is partly preserved, and in part there can be seen the holes of the nails for fastening it. For the vault, there is a curving series of round holes at each end of the room, and a series of square holes at a higher level on each side; but the square holes at the sides seem at present to be entirely restored, though presumably based on traces observed by the excavators. In the present instance it is certain that the square beams served to support the floor of the upper story: for on the W. wall, at some distance above, leaving an interval of about one foot above the top of the square holes, there is a considerable stretch of black-painted stucco wall (plate xx, no. 1).

In the same house, the large room to the SW. of the garden had a ceiling of varied form, as is shown by its N. wall: at each side of this wall, for a quarter of the distance toward the centre, there extended a horizontal cornice; the ceiling was flat to this point; then, in the centre, there must have been a slightly curved vault. Above the latter, there is a hole in the middle of the wall for the king-beam; a little to the right over the left end of the right-hand stretch of cornice, there is a hole for a round beam.

In the second house to the N. of this one, in the room which opens on the *atrium* to the S. of the entrance, there was a ceiling partly flat, partly vaulted: there are holes for large beams to the W. and E., and for small furring-strips to the S.

In the same house, the room opening on the *atrium* to the N. of the entrance shows holes for beams: here the beam-holes are square; but in a small bedroom at the SE. corner of the *atrium* there are round beam-holes for the flat ceiling, extending over the back part only of the room, that is to say over the space occupied by the bed.

V. iv, 13 (*Casa delle Origini di Roma*). In the large room at the NW. corner of the house there are holes for two beams and one of the lower rafters.

VI, v, 17, the House of the Etruscan Column. There is an excellent example of holes for rafters, in the room to the N. of the column: its W. end has seven smaller round holes set on a curve, and its N. side has five large square holes set horizontally.

VI, xi, 10 (*Casa del Laberinto*). Behind the peristyle, to the right (E.) of the back part of the great *triclinium*, there is a vaulted room with splayed window, which shows the beginning of a vault, and some of the holes above it.

The corresponding room to the left (W.) is less satisfactory, as the upper walls have been rebuilt or repaired.

VI, xiv, 12. NW. inner room beyond the *atrium*. An excellent example of the combined flat and curved form of ceiling, with cornice. There are some holes for rafters at both the N. and the S. ends; also some holes in the N. part of the E. wall. Plate xx, no. 2 shows the W. part, with corner, of the N. wall. The cornice was executed by successive applications of the same stamp. This is perhaps the best example which I have seen of this cheap method of making these mouldings. It was coloured in green and red; and much of the colour is still preserved. At the SW. corner of the room, a bit of the flat part of the ceiling actually survives in position; this corner is shown on plate XXI, no. 1. The portion at the SE. corner seems to have been replaced.

VI, xiv, 25. A room to the S. of the *atrium*. At the N. end, there is a complete series of round holes above the lunette, which lacks a horizontal cornice in relief, but is picked out below in colour. At the E. extremity of the N. wall, above, there is a break which is probably accidental. On the E. wall, about one foot above the moulding, there are two large round holes, evenly placed. Some similar round holes are preserved at the S. end.

In the same house, a little room with a window, W. of the *atrium*, shows a similar arrangement, but less well preserved: there is only one large round hole, in the middle of the N. side; and there are three small round holes, following a curved outline, at the E. side.

VI, xv, 2. The second (westerly) room on the N. side of the *atrium*. The N. wall shows a lunette, one or two round holes, and at a higher level, in the same wall, seven larger holes, some apparently square, others round; these must be due to two successive arrangements for the upper floor; they were continued over the next room to the E., which is described below. Part of the S. wall has been re-pointed, but at its W. end one and perhaps two square holes and one round hole can be seen, at a level, however, about one foot lower than those on the N. side.

A window or door in the upper story shows that the upper floor, over this room, must have rested at the level above described on the S. side, at least of this part: perhaps there was a corridor, and a step up to the room to its N. on this upper floor.

In the same house, in the large room to the NW. of the *atrium*, the NW. and NE. corners contain portions of well-made stamped stucco moulding; at the W. end of the N. wall are three round holes, the second and third of which served for a lunette, which has disappeared; about three ft. above these are apparently two large square holes for beams, an arrangement suggested also by the appearance of the stucco on the N. part of the W. wall.

In the same house, the first eastern room on the N. side of the *atrium* had a ceiling of flat form in the first (southerly) three-fifths of the room, lower than the vaulted one in the remaining rear two-fifths of the room; the latter presumably was situated above the bed. On the W. and N. sides, the two sets of round holes for these ceilings are well preserved. On the S. wall and also on the N. wall, at a higher level (about 4 to 5 ft. higher on the N. wall), large round beam-holes are well preserved. There are no indications as to how the front ends of the series of small rafters which formed a vault at the back of the room were supported or suspended.

VII. xv, 5. The second (middle) room N. of the *atrium* is an admirable example of these matters: the front half of the room had a vaulted ceiling at a high level, and the back half, one at a lower level; between the two there was a great beam, rectangular in section, which ran across the room. There can be seen the preparation, with nail-holes, for the horizontal moulding. In the back wall are two square holes, on a level with the top of the back vault: clearly there was an arrangement for two beams, running N. and S., the N. ends of which were to rest in these holes, while the S. ends rested at a height of about two feet above the top of the great beam at the front of the back vault. The E. side, with part of the N. end, of this most important room is shown in plate xxii.

In the same house, in a small room with a splayed window to the E. of the passage which leads N. from the peristyle, the N. wall, above a lunette, has a perfectly preserved series of six round holes for the rafters of the vaulted ceiling.

VII. ii, 16 (*Casa di Gavio Rufo*). In the room to the NW. of the *atrium* the ceiling showed a combination of flat and curved surfaces; there are traces of the lower, horizontal, cornice, and nail-holes for the upper horizontal cornice, as well as the under layers that prepared for the curving cornice of the lunette; also, round holes for rafters. Below these occurs later work, with painting; but the upper part of the wall seems to belong to the First Pompeian Period, and to exhibit the original form of the room.

VII. iii, 29 (*Casa di Spurio Mesore*). The little room behind the *atrium* had a ceiling of the combined flat and vaulted form. On the S. wall are round holes above the horizontal cornice. On the E. wall, above the lunette of the vaulted ceiling, the arrangement has been

obscured by modern plaster, but at the extreme left (N.) one round hole is visible.

In the same house, the famous room to the W. of the garden, illustrated as a typical example of the Third Pompeian Style by A. Mau, *Geschichte der decorativen Wandmalerei in Pompeji*, Taf. xii, still preserves traces of a vaulted ceiling.

VII. iv, 29 (*Casa del Pasticciere*). In the small room at the NW. corner of this house, the walls of which are protected by a modern pent-roof, there are perfect examples of mouldings produced by the repeated use of a stamp. In fact two stamps with different patterns were used, one in the moulding at a higher level from the floor in the E. part of the room, the other in the one nearer the floor in the W. part. The lower one is shown in plate XXI, no. 2, giving the SW. corner of the room.

The holes for rafters in the same room have been largely restored, but presumably in accordance with the traces found by the excavators.

VII. iv, 31. In the room SE. of the peristyle with the Ionic columns and the tank, there is a fine group of horizontal cornice, lunette, a bit of curving cornice, and three round holes for rafters (plate XXIII, no. 1).

VII. xii, 27. In the *schola* N. of the garden, there is an admirable example of well-executed stamped moulding.

VII. xiii, 4 (*Casa di Ganimede*). The second room to the E. of the *atrium* contains three separate series of stamped mouldings, the lowest of which shows successive stampings and is also painted.

IX. iii, 21, a room visible from the street has at its inner end a cornice, a lunette, small holes for rafters and some large ones for beams.

IX. v, 9. The room with Egyptian scenes to the NW. of the *atrium* has a cornice at the N. and S.; and on its W. side, still preserved, four round holes for rafters, which ran E. and W.; above these, there is the impression in the wall left by a six-inch beam running N. and S.

In the same house, two rooms behind the peristyle contain stamped and painted mouldings, carefully executed; the design in each room is different.

IX. v, 18. The room to the NW. of the peristyle has a complete system of lunette on the W. wall, with seven little round holes above it, and on the N. wall, six large round holes; the wall in which these are to be seen is itself early, but possibly the holes were made in it at a later period.

IX. vi, 5. Three rooms to the NW. and N. of the *atrium* show good examples of holes for a flat ceiling and at the same time for the floor of the upper story; they date from the Samnite period.

IX. vi, 8. At the risk of overstepping the bounds of our present study, it seems proper here to illustrate (fig. 19) the pent-roof over the cupboard (not the modern roof over the altar), which

is extremely interesting because it shows the manner in which the tile roof was supported on rafters.

IX. vii, 6 (*Casa del Centenario*). In the room to the NE. of the

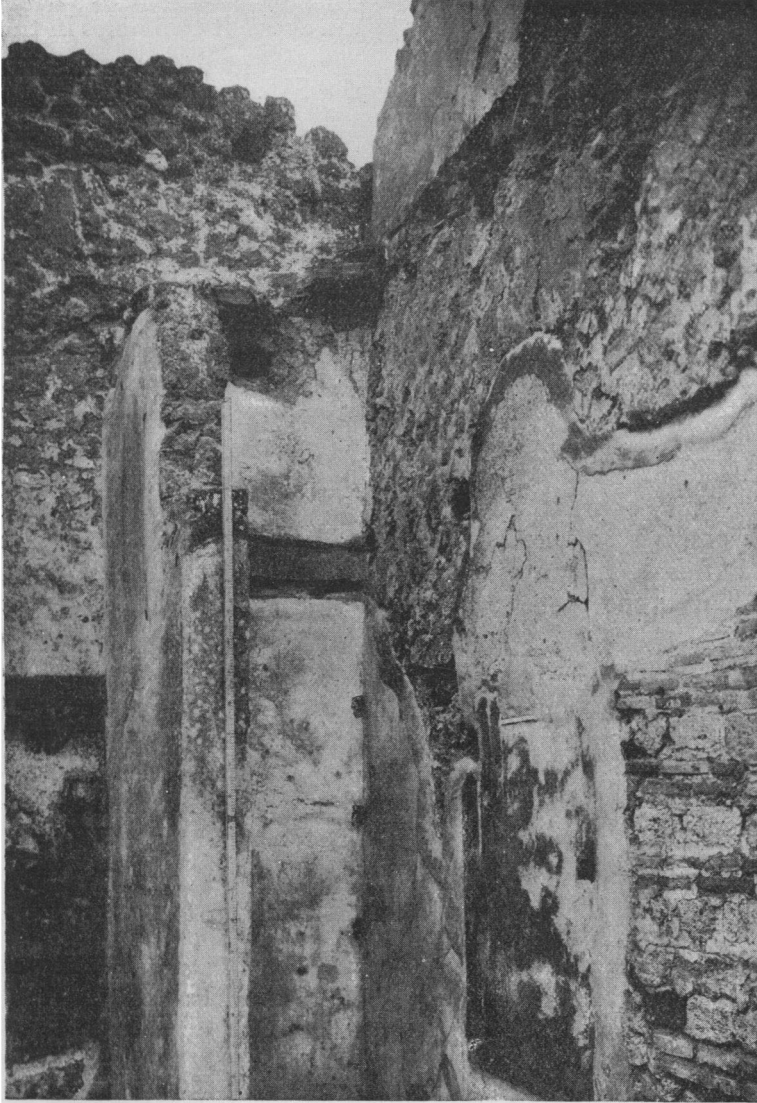


FIG. 19. POMPEII: REG. IX, INS. VI, NO. 8.

western *atrium*, there is the end of a vaulted ceiling, and one hole for a rafter is preserved.

In two rooms the vault has been almost entirely restored, but in one of these there are incorporated scanty fragments of the original; there seem to be none in the other.

The well-known bath-rooms in the same house seem to have ceilings of true masonry : one has a barrel-vault, and another a barrel-vault with, at its further end, a half-dome and eye-window.

In the same house, on one's way toward the room with obscene pictures, and to the left of the passage, there is a good example of the end lunette of a vaulted ceiling, and above it two holes in the wall for beams.

In the same house, the room to the SW. of the secondary *atrium* is instructive by reason of two sets of holes, for the upper and lower beams and rafters of a flat ceiling : the NW. corner of the room has not been restored or retouched, but much of the other walls has been. There are two smaller, round, holes among the larger, square, ones ; they seem to be explained by the fact that this room was remodelled, as is shown by a stretch of wall still standing in the middle of the room.

Some peculiar features are to be observed in the bedroom to the SW. of the *atrium* in IX. viii, 2. At the W. end of this room are a lunette, a cornice, and two holes for rafters protected above by fragments of tiles ; there is a smearing of modern plaster about the exposed edges of stucco, and there is a modern wooden top to the window-frame ; this room shows also, above, two square holes (the S. one has now been broken through to the street) for beams, which in this case ran in the same direction as the rafters below them ; in the S. wall, the stucco facing is preserved to the level of the top of the square holes ; this stucco would have been concealed by the vault.

IX. viii, 3 (duplicate number, behind the *Casa del Centenario*). In a room at the back of the peristyle, directly S. of the fountain-room of the *Casa del Centenario*, the back wall has nail-holes for attaching a cornice, and at the NE. corner there is a bit of the cornice itself ; there is a lunette, and a complete series of round holes for rafters (plate XXIII, no. 2).

The adjacent room to the S. has a row of nail-holes for attaching an ordinary cornice.

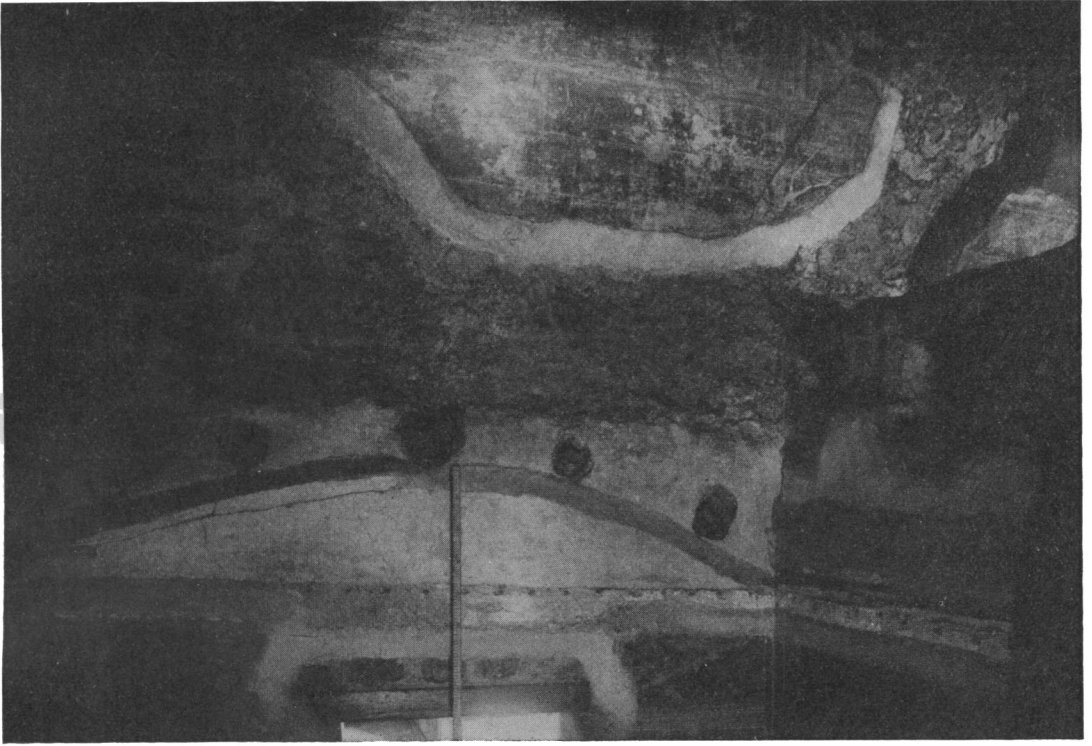
IX. ix, in the third house N. from the house of P. Aemilius Celer, there is a room SE. of the *atrium* containing the lunette of the vault, one hole for a round rafter, and two holes at each end of the room, for two square beams running above, and parallel to, the round rafters.

IX. xi, *Casa del Conte di Torino*. The further, small room to the W. of the peristyle, in the upper part of its further wall, shows layers of stucco pertaining to a vaulted ceiling, and also a line of nails for a horizontal cornice ; holes for furring-strips are absent.

The next room to the right of this, in its further right corner, has three holes for furring-strips in the body of the wall.¹

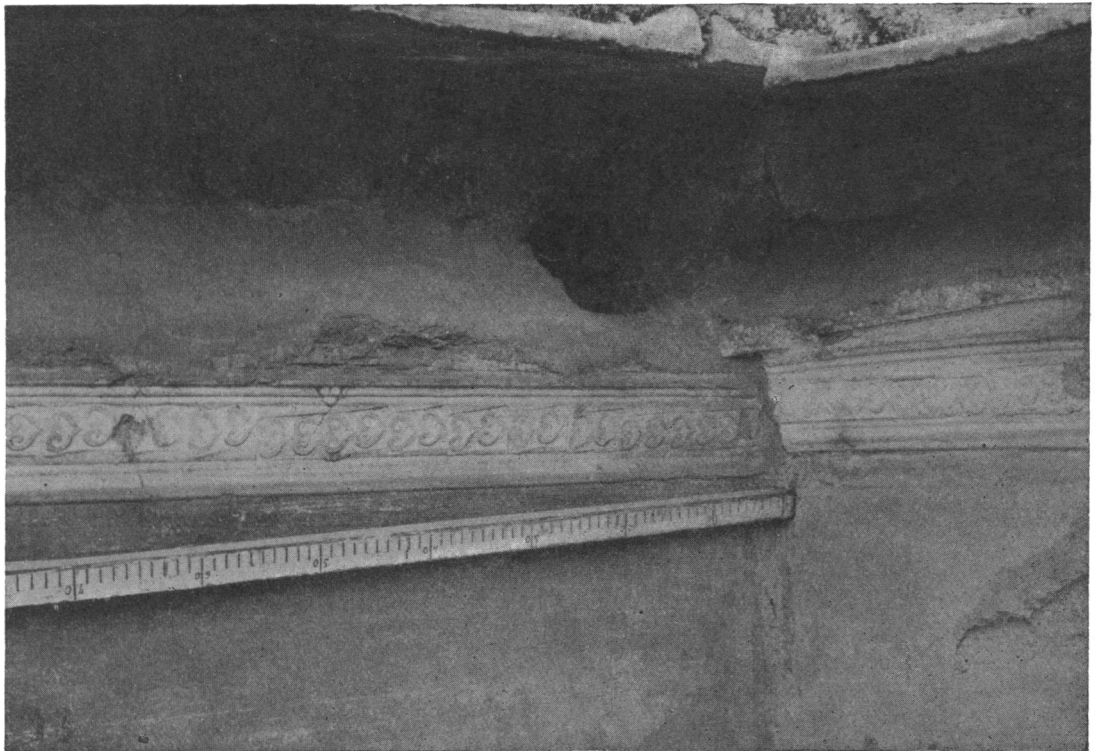
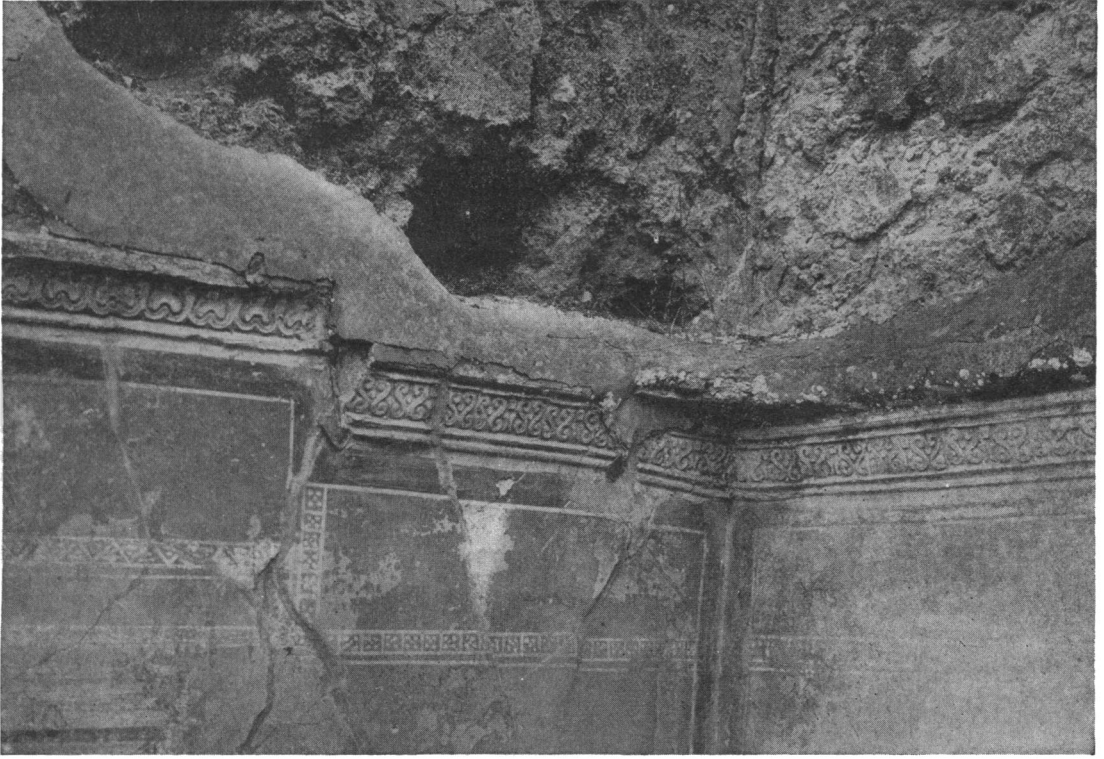
¹ The above list naturally does not include the unpublished excavations of the Strata dell' Abbon-

danza, where, however, the bathrooms in the House of Trebius Valens will well repay study.



NO. 1. POMPEII: CASA DI LUCREZIO FRONTONE (see p. 117).

NO. 2. POMPEII: REG. VI, INS. XIV, NO. 12. CEILING OF NW. CORNER OF THE ROOM (see p. 118).

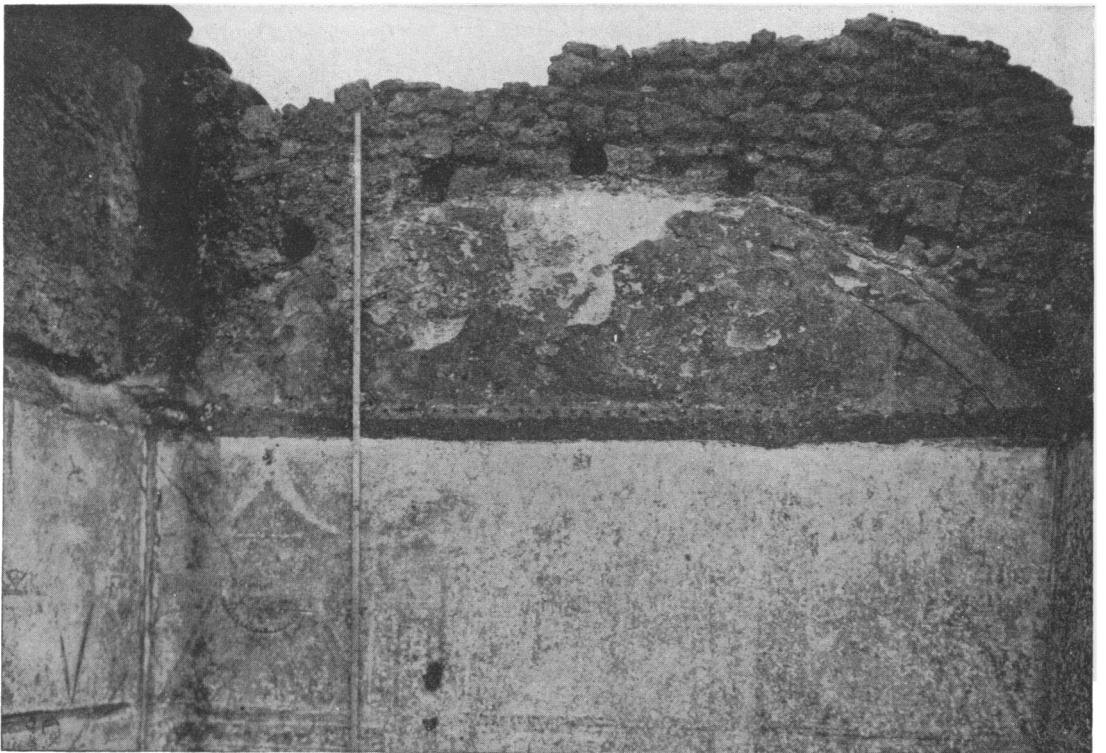
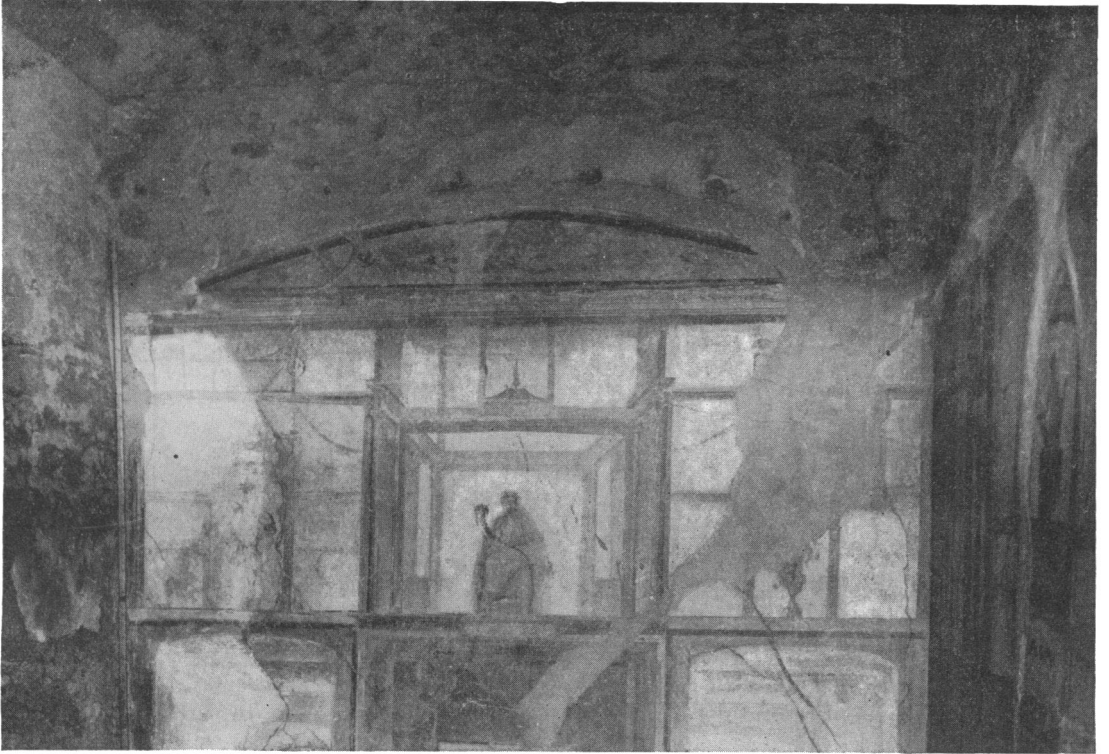


NO. 1. POMPEII: REG. VI, INS. XIV, NO. 12. CEILING OF SW. CORNER OF THE ROOM (see p. 118).

NO. 2. POMPEII: REG. VII, INS. IV, NO. 29. MOULDING (see p. 120).



POMPEII: REC. VI, INS. XV, NO. 5 (see p. 119).



NO. 1. POMPEII : REG. VII, INS. IV, NO. 31 (see p. 120).

NO. 2. POMPEII : REG. IX, INS. VIII, NO. 3 (see p. 122).