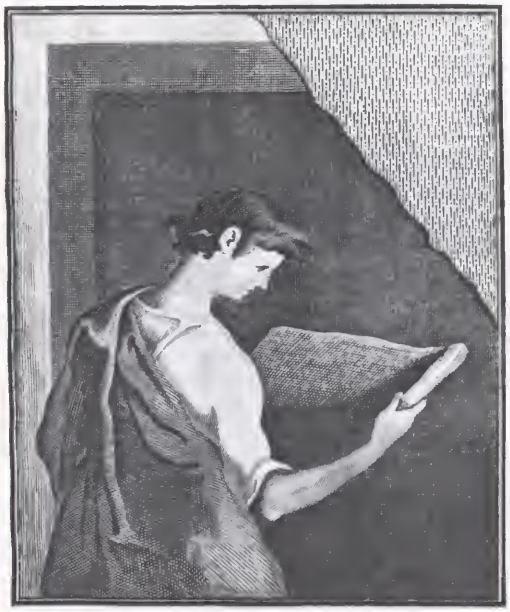

TRANSACTIONS

OF

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

VOL. IV. NEW SERIES, 1888.

Fifteen hundred copies of this Volume have been printed for the use of the members of the Royal Institute of British Architects, and for that of Architectural and other kindred Societies, Public Libraries and other Educational Institutions, throughout the British Empire and in Foreign Countries.

THE HOUSES OF PARLIAMENT, VIENNA.

BARON V. HANSEN, HON. CORR. MEMBER (ROYAL GOLD MEDALLIST), ARCHITECT.

[VOL. IV., NEW SERIES, PAGE 32.]

The Royal Institute of British Architects.

INCORPORATED IN THE SEVENTH YEAR OF WILLIAM IV.

TRANSACTIONS: VOL. IV. NEW SERIES.

FIFTY-FOURTH YEAR OF FOUNDATION.

USUI CIVIUM, DECORI URBIUM.

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The Royal Institute of British Architects.

INCORPORATED IN THE SEVENTH YEAR OF WILLIAM IV.

THE SESSION 1887-88.

THE OPENING MEETING of the Session was held on Monday, 7th November 1887, when Mr. I'ANSON delivered his second Presidential Address,* in which he repeated the terms of the Memorial humbly submitted on the occasion of Her Majesty's Jubilee, adding that he did so because he believed that it would gratify the members of the Institute thus to participate in a renewed expression of obligation and gratitude to The Queen.

The PRESIDENT referred to the foundation of the Imperial Institute, and alluded to the fact that, though subscriptions for the purpose of founding and erecting this building had been solicited, the Institute in its Corporate capacity had hardly the power to respond, while the majority of the members in a position to subscribe were members of other Bodies which had contributed to the fund. "Nevertheless," said he, "I am "afraid that this enforced abstention has been detrimental to Architecture, "for we live in an age when the *do ut des* of diplomacy, and the *quid pro* "*quo* of commerce, are often too rigorously exacted. In the composition "of the Executive Council for the Imperial Institute, the representation of "Architecture is conspicuously absent, unless indeed it is considered that "Sir FREDERIC LEIGHTON, as the President of the Royal Academy, represents "Architecture as well as Painting and Sculpture. We are, however, none

* The Address, in its entirety, is printed in the *Journal of* PROCEEDINGS, Vol. IV., 2, pp. 21-29.

"the less loyal to the principles involved in the foundation and objects of "the Imperial Institute; and we may rest quietly assured that a fuller "representation of Architecture than now exists on that Council will be "deemed not only wise but essential."

As a fitting work for the Imperial Institute, the President suggested the production of a full and complete record, or, at the least, a catalogue of the Historical Monuments extant within the confines of the British Empire.

After a eulogistic reference to the career of the late Mr. Beresford-Hope, whose death was deemed a loss to the Institute, both as regards the brilliant *Review* of which he was the proprietor, and as regards the House of Commons, in which his authority on architectural questions was considerable, the President referred to the grant of the Supplemental Charter, which, among other privileges, had given the Institute power to hold Examinations and to grant Certificates and Diplomas, not only in the United Kingdom, but throughout the whole British Empire.

The triennial Conference, held at the Institute in May last, had been most successful,—one meeting having been profitably occupied in considering the subject of Professional Education; and to another, the Council had referred the Special Federation Committee's Report, with the general tenour of which he expressed satisfaction. Another meeting had discussed the matter of Registration, with regard to which two very apt and pertinent questions might be asked: "First, as to the form in "which the registration of architects may be best effected; and secondly, "whether the fact of having passed those examinations for admission to "the Institute, now sanctioned by Royal Charter, ... will not accom-"plish—to all intents and purposes, and sufficient for the present time—"the main object of registration as contemplated by the Conference."

The obituary for the twelve months then received attention; and the election of Mr. Thomas Blashill, *Fellow*, to the important office of Superintending Architect to the Metropolitan Board of Works was noticed.

After a reference to the considerations which had induced the Council to recommend Mr. Ewan Christian as a worthy recipient of the Royal Gold Medal, which the President had had the most pleasing privilege to place in the hands of his respected predecessor, Mr. I'Anson touched on several matters of interest, notably the Exhibition of Students' drawings and designs, held in the Conduit Street Galleries in January 1887.

In respect to the statement that proposals, involving modifications in

the Constitution of the Royal Academy, were being considered by a Special Committee of Academicians, nothing had transpired during the past year to induce a belief that the Institute might be brought into closer relationship with that Body; on the other hand, the Architectural Association and the Institute had entered into a significant agreement, and it was a source of extreme gratification to feel that the mutual assistance long rendered was cordially appreciated by both societies.

The President, having commended to the attention of the members the important questions which would come before them during the Session, admonished both young and old not to be in a hurry. It was only last year that the London Colleges of Physicians and of Surgeons had combined for the furtherance of professional education; yet the former was founded early in the sixteenth century, and the Surgeons trace their existence back to the reign of Edward II. The position of the English Surgeons is now as eminent as that of any other of the learned or scientific professions; but, said the President in conclusion, "less than a hundred "years ago, in 1790, one of the Masters of the College of Surgeons, on "retiring from office, wrote to his subordinates an extraordinary letter. "'Your theatre,' said he, 'is without lectures; your library room, without "'books, is converted into an office for your clerk; and your Committee "'room has become an eating parlour.' Again, in 1844, only forty-three "years ago, a Charter granted to the Surgeons constituted a new Order of "Fellows,—a grade higher than Members—who were to qualify for the "distinction by strict examination, or by selection from among deserving "members. It is unnecessary to tell you the results of that great step; "you will draw your own inferences from the parallel I have ventured to "place before you. No class of men have been reviled, even for centuries, "with more bitterness, and with more wit, than the physicians and "surgeons. They have been assailed with clamour inside and outside "their ranks, they have met with every kind of opposition; but such "things do no harm, for, when the cause is good, opposition to it creates "no new enemies. On the contrary it consolidates old friendships, brings "back waverers, and strengthens the ties of interest and duty which unite "the members of a sound and flourishing Society like that to which you, "Gentlemen, and I have the advantage to belong."

9, *Conduit Street, Hanover Square, London, W.*

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XL.

THE ANCIENT QUARRIES OF EGYPT, WITH AN ACCOUNT OF A RECENT JOURNEY ACROSS THE EASTERN DESERT.

By Mr. W. Brindley, F.R.M.S.

Edward I'Anson, F.G.S., *President*, in the Chair.

Mr. President and Gentlemen,—

ALTHOUGH Egypt, south of Cairo, is a mere strip of cultivation, yet her quarries of building materials in the desert, outside this green strip, have played a most important part in the history of architecture; not only in Egypt, but in that of Imperial Rome and her Colonies. Most of the quarries, it may be observed, are on the eastern side of the Nile, which has always been called the Arabian Desert, and by early writers Arabia,—the Nile having been considered the geographical boundary of Egypt—whence much confusion respecting the locality of several important ancient quarries has arisen. I am, therefore, glad to be enabled to insert a communication, written at Cairo in August 1887, by Mr. E. A. Floyer, F.L.S., of the Khedivial Civil Service, on the subject of these Quarries, as follows:—

[*Historical and Topographical Note.*]

The mountainous country between the Nile and the Red Sea partakes of much of the interest—religious, commercial, and antiquarian—which so long has centred in Egypt itself. Before the Christian era, its mountain solitudes and picturesque valleys attracted men who lived alone, a semi-savage life—the *ophthoi*, or the monks of paganism. In later times, in the third and fourth centuries of the present era, the same pure air and rugged scenery helped the growth of the monastic establishments of early Christianity, and these granite mountains sheltered the first Christian monks of the world. The Monastery of St. Anthony, and, close by, that of St. Paul, are still monasteries, though the monks now there admit that their re-establishment dates only from recent time. Some 300 years ago the former was the scene of a dreadful crime. The monks had brought up a number of young savages who, when they came of age, demanded permission to marry, and, being refused, slew them.

A hundred miles to the south are the ruins of the Monastery of the Deaf Men. Such is its name among the Arabs of to-day, who can say about it nothing further; but, at a little distance, the beautiful Kittar valley winds into the heart of the mountains, and there, surrounded by towering peaks, lies a crystal pool of water, fed from the height above by a hundred little streams which trickle through a curtain of the softest greenest maidenhair fern. Above this is a ruined Catholic church, a mutilated inscription on which allows its story to be read with some approach to accuracy. This church stands by the side of a thing unique in these mountains—a stream of running water. It was perhaps consecrated by Meletius, a bishop of the Thebaid, in the year 300, and the author of more strife than falls to the lot of most men, for he originated the great Arian controversy.

These gentle monks succeeded men of very different stamp—the convicts of the Roman Empire, among whom Meletius himself served a term of quarry labour.

At the granite quarries of Mons Claudianus, where I picked up a penny of Vespasian's time, I think the quarrymen left a huge well of sweet water behind them when they abandoned the quarries; and the monks seem to have built a monastery there, though the building is now so ruined that nothing about it is certain.

The commercial history of these mountains is even more curious and interesting than the religious. For 1,400 years the whole trade between Europe and the far East passed across these mountains, and it only ceased to pass this way on the discovery by the Portuguese of the route round the Cape. The three main roads from the Red Sea to the Nile were used according to circumstances, which may be indicated. Navigation of the Red Sea was very difficult and full of peril for the ships of ancient time; but, while the sea passage had its trials, the desert passage, on the other hand, had its special dangers and fatigues. Koptos, near Keneh, on the Nile, was in all cases the objective point. On the Red Sea the traffic was distributed among at least three ports—Berenice, the southernmost; Kosseir, 200 miles further north; and Myos Hormos, a like distance north of Kosseir. It is a land journey of 260 miles from Berenice to Koptos, but, by building good rest and watering-places, Philadelphus attracted a good deal of commerce to Berenice. The shortest road transit was from Kosseir, 111 miles. I think that Myos Hormos was principally used for traffic with Petra and ports on the Arabian coast. If ships beat up the 400 miles past Berenice and Kosseir, it was perhaps because at Myos Hormos there was more fodder and water, and large numbers of camels could await the arrival of cargoes, without expense. It was at Myos Hormos that the weary General Ælius Gallus landed his sick and dispirited army, 2,000 years ago, and led them to the long wished-for Nile. By the treachery of Syllæus, the wily minister of King Obodas, they had been led wandering over the inhospitable deserts of Arabia, and they must have rejoiced extremely to return to their own well-roaded deserts with the grateful watering-places at regular intervals. But the crowning interests of these mountains lies in the ancient quarries scattered among their lofty peaks and winding valleys.

Here may be studied the skilled handiwork of men who lived 5,000, or, according

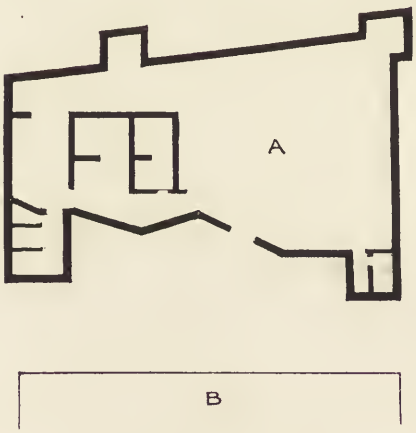
to one account, 6,000 years ago; and the old quarries of Hammamat were visited by the Imperial tourists, Cambyses and Darius, who carved their names here twenty-four hundred years ago. About two thousand years ago the quarries of Mons Porphyrites and Mons Claudianus gave out the busy sound of clanging hammers. At the former, huge blocks are lying of a stone so hard that a fragment will cut window-glass like a diamond, so hard that modern science has only recently learnt how to cut it by use of diamonds. At the latter, huge pillars lie about, 250 tons in weight, and shaped with an accuracy which has not been exceeded in modern times. And now for many hundred years a sleep has fallen over these mountains; the ring of hammers is silent, the watering places are caverns filled of sand, and, it is a fact and no mere figure of speech, the ibex reposes from the noonday heat in the temple of Serapis. The Bedawin descendants of the Blemmyes, who fought so fiercely that Proclus, when he defeated them, made a Roman triumph, now wander over the plains. The valleys are dotted with the blackened spaces where they industriously burn charcoal, and the waves of their internecine war now and then surge round the foot of the rock-like monasteries to the terror of the timid monks.

But once more is beginning a period of awakening, and already the ibex again looks down upon the Western workman. Eighty-seven years ago, came the first brief spasm of activity, when the gallant Sir David Baird led his little army one hot mid-summer from Kosseir to Keneh. Forty years ago, some Indian officials took this route to India, and for a short time the mails crossed the mountains by the same way. Twenty years ago, came the Marquis of Bassano with his thousand workmen digging in the Gimsa hill for sulphur. Last year, a colony of bearded miners set up derricks and boring engines on Djebel Zeit, the oil mountain, and at length it is found that these ancient Quarries produce a stone which can be matched nowhere in the world. Mr. Brindley, of London, is actually the direct successor of Epaphroditos, the Imperial freedman of Sigirium, whom the Greek inscriptions show to have been the last lessee of the Quarries, in the year 147 A.D., more than seventeen hundred years ago.—E. A. FLOYER.*

On the 9th March 1887, we arrived at Keneh, where our caravan of nine camels, which ultimately grew to fifteen, and nineteen attendants, was formed; and let me add that all food, water, tents, and bedding, with three weeks' provender for the camels, had to be carried in the event of emergency. In the afternoon of March 10th, after several delays, through the obstruction of the Mudir and the obstinacy of the Bedawin sheiks, we at last got on our way, and, passing through streets of potters, soon reached the outskirts of the dreaded desert, which was not of loose sand as we expected to find it, but, to all appearances, a perfectly level plain as far as the eye could see, bounded by a distant range of flat-topped mountains [Illustn. i.]. Instead of being loose, the sand was firm enough to drive a carriage over, being composed of only partially worn shingle, levelled with sand. We were well on our way when the sun set, and

* See an article by Mr. Floyer in *The Proceedings of the Royal Geographical Society*, Vol. ix. No. 11, Nov. 1887, on a "Sketch Map (p. 730) of two Routes in the Eastern Desert of Egypt."

having only an hour to wait for the moon to rise, we pushed further on. There did not seem to be much difficulty, for I counted as many as thirty camel-tracks alongside each other, like so many footpaths over a common, a camel's tread being no wider than that of a human being. About ten o'clock we had crossed the plain and reached the foot of the nearest rocks. Here there was a small well, or rather deep slanting hole, containing a few gallons of brackish water, at which the ibex came to drink, and where we had to camp for the night. Next morning we awoke at sunrise; the long shadows of the camels, a blue-grey on the warm-coloured sand, and the morning lights, on the delicately-coloured bushes (the place of our encampment was the drainage point of a large portion of the desert), were very beautiful to behold. The low-lying rocks near us consisted of bent striated sandstone, capped with a conglomerate of angular boulders, of brilliant colours, the débris of early rocks. After luncheon on the second day we crossed the *Wadi* Keneh, in which grew occasional bushes, of two or three varieties of green, which the camels enjoyed. This *Wadi* is formed by the drainage of an extensive plain to the east, bounded on the west by a limestone range, with occasional beds of boulders. In the evening, at sunset, we arrived at Kasr el Jin, thirty miles from Keneh, the first fortified station on the ancient Roman road [Illustn. i.]. Nothing could possibly surpass the effect of this sunset on the old fortification in the desert, while sheltered underneath were the rich grey masses of the ruined and deserted village. This fortification is at a considerable elevation above the plain, perched castle-like on the western extremity of a ridge, the offshoot of an extensive, partially conglomerate, boulder range, which stretches to the eastward. The old path up the mountain is still well marked, and here I found my first splinter chips of real porphyry, proving to me that it had at one time, at least to some extent, been a workshop. The walls of the fort, about 12 feet high, were chiefly of boulders, mud bedded, while some parts were of unburnt bricks. The plan, A, is an irregular rectangle, produced by the shape of the ridge, the length being about 200 feet, and the greatest width 75 feet. It had outlook towers at the angles, and a few important walled-off rooms.



Kasr el Jin station.

The station below was nearly a square in plan, B, of about 120 feet (built also of boulders), and divided into a series of small rooms. Here also is a disused well and reservoir, partly built of burnt bricks, and an extensive outer-walled enclosure, which was, no doubt, for the caravans. There is a considerable amount of foliage here, chiefly thorn and tamarisk, which, provided the Bedawins with their camels did not destroy it, would grow to a considerable size.

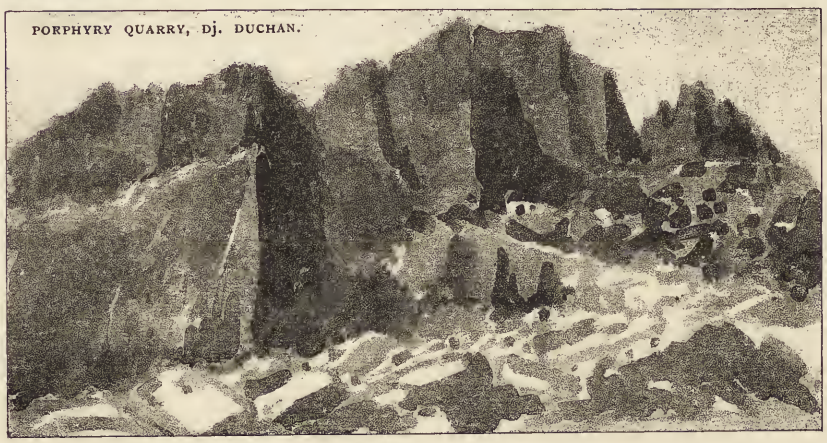
Starting early next morning from the Kasr el Jin station, our route lay somewhat north-east, chiefly over sandy ground, with a few delicately-coloured bushes and occasional

XL.—THE ANCIENT QUARRIES OF EGYPT (i).


KASR JINY.


Dj. MANFIEH.


Dj. DUCHAN.


PORPHYRY QUARRY, Dj. DUCHAN.

FROM SKETCHES MADE ON THE SPOT BY MR. BRINDLEY.

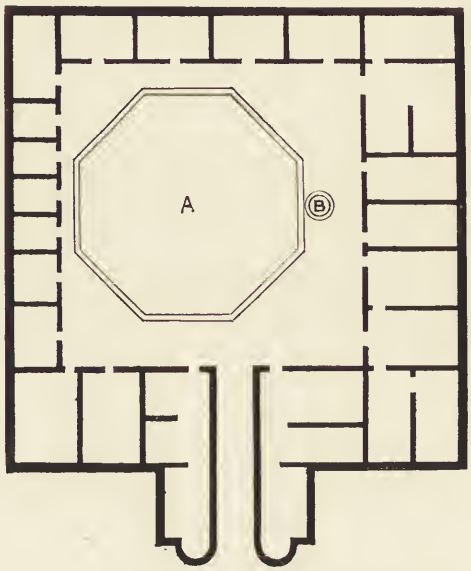
[*See pages 7—14.*]

low beds of boulders. We arrived about mid-day at the second Roman station, named Saghee. Some miles before reaching it, we had our first view of the mirage in the Desert, which, on all sides, appeared like a sheet of water with reflections. This station, being in the plain, is fortified with earthworks, the slopes of which, at a considerable distance, appeared green with vegetation, but, on nearer approach, were like sulphur-coloured scoriæ from some copper-smelting works. This embankment, which is entered by a rough wrought-stone gateway, contains a large well, partially filled up. There is also another enclosure, with a building much like a fort, also containing a well. "Saghee," according to Wilkinson, means the water-wheel, and there was one here for lifting water. Leaving this station after luncheon and rest, there lay before us a very extensive and open plain, hot and sandy, with igneous rocks in the distance, in which was a gap distinctly indicating our route. Arriving in the evening at these rocks, which were a beautiful rose-coloured granite, we pitched our tent. They consisted of white quartz with pink felspar, without hornblend, but so rotten, from the heat of the sun during long ages, that it was almost impossible to get a good rock specimen. From this spot to the Nile is a distance of about fifty miles, and though we appeared to have travelled across a level plain, I found by the aneroid, that in reality we had risen 800 feet. During our journey there had been a remarkable absence of insect life, except perhaps a solitary house-fly or two that travelled with us; but here at night when our candles were lighted, they could scarcely burn, owing to the large numbers of small moths.

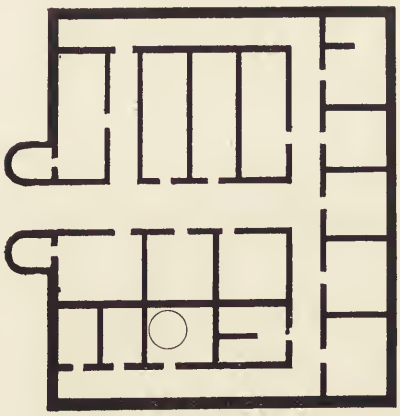
We were in our saddles next morning at 7.45, winding our way over a sandy bed, between spurs of igneous rocks, alternately of red, black, and grey, all disintegrated. At 9.45 we got the first peep, in the extreme distance, of Djebel Duchan, showing delicate blue grey against the sky, and at 11 o'clock I saw lying in the sand, to the right of the road, something that looked like a block of porphyry, which on examination proved to be a portion of a broken porphyry column roughly tooled over. It was 3 feet in diameter, and in length about 2 feet 9 inches, and had been evidently left here on account of the breaking down of a truck. This gave me great pleasure, for it indicated that I was in the right track, and my convictions were further strengthened at midday on our arrival at the third station, where I found a number of porphyry blocks partly buried, and lying about in various directions. This third station is named Deir, or the Monastery. It is a square of about 100 feet, built of rough stones, and entered by a gateway on the south side with projecting towers, and rooms over. About one-third of the interior space is taken up with a large reservoir, A, of considerable depth, with a deep well, B, adjoining, built of brick, but now dry, and partially filled up with rubbish [see next page]. In the remaining space, which is appropriated to rooms of different sizes, I found chips of porphyry and of a rich green serpentine, named in the Roman collections, the "Green of Augustus," * and very rare, being found at Rome only

* It was quarried in an adjoining mountain, as I found out at Cairo from Mr. Mitchell, the geologist, whose collection of rock specimens of the eastern coast, made for the Egyptian Government, often under great privation and difficulty, is one of the most instructive and comprehensive of any that I know. The collection, I am pleased to say, now forms part of a new Museum at Cairo.—W. B.

in small objects. This "Green" is described very accurately by Pliny, who tells us it was found in Egypt. Leaving the Monastery station after luncheon, we came to a spur ridge of black-trap rock, which had originally extended across the level road, blocking the direct way to the station, and through which the Romans had cut a broad pass, leaving, on the eastern side, the upright face of the rock. A few miles further on I saw a red porphyry-looking ridge, extending from east to west, which turned out to be nothing more than igneous rock of a very friable nature. The scenery here became very picturesque, as peeps of the high mountains were obtained, and towards evening we were near enough to the rocks to take advantage of the shade which was enjoyable, although the sand was very hot. At sunset we arrived at our resting place, *Wadi* Gatta, which was a delightful, verdant spot, with a quantity of desert foliage, high bushes, and delicately tinted, pleasantly scented plants. This valley on three sides is entirely rock-bound with mountains, five and six thousand feet high, without a single green sprig on their face, and, were it not for the absence of verdure and of water, it would bear some resemblance to Lanterbrunen. Here we rested a whole day, giving our camels drink at a charming dripping well, covered with palms, figs and ferns, about five miles off, where the mountains press together forming a gorge, and are abruptly stopped by a cross mountain, in which there are natural reservoirs. This valley, at its broad entrance, contains the fourth Roman station from the Nile, and is a simple walled enclosure with rooms and an outer court. Leaving the Kittar valley next morning we arrived, after one hour's ride, at the watershed, which is about 2,400 feet high, the drainage going to the Nile at Keneh and the Red Sea, a distance of 70 miles from the Nile, according to Mr. Floyer, and to the Red Sea about 30 miles. The full range of Djebel Duchan was now in sight, its great sombre mass of heavy ruddy grey extending as far as we could see. Hereabouts we passed some granite boulders quite 25 feet high, which were peeling through



Deir station, or Monastery.


Station at Wadi Gatta.

the action of heat and cold, the edges curled up three skins deep, like an overdone potato with its jacket on.

At noon we arrived at the fifth station, which was at the foot of an ancient pass over Djebel Duchan [Illustn. i.]; here we decided to pitch our camp while I made a mountain excursion in search of the quarries. This station is of considerable size, very similar to the others, and contains a conical roofed oven, or smelting furnace, as quantities of ashes and scoriæ are scattered about; also shells of fish, which had been used for food. It is protected by a fort, consisting of an isolated granite rock, with a wall round it, and circular entrance towers. The form of this rock is so irregular, some one part of it being always in shadow, that it is available for shelter and repose. This desert route, which I passed over, was the highway, by Myos Hormos, to India and the East, prior to the Christian era, as Strabo remarks concerning it:—"Now watering places are provided; "water is also obtained by digging to a great depth, and rain-water is found, although "rain rarely falls, which is also collected in reservoirs."

On March 16th, at 5.30 in the morning, I began my ascent to the quarries, in company with a Luxor Arab, who could speak a little English; he was the cousin of the Bedawin sheik, who knew the mountains through tracking the ibex. The Bedawin carried his gun and a skin of water on his back, and a cake of doora bread in the folds of his loose dress. The Luxor man had my sketch satchels, a bottle of cold tea, and some luncheon.

From the back of my tent, making straight for the saddle-pass of the mountain, was an ancient Roman road, about 18 feet wide, off which all the stones had been cleared, and banked up on either side with occasional piers, built of large loose stones, to mark the way more distinctly. This road is still in capital preservation, except where the torrents have cut through it, although it cannot possibly have been used for 1700 years. It extends from an ancient well, which still contains good water, to the first ravine, where it narrows to a four-feet track, going zigzag up the mountain like a Swiss path. After climbing about 1,000 feet up this ravine, we came to an old station, some 70 feet square, built of loose stones, with only one entrance, and divided into a number of small compartments. Here we rested about ten minutes, but it was so intensely cold from the night air and chilliness of the rocks, that we were glad to move on. The saddle-pass for which we were making was straight over our heads, the road became still narrower, and the zigzags very sharp and short. All the way up I had been diligently looking for porphyry, but was very dispirited, through not finding a fragment in any ravine. The entire mountain consists of trap rock, broken up into irregular angular pieces and masses of all sizes, chiefly through the action of the sun and the cold of nights causing expansion and contraction. At 8.30 we arrived at the summit of the pass, the altitude by the aneroid being 3,100 feet. Here I found a square watch-tower, some 15 feet across, built of loose stones, the view from which over the other side showed me that the mountain I had ascended was part of one side of an immense amphitheatre of rocks, of long horse-shoe form, giving the impression of a huge crater of an extinct volcano, the part where I was being the commencement of the bend. Down below, at the bottom of the amphitheatre, was the ancient town or *Medina*, and a temple, of which

the Bedawins thought I was in search, but, not having found at present any indication of porphyry, I was almost in despair; so, sitting down, and with a good field-glass to examine the rocks on the opposite side of the amphitheatre (the sun being then on them), I espied a rosy-tinted porphyry-looking mass, standing out from the slope of the mountain, which elsewhere was of a different colour, being of a heavy brown. Further observations revealed a path, which led from where I was standing to this mass of rock, and which I could trace up the face of the opposite mountain. I therefore pointed and explained to my companions that I wanted to ascend the mountain opposite, to which they emphatically said No, and kept on exclaiming, "Medina, Medina." So, after half an hour's rest, we again started, when, arriving at a junction of paths, I sat down, took another look, and became more convinced that I saw porphyry opposite. Determined to go in spite of my attendants,—who were very obstinate, their cry still being, "Medina, Medina"—I took my sketch-bag and luncheon, and went off alone. But after I had proceeded about seven minutes, I heard a cry and found the Arab following me. The path soon became interesting, being built up on solid masonry, to a considerable height in some places, where ravines had to be crossed. After an hour's descent, we arrived at the foot of the opposite mountain, when my delight knew no bounds, for I found the ground strewn with pieces of the most sumptuous porphyry, and, pushing on a little further, I arrived at the actual pitched road, or slide, down which the blocks were delivered. Here also were remains of workmen's sheds, and a number of broken blocks, some of which were 8 feet long. My troubles now appeared at an end, and with renewed energy, though under a blazing sun, I commenced the ascent of this second mountain. The road for a short distance was very good—winding round the crags—with piers constructed at intervals at each side for lowering the blocks. But after a while it became strewn with irregular masses of rock, and in many places was utterly destroyed by the torrents which, doubtless, occur periodically. It became so bad that we were compelled to leave it, and make our way as best we could up the mountain side, which meant continued climbing at a sharp gradient, over rough irregular blocks of all sizes. When nearing the top the block road again became good.

It was now noon, and I was completely prostrate, and compelled to lie down under the shade of a ledge of rock. Some cold tea and an orange seemed to put new life into me, so once more I continued the ascent, thinking that the road was taking me straight into the quarry, but alas! I found on arriving at the top that it began to descend on the other side, and I could see a splendid road winding round to the valley below. This road quite unnerved me, so retracing my steps I looked about with the glass, in search of veins of porphyry in the rock, or veins that the Romans had worked as mines; but all to no purpose, so I decided to rest awhile and eat my lunch. Finding a comfortable spot, and looking straight out before me, I saw the whole of the desert mapped out down to the Red Sea, with the entire range of the mountains of Sinai in the distance. After luncheon, I made a colour sketch, and being rested I started again in search of the quarry. After some more climbing I came across a number of ruined workmen's sheds, but no porphyry was to be seen. Sitting down and staring at a mass of rock, I noticed

wedge holes all over it, similar to what I had seen in the granite quarries of Assouan. My wonder now was what the Romans had been working here, for it looked much like a mass of brown felspar. Scaling off a chip with the hammer, I immediately discovered that the entire mass of rock was porphyry, and everything under my feet, and all the blocks about, were the same precious material, the ochre colouring being only a film on the surface. I now examined the quarries, and found that they produced, not only the choicest spotted varieties, but every sort—even to the brecciated ones, which are very uncommon, and also the rare green greys. I now saw distinctly where the Romans had extracted their grandest monoliths, one square columnar mass being half wedged* off by a series of holes up the vertical face of the rock. Looking down into a ravine, I noticed a great number of blocks that had been hurled below, as the easiest way of getting them down, although a very rough one.

The broad good road into the other valley appeared to have been made for block transit subsequently to the one I had gone up. If there is an outlet from the rocks towards Deir station, it would be an incline all the way to Keneh, and a shorter route by twenty-five miles (as it is about twenty-six this way), while round by Kittar valley to the quarry it is about fifty-one miles. What further confirms me in this opinion is that I could not find any fragments of porphyry, either going or returning, between Deir station and Djebel Duchan.†

From the quarry I now observed a path making direct towards the old town in the amphitheatre valley, which I determined to follow. In its various windings it passed several small porphyry quarries of rich colour, but not of thick bed, I think, being only veins in a disintegrating greyish granite, much like rotten Purbeck marble. I noticed alongside the path in one spot a porphyry bust, life size, roughly picked into shape, evidently quarry-prepared for the artist. Mortars also lay about on the mountain side, the same as marble mortars do at Carrara, where the boys and cripples chisel and work them out of the waste pieces. I reached the valley about 3.30 and found the old town (el Medina) on a slight elevation, so as to be above the torrents. It was much like all the other Roman stations, only a little larger, consisting of small rectangular rooms, with one or two more important ones. In the plain of the valley there was a well or cistern, of about 15 feet diameter, with piers all round it, built of stones plastered on the face, on which were scratched rude drawings of ships with single masts; and further up the valley was a temple of small dimensions, with an altar, all in wrought granite, the portico of which had fallen down, but the details of which were treated very simply though skilfully to suit the material. A dedicatory inscription in Greek of the time of Hadrian was cut in the frieze, which, translated by Mr. Murray, of the British Museum, reads: "For the safety and perpetual success of our Lord the Emperor Hadrian "and his whole house, this temple and its precincts [were dedicated] to the Sun God,

* If the Romans had used wooden wedges, as many think they did, they could not have water-soaked them in this position.—W. B.

† From a survey recently made for me, this road ends in a ravine, into which the blocks were "slid," the road having been made for the purpose of drawing up the blocks from this depôt.—W. B.

" Great Serapis, and the gods associated with him, by Epaphroditus Sigerianus, a slave of " the Emperor, when Rhammius Martialis was Prefect of Egypt, Marcus Ulpius Chresimus " Procurator of the Quarries, and Rufus Proculeianus [Superintendent of the Marble Works]." In a similar inscription at Djebel Fatireh where Epaphroditus dedicated another temple to Serapis A.D. 118, he is called " Lessee of the Quarries." On a plastered wall of the cell of the temple, in large red letters were W. 1823 ; L. 1845 ; S. 1877-78 ; meaning Wilkinson, Lepsius, and Schweinfurth. Under these, in indigo, I added *W. B.* 1887, adding the words *and quarries.* As evening was coming on, I had not time to examine properly these interesting archæological remains. I observed in this valley, as well as on the camp side of the mountain, a number of bushes (or rather trees, for some of them were 8 inches thick in the wood), one of which was a species resembling English broom, with seed pods. This proved that there must be water below. In other respects the mountains have not the slightest vestige of vegetation, being only ranges of rocks of browns and greys (the valleys looking green from shaley colouring), with occasional pink where they are of pink granite. Although the old Roman wells are partially filled up with rubbish and now dry, the Bedawin knew where to get water, for, running down the valley, he shortly returned with his goat skin full of beautiful water, which was very refreshing—particularly after having drunk water, all day, out of the skin which had been shaken about under a broiling sun, till it tasted like hot rancid bacon broth. We now made the best of our way back, arriving at the summit of the pass a little before sunset. The descent, owing to the dusk, was difficult, and before we reached the bottom it was quite dark and dangerous—so much so that, on arriving in the plain, we could not possibly find the old Roman road, by which we had gone up in the morning, and had to pick our way in single file through the rough stones, the Bedawin going first. Our progress was very slow and fortunately so, for suddenly the Bedawin gave a scream and disappeared over the edge of a deep ravine; but he escaped with a cut leg, which he doctored with a plaster of sand. At length, after about another hour's groping, we saw lights from the men of our camp, whom the dragoman had posted on the heights to look out for us. The next day was spent in rest. Delightful views of the Red Sea and the sloping desert plains, with Sinai in the distance, were obtained from the small hills near the camp. Our return journey was by the same road as that by which we had come, and I am thankful to say that we reached the Nile in safety, after thirteen days spent in the desert and about 170 miles of camel riding.

I am enabled to increase what little interest may be attached to this subject by embodying in my Paper a valuable communication from Mr. W. Topley, F.G.S., Assoc.Inst.C.E. (Geological Survey of England), who presents a scientific account of the Quarries, the search for some of which I have just described.

[*Geological Note.*]

The sketch-map of the geology of Egypt, of which these memoranda form a brief explanation, is only intended to give a very general idea of the distribution of the chief rock-

masses, especially in relation to the more important quarries. The topography of the map has been prepared from maps exhibited by Mr. Brindley when his Paper was read, and from these maps the positions of the quarries have been taken [Illustn. ii]. The difficulties attending the construction of a general geological map are still considerable, though the literature of the geology of Egypt is extensive. For many parts near Cairo and along the Nile much more detail could be inserted than is here necessary; for other parts the boundaries of the rocks are scarcely known. Dr. Schweinfurth and Mr. Mitchell, of Cairo, have for years been collecting information, and all recent travellers have freely benefited by their extensive knowledge; but only scattered notices of their researches have yet been published. It is much to be hoped that their results will soon be systematically worked out and published with a detailed map.

The oldest rocks of Egypt occur to the south, on the confines of Nubia; and again along the mountainous area of the Arabian Desert, between the Nile and the Red Sea. These rocks are of great antiquity, probably Archæan; they are for the most part highly metamorphosed, and are invaded by numerous dykes and bosses of igneous rocks, in which many of the more important quarries have been excavated.

Overlying these oldest rocks, but separated from them by an immense period of geological time, comes a series of beds, chiefly sandstone, but having other strata associated with them. This series contains rocks of very different geological ages, the precise relations of which are not yet clearly understood. For the present purpose it will suffice to speak of it as the "Nubian sandstone series."

Above this series of beds come the rocks which form the chief area of Upper and Middle Egypt. They are largely made up of limestone, but contain numerous other beds—marls, sandstones, conglomerates, &c. The lower portions are of the age of the Chalk of Western Europe—these are termed "Cretaceous beds;" above these come beds of Eocene age. The two series thus correspond in age and relative position to the rocks around London.

All these stratified rocks dip gently along the Nile from south to north; and also, but more rapidly, from the Arabian chain towards the Nile, or from east to west. Therefore, as we travel down the Nile from the south, or towards the Nile from the east, newer beds successively come on. The older rocks, especially those of the Arabian Desert, rise into wild and rugged mountainous masses; the newer rocks generally form wide-spreading monotonous desert areas, cut into by the valleys; the intermediate beds (the Nubian sandstone series) form an intermediate type of country. The newest beds of all, those now in process of formation, compose either the fertile alluvial flat of the Nile, the Delta, and a few smaller areas connected with these; or the desert area of blowing sand. Next older in age are the terraces along the Nile, the beds along the flanks of the Arabian chain and the border of the Red Sea, and some other areas near the Delta. Of quite recent date, too, are the sandstones which are quarried a few miles west of Alexandria.

The Tertiary rocks of Egypt are of great interest. They cover a wide area, and contain important quarries of building stone. On the map very different beds are included within the one tint employed to denote the Tertiary beds. East and west of

Cairo there are hard sandstone and quartzite beds, with which occur the famous petrified forest; these (the "Nicolia Sandstones" of Zittel) are of late Miocene date; the beds are now used mainly for road-stone and mill-stones, but they were anciently quarried for more important uses. Underlying the Nicolia sandstones are the Nummulitic and other Eocene limestones, the most important quarries in which are those at Djebel Mukattem near Cairo; but numerous other quarries border the Nile further south. The Nummulitic limestone for the Pyramids was obtained about ten miles south of Cairo, on the east bank of the Nile. It is this series of beds which gives the characteristic scenery to almost the whole of the Nile valley from Cairo to Silsilis; the alternations of hard limestones with softer marly bands, all lying nearly flat, weather into terrace-shaped hills,—the harder limestones forming the steeper slopes or the vertical walls. The greater number of the limestone quarries in Egypt, and also the grottos and caves, have been excavated in these Eocene beds.

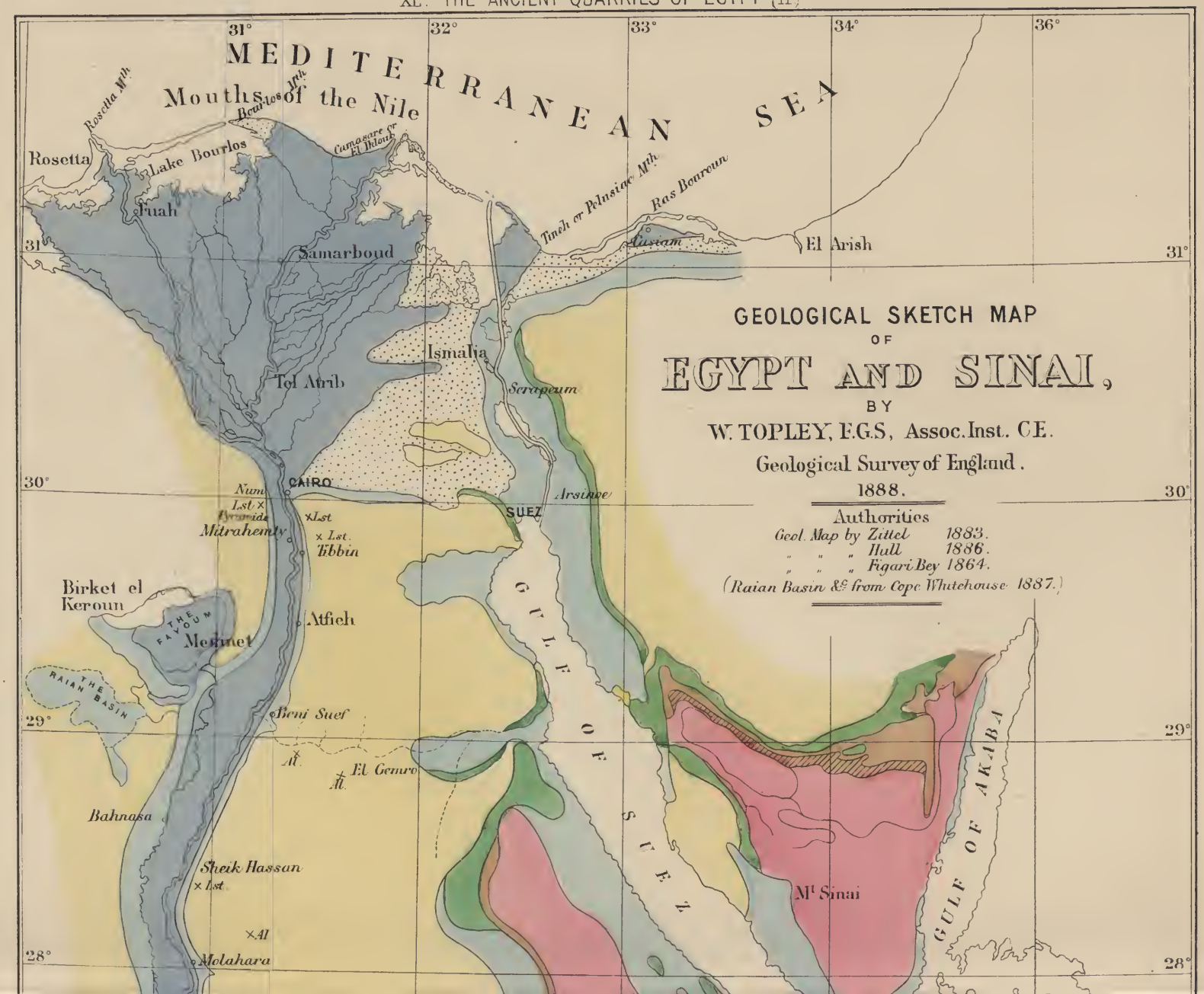
The alabaster of Egypt (Oriental alabaster) is a deposit of *carbonate* of lime, occurring in the Eocene beds; it thus differs from the stone now generally known as alabaster, which is *sulphate* of lime. Some of the old quarries for this beautiful stone were near Alabastron (whence the name); those for modern work, as for the alabaster Mosque at Cairo, are near Beni-Suef.

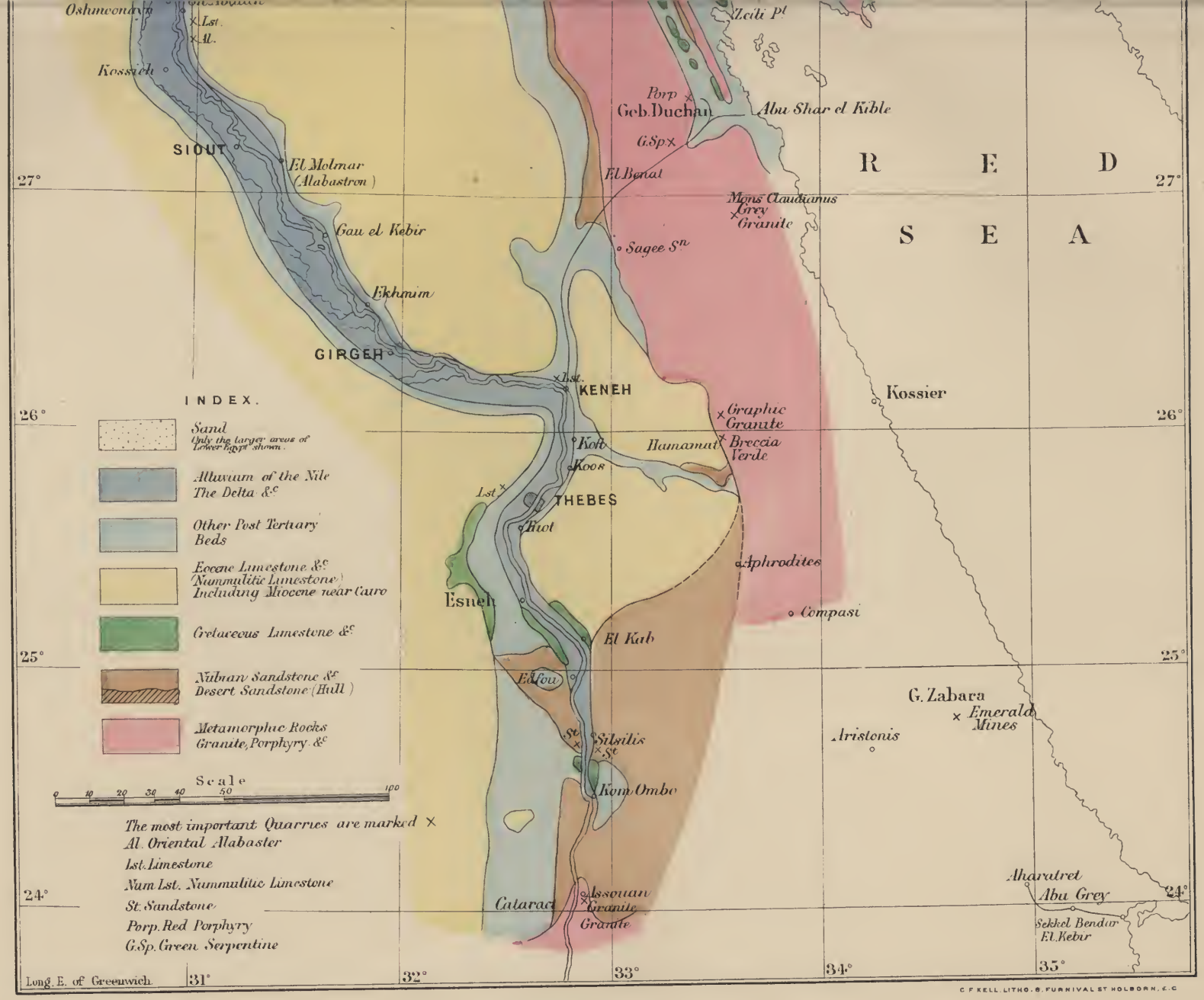
The limestones of the cretaceous rocks are not much quarried; indeed these beds occupy but a small space on the slopes of the Nile valley, from Thebes to Edfou, and again a small area south of Silsilis. Quarries occur in these limestones at Djebel Attakeh, near Suez.

The Nubian sandstones are generally described as extending northwards on the Nile only to Silsilis, where occur the large quarries whence the sandstones for Thebes and for most of the temples in Upper Egypt were obtained. Zittel's map shows the sandstones near the Nile as far as Edfou. They flank the Arabian chain, and cover an immense area in Nubia; they are the chief source of the wind-blown sands of the Desert.

The old crystalline rocks of Assouan, &c., have recently been studied by Sir W. Dawson, who recognizes in them representatives of the Laurentian rocks of Canada. He says that there is here a newer series of metamorphic rocks, resting upon the denuded edges of the older series. The older beds are penetrated by dykes and bosses of granite, diorite, &c., which stand out in bold relief from the more easily decomposed rocks around; in these dykes the most important quarries occur.

The rocks chiefly quarried near Assouan may be referred to generally as granites; one largely used in monuments is described by Professor Bonney as a "coarsely "crystalline rock, with large pinkish-red felspar crystals, quartz, some whitish felspar, "and black mica . . . . It has a gneissose aspect." The colour of the granite depends mainly upon that of the felspar, a red or pink felspar giving a reddish granite; a white felspar, a grey granite. The rock which was originally termed "syenite" was one of the rocks at Syene (Assouan); but this rock would now be termed hornblendic granite—a granite containing crystals of hornblende. The syenite of the German petrographers consists essentially of orthoclase felspar and hornblende, and thus differs from the rock of Syene in containing no quartz.


GEOLOGICAL SKETCH MAP
OF
EGYPT AND SINAI,
BY
W. TOPLEY, F.G.S, Assoc. Inst. C.E.
Geological Survey of England.
1888.
Authorities
Geol. Map by Zittel 1883.
" " " Hull 1886.
" " " Figari Bey 1864.
(Raian Basin &c from Capt. Whitehouse 1887.)
MEDITERRANEAN SEA
Mouths of the Nile
Rosetta Mth.
Bourlos Mth.
Rosetta
Lake Bourlos
Tuah
Samarboud
Tel Atrib
Ismalia
Scrapeum
Tineh or Pelusiac Mth.
Ras Bourroun
Ausiam
El Arish
CAIRO
SUEZ
Arsinoe
Num. Lst.
Pyramids
Mitrahenny
Lst.
Tibbin
Birket el Keroun
THE FAYOUM
Medinet
Atfieh
THE RAIAN BASIN
Beni Suef
El Gemro
Bahnasa
Sheik Hassan
Lst.
Al
Molahara
GULF OF SUEZ
GULF OF AKABA
Mt Sinai
31°
32°
33°
34°
36°
30°
29°
28°



C F KELL LITHO. 8, FURNIVAL ST HOLBORN, E.C

SEE Mr TOPLEY'S MEMORANDA, PP. 14-18.

XL.—THE ANCIENT QUARRIES OF EGYPT (iii).

The Phototype Co., 303, Strand, London.

MONOLITHIC SHRINE,

TEMPLE OF ISIS, AT PHILÆ.

A HOUSE IN CAIRO,

WITH ANCIENT MARBLE AND PORPHYRY.

[FROM PHOTOGRAPHS.]

Graphic granite, in which the crystals of quartz and felspar have so arranged themselves as to have a rude resemblance to Hebrew writing, was quarried near Hammamat. It is also found in other parts of the Arabian chain. Generally this variety of granite occurs in veins, and this, probably, is also its condition here.

True diorite (plagioclase felspar and hornblende) occurs near Syene. But another rock, also termed diorite, which occurs in the Arabian chain, is described by Sir W. Dawson as "Anorthosite Gneiss" (a gneiss containing lime-felspar). This is an exceedingly hard and durable stone; from it were carved the nine statues of the temple opposite the pyramid of Chephren.

The red porphyry of Djebel Duchan is a rock about which much has been written. Rocks not very dissimilar in composition and appearance occur in the Sinaitic peninsula and elsewhere, but they do not possess the same high qualities as an ornamental stone as that from Djebel Duchan. This is probably a dyke of igneous rock penetrating the Archæan rocks. It consists of crystals of plagioclase felspar in a purple felspathic paste. Some varieties are curiously brecciated, but the fragments are essentially of the same chemical and petrographical character as the rock in which they are embedded, although to the eye appearing very different. Mr. Rutley, who has investigated the brecciated variety, believes that this is due simply to crushing.*

The famous breccia-verde occurs on the western flanks of the Arabian chain. It is made up of fragments of rocks, some from the mountains, some from sources as yet unknown. The geological age of the breccia is not certain; but it probably belongs to the later Archæan series. The breccia consists of rounded and angular fragments of granite, porphyry, diorite, gneiss, &c., cemented by a hard, feebly calcareous paste, generally green in colour, but sometimes purplish red. The most important quarries of this breccia were near Hammamat, but a rock resembling it occurs near Djebel Duchan and Djebel Zeit.†

In addition to the authorities before quoted, the following may be consulted for information upon the geology of Egypt. The older writers, before 1869, are fully referred to by Lartet;‡ only the more general, or the English authorities before this date, are here mentioned.

Newbold: *Quart. Journ. Geol. Soc.*, vol. iv, p. 324, 1848.

Hawkshaw (1st Cataract): *Ibid.*, vol. xxiii, p. 115, 1867.

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* *Quart. Journ. Geol. Soc.*, vol. xli, p. 157, 1885. This rock was well described by Delesse, from specimens collected by Lefevre (*Bull. Soc. Géol. France*, ser. 2, t. viii, pp. 484, 524, 1850). Rosenbusch, *der Massigen Gesteine*, 2 Abt. p. 472, 2 ed., 1887, says that the red colour is due to red epidote (Withamite). The only other known locality for Withamite is the porphyry of Glencoe. The fullest description of the porphyrite, its history, uses, &c., is that by Schneider,—*Uber den roten Porphyr der Alten* (*Naturwiss. Beitrage zur Geographie und Kulturgeschichte, Dresden*, 1887). Wilkinson visited the quarries in 1823, and collected specimens, which are now in the museum of the Geological Society of London.—W. T.

† A small area of volcanic rocks, not shown on the map, occurs near Abu Za'bel, N.E. of Cairo.

‡ See Lartet's *Essai sur la géologie de la Palestine et des contrées avoisinantes*, Paris, 1869, p. 107, &c. This work contains a great amount of information upon the geology of Egypt, with an account of previous publications on the subject.—W. T.

Sir W. Dawson: *Geol. Mag.*, dec. iii, vol. i, pp. 289, 385, 481, 576, 1884; and vol. v, p. 101, 1886 (Notes on the Rocks, by Professor Bonney). A briefer and more popular account is given by Sir W. Dawson in his *Egypt and Syria* (*By-paths of Bible Knowledge*, No. vi) 2 ed., 1887.

K. Zittel: His map was published in 1880, "Libyschen Wüste,"—*Sitz. Bayerischen Akad. Wiss;* a revised edition of the map, with full description, was issued in 1883. An excellent abstract of this important work was given by Dr. G. J. Hinde in *Geol. Mag.*, dec. iii, vol. i, pp. 172-179, 1884. The Geological Notice in Baedeker's Lower Egypt is by Zittel, 2 ed., 1885, pp. 60-63. The building and ornamental stones of Egypt, as exhibited in the British Museum, are described by T. Rupert Jones, *Proc. Geol. Assoc.*, vol. viii, pp. 359-376, 1884. O. Frass: *Aus dem Orient*, 1867.

The relations of the Nubian sandstone are discussed by W. H. Hudleston, *Geology of Palestine, Proc. Geol. Assoc.*, vol. viii, p. 1, 1883, and vol. ix, p. 77, 1885 (published in separate form, 1885).

The country near Cairo and thence to Suez has been often described:—Bauerman and Foster, *Quart. Journ. Geol. Soc.*, vol. xxv, pp. 17, 40, 1869. Carruthers, *Geol. Mag.*, vol. vii, p. 306, 1870. Milne, *Geol. Mag.*, ser. 2, vol. i, p. 353, 1874. Hull, *Mount Seir*, pp. 17-27, 1885; this work and the same author's *Geology of Western Palestine*, 1886, contains a geological map of Palestine, Sinai, and Lower Egypt, of which use has been made in constructing the map here given. Fuchs, *Denkschr. K. Ak. Wiss. Wien.* Bd. xxxviii, p. 25, 1878. Notices of Dr. Schweinfurth's work are given by Dr. Beyrich, in *Sitz. K. Preuss Ak. Wiss*, 1882, pp. 163-176.

J. T. Prince Zagiell, *Aperçu général des Formations Géologiques de l'Égypte*. . . . . Paris, 1872. The geological map for this work was published in London (by E. Stanford) in 1871.—W. TOPLEY.

I propose now to consider the materials used in the construction of the Pyramids. Originally seventy in number, all on the western bank of the Nile, they extended in a continuous line for a distance of eight miles. Twenty of them still remain, the group of Geezeh comprising the largest. Much of the material is a Nummulitic limestone, quarried on the spot in large cubical blocks, which were laid in pyramidal steps.

Limestones.—The triangular casing blocks, a fine cream-coloured, magnesian limestone, quarried at Toora and Masarah, on the opposite side of the river, were all cut from the solid rock and dragged down on sleighs to the water, which, in time of high Nile, would be equidistant about five miles from the quarries and the pyramids. These casing stones, except a few lower ones recently uncovered, have all been taken away for the building of modern Cairo. There are several pieces in the British Museum, and a fragment, with the original tooling of the joints, that I picked up on the spot and applied in position (this, for practical purposes, is very valuable, showing the vertical and horizontal joints, and giving the angle correctly) shows the surface wear for a period of at least 4,000 years. No stone in Egypt has worn better than this casing stone; it has actually

withstood the changes of climate equal to, or better than, the granites. In the hilly range immediately behind Thebes are quarries of fine limestone which was used in considerable quantities at Thebes, some of the most delicate existing hieroglyphics being carved in it. The famous royal tombs, in the valley of the Kings, are all excavated in the strata of this rock. Owing to the extreme fineness of the grain, the Egyptians were also very partial to this limestone for sculpture, sepulchral slabs, and sarcophagi of mummy form. Its nature is that of a close, hard chalk, only much harder and of warmer colour. It occasionally contains brown flints, which, sometimes, are Egyptian Jaspers, that were dexterously cut by the ancients into " scarabs ; " and even the hardbeds of the limestone itself were used for this purpose. The Arabs of Luxor still manufacture most of their spurious antiquities from this stone, but, being clumsily coloured, deception is apparent. Owing to the dryness of the climate, this stone, notwithstanding its exposure for thousands of years, has worn well.

Sandstones.—The next stone of importance is that most frequently used in the building of temples. This was a sandstone of warm grey colour and of fine texture, the quarries of which are at Silsilis, on both banks of the Nile, about ninety miles south of Thebes. The formation is a sandstone ridge, extending across the Nile, which has cut through it—the river at this part narrowing to a little over 1,000 feet. Nothing in Egypt gives a truer conception of the magnitude of the building operations of the Egyptians than the working of these quarries, which consist of extensive grottoes and open court-like spaces, showing where the old workmen followed the best beds, the blocks being cut out with the greatest care and tooled into shape on the spot, before they were floated down the Nile. Stones of immense size were obtained. For example, the architraves of the Great Hall of Karnak were no less than thirty feet long, each stone weighing sixty-five tons. In building operations the blocks were usually set dry, the finished faces being afterwards coated with stucco, to receive colour decoration, which, in the case of columns, covered the joints, so as to present the appearance of monoliths. This fine stucco, in some cases, appears to have been hardened with albumen or gum.

Granites.—The famous granite rocks of Syene, rising to the height of 7000 feet, form part of the igneous range which runs parallel with the Red Sea. An offshoot of this range crosses the Nile at Assouan (the ancient Syene), so forming the first cataract—the fall being 50 feet. The road from Assouan to Philæ is through a desert valley of granite rocks, consisting of weather-worn masses of rounded rectangular form, piled on each other like Cyclopean masonry. The surfaces are all decayed and crumbling, conspicuously curled up and peeling off several thicknesses deep. This must have been so in early times, as many of the huge massive boulders have surface-sculpture in panels, sunk into the solid stone, which appear as perfect as if recently executed. Most of the masses are red or rose, but some are blackish grey, while others are grey with large crystals of pink felspar. Occasionally red and grey come together in the same block, as may be seen in the colossal head and shoulders of Rameses II in the British Museum. There are also intrusive masses of felspar, mostly black on the surface, and not decayed, like the granites. Sometimes you see a mass of felspatic rock, with a vein of granite

running through it, as may be observed in the statuette of the son of Rameses II, also in the British Museum. I mention this to show that many of the singularly-coloured and variegated granites containing large felspar crystals, that we notice in Rome and elsewhere, are nearly all from the quarries at Syene. These ancient quarries are in the eastern desert, about two miles from Assouan, at an altitude of 80 to 100 feet above the Nile. They are very extensive, but all on the surface, the greatest depth not exceeding 80 feet. The granites of these quarries were used by the ancient Egyptians [Illustn. iii, A] not only for their monolithic obelisks, colossal statues, sarcophagi, and ordinary sculptures, but also as building material in the temple of the Sphinx, and in the great sarcophagus chamber of the pyramid of Cheops, the high walls, the ceiling, and the floor of which are made entirely with polished blocks of this material. In one of these quarries is the block known as the unfinished obelisk, which is a dressed mass of rock, 95 feet long, attached on the bottom bed and back to the parent rock. The width is 11 feet, but it is not tapering, obelisk-like, and moreover has a series of transverse cuts, about 12 feet apart on the top bed, indicating a preparation for blocks for sarcophagi; while the top end has a groove running lengthwise some 30 feet, indicating a small obelisk or lintol. I was much disappointed after all I had read about this block, and I came to the conclusion that it was not an obelisk, but a bed of stone, dressed by a gang of task-workmen or convicts, to be cut up into sarcophagi. Some say these cross-wedged channels are of a subsequent date, but, not being able to detect any workings of an earlier period, I was persuaded that the work was of Roman times. This is not to be wondered at, considering the immense masses that were quarried, worked, and taken away by the Romans during their occupation of Egypt. The monolith columns of the portico of the Pantheon, and the so-called Pompey's pillar at Alexandria (the shaft being 65 feet long and 6 feet 9 inches diameter), with numerous others of large size in Venice and elsewhere, came from Syene. Inscriptions also inform us that, under Caracalla, Septimius Severus, and Diocletian, new quarries were opened at Syene. In addition to the quarries of Syene, there are those of grey granite, the *lapis Psaronius* (spotted like a starling), used most extensively in Rome for the Forum of Trajan, as well as for seven of the monoliths in the portico of the Pantheon. These are over 46 feet long and 5 feet diameter. The quarries are near the porphyry ones, between the Red Sea and the Nile, now called Djebel Fatireh. Mr. Floyer, who was encamped some time in these quarries, gave me a specimen of the rock, and informed me that pillars, 59 feet long, and 8 feet 6 inches diameter, accurately wrought, and of an estimated weight of 255 tons each, are still lying in the quarries, which were in full activity in the time of Hadrian. They seem to have been worked only by the Romans, and it may have been one of their convict settlements. They are called by historians the quarries of Mons Claudianus, though they must have been worked before the reign of Claudian. The four great monoliths lying in the cloister of Trèves (the Augusta Trevirorum of Roman times) appear to be of the same granite. In the museum of that town there are examples of rare coloured marbles, including imperial porphyry, all of which have been found among the ruins of the ancient city. The granites and

syenites of Egypt have not worn well, when compared with some inferior stones. Most of those which were polished retain their dull polish still—the decay being chiefly from the peeling off of the polished surface. I have seen in some places patches, —a few feet square, and not more than one inch, and often less, in thickness,—loose, and ready to drop off with the least touch. The great polished blocks in the temple of the Sphinx appear generally quite sound, but if tapped with the rule they sound hollow, like a tile floor that is lime blown. The great obelisks at Karnak are peeling, so when we exclaim about the decay of our Cleopatra's Needle, we are liable to forget that we did not receive it in a sound condition. The colossal arm of Thothmes III, in the British Museum, in its half-peeled state, is a fair example of the state of many of the monuments in Egypt.

Imperial Porphyry.—The ancient Egyptians, with all their love for beautiful stones, never seem to have discovered the choicest product of their mountains—a pleasure reserved for those wonderful Romans, who, in all their military expeditions, must have been accompanied by men of science to investigate the resources of newly-acquired countries, and who appear not to have neglected even the most out-of-the-way places, however difficult of access. Nothing can confirm this more strongly than their discovery of a noble red purple stone on the ridge of a mountain, 4,000 feet high, without a scrap of verdure on its face—a wilderness of desolation and fallen rocks, a Vesuvius without smoke to entice the inquisitive, accessible only across a desert, 100 miles from the first essential of human existence—food. Having found a valuable rock in this remote spot, they established a colony, which, according to the calculations of Sir Gardner Wilkinson, must have contained thousands of workmen, who were entirely dependent upon the Nile for their supplies. The quarries are on Djebel Duchan (in Arabic the mountain of smoke), which rises abruptly out of the plain to the height of 5,600 feet [Illustn. i]. The mountain is covered with roads and paths, being short cuts from this village to another one over the western mountain; also to the quarries, the Nile, and the Red Sea. From the last they obtained shellfish, heaps of shells still remaining on the spot. In addition to these roads, there were two grand block roads partially pitched; and with piers at the sides for lowering the stupendous blocks, by the aid of ropes, as at Pentelicus. Small towers were also erected as outlook stations for the guards. These block roads were formerly continued all the way up to the quarries, but are now in many places destroyed or buried. The quarries are near the summit of the western half of the mountain; the porphyry protrudes in massive blocks in one place 120 feet wide, while some of the choicest varieties are not more than 10 feet broad. It appears to have been upheaved through a mass of granite and black shaley trap rock—the granite being burnt apparently by the heat of the porphyry. The great mass appears of a tolerably uniform texture, but some of the obtrusions are very different, being worn volcanic masses of various tinted porphyry boulders, embedded in an amorphous purple felspatic paste. This gloriously coloured stone seems to have been the only one in the scale of colour that the Romans lacked. It contained depth with richness, and came so near the imperial purple in tone, that it was afterwards named porphyry. The quarries from the first being imperial and worked

only by and for the State, porphyry never became a commercial material, but there is evidence that the influence of rich citizens was occasionally exercised to cheat the Emperor of a little of it for private use.* The early Emperors seem to have guarded it most jealously, and, down to the time of Hadrian, must have quarried far more than they had either skilled men to work up, or buildings in which to use it. In all probability there were reserve depôts in Alexandria, where lapidaries and artists resided, a source of supply for the large quantities used by Constantine. The earliest mention of porphyry is by Pliny, who refers to a statue of this material having been presented to Claudius. A number of important statues still exist of about this date, and others, in which gilt, bronze, and marble are employed for the head and hands. It continued in use for sculpture (although not suitable for this purpose) until the time of Justinian, and again for busts in the Renaissance period. The Pantheon, the Temple of Venus and Rome built by Hadrian, the Baths of Caracalla, the Temple of the Sun, the Palace of the Cæsars, and later, the Basilica and Baptistry of Constantine—all these as well as numerous churches in Rome, and Italy generally, especially St. Mark's, Venice, contained pillars and wall linings of porphyry [Illustns. iii, A; iv-vi]. The two monolith pillars reared up at the east end of the Baptistry of Florence (alluded to by Dante in the Inferno) were accepted by the Florentines, as a present from the Pisans, in preference to the bronze doors that are now in the Cathedral at Pisa. There cannot be less than 300 monolith porphyry pillars still preserved in Europe, while the material is found in Asia as far as Baalbec and Palmyra. In all cases the stone preserves its freshness of colour, proving its undoubted durability and the far-sighted wisdom of its discoverers. The Roman emperors were very partial to porphyry (owing to its colour and durability) for sarcophagi. The earliest mentioned is that of Nero. The next in importance is that of Hadrian, which we are told was 32 feet high. It stood in the centre of his mausoleum. This sarcophagus was made for Innocent II., and destroyed by a fire at the Lateran, A.D. 1143. The lid which now forms the baptismal font in St. Peter's was previously used as a tomb for the Emperor Otho II. It is of oval form, 13 feet long and 6 feet broad, and cut from one solid block. The largest porphyry sarcophagi known to exist are those of Saints Helena and Constantia, the mother and daughter of Constantine the Great, now in the Vatican. These two, the blocks for which must have weighed 20 tons each, are sculptured all over. Attached to the Church of the Apostles, built by Constantine at Constantinople, was a mausoleum, the burial place for himself and his descendants. This church contained, in the 10th century, not less than nine porphyry sarcophagi, amongst others of rare marbles. In the Imperial Palace at Constantinople, as stated by ancient writers, was a separate room, finished with a pyramidal roof, which was lined with porphyry,—the material

* These porphyry quarries, after having been lost sight of for 1500 years, and having lain dormant for probably 1700 years, are once again to be worked. The Romans carried their blocks to the Nile—a distance of ninety-six miles; but now that there is a direct route, through the Suez Canal, they will be taken to the ancient port of Myos Hormos, on the Red Sea. This route being a gentle incline, and the distance a little more than twenty miles, cheap sea transit from this port will now enable this valuable material to be obtained in Europe and America, in large sizes, at a reasonable price; and, by improved machinery, the cost of working will be reduced nearly to that of granite.—W. B.

having been brought from Rome by Constantine,—and was specially set apart as a place for the accouchement of the empress, the children born therein being named the "Porphyro-"geniti." There was also in the reception hall of this palace a large porphyry slab under a baldacchino, upon which the emperor stood on the occasion of great secular and religious festivals. Owing to the destructiveness of the Christian conquerors of Constantinople and of Doge Dandolo, only one of these porphyry sarcophagi now remains. It is said that Dandolo plundered the Church of the Apostles with the most savage barbarity, throwing out into the street the ashes of the imperial bodies, and even dashing to pieces most of the sarcophagi. But let us hope that many of these were re-used in St. Mark's, being cut up for the famous stones of Venice. The four very beautiful royal sarcophagi with baldacchinos* in the Cathedral of Palermo are as late in date as 1250. Baths, also vases, and fountain basins, of porphyry of very large size, still exist—one basin to be seen in the Vatican being in one stone 14 feet diameter. When Constantine strove to make Constantinople the greatest city of the world, he removed masses of costly porphyry from the old to the new capital of the empire. The most important monument he erected there was a column 100 feet high, built with nine cylindrical pieces or drums of porphyry, each 11 feet long and 11 feet diameter, the joints being covered with annulets of laurel wreaths in gilt bronze. This is still standing, and is a very impressive monument, although it has suffered much from fire and earthquakes, and, moreover, has lost one of its drums. The eight grand monolith pillars, the glory of Santa Sophia, and the finest in the world, are stated to have been presented to Justinian by the widow Mercia, being taken from the Temple of the Sun in Rome, having previously been used in the temple at Baalbec. The quantity of precious porphyry cut up for pavements in early Christian times, and at a later date, was very great,—as seen in Rome, in the churches of St. John Lateran, Sta. Maria Maggiore, and St. Clement. The pavements of numerous churches in Italy generally, including Sicily, contain quantities of porphyry [Illustn. v]. Some of the circular slabs are very large, the one in St. Peter's being 8 feet 6 inches across. It is stated concerning this slab that every emperor from Charlemagne downwards was crowned upon it, and certain official acts were also performed upon it by the Popes. The steps to the Tribune of St. Peter's, extending the entire width of the nave, are all of solid porphyry. The most famous collection of ancient works in porphyry is that in the Castle of Glienicke, formed by the late Prince Charles of Prussia; Dr. Schneider notes a colossal statue of Minerva, as well as other statues; also 6 busts, 12 columns, 14 vases, a colossal pillar in two pieces, numerous other specimens, and a grand pavement of *Opus Alexandrinum*, containing large slabs of porphyry, which was removed to that castle from a monastery at Ravenna. Among the works in porphyry in this country may be mentioned the plaques and pavement of the Royal tombs in Westminster Abbey, the pavement under "Beckett's crown" at Canterbury, and also a very important block, now in the possession of the Earl of Elgin, which probably formed part of the mausoleum of Constantine. In the British Museum is a broken pillar, some 2 feet 6 inches diameter, of the first century, which probably belonged

* See Illustn. iv, facing next page.

to the Elgin Collection, as I have the fellow one, purchased from Lord Elgin, with a number of others of large size, of Byzantine date. In North Wales there are two pillars about 2 feet 3 inches diameter, which came from Carthage, and are stated to be from the palace of Dido. The Duke of Wellington also has, I believe, two columns of porphyry of small dimensions; and I have in my possession the moulded upper part of a shaft which undoubtedly came from the portico of the Basilica of Constantine at Rome. The height of this shaft, in a perfect condition, must have been 25 feet, and its diameter 37 inches. The South Kensington Museum contains some very beautiful examples of Renaissance and French work, mostly from the Jones Collection. The private collections, also, of the Dukes of Westminster, Devonshire, Marlborough, Hamilton, of Lord Rothschild and others, contain a variety of costly objects made with this beautiful material.

Breccia-verde, or *Brèche-universelle.*—A very beautiful and rare conglomerate marble, found only in Egypt. The general colour of the stone is greenish, owing to a large quantity of delicate green granite boulders, the parent rock of which it would be interesting to find. In addition to these, there are pieces of porphyry, red jasper, green felspar, and different coloured slatey rocks and serpentines, the whole being cemented together by a greenish silicious paste full of small angular fragments of the same rocks. These quarries were worked by the ancient Egyptians, and were visited by Kings Cambyses and Darius, their cartouches being cut on the rock. The quarries are situated at Hammamat, about two days' camel ride from Keneh, on the route to Kosseir on the Red Sea. The most important known work executed in this breccia is the grand sarcophagus of Nectanebes I, about 378 B.C., now in the British Museum. It is covered with delicate hieroglyphics inside and out, but is so dark-toned and dirty, except where it has been rubbed by the fingers, that it may be taken for basalt. After the Roman occupation, the quarries were worked extensively, as there is a considerable quantity of breccia in Rome and Constantinople, chiefly of columns and slabs, and of large plaques in the old mosques of Cairo, which, I think, are of Byzantine date. During the Renaissance period, also, much old material was cut up for ornamental purposes. This breccia is very difficult to work, and more troublesome to polish, owing to the cementing matrix being frequently harder than the boulders. Adjoining the quarries of it at Hammamat were others containing a beautiful black and white granite, worked during the early dynasties. These quarries, which contain numerous inscriptions, produced a decorative granite much prized by the Romans, although it was not obtainable in large sizes.

Green Marble of Augustus.—This marble is a green serpentine, and was first used in Rome in the time of Augustus; it is also called *lapis Tiberianus*, and other names according to the varieties of the markings. It was used occasionally by the Egyptians for small figures, and by the Romans also, but only in small quantities. At Deir, the first station in the mountains, workshops existed, in which small articles in porphyry and in this serpentine were wrought.

Oriental Alabaster.—This, the *marmor Arabicum* of the ancients, was called "onyx" owing to its semi-transparency, like the finger nails. Geologically it is a stalagmitic carbonate of lime. A number of old quarries have been discovered in

XL.—THE ANCIENT QUARRIES OF EGYPT (iv).

The Phototype Co., 303, Strand, London.

PORPHYRY TOMB AND CANOPY IN PALERMO CATHEDRAL.

[FROM A PHOTOGRAPH.]

XL.—THE ANCIENT QUARRIES OF EGYPT (v).

The Phototype Co., 368, Strand, London.

PORPHYRY PAVEMENT AND PLAQUES, AT PALERMO.

PULPIT WITH PORPHYRY WORK, AT RAVELLO.

[FROM PHOTOGRAPHS.]

XL.—THE ANCIENT QUARRIES OF EGYPT (vi).

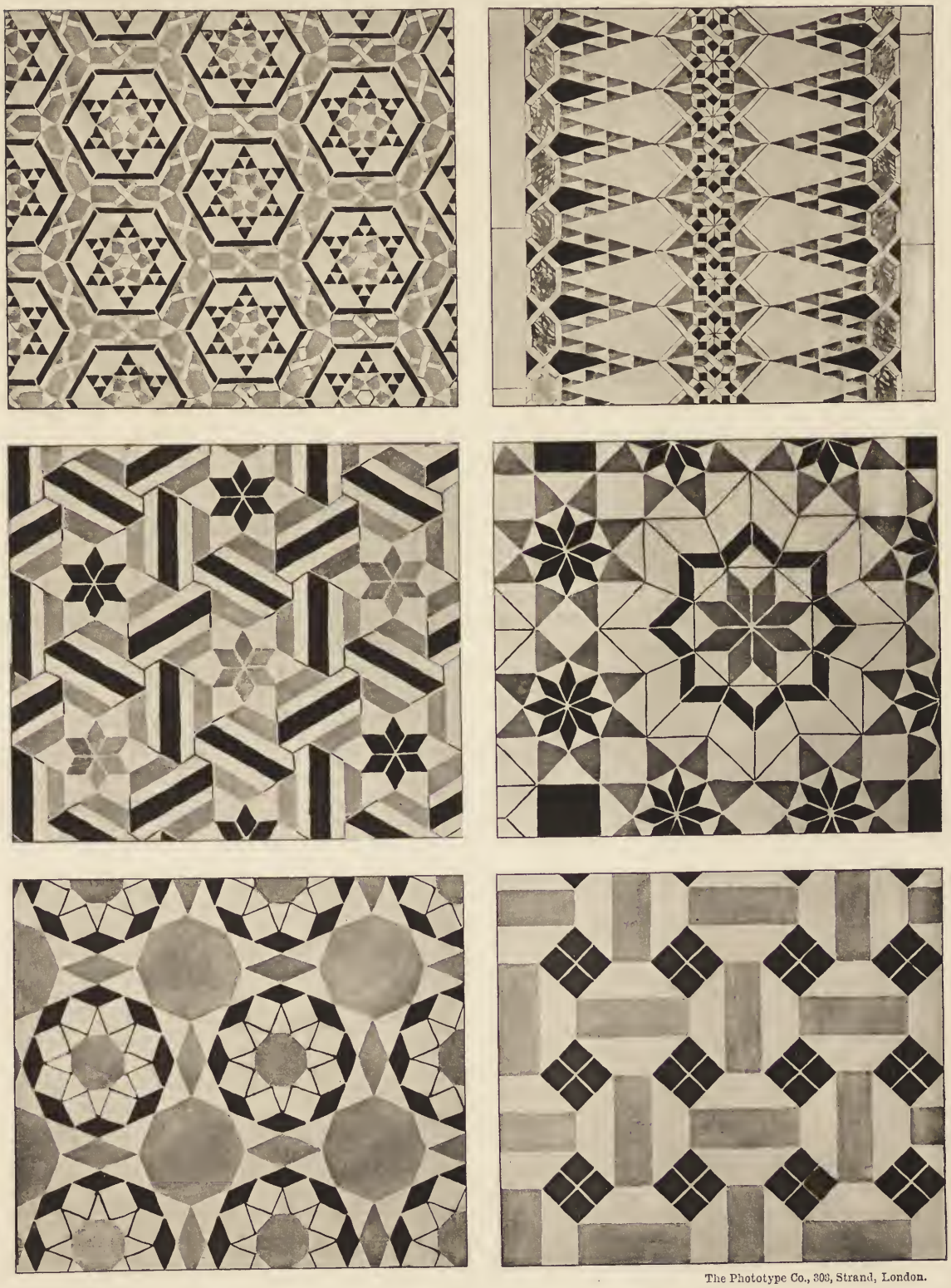
The Phototype Co., 303, Strand, London.

ST. MARK'S, VENICE,

SHOWING BENT PAVEMENT AND PULPITS OF PORPHYRY WORK.

[FROM A PHOTOGRAPH.]

XL.—THE ANCIENT QUARRIES OF EGYPT (vii).



The Phototype Co., 303, Strand, London.

W. BRINDLEY, DEL.

WALL MOSAICS IN COPTIC CHURCHES AT OLD CAIRO.

the Arabian desert, east of the Nile, from Beni-Suef in the north to Tel-el-Amarna in the south. These latter quarries are six feet thick in the bed, and may have furnished the monolith blocks at Karnak. Those near Beni-Suef have been re-worked for the Great Mosque of Mohammed Ali at Cairo. The monolith columns of the baldacchino of the Basilica of St. Paul (outside the walls), Rome, and the two at the doorway, which came from here, were presented to Gregory XVI. by that Viceroy. Alabaster was a favourite material with the Egyptians and Greeks, taking its name from the usually handleless turned vessels for perfumed ungents, called *alabastra.* In addition to all sorts of domestic purposes it was used in their temples for interior decoration, also for sculpture and for sarcophagi—the grandest sarcophagus hitherto discovered being the well-known one in the Soane Museum. This magnificent work of art was discovered by Belzoni, in a tomb, now named the Belzoni tomb, in the valley of royal tombs at Thebes, and was purchased by Sir John Soane in 1824, for the sum of £2,000. Egyptian alabaster is usually white and yellow, with occasional thin markings of red and purple; but we find in Rome at least twenty different varieties, to which fancy names are given, according to the markings and colour, such as "tigrato," "fiorito," "rosso," and "dorato." These are rarely found of large dimensions, being only occasional patches, with an excess of oxide, usually iron, the markings being produced by sections through the stalagmitic secretions. The Romans and Greeks were very fond of alabaster, and used it for columns, baths, *tazze,* and every description of decorative work, including sculpture. In the Sanctuary pavement of Westminster Abbey there are rich plaques of it, and part of the uncovered pavement in the destroyed chapter-house of Durham Cathedral is made with one of the brown varieties of alabaster.

Various Hard Stones.—The various granites, diorites, felsites, quartz-porphyries, and similar very hard stones (used for sculpture and mummy cases), are all dykes, or intrusive veins, found in the igneous rocks at Syene, and in the eastern desert; and further south, on the route to Berenice, there are rocks of basalt.

Gems and Ornamental Stones.—The Egyptians were great lapidaries,* and used nearly every sort of gem-stone known to us, except the diamond, ruby, and sapphire. The amethyst, the emerald, the garnet, the aquamarine, the chrysoprase, and every variety of agate, bloodstone, jasper, amazon-stone and lapis-lazulite, were used by them; and

* The opinion I have formed of the Egyptian methods of quarrying and working hard stones is, that they were precisely the same as our own were until a few years ago, viz., heavy pick tools for scabble dressings, and holes cut for wedges, the blocks being split with metal wedges, and the masonry surfaces dressed with large and small picks. After this they were rubbed down with flat stone rubbers and sand, then polished with bronze or copper rubbers with emery powder. The wedge holes, which are plentiful enough in the granite and porphyry quarries, are the same as ours. Some of the most learned Egyptologists are of opinion that they have discovered the results of gem-stone drills and saws, in consequence of finding a few holes and slabs striated. I have a piece of granite which has been recently bored with the aid of coarse emery powder and a copper tube, also a slab of sawn porphyry, the result being the same as is observed in Egypt. Dr. Schliemann told me he thought the hard stone hammer heads of pre-historic times were bored with wood and emery powder. In the Boulak Museum at Cairo, and in that of the Lateran at Rome, are some unfinished statues, all left from a fine pick—the one in Rome, which is of porphyry, being ready for finishing by the emery grinding process.—W. B.

the last named proves their commercial relations with Persia. They had also emerald mines at Djebel Zobara which had been worked from early times down to the reign of Mohammed Ali. Gold mines, too, famous in history, are at Djebel Allakeh, south of Assouan, and copper ore was obtained in the vicinity of the porphyry quarries.

Ancient Stones in the Cairo Mosques.—History in stones is nowhere more distinctly readable than in the old mosques and Coptic churches of Cairo. These interesting buildings are, for the most part, actual museums of stones and marbles removed from ancient temples and Byzantine churches. In Cairo and the vicinity there are said to be nearly 400 mosques, the greater portion of the materials having been obtained by the destruction of the other buildings; and nearly all have been decorated with panels of sectile marble mosaic, and plaques of porphyry, granites, and marbles [Illustn. vii]. The whole of such work seems to point to the time of Justinian, while the materials used for the wall decorations, especially the marbles, came either from Greece or from Constantinople. These mosaics have a specially oriental character, owing to the large quantity of mother-of-pearl cleverly used to light up the marble, chiefly in narrow strips and dots. Many of these mosaics are in a very dilapidated state—the mosques being frequently roofless and in ruins. It is a sad pity that no steps are taken for their preservation. The mother-of-pearl has worn quite as well as, or even better than, the marble. Its use may be traced by the course of the Nile, which was the recognized route from the Persian Gulf and the East, until the discovery of the way round the Cape. The designs for these mosaics are often traceable to the various patterns found in eastern lattice-windows and screens, the mother-of-pearl taking the place of the thin wood strips, and the dark marbles representing the voids or shadow spaces between. The pavements of these mosques are mostly marble, made up with old materials, on the Byzantine system of geometrical arrangement, with round and square slabs of rich marbles and interlacing bands of white, without the usual small mosaic between. They are simple and effective.

WILLIAM BRINDLEY.

*** See the Paper (No. XXVIII) by the same author, entitled "Marble: its uses as "suggested by the Past," TRANSACTIONS, Vol. III., N.S., pp. 45-54; with details of the pavements of the Basilica Julia in Rome, of St. Sophia at Constantinople, and of St. Mark at Venice, &c.

XLI.

THE RECENT DEVELOPMENT OF VIENNA.

By Frederic R. Farrow, *Associate* (*Holder of the Godwin Bursary*), and Thomas Blashill, *Fellow*.

Edward I'Anson, F.G.S., *President*, in the Chair.

A PROPOSED scheme for the remodelling and improvement of the Metropolis of the British Empire was, a short time ago, brought before the Institute,* and it can hardly be without interest to consider the recent remarkable development of the City of Vienna, a short account of which is given in the two following Papers.

[*Mr. Farrow's Paper.*]

Mr. President and Gentlemen,—

Less than thirty years ago the Metropolis of Vienna consisted, as does our own, of a small inner city, distinct from and surrounded by an outer town of vastly greater extent, but with this difference, that whereas the division between the City of London and its surrounding town consists for the most part of an imaginary line, the separation between the city and town of Vienna was most clearly defined by the existence of a system of fortifications [Illustn. viii, A], which had successfully withstood the Turks in 1529 and 1683, though they had failed to keep out the French invaders under Napoleon in 1805 and 1809. The inconvenience of this artificial separation of the inner city from its suburbs became more and more felt by the increase of population, and much discussion took place as to the advisability of removing the old fortifications, and the best method of accomplishing the desired improvement.

At a General conference of German architects, held at Leipzig in September 1842, a plan by Ludwig von Förster was exhibited, showing a proposed enlargement of the city by the removal of the fortifications, a model of which scheme was already in existence in Vienna; and the question having been thoroughly discussed by the public, matters were at length brought to a head by a Decree of the Emperor, dated 20th December 1857, and published in the *Wiener Zeitung* on Christmas Day of that

* Transactions, Vol. II., n.s., pp. 13-65.

year. This decree, which was addressed to the Minister of the Interior, translated into English, reads as follows :—

Dear Freiherr von Bach,—

It is my will that the enlargement of the inner city of Vienna, for the purpose of a suitable connection of the same with the suburbs, should be undertaken as speedily as possible; and also that the improvement and adornment of my residential and capital city should be considered concurrently therewith. For this purpose I decree the abolition of the enclosure and fortifications of the inner city, together with the ditches thereof.

Every part of the area obtained from the abolition of the fortifications, ditches, and glacis, which is not designated on the accompanying plan for a particular purpose, is to be sold as building land, and the proceeds thereof are to be devoted to the establishment of a building fund, from which is to be defrayed the cost of carrying out this alteration of the public property, the erection of public buildings, and the provision of the necessary military establishments.

In the preparation of the necessary ground plan, and for my approval thereof, the following points must be attended to in the carrying out of the city enlargement :—

The removal of the fortifications and the filling-in of the ditches is to be commenced in the space between the Biber bastion and the enclosure wall of the Volks-garten, so that a broad quay can be formed along the Danube Canal; and the space obtained from the Schotten Gate to the Volks-garten can be partly made use of for the modification of the parade ground.

The enlargement of the inner city is next to be undertaken, in the direction of the Rossau and the Alser suburb, between these two points, following on the one side the Danube Canal, on the other the boundary line of the parade ground, and taking into consideration the suitable enclosure of the Votive Church now in course of erection.

In the arrangement of this new quarter of the city, care is to be taken to include the erection of a fortified barrack building, in which also are to be located the great military bakery and the city prison, and these barracks are to be situated in the axial line of the road to the Augarten Bridge and distant 80 Viennese fathoms* therefrom.

The square in front of my palace, next the gardens on both sides, is to remain in its present condition pending further arrangements.

The area outside the palace gate, as far as the imperial stables, is to be left open. Also, that part of the city walls (the Biber bastion) on which the barracks called by my name abut, is to remain.

The further enlargement of the inner city is to be proceeded with next the Kärnthner Gate, and thence on both sides of the same in the direction of the Elizabeth and Mondschein Bridges as far as the Caroline Gate.

Consideration is to be given to the provision of the following public buildings:—a new War Office, a City Marshal's Office, an Opera House, Imperial Archives, a Town Hall, and the necessary buildings for Museums and Galleries, and sites for the same are to be allotted, as well as for the following open spaces :—

The area from the Caroline Gate to the Danube Canal shall be left open, to be added to the great garrison parade ground in the neighbourhood of the Burg Gate.

From the fortified barracks on the Danube Canal to the great parade ground, a space of 100 Viennese fathoms is to be left free from building. Moreover, from the junction with the quay along the Danube Canal a boulevard around the inner city, of at least 40 fathoms in width, is to be arranged on the site of the glacis, including a roadway, with foot and riding ways on both sides, so that this boulevard may include an assemblage of buildings alternately with open spaces laid out as public gardens.

The remaining chief streets, and also the cross streets, are to have a width of at least 8 fathoms.

No less care is to be taken in the arrangement to provide for markets, and for their suitable distribution.

Together with the arrangement of the ground plan of the city enlargement, attention is to be given to the arrangement of the inner city in connection with the main arteries of communication with the suburbs, and the provision of the necessary bridges for these lines of communication.

For the purpose of obtaining a ground plan a competition is to be promoted, and a programme is to

* A "fathom," a Viennese measure now seldom used, equals about six English feet.

XLI. THE RECENT DEVELOPMENT OF VIENNA (viii)

PLAN
OF THE INNER CITY

PRIOR TO THE REMOVAL OF THE FORTIFICATIONS.

(See Pages 27-29)

THE INNER CITY OF VIENNA, 1857 AND 1887.

C.F.Kell, Printer, 8, Furnival St, Holborn, London, E.C.

XLI. THE RECENT DEVELOPMENT OF VIENNA (ix)

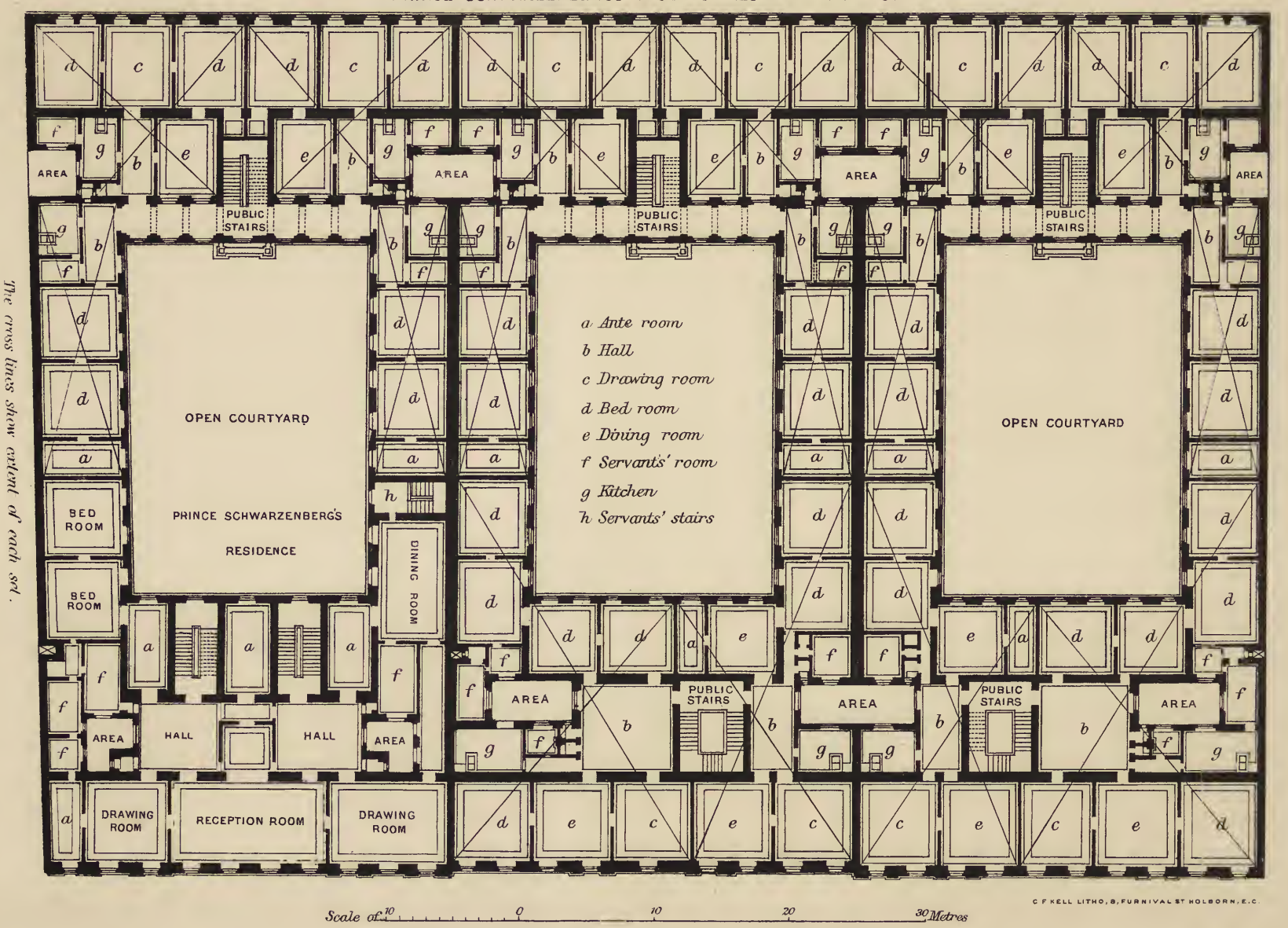
THE KAISERLICHE STIFTUNGS-HAUS, PAGE 34.

SECOND FLOOR PLAN.

C. F. KELL LITHO., 8 FURNIVAL ST. HOLBORN, E.C.

XLI. THE RECENT DEVELOPMENT OF VIENNA. (x)

PRINCE SCHWARZENBERG'S GROUP OF RESIDENTIAL FLATS.



The cross lines show extent of each set.

PLAN OF MEZZANINE FLOOR.

be drawn up on the lines of the principles herein indicated, but nevertheless with freedom of conditions, so that the competitors may be allowed free scope for the conception of their designs, consistent with the carrying out of the proposals herein contained.

For the selection of the plans submitted a Commission is to be appointed of representatives of the Ministries of the Interior and of Commerce, of my Central War Department and Chief Police Department, a Member of the Representative House of Lower Austria, and the Burgomaster of Vienna, who are to submit the plans to a Committee of Specialists appointed by the above-mentioned representatives and the Minister of the Interior, and by this Commission three designs are to be selected, and premiums of 2,000, 1,000, and 500 gold ducats awarded.

The three ground plans thus premiated are to be submitted to me for final selection, so that I may arrive at a resolution as to the further details of the carrying out of the premiated designs.

You will arrange forthwith the necessary steps for carrying out this my decree.

Vienna, 20 *December* 1857. FRANZ JOSEPH.

In accordance with the terms of this Imperial command, an open competition was instituted, in which 85 designs were sent in. The premiated designs were by Friedrich Stache, Ludwig Förster, and von Siccardsburg and van der Nüll, but none of the three were literally carried out. The final plan prepared in the Office of Works of the Ministry of the Interior was approved by the Emperor on the 1st September 1859, previous to which the work of demolition had already commenced.

The map of Vienna as it is at present [Illustn. viii, A.] shows that the re-arrangement of the area previously occupied by the fortifications consists of a wide boulevard or ring round the inner city connected to the broad quay next the Danube Canal, referred to in the Emperor's decree. At intervals along the line are open spaces, the Stadt Park, the Palace Court and People's Garden, the Rath-haus Garden, and the garden in front of the Votive Church. When these open spaces had been set apart, and sites allotted for the numerous public buildings contemplated, there remained still a considerable area of building land free for the operations of the capitalist or speculator. This was speedily taken up at prices ranging from £150,000. to £300,000. sterling per acre, and thus was provided the building fund which has given to Vienna, during the last quarter of a century, a series of public buildings, such as no other modern European capital has had the opportunity of securing during a similarly short space of time.

Taking these buildings in order as we pass along the Ring from the Aspern Bridge, over the Danube Canal, we come first to the Museum of Applied Art with its Technical Art School. This was built during the years 1868-71, from the designs of the late Freiherr von Ferstel, *Hon. Corr. Member* (*Royal Gold Medallist*), at a cost of £55,000., and an additional sum of £10,000. for the internal decorations. The building consists of three storeys and basement, the ground floor being devoted to the purposes of a museum, the upper floors to library, drawing and art schools; and the basement to modelling and plaster casting rooms, stores and caretaker's residence. The plan of the museum, on the ground floor, consists of a large glass roofed arcaded court, entered from a vestibule, and opening from which are, left and right, three galleries on each side, the centre top lighted, the others side lighted, these are terminated at their opposite ends by a large side lighted gallery. The façade is Italian Renaissance in style, carried out in red brick with sgraffito decorations and majolica medallions, showing heads of celebrated artists and art workmen.

The next public building on the Ring, is the so-called Cur Salon, in the Stadt Park, a building used as concert room and café; its architect's design, in florid Italian Renaissance, was carried out at a cost of about £32,000. On plan there is in the centre block a grand concert room, 75 feet by 45 feet, approached by a vestibule and circular corridor around the orchestra. Above the orchestra is a semi-circular hall or large gallery, at one end of the concert room is the pump room, with an arcaded ambulatory around, and at the other end is the café. At the side of the concert room, opposite to the orchestra and entrance, is a spacious terrace overlooking the Park.

At some distance further along the Ring is the Opera House [Illustn. xii, A], the first of the monumental buildings undertaken as part of the expenditure of the City Enlargement Building Fund. An open competition resulted in the selection of the designs of van der Nüll and von Siccardsburg, both of whom died before the work was completed. The building, commenced in 1861, was completed in 1868, at a cost of £500,000., and opened in 1869. The plan consists of a central block, comprising the staircases for the public next the Ring, the auditorium for 3,000, and the stage with its accessories at the rear. The staircase approaches consist of a grand central stair with smaller stairs on each side to the galleries. Right and left of the main block are projecting wings, containing the entrances, stairs and salons for the use of the Grand Dukes and the Emperor respectively. At the rear of the building are similar projecting wings, giving space for the green rooms, scene docks, painting rooms, and workshops. The elevations are treated in the style of the Renaissance with a certain dignity.*

A little back from the Ring, and facing the Schiller Platz, is the Imperial Academy of Fine Arts, by Freiherr von Hansen, *Hon. Corr. Member*, erected in 1874-76. It consists of a rectangular block, 290 feet frontage and 200 feet deep, which has on the ground floor accommodation for casts, in galleries and in the large central hall 100 feet long. This central hall is the dominant feature of the plan and is a noble room with internal colonnade on four sides. On the ground floor are also the sculpture school and painting school. On the mezzanine, are library and reading room, etching and modelling rooms, architectural school, and residential apartments. On the first floor are picture galleries, and further accommodation for schools of painting and architecture. On the second floor are also ateliers for painter students. In the basement are sculpture ateliers, casting and modelling rooms, and caretaker's domicile. The design is Renaissance in outline and general treatment, the details being based on Greek forms and motives.

Proceeding along the Ring we come next to the great open space, extending from the old palace of the Emperor to the Imperial stables. On the side of the Ring, furthest from the palace, are the two great Imperial Museums for Art and Natural History; on the other side of the Ring are the buildings of the new Imperial Palace, now in course of erection, and forming, as far as I know, the last instalment of the monumental buildings proposed to be erected as part of the grand scheme for the enlargement and adornment of the Inner City of Vienna.

The project of the twin museums was first started in 1867, when a limited competition

* See *Monuments de Vienne: L'Opéra de la Cour*, in the Institute Library.—F. R. F.

was promoted between four architects, one of them being Ferstel, photographs of whose competition drawings are in the library of the Institute. The late Professor Semper being invited to adjudicate on the designs, gave the preference to those of Freiherr von Hasenauer, *Hon. Corr. Member;* but, by the wish of the Emperor, a new design was prepared jointly by Semper and Freiherr von Hasenauer, embracing not only the museums but also the new Imperial Palace.

The building of the Museums was commenced in 1872, and was completed in 1884. The remainder of the scheme, the erection of the Imperial Palace, is still in progress.

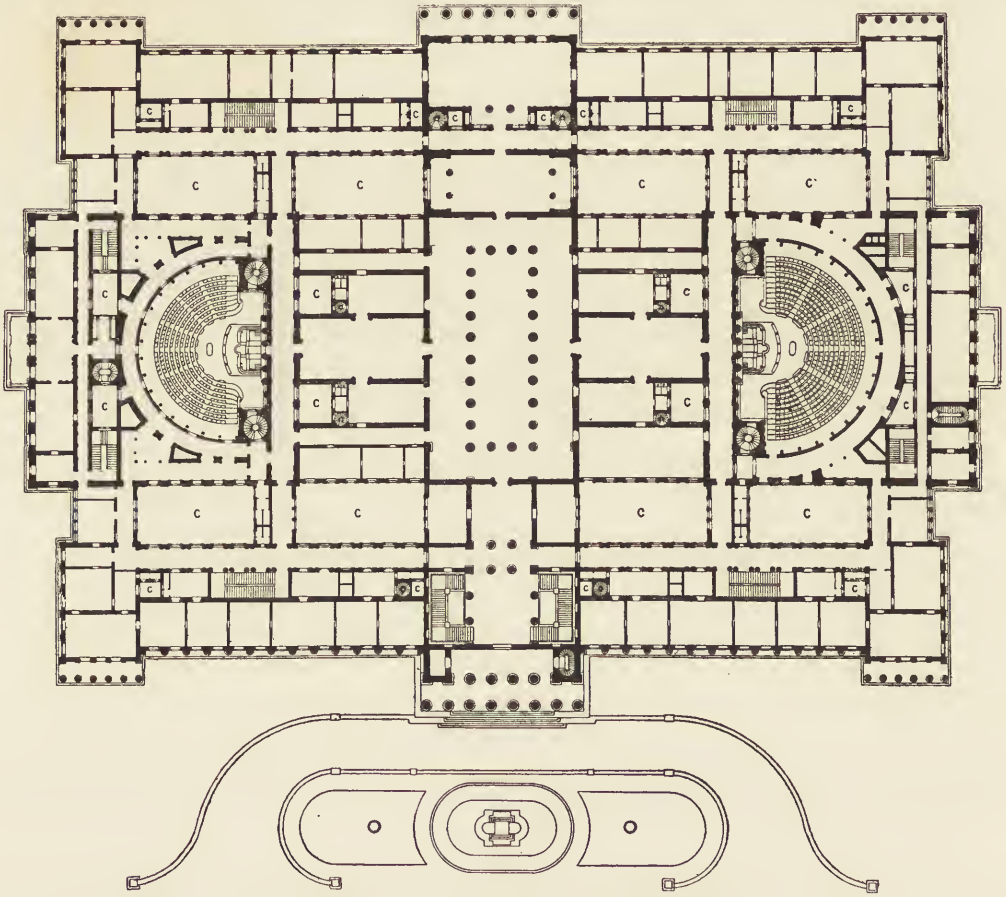
The Museums are in plan and general elevation similar, the details of the Art Museum being, however, somewhat more elaborated than those of the Natural History Museum. On plan the Art Museum comprises a central pavilion, containing a sumptuous entrance hall, arcaded and groined, with a central dome, and beyond this the grand staircase; right and left of the centre pavilion are the exhibition galleries, which are planned throughout in pairs—a wide gallery and a narrow one side by side. This arrangement admits of the top-lighted picture galleries being masked on the external elevations by the narrow side-lighted galleries, which are placed on the outside. The basement is devoted to living rooms for officials, storage and packing rooms. On the ground floor are the sculpture galleries, on the first floor the picture galleries, and on the second floor the collection of engravings. In the Natural History Museum the ground floor contains the geological and mineralogical collections; the upper floors the zoological collection. The basement is applied to similar uses in both museums. The design is treated in Renaissance style, with much elaboration of ornament and sculpture.

Lying a little back from the Ring are the New Courts of Justice, erected during the years 1875 to 1881, from the designs of Herr von Wielemans, at a cost of £225,000. This building is fully illustrated by the monograph in the Library of the Institute (*Monuments de Vienne: Le Palais de Justice*).

In close proximity to these buildings are the new Houses of Parliament, designed by Freiherr von Hansen, and forming perhaps the most beautiful group of all the modern buildings of Vienna, not to say the most satisfactory example in Europe of modern work in Greek style. Having to provide simply for a one-storey building, with a basement for minor offices, Freiherr von Hansen has seized the opportunity to carry out an example of Greek architecture, which a more complicated building would have effectually prevented, as, for instance, in the same architect's work at the Academy of Fine Arts and the Bourse. The building looks beautiful, at present, in the purity of its white stone; but it is the wish of its architect to follow Greek tradition by colouring the exterior, and he has accordingly had a portion of one flank decorated as an illustration of his scheme; but hitherto, I believe, he has been unsuccessful in obtaining permission to realize his desire in this respect.

An inclined plane leads up to the octastyle portico, forming the chief entrance, from which through an inner hall and vestibule is reached the great central hall, 135 feet long and 75 feet wide. From this, left and right, are the ante-rooms and corridors leading to the House of Peers and the House of Representatives respectively. In connection with

the ante-rooms are writing and conversation rooms for the use of the members. The arrangement of each House is similar; except that the House of Peers is smaller than that for the Representatives [see plan]. Their form is semi-circular, the seats rising in



Plan* of the Houses of Parliament at Vienna.

ranks, with a gallery above for the use of the public. The ceiling is of glass, through which the House is top-lighted. In order to prevent down-draughts of chilled air, the space above the ceiling is heated by steam-pipes. Right and left of the principal entrance on the front elevation are rooms for Ministers and the Presidents, in connection with their respective Houses. At the rear of the great hall is the refreshment department, and right and left of this are rooms for archives and for officials. On each flank elevation are entrances for the Court and for the public. The internal decorations of the building have been carried out with lavish expenditure, but with great refinement, particularly in the colouring, which is worthy of careful study.

Within sight of the Houses of Parliament, and totally different in almost every respect, though included with them in the coup-d'œil of this part of the Ring, is the

* Reduced from a plan presented by Freiherr von Hansen, *Hon. Corr. Member* (Royal Gold Medallist elect), and now in the Institute Library.

new Rath-haus, the design of which was entrusted to Professor Friedrich Schmidt, now Freiherr von Schmidt, *Hon. Corr. Member* (*Royal Gold Medallist*); and in accordance with his plans the building, commenced in 1872, was completed in 1884. The plan consists of a range of buildings around a great central court, 260 feet long by 115 feet wide, and 6 smaller but still large courts lying three and three on each side of the central court. The principal front is devoted to the grand ball room, about 12,000 feet superficial area and 45 feet high, with its attendant supper rooms, salons and other appurtenances. The grand staircases approaching this ball room are situated on each side of the great court, and planned to admit of access from either end. At the rear of the great central court is the council chamber, with ante-rooms, committee rooms, &c. The remainder of the building is devoted to the multifarious requirements of municipal official government, including residences for the Burgomaster and chief magistrate. The design is in German Gothic, with an endeavour to incorporate 14th-century Italian detail. The chief features of the principal façade are the groined open arcades on the ground storey, and the lofty tower, 350 feet high, attached to the main building, and forming the central point of the façade.

Flanking the open space before the Rath-haus, and opposite, therefore, to the Houses of Parliament, are the new University buildings, designed by Ferstel, commenced under his direction in 1874, and completed by his son, Freiherr Max von Ferstel, in 1885. These buildings provide accommodation in 46 lecture rooms, of various sizes, for 6000 students, in the faculties of arts, laws, medicine and theology. There are, also, three halls for festival occasions, holding, respectively, 1000, 500, and 300 persons, with Examination rooms and a fine library, on the model of the Ste. Geneviève at Paris, for 32,000 volumes and 520 readers. The building is entered through a triple-arcaded and groined vestibule, leading to the great central courtyard and to the vaulted open cloister which surrounds it on all four sides, and above which, on the upper floors, are lecture rooms. The plan thus resolves itself into a great central quadrangle, with the principal entrance next the Ring-strasse, and the library forming its further side. On each flank of the quadrangle are wings right and left, consisting of an open court surrounded with corridors and lecture rooms, and crossed and divided by staircases and corridors, and a large lecture theatre. As in most of the modern public buildings of Vienna, a striking feature of the plan is the large minded and liberal expansion of the open spaces, staircases, halls, and corridors of the building. The elevations are treated in a severe phase of Renaissance, and terra-cotta and sgraffito are employed in the internal façades.

The completion of the group formed by the Houses of Parliament, the Rath-haus, and the University, is furnished by the new Court Theatre, which faces the Rath-haus. This theatre, of which Semper and Freiherr von Hasenauer were the architects, is a beautiful group in florid Renaissance, contrasting with the Greek style of the Houses of Parliament, the Gothic Rath-haus, and the dignified Renaissance treatment of the University. Not only does this contrast give piquancy to the general grouping of the monumental buildings thus associated, but there seems to be a fortunate fitness, if not a judicious selection, in the connection of each style with the purposes of the building. The façade of the Court Theatre, toward the Ring-strasse, is remarkably effective by

reason of the skilful projection of side wings, containing staircases and approaches from the circular ended main building of the auditorium and stage.

After passing the University buildings, one catches sight of the Votive Church, but having been commenced in 1856, it can hardly be regarded as part of my subject.

The next modern building on the Ring was the unfortunate Ring Theatre, destroyed by fire on the 8th December 1881, and on the site of which has since been built, from the designs of Freiherr von Schmidt, as a memorial of that dreadful calamity, the Kaiserliches Stiftungs-haus, a building of four storeys, basement, and attic, devoted to the provision of a chapel, wherein expiatory masses may be offered for the souls of the unfortunates who lost their lives in the fire, and a series of residences in flats, whose rentals are applied to charitable purposes. The building [Illustn. ix] consists of a rectangular block with a large open inner court, about 75 feet by 70 feet, and four smaller areas for light. It stands free on three sides, the principal façade facing the Ring. On the ground floor there are four suites of apartments, and, both in front and rear, spacious entrances with vestibules leading to the principal staircases. As the residences in this building show the latest development of Viennese house-planning in "flats," it may be worth our while to study the plan of one set in detail. Entering from the main staircase hall we reach an inner vestibule of ample dimensions, with a communicating corridor, and it is especially noteworthy, as an example of the latest phase of feeling in respect to these domiciles, that there are only two principal rooms on the whole floor which are not entered directly from the vestibule or corridor; a distinct departure from earlier types of plan, in which the only means of access to many of the apartments is by transit of other rooms. It will be noticed that the rooms are still, however, arranged *en suite.* Each suite consists of a saloon, three or four other principal rooms, a kitchen, pantry, one or two servants' rooms, bath room, and w.c. This we may take as a typical example of a modern Viennese residence of the best class on the "flat" system. The mezzanine or first floor is also planned for four suites of residences in similar fashion. The next contains, in addition, the Commemorative Chapel, which occupies the centre of the façade towards the Ring, and runs up through two storeys. On this chapel, as the central point of the building, the architect has lavished, ungrudgingly, great wealth, both of design and of costly material. The plan is an irregular octagon, with a gallery for the members of the Imperial family at the end opposite to the altar. The octagon is covered by a vault decorated in polychrome; the floor is of inlaid marble; the walls painted in fresco with figures of the patron saints of the Imperial family; the window is filled with stained glass, and the reredos of mosaics on gold ground. Externally, as internally, the chapel is the central feature of the principal façade, which is designed in Freiherr von Schmidt's conception of Gothic, with an admixture of Renaissance features, as in the same architect's work at the Rath-haus. The upper floors are arranged in suites similar to that already described, while the basement is given up to wood and other stores, residences for porter and caretaker, laundry, &c. [Illustn. ix]. The cost of the entire building has been about £67,000.

The flat residences in the Kaiserliches Stiftungs-haus, show the later method of

planning such residences in Vienna. The earlier and less scientific method may be seen in one of the largest groups of residences on the "flat" system in Vienna, that of Prince Schwarzenberg, in the IV Bezirk [Illustn. x]. It contains 100 dwellings, and is divided into three blocks on plan, each with a large internal court 60 feet by 90 feet. The arrangement of each individual residence is based on the older system of Viennese planning, the rooms being without distinct corridor communication. The sets of course vary in extent; they usually contain a salon, dining room, two or more living rooms, a small cabinet or private room, kitchen and servant's room, and sometimes a bath room. The building is five storeys in height above the basement.

Almost opposite to the site of the Ring Theatre is the new Bourse, designed by Freiherr von Hansen, who obtained the commission in a limited competition in 1869. The building was completed in 1875 at a cost of about £350,000. The great feature of the plan is, of course, the large exchange room, a hall about 195 feet long by an extreme width of 130 feet; this extreme width is divided in basilican fashion into a nave, 85 feet wide, and aisles on each side, over which are galleries. The height of the central area is 75 feet high to the horizontal ceiling. The great hall is approached through a spacious vestibule whose length is the same as the width of the hall, and which is subdivided by two ranges of columns. Without the vestibule is a grand portico, to which a flight of steps leads from the street pavement. At the rear of the great hall is a corresponding arrangement of vestibule and portico to that in front. Lying outside the main block formed by the great hall and its approaches, and separated therefrom by open courts, are, on the side façades, ranges of offices for bankers, stock-brokers, and others. The upper floors were also arranged for this purpose, though some of the space was in 1884 devoted to the Oriental Museum. In the basement are a corn exchange and refreshment department. The design is Renaissance in character, with Greek details and motifs, and considerable richness has been obtained internally by the generous use of Italian marbles of varied colours.

I have now noted the important public buildings recently erected on the Ring, but these scarcely surpass in monumental character many of the buildings due to private commercial enterprise. Among these are the immense hotels, such as the Grand Hôtel, on the Kärnthner-ring, with its 300 visitors' rooms, and the Hôtel Austria, on the Schotten-ring, with 150 rooms, but more luxuriously finished. In each of these buildings there is a large central court with glass roof, round which, and the external façades, are the visitors' rooms. The dining and other public rooms are on the ground floor, the upper floors being devoted entirely to private rooms, service, &c. Hydraulic lifts are provided as well as grand staircases. Other hotels of similar class on the Ring are the Hôtel Imperial, on the Kärnthner-ring, formerly the palace of the Duke of Württemburg, of similar size to the Hôtel Austria, and the Hôtel Métropole, on the Franz Josef Quay, with 400 visitors' rooms.

On the Park-ring, and overlooking therefore the Stadt Park, is the Palace of the Archduke William, built from the designs of Freiherr von Hansen, the first floor providing for the private apartments, and the ground and second floor being devoted to

State receptions. The inner court is glass roofed with vaulted arcade around, and the principal staircase leading therefrom.

An example of a purely speculative group on the Ring, is the "Heinrichshof," one of the first buildings [Illustn. xii, A] on the new boulevard, erected between 1861 and 1863 from the designs of Freiherr von Hansen. This building is one of the largest residential blocks of houses-in-flats in Vienna, and is divided into three groups, each with its central court and rooms around. The ground storey is devoted to shops and cafés, the building being in one of the busiest parts of Vienna, and nearly opposite to the Opera House.

Before leaving the Ring, I may notice the interesting treatment of one of the old bastions, the Augustiner-bastei, which it was necessary to retain because the palace of the Grand Duke Albrecht stands upon it. The bastion has accordingly been masked by a fountain and sculpture, representing, allegorically, the Danube and its tributaries, and dedicated to the Emperor Franz Joseph [Illustn. xi].

In speaking of the Kaiserliches Stiftungs-haus [Illustn. ix], I have already indicated one type of plan adopted by the Viennese in building residences on the "flat" system, and I would now invite your attention to other examples. In the building called "Zur "Kugel," or Globe House, erected in one of the older squares of Vienna, from the designs of a Viennese architect, there is, on the ground floor and mezzanine, an example of the café and restaurant which form an essential feature of life in that Capital. The first floor is planned for business purposes, and the upper floors are arranged each for a single residence. These suites contain salon, boudoir, gentlemen's room, dining room, five bedrooms, kitchen and pantry, and two servants' rooms. Here, as in the Stiftungs-haus, while the whole of the rooms are *en suite,* they are nearly all entered from vestibule or corridor. Situated as is this building in the middle of Old Vienna, the architect has adopted the Baroque style so frequently exemplified in the older parts of the city; and the different apartments of the café and restaurant are richly decorated in various phases of the later Renaissance of France and Germany. Another example of the commercial type of building may be instanced in a house in the Rudolfs-platz, the ground floor and mezzanine of which are devoted to business purposes, while the upper floors are each planned for a single residence,—a notable feature in the building being that the façade is of stone.

In Vienna the house-fronts are generally treated in stucco, and the use of stucco for the purpose is a handicraft, the workers in which carry on their trade and hand down their traditions from father to son [Illustn. xiii]. The stucco is composed of white lime, slaked, and kept in pits under water for a considerable time before using, and Danube sand of varying degrees of fineness, coarse grit being used for the first coats, and the finest for the finishing. The proportions of lime and sand are determined literally by rule of thumb, the workman judging of the fitness by the appearance as it runs off his thumb or finger after dipping. Occasionally Portland cement and hydraulic limes have been tried, but the plasterers seem unable to make such satisfactory work in these materials as in those of their forefathers.

The space around the Rath-haus has been laid out for the reception of such

XLI.—THE RECENT DEVELOPMENT OF VIENNA (xi).

The Phototype Co. 303 Strand, London.

THE FRANZ JOSEPH FOUNTAIN.

WITH THE PALACE OF THE ARCHDUKE ALBRECHT ON THE AUGUSTINER-BASTEI, VIENNA.

[FROM A PHOTOGRAPH.]

buildings as the Arkaden-häusen, erected on each side of the Rath-haus. These buildings are so called from the open arcades which form an important feature in their design, and are connected with the cafés and restaurants behind them. These Arkaden-häusen are most richly carried out both internally and externally. On the upper floors are residences in flats, let at a rental of £500. per annum for a suite of six rooms, kitchen, and servants' rooms, &c. They are fitted with electric light and bells, hydraulic lifts, and costly joinery and marble work.

As an instance of the manner in which private freeholders build their homes in Vienna, we may take such a house as that of the Brothers Böhm in the Mariahilfer-strasse, erected by two brothers for the four families of themselves and their two sons. Having purchased the freehold for £12,000., they have pulled down the old house, and, at a cost of £20,000, erected the present building, consisting of a front and rear block with an open court between and a garden behind. The first and second floors are planned for the four domiciles of the four families; the ground floor has shops in front and two small suites of apartments next the garden, and is intended to be let, as is also the third floor, arranged in four suites.

Near the Court Theatre, but lying back from the Ring, is the building of the Commercial Bank, an excellent example of a modern Viennese business building. The ground storey, in two floors, and the first and second floors, are devoted to business purposes; the upper floors to residential suites. These are planned on the older system of "flat" arrangement, in which the various rooms are entered through others, and not by distinct entrances from vestibules or corridors.

During the time that the important public edifices on the Ring-strasse have been in progress, building has been going on to a considerable extent in other parts of the city. The rectification of the Danube, and the expansion of the town, both in this and other directions, has created a need for churches, schools, hospitals, and other buildings. Of the churches, those designed by Freiherr von Schmidt are the most noticeable, as the Brigittenau, the Weissgärber, the Lazzaristen, and especially the church in the suburb of Fünfhaus, which consists of an octagonal dome, carried on eight piers, and surrounded by an ambulatory and chapels.

FREDERIC R. FARROW.

[*Mr. Blashill's Paper.*]

Mr. President and Gentlemen,—

In regard to latitude and altitude, Vienna does not differ very materially from London, but its situation, far inland, and in the vicinity of snow mountains, makes a very material difference in its climate. Its summer glows with a heat of which we may judge from a few days that sometimes occur in an exceptionally hot English season. Its winter is what we should think steadily cold, though there are pretty sharp changes of temperature. But the clear air permits brilliant sunshine at most times, so that, to our eyes, Vienna is first of all *bright.* It is not without manufactures or commerce, but it is

not what we should call a manufacturing or commercial city. It is the town residence of the Emperor and the Court, the nobility and the official and wealthy classes. There are important villa residences in some of the suburbs; but people of what we should call the middle classes live mostly in large compound houses or flats, near the centre of the city, in the usual Continental fashion. They seem to pay nearly twice as much in rent and other outgoings for very scanty accommodation on the upper floors of these grand houses, as would be paid here for a separate house and garden. The working population is accommodated in houses of some architectural pretension (at least as regards the new houses), and with rather high rooms, in which, however, they are closely packed. Rates and taxes are exceedingly heavy, the cost of living high, and the conditions of life much harder than with us. Coal smoke is only now becoming a matter of concern. The streets are splendidly clean, the parks and gardens numerous, spacious, and well kept; and the exteriors of the buildings, generally, well cleansed and repaired. But, although we may some day thoroughly cleanse and keep-up our streets and houses, we can never give to them the brightness of Vienna, which reminds one of the East and the South. I think, however, that there is nothing else that is southern or eastern in the general aspect of the place. It will be seen that the architecture is distinctly Italian of a northern type. The dress, aspect, and bearing of the people in public places are more familiar to Western eyes than anything seen in the countries passed through on the way to Vienna. With such a climate, the Viennese take much of their pleasure cheerfully out of doors to music that is distinctly their own. I wish I could represent their architecture as well as that music was represented amongst us no great while ago in the gardens of the Albert Hall.

If you find some elevated central spot near the beautiful Volks-garten, where, in the evening, one or more bands play Straus's lively compositions, you may look round on the chief of the new buildings of the city. To the right is the Court Theatre, now being completed by Freiherr von Hasenauer, sumptuous in design and decoration, in sculpture, marble, and scagliola; and so placed that you might drill a battalion on every side of it. Then come Ferstel's University and his Votive Church, the Palace of Justice, the Town Hall by Freiherr von Schmidt, and the Houses of Parliament by Freiherr von Hansen—all names familiar to architects in this country. Following along the wide Ring-strasse you see the two Imperial Museums, finished externally, but not yet occupied, and opposite to them, in the Hof Garten, is slowly rising the new palace of the Emperor, meant to replace the old rambling structures adjacent to it. Of this building, I regret that I have no illustration. Blocks of private buildings fill up intervals and form backgrounds in the view, dwarfing by their size all save the grandest of the public edifices. Rather beyond the range of view from this spot is the new Opera House, a fine Renaissance building, with a very handsome entrance hall, staircase, and the usual open loggia above the entrance; and possessing an auditorium that seemed to me very successful in respect of sight and sound.

In such a climate we should not expect to find Gothic the favourite or even a prominent style. The grand church of St. Stephen, though full of interest, is a rare

ancient example. Almost the only modern instances in this area are Ferstel's Votive Church, which is well known to us by illustrations, and Freiherr von Schmidt's Town Hall, with the expiatory building (occupying the site of the destroyed Ring Theatre) by the same architect [Illustn. ix]. In these the Gothic of Italy mixes with the northern variety, and rustications are used which Englishmen consider the monopoly of classical Italian. The group of spires in the Town Hall forms a picturesque and valuable feature above the horizontal lines of the general mass of buildings.

Apart from the wealth of sculpture, to which I shall have to refer, I was struck with the sober character of the ground work of the great mass of the Italian designs. Doorways, windows, cornices, balustrades, seemed old friends of over thirty years' standing—of the time when Cannon Street was thought to be rather a gigantic undertaking for this metropolis. There are not wanting specimens of good Renaissance design, nor of the fanciful gables, broken pediments, scrolls and shells, of which Old Vienna furnishes examples, but there is little or nothing of the very "free Classic" that has been flourishing here during the interval.

The most interesting building to many will be the Houses of Parliament, which is the only instance known to me of the use of the Greek style, in anything like purity, with success, in a large and complicated design. Belief in the Greek Corinthian Order, though carefully impressed upon English students, has never advanced much beyond the condition of a pious opinion amongst our practical architects. In the work of that distinguished Master, Freiherr von Hansen, the Order is developed into life and beauty, standing out in greyish white marble, under a sky that may rival in brightness that of the country in which it flourished. The interior of this building is richly arranged in coloured marbles, adorned with figure sculpture and decorated in harmonious designs. It is the chief work of one who has contributed very largely to the adornment of Vienna, and who was selected to design the Academy at Athens, photographs of which are in the Institute Library. He feels himself to be the last of the Greeks! But when I perceived upon a tablet, fixed in the Imperial Academy of Fine Arts, the terms of affectionate regard in which his old pupils spoke of him, it seemed as if he underestimated the effect of his own teaching and example, as well as the vitality of the style of which he is the leading practitioner.

Upon a general view of the new architecture of Vienna, one is struck with the immense amount of figure sculpture that is employed, in every situation in which the human figure can be placed, in the external elevation of a building. This is simply following out the practice in the older buildings of the city, where the taste seems to have long existed. In one of the private buildings, I counted one hundred and fifty figures of large size on its four faces; and, if a street census were taken of the creations of the sculptor and the modeller, they would certainly equal the population of a respectable market town. Figure sculpture is executed very cheaply, and this profuse employment of it produces a very lively, rich, and fine effect. In these large blocks of private buildings, where the outlines are necessarily somewhat rigid, it gives life and variety, which is much wanted in such a mass of classical designs of pretty much the same

character. Statues stand in lines on ground-floor cornices and on the balustrades over chief cornices; the spandrils of circular-headed openings are filled with figures in high relief. On pediments, large and small, broken or entire, they recline after the manner of Twilight and Dawn in the Medici Sacristy at Florence. Statues also adorn the parapets of bridges, notably the Elizabeth Bridge [Illustn. xii, B] which spans the Wien—an enormous trench, dry and overgrown with weeds, that traverses one-half of Vienna. I mistook it for a disused railway cutting, but it is, I understand, a river that, at times, floods town and country. Caryatides and Atlantes are, however, the great characteristic feature of Viennese architecture. They are placed in rows to support the chief cornices; they flank the windows; on a larger scale they support the pediments over doorways; in interiors they support the fronts of galleries, as in the Parliament buildings and in the Hall of the Music Society. Sometimes they are placed on house-fronts between the openings of compound windows, and with very rich effect, as in the Haus am Lubeck, and in Herr August Schneider's house. But amongst so many thousands, if the calm expression of sufficiency—without excess and without defect of strength or effort—is always to be preserved, variety can hardly be had. No doubt we should tire of an unlimited repetition of the beautiful figures placed in pairs under the side portico of the Parliament Building; but one feels a sense of incongruity when some slim figure stands placidly under an impossible load, or when a prodigy of muscular development does not simply bear but hoists his end of the pediment, turning his face to the wall for that purpose. Indeed, I am not sure that such objects are at best altogether cheerful to look upon. Waiting at some great man's door (not in Vienna only), and brooding over Life's Mystery, one must sadly contemplate the weary giant—

> Staggering on to his goal;
> Bearing on shoulders immense,
> Atlantëan, the load,
> Well-nigh not to be borne,
> Of the too vast orb of his fate!

The back elevation of the University building furnishes a good example of the use of sgraffito externally. In such a climate and under conditions as to cleansing, such as I have described, it seems possible that this work may for a very long period retain its freshness. Terra-cotta is used in enriched friezes and in the form of bold figure sculpture, as in the Exchange and the House of the Music Society. Open arcades on the ground-storey—of the kind which is so common at Bologna—are employed on a grand scale in a large building in the Reichraths-strasse, which is occupied by splendid cafés. The design is by Ritter von Neumann, jun., and the effect of the ground storey is exceedingly fine. But the richer features of the upper storeys, which, I presume, had to conform in size to practical requirements, are dwarfed by comparison with the arcades. Although brick is much used, it is seldom seen in the elevations of important buildings. When so shown, the fashion is to exhibit the ends or "headers" only; a practice very prevalent in new buildings in Italy also. This involves much cutting, so as to injure the bond, and I venture to think there is no artistic merit to counterbalance this objection. The

XLI.—THE RECENT DEVELOPMENT OF VIENNA (xii).

The Phototype Co., 303, Strand, London.

A.—THE KÄRNTHNER-STRASSE, VIENNA

LOOKING TOWARDS THE INNER CITY.

[FROM A PHOTOGRAPH.]

The Phototype Co., 303, Strand, London.

B.—THE ELIZABETH BRIDGE AND SCHOOL, VIENNA.

FROM THE KÄRNTHNER-STRASSE.

[FROM A PHOTOGRAPH.]

XLI.—THE RECENT DEVELOPMENT OF VIENNA (xiii).

The Phototype Co., 303, Strand, London.

A TYPICAL VIENNESE BUILDING IN STUCCO.

[FROM A PHOTOGRAPH.]

elevations of the Academic Gymnasium—one of the exceptional Gothic buildings—show this treatment.

Some use is made of fresco externally, as in the Academy of Art and the Heinrichshof, where figures stand against gold back-grounds. In such a climate much greater use might be made of painting, mosaic, and coloured building materials; indeed, one rather feels the want of some warmth in the vast masses of grey and white.*

Out of tenderness for the susceptibility of the hypercritical, I have concealed as long as possible the fact that very much of the architecture in Vienna is executed in cement upon a structure of brick. Stone is not the local building material, but, for the more important buildings, good grey marble, reddish white marble, and light grey limestone are obtained, besides the richly coloured marbles which are lavishly used inside the Houses of Parliament. Portland cement has been much used externally, but old work executed in the local plaster has stood well, and this is being used now. I saw some repairs of exterior cement wall-faces being roughly done, and in thirty hours the work was ready to plane down to a beautiful surface for painting. Very good-looking distemper is used externally, and the dirty, dilapidated cement-work sometimes seen elsewhere is, at least, not conspicuous.

The great work of improving and developing Vienna has been the result of a grand combination of tact, talent, and business capacity. The personal popularity of the Emperor enabled him to reconcile conflicting interests, and the co-operation of the official classes, wealthy private persons, contractors, and architects, has had to answer for the rest. I was told in sad earnestness that, now the greater works are finished, there are ten times too many of our professional brethren in Vienna—let us hope this is an exaggeration—but of able artificers and decorative artists there is evidently an abundant supply. I was kindly shown over building workshops where excellent ironwork and joinery were in progress. In the latter, ordinary joinery was being done on a large scale by machinery, and also by hand—the cost of production being the same in both cases. One of the curious sights about works in Vienna is the number of Bohemians who, in the Spring, come by hundreds for the building season. The men are excellent scaffolders and movers of heavy weights; the women, mostly barefooted, are the bricklayers' and masons' labourers, as is indeed common in Italy and other southern countries. An experienced friend assured me that their duties were only very light—merely to mix mortar and carry it and bricks, also beer for the men who do the work. I was struck with their neat and clean appearance; their hands were quite equal in condition to those of women employed in domestic work. They looked as contented, and infinitely more gay, than their stony sisters who adorn the

* The following regulations of the Vienna Building Act are important in their influence on façade design in that city. "The height of dwelling houses to the topmost edge of the cornice shall in no case "exceed twenty-five mètres; the floor of the topmost storey shall never be at a greater height than "twenty mètres above the street pavement. Dwelling-houses shall not contain more than five floors, "including the ground floor and mezzanine. Dwelling rooms with flat ceilings must have a height of not "less than three mètres. If the ceilings are not flat the cubical contents of each room must equal that of "a room of equal area, and be not less than three mètres high."—F. R. F.

façades which these have helped to build. I do not think they will thank the promoters of a movement that is now afoot for the abolition of female labourers.

I have to express my thanks to our Corresponding Members in Vienna who, upon the introduction which I took, received me cordially and, each according to his power, rendered me assistance in my object. Freiherr von Hansen personally conducted me over his Parliament buildings, with much pleasant explanation; Freiherr von Hasenauer placed me under excellent guidance in inspecting the Hof Theatre; Freiherr von Schmidt facilitated my admission to the galleries of the Academy, and desired me to convey his compliments to our Vice-President, Mr. Waterhouse, R.A., whom he had met on the Milan Cathedral Commission. I was thus enabled to gain for myself, and to lay before this Meeting, some account of the more recent architectural works in bright Vienna.

THOMAS BLASHILL.

XLII.

MASONRY FOR ARCHITECTURAL STUDENTS.

By Lawrence Harvey, *Associate.*

Alfred Waterhouse, R.A., *Vice-President,* in the Chair.

Mr. Vice-President and Gentlemen,—

You will doubtless agree with me that geometrical drawing is the language of architects; it is the means by which architects convey their ideas to others. I hope, therefore, to be able to prove to your satisfaction:—(1) That the science of masonry affords the most thorough and practical means of teaching geometrical drawing, and that by no other means can geometrical drawing be taught properly, so as to become the living language of architects; (2) That the science of masonry enriches the store of ideas in the designer, and has thereby a special artistic importance, and that as it furnishes ready and sometimes indispensable means of solving problems of construction, not only in stone-work, but in every branch of the art of building, the study of masonry is of great importance to the constructor.

In order to satisfy you as to the exact truth of my proposition, that masonry offers the most thorough introduction to geometrical drawing, the best proof will no doubt be to give you a practical example of my teaching. I remember when, more than a year ago, the President and some Members of our Council came to see me start my class, Mr. Cates, who was present, asked me if I would not begin by defining what was a solid. On the spur of the moment, I answered that if any of my pupils had the slightest doubt as to the nature of a solid, I would throw a brick at him, and his doubts would instantly cease. Now, gentlemen, in view of this Meeting, I have since the beginning of this year been assiduously following the lectures on modern geometry, delivered by one of the best mathematicians of the day, Professor Henrici, at the City and Guilds of London Central Institute. I was rather surprised to find that my definition of a solid agreed exactly with the last results of mathematical science. It is now admitted by the front rank of mathematicians that the elementary notions of geometry are obtained through experience. We know what a straight line is like, not from Euclid's definition, but because from our childhood we are always seeing straight lines. Euclid's

definition is only logical hair-splitting. Likewise, our notion of a plane is obtained from seeing planes all about us,—floors, ceilings, walls,—and our notion of a solid is also a matter of everyday experience. I may say that, thanks to this common-sense way of treating geometrical definitions, and thanks also to considering the whole extent of lines and planes from infinity to infinity, instead of small parts of them, the modern geometry taught by Professor Henrici is to Euclid what the sewing machine is to the needle. The complex theorems of Euclid become mere commonplace truisms, and an immense number of properties unknown to Euclid are discovered. Now, my teaching is likewise entirely grounded on experience. I ask my pupils to believe nothing but what they can see and touch. To begin with, when explaining the fundamental convention on which geometrical drawing is based, I am not contented with sketching in perspective the projection planes of the elevation and plan, but I present to my pupils the projection planes themselves in a model formed of two boards nailed together at right angles. On one of the planes is written in large letters ELEVATION, on the other PLAN. I show then, by means of an object placed within the boards, how the elevation and plan of a point is determined, and how a point is only determined by its elevation and plan taken together, for each of the projections taken singly, correspond to an innumerable number of points. I then draw a horizontal line on the black-board, and write thereon "ground line;" and I ask my pupils to remember ever afterwards that the ground line is the line where the planes of elevation and plan meet, and that they must consider every line, or point, drawn above the ground line, as being on a vertical plane, whereas every line or point drawn below the ground line lies on a horizontal plane, as in the model. Our convention is, that we are supposed to draw everything on these two planes represented by the boards of the model, and when

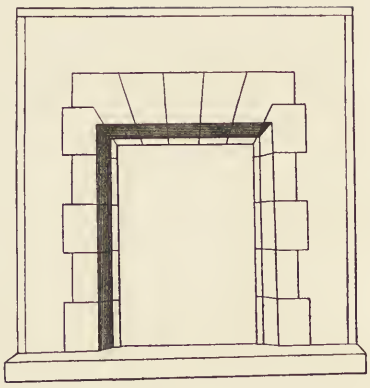


Fig. 1.*

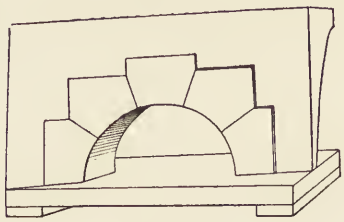


Fig. 2.

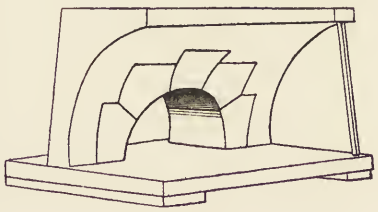


Fig. 3.

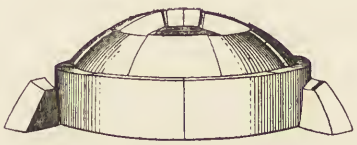


Fig. 4.

* Fig. 1 is from the model constructed, one-eighth real size, by the Architectural Association Class of Masonry in December 1886, namely, a square-headed doorway with splayed jambs; figs. 2 and 3 are from models constructed, one-eighth real size, by the Class of Masonry under Mr. Harvey's supervision in November 1887, the former representing the exterior and the latter the interior of a stone arch penetrating into a concrete vault through skew and inclined wall; fig. 4 represents a cupola made by the same class, each course of stones being cut by a different method. These diagrams are traced from photographs of the original models.

the drawing is complete we turn the vertical elevation plane down on the table, as I turn down the cover of a book. When drawing on the black-board, therefore, we must conceive that we turn down the horizontal plane of the plan so as to bring it on the surface of the black-board. Then I proceed to another experiment; by means of an articulated stand, I place a cube between my two boards in a purely arbitrary position, and I ask every pupil to file past the model, first looking right in front of the cube, then down over it; and I beg them to observe that neither on elevation nor on plan will they see any part of that cube in its real shape and dimensions. I then turn round the vertical axis of the stand, so as to bring one of the arrises of the cube parallel to the elevation plane, and I ask the pupils to take another front look at the cube, when they will see that all the arrises appear in elevation with their real length. Then I twist the cube round so as to bring one face parallel to the elevation, and my pupils again observe that the whole of that face appears in its real shape and dimensions on the elevation; but looking down on the cube from above they find that the faces of the cube still appear foreshortened in the plan. Turning down the axis on which the cube is placed, I then make the upper and lower faces of the cube horizontal, and then the faces of the cube appear in their real shape and dimensions, both on plan and elevation. Taught by this practical experience, my pupils have now learnt one of the principal methods of getting the moulds—that is, the real shape—of any face of a stone belonging to a structure drawn in plan and elevation. It consists in giving the stone a series of twists or rotations by which its faces are brought to be parallel to one of the projection planes. The next step is to learn how these rotations are drawn. To do this, it is sufficient to learn how to draw the rotations of one point, for the operation has only to be repeated with every point of a solid, so as to rotate the whole of a solid. Again, proceeding by experiments on the model, I show my pupils that when a point is rotating round a vertical axis its plan describes a circle, but its elevation describes a horizontal line; and the pupils themselves apply this knowledge to drawing the rotation on the blackboard. Then I make them apply the method of rotation to drawing a cube in any position, starting from a cube placed on the plane of the plan and parallel to the elevation plane. This completes my first lesson. Similarly, by the use of models, I teach from the concrete facts themselves how the intersections of cones and cylinders are found; the various properties of the sections of the cone; the methods of finding the tangents. It is only after my pupils have thoroughly realised these things by experience that they are made to pass on to the drawing of them in plan and elevation. In this way, also, every problem of practical masonry is treated; thus, during the whole course of my lessons, the students are made to pass from the fact to its representation in drawing, and again from the drawing to the fact. Therein lies the immense advantage of the study of masonry, and I hope that it will be admitted I have proved my first proposition. I have certainly come to the conclusion that there is no branch of mathematics so important and especially so useful, by its practical applications, as "modern geometry." To give you an idea of this, I may say that it is the key to the principles of perspective drawing; to the principles of geometrical drawing; to conic sections; to trigonometry, both plane and spherical; and

to differential and integral calculus. The portals to all these branches of mathematics it opens most readily, and, therefore, modern geometry may well be called, as Professor Henrici calls it, the royal road to mathematics. Unfortunately, to this luminous picture there is a dark side. In modern geometry the student is met at the outset by a nearly insurmountable obstacle (at least, it is so for many persons). He is asked to conceive, by the sole power of his imagination, lines and planes in every position and direction from infinity to infinity; moreover, he is asked to conceive aggregates of these infinite planes and lines, sheaves of planes and lines in infinite numbers. I shall be therefore excused in saying that, if modern geometry be the royal road to mathematics, it lies on a very high plane, say at the level of the plains of Mexico, and that it needs a good practical road to lead the traveller from the lower regions of ignorance up the rugged sides of the mountains of knowledge, where the royal road to mathematics is to be found. The easiest road to ascend to these heights lies, I believe, through masonry; for in masonry we handle lines and planes in every situation and direction, not as abstract conceptions, but as facts which we see and touch. I have come, therefore, to the very opposite conclusion to the one I was seeking; instead of having to recommend Professor Henrici's lessons of geometry as an introduction to masonry, I do most seriously recommend my lessons of masonry as the best preparation for entering intelligently on the studies

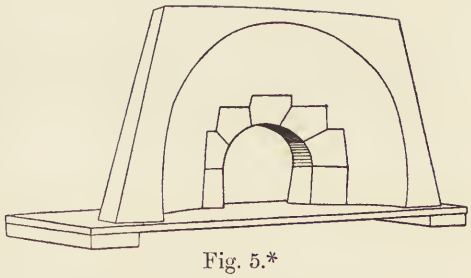


Fig. 5.*

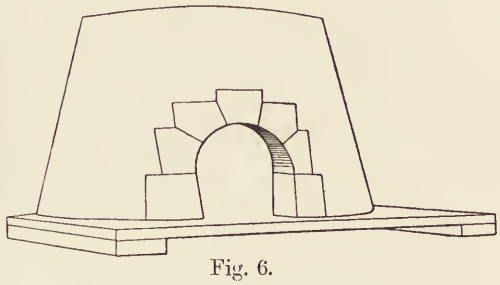


Fig. 6.

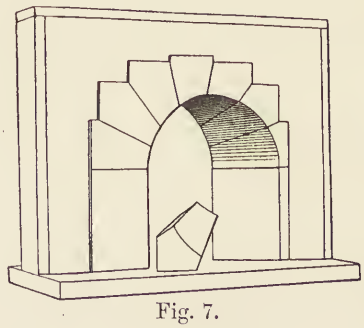


Fig. 7.

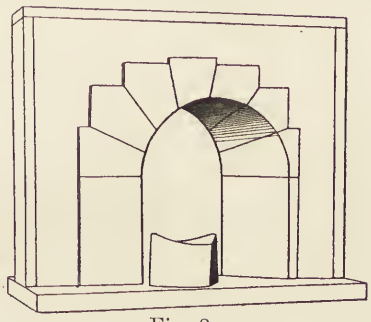


Fig. 8.

* Figs. 5 and 6, constructed by the Class of Masonry, now at work under Mr. Harvey's supervision, represent the two sides of an oblique arch intersecting a cupola in a round sloping tower; fig. 7 is the cow's-horn arch; fig. 8, the ancient cylindrical skew arch. Since this, the pupils have constructed "back vaulting" as described on page 48. It should be added that each stone of the models constructed by the class is worked by a different pupil, and is signed by him on its face. The stones are then fitted together. The time required to produce these models is about two hours. Mr. Harvey states that if each pupil produced one complete model, as is the custom in the Paris Municipal School of Masonry, the models would require as much as 14 or 18 hours to complete.

which Professor Henrici so eminently represents, and the utility of which cannot be too highly esteemed.

I should think it is hardly necessary to discuss at any length my second proposition, that "the science of masonry enriches the store of architectural ideas in the designer," because not a single architect will be found to deny it. Masonry, of course, comprises the whole range of vaulting, and vaults are very important architectural features. But, perhaps the description of some vaults not generally known in this country may interest you. "Skew" arches are not confined to modern times by any means. If you take the plan of the Château de Madrid, a work of the Early Renaissance, you will find that many of the doorways leading to the principal rooms are "askew." Masons have at all times had their wits highly exercised by this kind of arch, for if the beds were made to radiate as usual from the axis, the thrust of the arch would not follow the direction of the wall, and it would find practically no abutment. Modern engineers have surmounted this difficulty by the invention of the spiral courses which you may observe at the head of nearly every tunnel of the Underground Railway. The ancient solution of the same problem is not so effectual, but it is ingenious and has led to other applications worth knowing. The soffit of the arch was at first made cylindrical [fig. 8] as in any ordinary arch, but the arch-stones were made to radiate from an axis perpendicular to the face of the wall and not from the centre line of the arch. The result was that the beds of the arch-stones intersected the soffit of the arch along elliptical curves. As a question of beauty, these elliptical joints were not uglier than our modern spiral ones, but then the beds were often not at right angles with the soffit, and the edges of the arch-stones were sometimes sharp, sometimes obtuse, which is a very great defect in masonry. To get rid of these elliptical joints, some clever fellow invented what is called in French "*la corne de vache,*" the cow's horn [fig. 7]. In this form of the skew arch, the joints radiate, as in the former structure, from an axis perpendicular to the face of the wall, but the soffit of the arch is no longer a cylinder; it is generated by the motion of a line bound to meet the axis from which the bed-joints radiate and the head curves of the arch on both sides of the wall. The joints on the soffit of the arch are then no longer elliptical curves, but straight lines, and the arch-stones can easily be cut with the help of a straight-edge only. The cow's horn is not so good a method of constructing the skew arch as our modern way by spiral courses. The arch-stones on the face of the wall are necessarily unsymmetrical, and the surface of the bed-joints is not everywhere square with the soffit of the arch. On the other hand, the formation of the "cow's horn" arch has found a most beautiful application in bridge architecture. In several bridges of Paris and its neighbourhood, the arch of the bridge begins with a splayed surface, built exactly on the same principle as the "cow's horn," so as to allow the water to slip through when it is exceptionally high. Such is the formation of the arches of the Pont de Neuilly, and also of the Pont Neuf; apart from all practical purposes it forms a most beautiful arch, exhibiting strength and lightness combined.

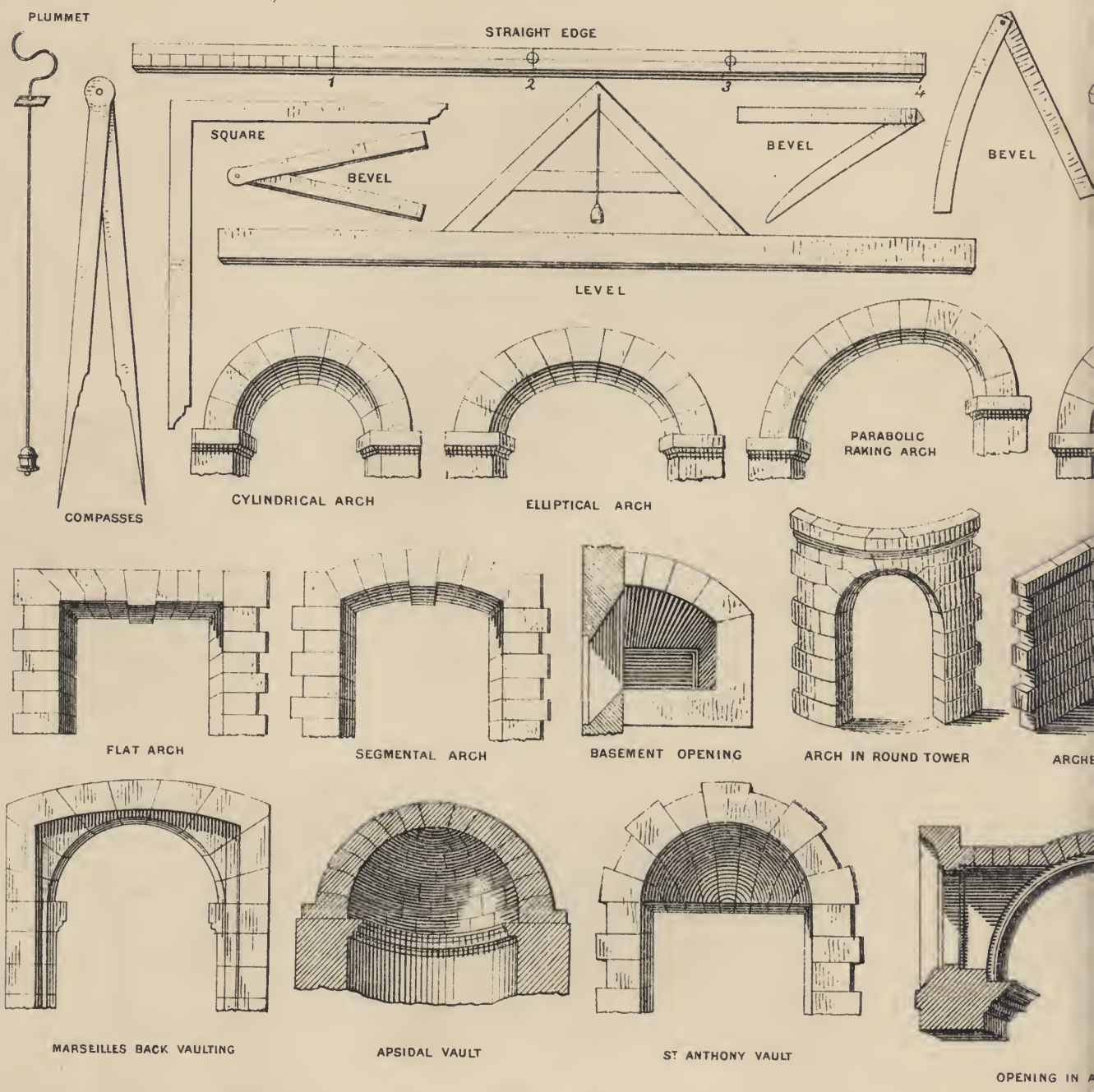
Within our thin walls we have not much opportunity of using back vaulting—in French "*arrière voussures*"—but in the Paris public buildings, with walls three or four

feet thick, circular arches for doorways are usually finished inside by back vaultings. The most common is the "*arrière voussure de Marseille,*" a back vaulting calculated to allow the circular head of the leaf of a door to be opened and laid back on the jambs on each side of the arch. This back vaulting is generated in the following way. On the inside face of the wall a segmental arch or even a flat arch is drawn; then, from the angles where this flat arch meets the jambs of the doorway, curves are drawn on the faces of the jambs to meet the springing of the circular arch of the door. The space between the circular head of the door, the flat arch at the back, and the curves on the jambs, is then covered by a vaulted surface generated by the motion of a straight line bound to meet the circular rebate of the door, the flat arch or the curves at the back, and the prolonged axis of the doorway. I may repeat here what I said of the preceding arch: that, apart from their practical purpose, such back vaultings are really elegant architectural features, and in France they are often used, where no door is intended, simply to connect harmoniously the circular head of an arch with the horizontal ceiling of a room or a hall.

A vault which is very little known, even in France, is the back vault of St. Anthony, thus named from the Porte St. Antoine, in Paris, demolished many years ago. This vault exhibited the exact surface of a sail when filled by the wind. It is the reverse of the Marseilles back vaulting: the doorway is square, and the outline of the vault on the back of the wall is circular; thus the soffit of the vault spreads from the straight line in front to the circular head at the back. You can easily conceive that such a vault would connect most harmoniously a square-headed arch with a barrel-vault behind; but, wherever I have seen it used, it was as an architectural feature to the outside face of a straight arch, that is, it was a front vaulting and not a back vault.

Turrets are often carried on stones corbelled out, but they can be carried also by an arch called in French "*trompe.*" As an example on a large scale, I may cite the arch which carries the circular apse forming the Lady Chapel at the back of the Church of St. Sulpice,—thereby leaving a free passage through the small street which otherwise would have had to be blocked up. In the "trompe" arch, the arch-stones wedge both ways, vertically and horizontally. Arches constructed on that principle, in whatever position, are called "trompes." Sometimes they are used on the outside angles of a building, to carry the angle of the wall, when the ground floor is splayed. Sometimes they are used inside angles at the meeting of two walls, and serve to carry turrets in courtyards and landings in stairs [Illustn. xiv.]. Sometimes they are used simply as an architectural feature.

On the south side of Paris is the grand classical Church of St. Sulpice, the façade of which consists of two storeys of open colonnades flanked by towers. During the Franco-German war, a bomb broke off the angle of the upper cornice of the building just under one of the towers. The projection of the cornice being about 6 feet, to replace that angle it would have been necessary to hoist, up to the level of about 100 feet, a stone of at least 8 feet by 8 feet, and 3 feet in depth; it would have been necessary, also, to cut out the wall below the angle of the tower, shoring up the superstructure with a hundred feet of shoring, while housing the stone in the cavity made to receive it. This



Extracted from Plates in Daviler's "Cours d' Architecture", published in 1696

MASONRY DIAGRAMS CURI
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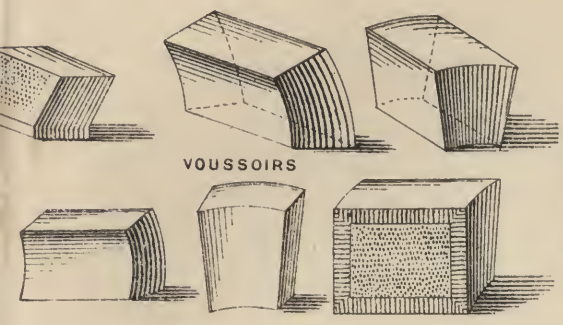
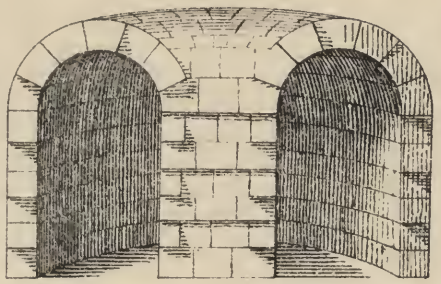
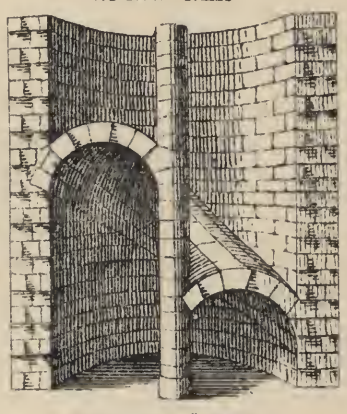
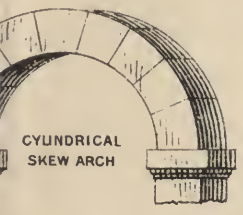
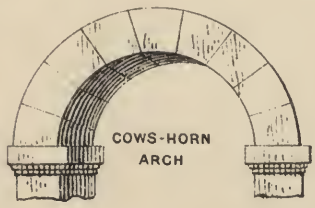
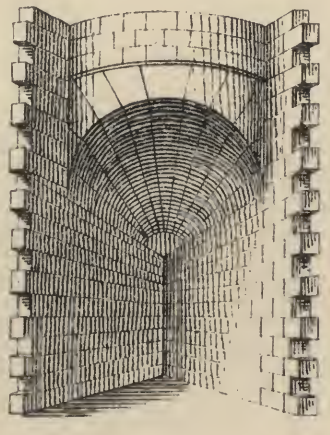


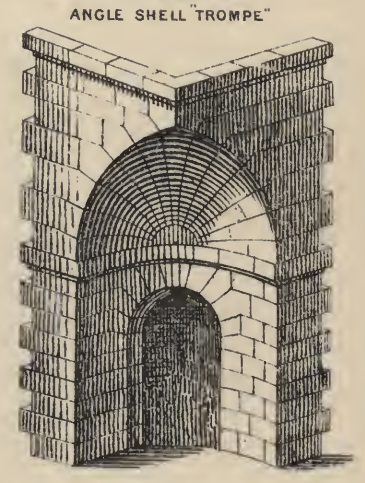


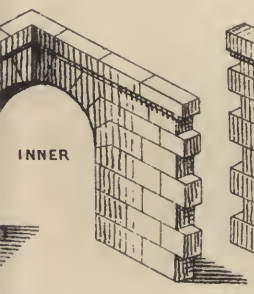


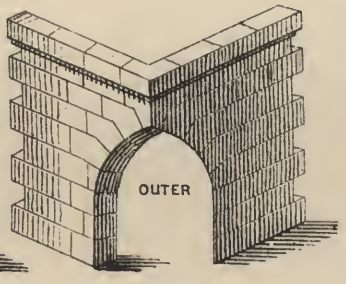




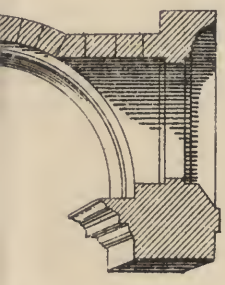




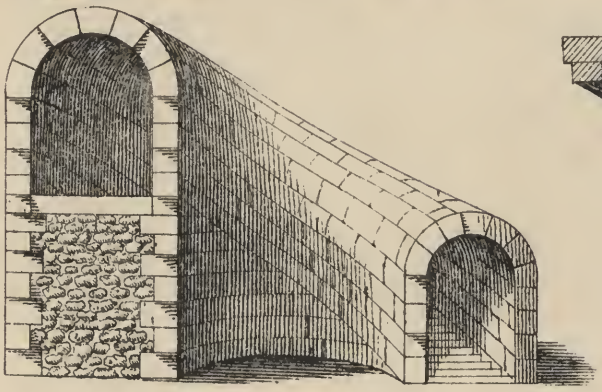




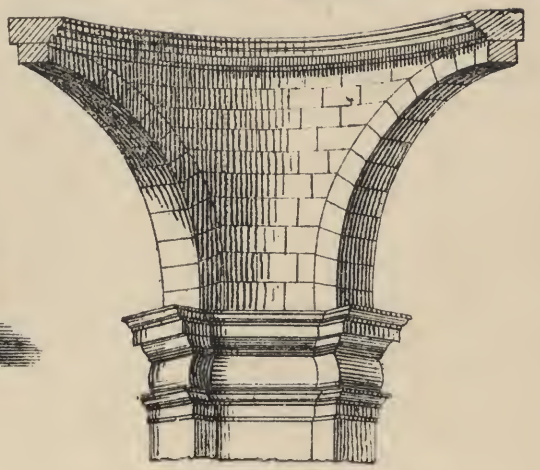
N ANGLE OF WALLS



ARREL VAULT



SPIRAL VAULT



PENDENTIVE

NT IN THE TIME OF LOUIS XIV.
49)

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would have been an expensive operation for a very small result. Happily a skilled foreman of masons proposed a scheme by which the angle of the cornice was repaired at a very small cost. He constructed the angle as a straight arch round the corner of the building, on the principle of the "trompe," with arch-stones radiating on plan as well as wedging downwards; and, to prevent the stones slipping out, stone joggles were inserted between the bed joints.

If I attempted to describe each kind of vault which offers matter of interest, the subject would be too vast for the time we can afford, but I beg leave to say a few words on one which we have near home: I mean the vaulting of the nave of St. Paul's. If we take the plan of St. Paul's we shall find that the ceiling is divided in oblong spaces; yet these spaces are covered by flat domes and pendentives. That the pendentives are spherical surfaces everybody sees, but many may not exactly realise how the vaulting is designed. I believe it is as follows: through the angles of the oblong space to be covered by the vault a sphere is made to pass; of this sphere only the surface comprised between the cross ribs and the walls of the nave remains. Then this spherical surface is cut above by a horizontal plane, from which the flat cupola springs; and on the two sides it is penetrated by elliptical lunettes.

In most of the Continental architectural schools, amongst others at that of Zurich and at the Paris École des Beaux-Arts, masonry is taught theoretically at the black-board, but the practical cutting of stones and the construction of models is not much encouraged. The reason for this is obvious to those who know what enormous trouble the practice of stone-cutting involves. But, without the practical exercises in stone-cutting, the constant passage from the fact to the drawing and from the drawing to the concrete fact, on which I have laid so much stress, disappears. Masonry taught in that way offers no advantages over ordinary lectures in geometry, and very little practical benefit is derived therefrom. This science contains the grammar and the syntax of geometrical drawing,—the language in which architects think out their conceptions, bring them to maturity, and convey them to others—and I think it will be admitted that the study of masonry must form the foundation of the architect's technical education. I hope that, in due course, Scientific Masonry will be one of the subjects of Examination required from candidates for the Associateship of this Body.

The treatise on Architecture by Daviler, published in 1696, contains a chapter on masonry and stone-cutting, which is interesting, as showing the importance given to this study by the architects of Louis XIV. [Illustn. xiv.]. It begins thus:—
"The most important part of the science of construction is the art of stone-cutting,
" or rather the art of setting out the work for stone-cutting, which Mathurin Jousse
" proclaims the Secret of Architecture. The principles of this science are based on
" geometry; so that from the operations of the geometrical drawing one passes on to the
" execution of the work, and to set out accurately the shape of stones to fill up voids of
" however irregular a shape. This knowledge forms the capital of the best workmen, for
" the talent in setting out work is the workman's principal recommendation. This

" knowledge is so highly esteemed that the master-mason stands higher in public opinion " than the builder. The knowledge of this science is also required by architects." He advises those who wish to seriously study this art to produce models under the guidance of an intelligent foreman of masons; for, says he, in this art practice is worth much more than theory. As a material for cutting out the stones of the models, he recommends the stone of Saint-Leu, which is very soft.

Masons are a conservative race, for the tools described by Daviler are used in Paris at the present time. Of the pointed arch, Daviler would necessarily know nothing, for Gothic architecture was then despised, but he described every arch—the cylindrical, the elliptical, the parabolic raking arch, the segmental, the flat—except the mediæval one. Of skew arches he describes the cylindrical and the cow's horn; the Marseilles back vaulting and the back vaulting of St. Anthony, which he considers highly useful and elegant, he also mentions. The figure [Illustn. xiv.] next to the segmental arch is the section and half the elevation of an opening to light a basement; it is square inside the wall, and segmental outside, the surface being continuous between the outside and inside of the arch. Next to this figure is a doorway in a circular tower; then doors at the inner and the outer angle of two walls are given, built on the principle of " trompes " or circle upon circle arches. Next to these come two fully developed " trompes," one supporting a turret, the other the angle of a wall, which is called the shell " trompe." Above, there is an annular arch, and by the side of it the famous spiral vault called " vis St. Gilles." At the bottom of the page is another spiral vault around an open circular well-hole.

Daviler further says,—" As to the drawings required for setting out these struc- " tures, they are to be studied in the four principal authors on the subject. Philibert " de Lorme is the first who has opened the way to this science unknown to the ancients, " and who has reduced it to rules, but he does not explain his meaning clearly enough. " Mathurin Jousse has managed to make himself better understood by workmen, and it " seems by his treatise that he was an able practitioner. As to Girard Desargues, " whose works have been published by Abraham Bosse, it seems that, being clever in " geometry, he wished to prevent one learning what he teaches by drowning it in " generalities, and by using stilted terms and language unknown to workmen. The " best author of all, according to men who are both practical and learned, is the Jesuit " father François Derand, who has written a large volume on the subject with full " explanations and diagrams. This is the book the most sought after by workmen, and " it is given to apprentices to guide them in studying this subject, which is by no means " the easiest part of architecture. But, although these books are a great help, their " methods are now to a large extent superseded by shorter ones, which the master- " masons are using in the new buildings for the King." I may add that the famous mathematician, Monge, has since created a great science, universal in its application, and simple in its principles, viz., Stereotomy.

LAWRENCE HARVEY.

XLIII.

THE LATE RIGHT HON. A. J. B. BERESFORD-HOPE, *Past President.*

By Mr. Henry Hucks Gibbs, M.A., F.S.A.

Arthur W. Blomfield, A.R.A., *Vice-President,* in the Chair.

Mr. Vice-President and Gentlemen,—

I AM not sure that I felt wholly grateful to this learned Body for having laid this task upon me; for though I warmly acknowledge the honour that has been done to me, and cannot but be gratified by the compliment implied in your selection of me, I must say that I should have been sincerely glad if it had fallen to some one else, rather than to me, to write a Paper on the life of my dear friend, Alexander Beresford-Hope, now lost to us. Some one might, I think, have been found who had been familiar with him from his youth up, and had seen the first beginning of that love of Christian Art which so fully filled his mind, and which enabled him in so many ways to be useful in his generation. But I have done my best, and must rejoice that there were some to be found who, though they would not themselves undertake the task, have done the next best thing, and have helped me with their recollections. From Mr. Hope's old friends—the Rev. H. Bailey, first Warden of St. Augustine, Mr. France and Mr. Butterfield, and from Mr. R. H. Carpenter—I have received valuable notes.

What can I say that you do not already know? Many of you were well acquainted with him; to some of you he was a near friend; and you are all better judges than I can be of the services which he was able to render to the branch of art to which you are yourselves devoted. His love for art, and particularly for that branch of art, was hereditary; for his father, Mr. Thomas Hope, of Deepdene, was himself a lover and patron of art, and of no mean power in design, as his published works bear witness. More particularly had he devoted his attention to architecture, and I doubt not that it was his example which first led our friend, his youngest son, to the study of this, the most ancient and most necessary of all arts. Mr. Thomas Hope's *Historical Essay on Architecture* was, in any case, well fitted to awaken his son's interest in it if it had not been stirred before. Mr. Thomas Hope did not fail to perceive the ultimate relation between

fully developed architecture and the religions of mankind; but, in the mind of Mr. Beresford-Hope, architecture always maintained its place as the especial handmaid of the Christian religion, and of the worship of the Catholic Church; and accordingly it was to Ecclesiastical Architecture that he chiefly turned, as to a subject which alike gratified his hereditary taste and appealed to those strong religious sympathies which were a part of his nature.

His lot had fallen in stirring times for the Church. She was awakening from the lethargy by which she had been numbed in the eighteenth century, and men's minds were turning to the thought that the worship of God did not rightly consist in a droning duet between parson and clerk, and that it was not in itself fitting, nor at all suited to the reviving order and decency of public worship, that the House of God in which it was held should be little better than a whitewashed barn, while the worshippers themselves dwelt in good houses. Architecture itself began to give, by slow degrees, its greatest and best thought to the higher and nobler task of building, restoring, and adorning the Houses of God in the land. What public worship too frequently was in those early days, Mr. Beresford-Hope has himself most graphically described, in his *Worship of the Church of England*, giving, I believe, a true and lively picture of the Parish Church of Dorking, near which his early years were passed. What public worship is now, St. Paul's Cathedral can tell us; and not St. Paul's only, but quickened and improved services throughout England, zeal and energy on the part of the clergy, interest and awakened religious life amongst the people. What the churches were, the experience of many of you can tell; and what they have been made to be, or will be made to be, one can learn in many a parish and in many a cathedral city. By slow degrees, and through many mistakes, have both results been reached, and there is yet much to do—a vast field of labour before both priest and architect.

It was in the beginning of the set of the tide in this direction, that Mr. Beresford-Hope first became publicly known as a young man of promise, whose heart was in the then beginning church movement, and in the revived love of architecture. He was but eighteen years old when (in 1838) he expressed to the curate of Goudhurst, who was to serve the new and cheap little church at Kilndown (built, I think, by Mr. Salvin), a wish to give a marble altar to the church. "It was too poor a building," said the curate; "all the more reason," said Mr. Hope, "that the altar should be magnifical." What he did do was to give a stone (not marble) altar, and to cause all the windows to be filled with stained glass; and as time went on he did all that was possible, with the able help of Mr. R. C. Carpenter, to make that church where he and his family worshipped, and where he and Lady Mildred, his wife, now lie buried, more fit to serve as the house of God, and to be a worthy memorial of his own early zeal.

These were the days of the early labours of the Cambridge Camden Society, labours which were in that University the practical correlative of the great church movement at Oxford. I do not mean that Oxford monopolised the spiritual side of the movement, or Cambridge the practical side, for the same spirit animated the leaders in both seats of learning; but that this particular outcome of the stir in men's minds, the direction of

their zeal to the improvement of churches and of the accessories of public worship, took earlier and stronger root in Cambridge. The practical nature of their aims was expressed in their motto, "Surge igitur et fac, et erit Dominus tecum;" a motto which well corresponded to the energy and faith of Mr. Beresford-Hope. His friends, Mr. Benjamin Webb, Mr. J. M. Neale, and Mr. F. A. Paley, founders of the Society about the year 1841, with Archdeacon Thorp, Lord John Manners, and Mr. Augustus Stafford, were already hard at work in the cause; and, with many recruits, they carried on the work with indomitable energy and thoroughness. The Cambridge Camden Society became the Ecclesiological Society, and (in 1846, I think) transferred its domicile from Cambridge to London, from which central point it could make its influence more widely felt, and enlist among its friends people of all ranks and connections, whereas, before it was almost entirely an academical body belonging exclusively to its own Alma Mater. When it was removed to London, Mr. Hope became its moving spirit, its mainspring. The committee meetings were held at Arklow House, and a great annual dinner, at which his hospitality, his kindly nature, and the mingled jocularity and seriousness which characterised him had full course, cemented the union of its members representing severally the architectural, liturgical, and musical, elements in its composition. Mr. Hope himself, and Mr. Webb, may be taken to have been the foremost in the especially Architectural department, and in the department of Ecclesiastical Archæology; Mr. Neale and Mr. J. D. Chambers in the Poetical and Liturgical, and Mr. W. Scott (the Editor of the *Christian Remembrancer*) in the Literary branches of the work; Messrs. Greathead, Jenner, Helmore, and Webb, in the Musical part; though all of them, of course, took cognisance of the whole range of subjects, and of the corresponding plans submitted to the committee for their consideration.

To them we owe in great measure the excellent collection of hymns known as Hymns Ancient and Modern, which took their origin in part from the "Hymnal Noted," which itself contained many translations of ancient church hymns and sequences, mainly due to the care and learning of Dr. Neale and Mr. Helmore, but in which Mr. Hope and his colleagues took a keen interest.

It is difficult nowadays to realise the ignorant opposition and misguided religious objections, which were entertained forty years since, to any sort of proper ecclesiastical arrangement. It was the aim of the Society to dispel that ignorance and combat those objections; to improve church architecture, and to educate the English people in proper ritual arrangement of churches themselves and their ornaments. A chancel had been thought to be a superfluous expense, a chancel screen an enormity; a mean recess for the communion table, such as that at St. Paul's, Brighton, being all that was thought necessary for the first, and no one thought of putting up the second. The church at Maresfield, near Bedgebury, designed by Mr. R. C. Carpenter, was, I am told, the first instance of a well-developed chancel in a modern building, and Mr. Hope took great interest in its erection, as he did also in the grand chancel, with its screen and returned stalls, at St. Paul's, Brighton. At Kilndown he had caused to be erected, from Mr. Carpenter's designs, a richly carved rood-screen of the Norfolk type.

Nor were other forms of artistic culture neglected. Mr. Hope was keen to observe and encourage, as far as he could, any indication of talent in sculpture or painting which fell in his way. When, on a visit to his Derbyshire estate at Sheen, he learned that the son of one of his tenants showed the promise of great skill in figure carving, he at once took great interest in him, sent him to study modelling and drawing, first under his friend Mr. Clayton, and afterwards in Paris; and thus, by his timely aid, was developed the talent of Redfern, the well-known sculptor, who lived, alas! too short a time, but whose sculptures at Salisbury, in the reredos at St. Andrew's (Wells Street), at Clifton Hampden in the County of Oxford, and other places, bear witness to his ability. The growing improvement in painting, especially in its relation to Christian art, soon attracted Mr. Hope's attention, and the progress made in this direction by the German school, under the lead of Overbeck and others, greatly interested him; for, under the hardness of design and coldness of colour which some of them affected, he could see and admire the devout feeling which always existed in their works. If the beauty of the human body was not always well represented, it was, perhaps, because, like some of the earlier painters, they more carefully addressed themselves to pourtray the soul and mind, so far as it is in the power of man to do so. In his admiration of the progress thus made, and his desire to further it, he had the full sympathy and co-operation of another accomplished member of the society—Mr. Gambier Parry, himself an admirable painter, as Gloucester and Ely Cathedrals, and Highnam Church, can testify.

I have mentioned the church at Kilndown, and the stained glass with which Mr. Hope had caused its windows to be filled. This was another instance of his readiness to accept and further any new step forward in art; for he saw in the Munich school of glass painting a reflection of that which I have just mentioned—the advance in true artistic feeling made by their brethren of the brush and palette in the same country. I will not say that the step in advance made by the glass painters was a wholly successful one; but it was, I think, one of those which led, as well by its shortcomings as by its advance, to the great improvement which we have seen in our own country in that branch of art.

I need not enumerate the multitude of instances in which, by advice or substantial assistance, he was helpful in the repair and adornment of churches, chiefly of historical interest, in England and Ireland; but I may mention the church which he built at Sheen, the font which he gave to Boston, the pinnacle and gable cross to Ely Cathedral, and his constant and substantial help at St. Andrew's, Wells Street. In the restoration of the Round Church of the Holy Sepulchre at Cambridge (famous for what is wrongly called the Stone Altar case), which was the first work undertaken by the Cambridge Camden Society, Mr. Hope was, I believe, very helpful.

Of the Church of All Saints, Margaret Street, he and my good friend Henry Tritton were the munificent founders; and he spared no trouble in the selection, with Mr. Butterfield's help, of marble, tiles, and other materials for its adornment. They travelled together into Derbyshire, and spent some days at Mr. Minton's house, discussing the subject. But Mr. Hope's greatest work in this direction was St. Augustine's Missionary

College in Canterbury. It was Mr. Robert Brett, of Stoke Newington, who sowed the first seed of this undertaking in his mind; for Mr. Hope, having occasion to visit Canterbury, chanced—if chanced be the right word—to read at that very time a letter of Mr. Brett's in the *English Churchman*, describing the ruins of the Monastery as they were in 1844, and went to see them, notwithstanding Archdeacon Lyall's assurance that they were "miserable things, not worth a visit." He noted all he saw, conceived a design in his mind, and, not without suffering many vexatious delays, not without having to procure three private Acts of Parliament, not without encountering much opposition which would have discouraged a man of less energy and less persistence, he purchased the ruins and sufficient land for his purpose; and Mr. Butterfield could tell you, of his own knowledge, with what zeal and interest he watched the work of restoring the monastic buildings, down to the time of the completion of the College in 1848. I have said that it was Mr. Brett who sowed the seed which grew into so noble a tree, but another seed, of no less virtue, had been sown by Bishop Broughton of Sydney, who was the first to suggest the idea of a college for missionary clergy; and the plant thus raised was fostered by Mr. Edward Coleridge with his accustomed warmth, and gladly welcomed by Mr. Hope, by whose munificence the restored buildings of St. Augustine's became the seat of that great and prosperous work. In his letter to Mr. Coleridge, in which he makes them over in other respects unreservedly, he says—"You will not object "to letting me have the management of the architectural part of the College." He committed the task to Mr. Butterfield, and the buildings themselves bear witness how good a choice he made. Their completion, and the establishment of the College, were a great happiness to Mr. Hope. Together they illustrated his ruling tastes, and his fixed principles. What were those principles? I may answer that question in the words of the Warden of the College. "They were those of a faithful son of the Church of "England, of one who believed that, as a branch of the Church Catholic, she was right "when, in the sixteenth century, she chose to retain a form of Church Government, "which had been handed down to her in unbroken continuity from Apostolic times. "They were those of one who deemed her right, when she asserted her liberty to cut off "the accretions of centuries, which had gathered round the Apostolic doctrine and "practice, and to return to primitive and Catholic usage. They were those of one who "believed she was bound to use for the benefit of her children, all that art and music "and painting, and chastened symbolism, could do for her, that her sacred edifices were [in Mr. Hope's own words] "to be treated, not as halls for sermons, but as temples for the "'worship, in its various forms, of the Almighty.' They were those of one who believed "that while everything was to be done that could be done to proclaim her continuity "and her connection with the past, everything also ought to be done to proclaim the "conviction that she had a great mission before her in the years to come, and that the "Catholicity of her position reserved for her a unique destiny in the future of "Christendom." Mr. Beresford-Hope's last work in the college was the gift of a silver altar-cross for the upper chapel, and an altar of inlaid woods made by his own workmen at Bedgebury, for the lower chapel, as memorials of Lady Mildred, his wife.

The mention of the tarsia-work, executed at Bedgebury, reminds me that when the chapel of Trinity College, Cambridge, was decorated and the accommodation enlarged, —in 1874-5,—Mr. Beresford-Hope undertook, as his contribution to the work, to fill the oak panels of the sanctuary with tarsia-work, which was executed in the most skilful manner at Bedgebury by his resident clerk-of-works, Mr. Norris. The drawings for the decorative part were made by the late Mr. Clement Heaton. In this work no artificially stained woods were used, only natural colours; even the vivid green which is seen in some parts is a natural stain, acquired in some manner by broken branches of trees lying in the woods at Bedgebury, of which Mr. Norris had collected a large quantity.

I need not speak of the house at Bedgebury which he inherited from his step-father, Field-Marshal Lord Beresford, for I think its great enlargement and conversion into a free imitation of a Louis XIV. chateau with a mansarde roof, under the direction of Mr. R. C. Carpenter, has been already described in this place. Mr. Hope rebuilt, also, almost all the cottages on both his Kentish and Derbyshire estates; and, besides the church at Sheen already mentioned, he rebuilt the farm buildings and erected a schoolhouse, all from the designs of Mr. Slater.

Of Beresford Hall itself, Mr. Hope's manor house at Hartington, in the adjoining parish to Sheen, I can say little; for I am sorry that certain photographs are all that remain of it. It was an interesting house, and Mr. Hope set much store by it, as he did by all his Derbyshire property.

It was especially to mediæval art that his taste led him, and more particularly to the English forms of Gothic Architecture, of which that of the Decorated period had most attraction for him; but he had a great admiration for foreign work also, and not least for that development of Early French which was so ably worked out by the master hand of his friend, the late William Burges. It was by the Cambridge Camden Society and Ecclesiological Societies, as I have said, that the principles of Gothic Architecture were consistently and persistently advocated; but death, and the calls of duty in other directions, gradually diminished the numbers of the latter society, and even Mr. Hope's zeal and animating influence, which had long and powerfully sustained it, could not avail to ward off its dissolution. But its work was done; and it may be interesting here to inquire whether its labours and the labours of Mr. Hope and his colleagues have been wasted upon the world, or whether they have borne good and lasting fruit.

I have read that the Gothic revival, pure and noble as the art was which it sought to restore, was already dead while Mr. Hope was still its living and enthusiastic defender; and that the period of architectural history which that revival filled is already far behind and forgotten. With this I do not at all agree. It may be that I have still the prejudices of those early days, when the revived study of Gothic Architecture seemed both good in itself and indissolubly bound up with the revival of church feeling, and that I am still worshipping the shadow of a substance that has itself passed away. I do not think that will be your opinion, or I should feel that it was presumptuous in me, a layman, to venture a strong opinion on such a matter. But I do feel strongly, both that

Gothic Architecture is a living and flourishing reality, and that it has done more than live and flourish; for the study of it has informed the minds even of those who practise it no longer, and has communicated some portion of its spirit to their works. But does it not still live? Can any one doubt it who has seen Mr. Pearson's noble building at Truro? I mention this amongst many, not invidiously, but because one, and that the latest, example is alone a sufficient answer to the allegation that Pointed architecture is dead in England. No better proof can be shown of vitality than the fact that the works of architects in that style are not resting at a dead level, but are going on from good to better. Compare what used to be done in the matter of restoration of churches with what is now done. How much has increased the feeling of reverence for the work of those who went before us? Such reverence is, of course, not universal. In some cases it is painfully conspicuous by its absence; but I think it is rare to find either architect or layman who is willing to follow his own fancies rather than the example of those on whose foundation he is building. It was natural that, in the early stages of the revival, zeal should have outrun discretion, and that some should have thought that from a palace to a pigstye, from a castle to a cottage, nothing could serve but Gothic. *That* phase of the revival may have passed away, but the influence of Gothic Architecture, and of the practical study of it, is still amongst us. Let those who think it is gone ask themselves whether it is conceivable that any one would now build a second St. Pancras as a parish church, that any one would do as Bishop Wren did when he added a classical doorway to Ely Cathedral. Had it not been for the teaching of the architecture of our forefathers, who could have expected that the four bare walls, which were sometimes the best that architects could give us for churches, in the Georgian era, could have been adorned as some of them have since then been adorned? Some may approve and some may disapprove the treatment of the chancel of St. Marylebone; but I think I may safely say that, in that it has received any such ornamentation at all, even that least Gothic of all churches has felt some of the influence of the Gothic revival.

I remember saying to Mr. Hope, and as he fully agreed with me I may venture to repeat it here under correction of your better knowledge, that the opprobrium which has been sometimes cast upon Gothic architects of the present day, that they are but imitators and that there is no style of this century that can be called our own, is a very erroneous one. Imitators the revived school of Gothic architects necessarily were, and are; but where does the part of the imitator cease, and the part of the man of genius begin. All art must have a substructure of imitation. Was not Wren an imitator? Was not my namesake, the architect of St. Mary-le-Strand and of the Radcliffe, an imitator? Phidias and Raphael were imitators; but they infused their own souls into their imitative works, and imitation became creation. So must it be with architects of all time; with you and all others. There must be a basis of imitation (which is a very different thing from servile copying), but you may each touch the work of your hands with the light of the genius which God has given you, and not only will the dead material seem instinct with life as bearing the impress of the living mind of him who handles it, but new forms will arise, all springing out from the old stock planted by those who have gone before you.

The architects of the Renaissance were imitators, for they had set before themselves as new examples the buildings of classic times, raised on different principles from the works of their forefathers. The architects who led the Gothic revival were imitators, for they had been brought up in a school of what was originally Italian architecture, but had degenerated (so far as the taste of the nation was concerned as distinguished from individual excellence) into no style at all. Therefore they had to begin to learn anew. I suppose the necessary condition of such a state of things would be that one man would be attracted by one feature of the works of his predecessors, and one by another; and while this period of eclecticism continued,—and while the whole generation was failing to make up its mind what, as Mr. Hope said, "to eclect,"—either a composite style would be evolved, or the general result of the study and practice of the Pointed style would deeply affect whatever might be the prevailing architecture of a later generation.

The case was no doubt different before Classical architecture had supplanted Gothic; but, if we leave out of the question the space of neutral ground occupied by the first years of the Renaissance, was there any time, do you think, when the architects of the three periods of Pointed architecture were conscious that they were working in a new style of their own—a style, that is to say, separate and discriminated, as we are able to discriminate them, from the style of their predecessors? I imagine that they would have said, "We don't now make the mouldings so deep as we used to do," or "We add more "ornamental work than was customary," or "We do not like so many curves in our "tracery;" but that they would have considered themselves to be working on the same lines as their predecessors, and perpetuating the one style of architecture which had been for centuries planted in England. It will be for subsequent generations, and not at all for the present one, to determine whether we have really evolved a Victorian style of architecture; but I cannot but think that it is impossible to pass through many streets of London without seeing that our domestic architecture has assumed a character of its own, not uninfluenced by Gothic feeling, though much differing in form; or to look at some of the Gothic buildings, which have been raised amongst us, without perceiving and admiring ability and original thought in their designers.

I claim for Mr. Beresford-Hope and his fellow workers no exaggerated merit, no greater praise than their work deserves. They had no monopoly of genius. The taste of that generation was bad, and their's was, to my mind, good; but, "Vixere fortes ante "Agamemnona," there had been a never-failing succession of men of genius, though they fell on evil times; and the chiefs of the new revival led the men of their time into a new path, which was, at the same time, old; and you will not, I think, grudge them the praise of having helped to make yourselves—the present generation of architects—what I rejoice to think you are.

Mr. Beresford-Hope was but an amateur, but he escaped the snares which "a little "knowledge" lays for man. Your amateur painter too frequently thinks himself capable of giving lessons to the President of the Royal Academy; your amateur theologian knows in his own conceit more than all ancient fathers and modern divines; your

amateur Galen will cure you of all diseases allopathically or homœopathically (the latter for choice), despising the methods of the trained practitioner; and your amateur architect, rejoicing in his own wisdom, is perfectly sure that if there is one man in the world who does not understand the principles and practice of building, it is a member of the Royal Institute of British Architects. But Mr. Hope had none of this weakness. Those who have worked with him will, I am sure, bear witness that, while expressing clearly his own wishes, he was the last man in the world to interfere with the technical knowledge and independent judgment of the skilled masters of the art which he loved. Independent himself, he respected independence in others; and I think I shall be borne out by all those who knew him in saying that he obtruded his opinions upon no man. When he was called upon to give them, he gave them unflinchingly, and without minimising what he felt to be the truth. Independence was the main feature of Beresford-Hope's character. In matters both of Church and State, both in and out of Parliament, that was indeed his chief characteristic. He was elected for Maidstone in 1841, the year in which he took his degree at Trinity College, Cambridge, and from that time till his death, on the 20th of October 1887, when he was still one of the Members for his University, he never shrank from defending stoutly and persistently the unpopular, and even the losing, cause, if in his mind and conscience he was satisfied that it was the right one. He was one of the few opponents of the foolish and futile Ecclesiastical Titles Bill, called for by popular clamour, against Papal aggression. A Conservative by instinct, reason, and profession, he opposed Mr. Disraeli's Reform Bill with all his might. Church-rates found in him one of their foremost defenders; and the Bill for legalising marriage with a deceased wife's sister counted him amongst its foremost opponents. Whether his opposition in the latter case will be as much justified by ultimate success as it is, in my opinion, by its wisdom in the interests of public policy, time must show; but in the other cases time has already amply justified him. The provisions of the Ecclesiastical Titles Act were not once put in force, though the provocations to such action never ceased, and it is not long since it was silently and contemptuously repealed. The Act for the Abolition of Church Rates was intended to remedy the grievances of dissenters, and to make them happy and contented ever after. It was said to be so hard that they should have to contribute to the sustentation of a fabric in which they never worshipped, and the repairs of a churchyard in which they might not lie. That grievance once removed, they surely would have nothing to say. It was removed, and they—the political dissenters I mean—began to agitate for admission to churches for which they did not pay, and for joint rights in churchyards which they did not help to repair. The Reform Bill was to have been the end of controversy; but whatever its merits, and whatever the necessity for it, it has been, as Mr. Beresford-Hope foresaw, the beginning of new strife.

For restoring the active life of convocation, he and his friend Mr. Henry Hoare, were among the first to plead, and their pleading was successful. Mr. Hope's signature was affixed to the first petition addressed to the Convocation of Canterbury on its receiving the Royal license to proceed to business; and of the House of Laymen, the

latest development of the deliberative voice of the Church, Mr. Hope, for the short time which remained to him after it was summoned into existence, was a distinguished member.

I cannot better sum up the character of Mr. Beresford-Hope, than by borrowing the eloquent words which were spoken by the Dean of Llandaff, in a sermon preached in the University Church of Cambridge on the Sunday after his death, words which, though forming part of a sermon, are as appropriate to this place as they were to the pulpit in which they were spoken.—" Politics must be silent, absent here, but they may be silent or absent, and yet leave this man, leave all that was characteristic of him—for the " characteristic of the man, all will agree, was his independence. It is a blameless, a " beautiful life to look back upon, as I can look back upon it from undergraduate days, " and remember nothing in it that would not bear the scrutiny of the sunbeam. The " Church may well mourn him, for he was her devout and devoted son and munificent " benefactor, her dauntless champion in good report and ill, most of all in the latter. " But I think that England mourns him too, were it but that he suffered not himself to be " trampled under foot and ground to powder by the Juggernaut of Party; willing to " stand alone, if need be, in the maintenance of principle, and never suffering principle " to be moulded or manipulated by that sort of convenience which men seek to dignify " by the more respectable title of expediency or policy. We have other such men. " These late days of trial have brought them out as gold from the furnace; but his was " a religion, not merely of political independence; he sought nothing and he gained " nothing by it, save the testimony of his conscience and the respect of good men. " Peace be with him. May another like-minded with him in the sensitiveness of " conscience, in the delicacy of honour, in tenacity of purpose, in fervour of faith, in " munificence of piety, be found—if it be by long research—to replace him, and may his " example provoke very many to go forth from this place to play the man in England!" We may, I think, fully accept Dr. Vaughan's words.

Mr. Beresford-Hope had no desire for such honour as an advance in rank could confer; but he welcomed, in 1880, the wholly unexpected intimation from Mr. Disraeli, that he was to attend at Windsor to kiss hands, on being called to the Privy Council; and he welcomed, with at least as much pleasure, the various distinctions which he successively received, and which bore witness to the appreciation by his contemporaries of his services to literature and art. He was D.C.L. of Oxford in 1848, and his letters to *The Morning Chronicle* under that signature, were effective weapons in the armoury of the defenders of Church principles. He was LL.D. of his own University in 1864, and, in the same year, of Dublin, and of divers Universities of the United States. He was a Trustee also of the British Museum, and of the National Portrait Gallery, a Fellow of the Society of Antiquaries, President of the Architectural Museum, and the only amateur since the time of Earl de Grey, your first President, who has had the honour of presiding over the Royal Institute of British Architects, the general exponent and mouthpiece of English Architecture, as he called you—the central regulating Areopagus of Architecture. He served as one of the British Commissioners for the Paris International Exhibition of 1867,

and took the warmest interest in the arrangement of its English section, as his first Presidential Address to this Body, in 1865, well shows. He was an active member of the Ritual Commission, and of the Cathedral Commission; also of the Church Defence Association.

I revert to the Cambridge Camden Society, the leaders of the revival of Gothic architecture, the fellow-workers of those who led the Church revival in our land. How few are left to tell the tale of those times! Almost all of those whom I have here commemorated have been taken to their rest; and this Institute will, I am sure, not fail to recognise the great services which they rendered to the cause of architecture and its kindred arts. Among them none was more distinguished for zeal, energy, ability, and keen appreciation of the truth and beauty of the cause for which he strove, than Alexander Beresford-Hope. Truly, said a writer in *The Times*, "Wherever Anglican "churchmen are to be found, there will be mourning for the death of Mr. Beresford-"Hope." He had many friends to mourn for him, and no enemies to think evil of his memory. He is gone; his colleagues and fellow-workers in the good cause are many of them gone; but the good that men do lives after them, their work remains, their influence remains—*Manet mansurumque est in animis hominum, in æternitate temporum, fama rerum.*

HENRY H. GIBBS.

XLIV.

VIOLLET-LE-DUC: A FURTHER SKETCH OF HIS LIFE AND WORKS. By Charles Wethered, M.R.C.S., *Hon. Associate.*

Arthur W. Blomfield, A.R.A., *Vice-President,* in the Chair.

Mr. Vice-President and Gentlemen,—

I ADDRESS you to-day, partly by favour of admission to your Institute as an Honorary Associate, and partly from my having had the happy fortune of seeing, perhaps, more of the daily life of the late Monsieur Viollet-le-Duc than any other Englishman, save one. If, too, before a fuller portrayal comes from abler hands, apology were needed for giving some traits of a character, some further record of a career altogether noble, I might find it in certain words in *Coningsby*:—

"It is the personal that interests mankind, that fires their imagination, and wins their hearts."

Early in the Summer of 1876 his translator, Mr. Bucknall, and myself received an invitation from M. Viollet-le-Duc to visit him in the following August at the Châlet he had just built for himself on the shore of Lake Leman, near Lausanne, there, in his own words, " to drink to the success of all that is good in this lower world." This gracious invitation also conveyed a wish that we might be able to accompany him in his Alpine excursion for that year. Before the close of our memorable holiday we were joined at Chamouni by Mr. Sibree, to whom the English versions of his works owe so much of their accuracy and finish. At that date Viollet-le-Duc had completed his sixty-second year, but he still retained the activity of a strong man of forty. I have seen him fearlessly standing on parapets where others would have clung to adjoining pinnacles, and climbing the crockets of that new spire of his which crowns the old Burgundian Cathedral of Lausanne. I have also seen him run down rocky slopes with the swiftness of a chamois hunter. Fearless himself, I frequently noticed his thoughtful care for others. One of our party, though sure of foot, was, like Hamlet, scant of breath. Our chief, ever on the watch, insisted that wherever practicable he should travel *au mulet,* and be helped up steeper ascents by the strong hand of our guide François, playfully telling the latter to keep his eye upon *le Docteur perdu*—a name he bestowed on me from a

knack I had of getting, unawares, into dangerous places It was an education and a privilege to visit ennobling lands with such a companion as Viollet-le-Duc. In every mood and upon every subject his stream of mind, as Dr. Johnson said of Burke, was perpetual; but of his own achievements, whether in peace or war, not a word fell from his lips. When one of us mentioned that much valuable ore had been extracted from that mine of architectural wealth, his *Dictionnaire*, without payment of royalty in the shape of acknowledgment, he simply remarked:—"Qu'importe, j'ai écrit mes livres à "l'usage de tous."

Viollet-le-Duc, who became joyous as a boy over our simple fare in Alpine chalets and cabins, made himself a favourite with all wherever we went, from the infantile mountaineer in its mother's arms to the shepherd's collie; caressing the former and playing with the latter in a way that won their affections at once. Every day he would make one of those transcripts of nature which give with perfect veracity the varying forms of rock structure, with their surroundings of serac, moraine, or glacier. In the hour or two preceding dinner, while his English fellow-travellers were reclining weary and foot-sore, he would complete in colour some sketch taken in the morning. To the perception of the artist he added the love of the naturalist for all rural sights and

sounds—the fleeting splendours of sunrise or sunset, raving torrent or murmuring rivulet, an eagle's flight into upper air, a tree or lowlier Alpine plant, a stone telling its geological tale, would in turn arrest his attention and call forth some happy remark.

The week before making the usual ascents from Chamouni we took up our quarters at the Auberge of Nant Borant, below the Col du Bonhomme and near the glacier de la Tré-la-Tête—a district which includes the softer as well as the wilder features of the Alps. From that small hostelry we made daily excursions in all directions. Stirring with the lark, and starting with his sketching materials several hours before us, we joined him at some pre-arranged spot for breakfast. The first glimpse of his whereabouts, caught from afar, was his red Indian scarf, worn by him in those excursions as a waist-band but now tied to his alpenstock fixed in the ground for a signal. Usually our table was a block of granite with a cover of fine moss and lichen, and in the absence of seats we stretched our limbs on a carpet of stunted herbage, bordered with bushes of rhododendron and beds of the deep blue gentianella, skirted with flowers of all hues, which, as somebody has truly said, "bloom and blush by the side of the virgin snow." For dessert we had the big wild strawberry of the South with the thickest of cream; for music "the sweet bells "of the sauntering herd" below, the note of some wild bird on the wing, the softened roar of the distant cataract, while now and again the crash of an avalanche fell upon our ears. Every incident in every ramble with our revered friend belongs to a precious store of recollections. Not for us alone with those Arcadian days, but for all who knew him and felt the spell of his individuality, "there hath past away a glory from the earth."

It was to a combination of inexhaustible mental and physical energy, as much as to his scientific knowledge and technical skill, that we are indebted for his *Mont Blanc: a Treatise on its Geodesical and Geological Constitution, its Transformations, and the Ancient and Recent State of its Glaciers,* together with the fine illustrative map which gives an almost bird's-eye view of the chain. An examination of this addition to the science and literature of the Alps affords unmistakable proof that Viollet-le-Duc was as conversant with the phenomena of nature as he was with the works wrought by men's hands. Every page bears the impress of the close watcher and original questioner of material forces for ever acting and re-acting upon each other. Assuredly in this world of marvels there is nothing more awe-inspiring than the site of Alpine glaciers in all the grandeur of their environment—those stupendous masses of ice that

"Adown enormous ravines slope amain,"

deeply fissured here and there with rents tinged with hues of the richest conceivable blue; or sometimes crested with glittering pinnacles, formed, as it were, by the wildest fantasy of frost. Sluggishly moving at the rate of a few inches per day, but with resistless power, they, in long bygone ages, helped to widen out and mould the form of the deepest existing valleys in Europe. The grand vales of Chamouni and the Rhone, at the glacial epoch, were filled, so geologists assure us, with these vast rivers of ice. The beautiful lake of Geneva, now fed

"By the blue rushing of the arrowy Rhone,"

occupies an ancient glacier bed.

Nature never entirely destroys the evidence of her work, and the surfaces of imperishable rocks may often be seen grazed or scratched along the line of flow, sometimes even finely polished by the friction of old glacial currents. All that Viollet-le-Duc writes on the causes, conditions, and effects, of glacial action, will awaken and win the attention of the thoughtful reader. He has, as we are informed on high authority, thrown fresh light on points connected with this, perhaps the most interesting of all geological problems. "Our globe is, in fact," writes this philosophical architect, "only a "vast edifice, all whose parts are capable of rational explanation; its surface assumes "forms dictated by imperious laws, following a logical order." The artistic basis of his map consisted of upwards of five hundred sketches drawn *in situ*, besides a much larger number taken at long distances by means of a telescope fixed to the camera lucida. His disciplined skill as a geometrician enabled him to take measurements with the utmost exactness, and to perfect the result now exhibited as a whole. Many of the points of observation could only be reached after eight or ten hours walking, and then, in some instances, had to be re-visited several times when the neighbouring heights were hidden by those capricious mists that sometimes suddenly obscure all surrounding objects.

Those who on Alpine summits have walked under an ampler heaven, and breathed a diviner air, can share the enthusiasm he has reflected in the following passage from the introduction to his *Mont Blanc*:—"It requires a passion for climbing to stimulate one "to recommence these ascents day after day to no purpose, for the chance of ultimately "obtaining a few hours of fine weather. It must, however, be allowed that those few "hours soon make you forget the fatigue, and there is no pleasure or gratification that, in "my opinion, equals that of days passed in work beneath a bright sky, at an altitude of "from 10,000 to 12,000 feet, commanding those vast solitudes of snow, from which "shattered rocks stand out—gigantic ruins which the imagination endeavours to restore." The illustrations given in pages 106 and 109 display the synthetic skill with which he has restored, in idea, the primitive rhomboidal outlines of mountain tops, composed of crystalline rocks, of those masses now forming the jagged ridges and jutting peaks of these formations—the scarred and riven features of Nature in her sternest mood—graven by processes of the sun, through the potent agencies of atmosphere, heat, and ice. For us, the beings of an hour, with finite capacities for comprehending the whence and the whither, it were vain to theorise on the length of time taken to bring about these changes. "Nature," says our author, "does not count; she has eternity to work in."

Elsewhere, and within these walls, I have dwelt on Viollet-le-Duc as an architect, and, whilst now rapidly glancing at one or two other phases of his mobile intellect, I venture to take it for granted that you are interested in all that concerns the author who has enriched your profession, among other works, with that monument of erudition, art, and science, the *Dictionnaire Raisonné* of French architecture of the Middle Ages. We know of no surer test of greatness than *laudari a laudatis*. From the consensus of praise of this kind applied to Viollet-le-Duc, I have only space for a few examples taken from among many. No one, so far as I am aware, has so well measured and condensed in a sentence the wide range of his capacities as the sometime Slade Professor of Fine Arts at

Cambridge—Mr. Sidney Colvin. In an article of his in the *Nineteenth Century* (for 1878), after stating that French architects had cause to be justly proud of their leader, then living, he adds:—"M. Viollet-le-Duc is a personage of commanding attainments and "commanding character, who combines the science of Germany with the lucidity of his "own nation and the methodical energy of ours. In such a personage . . . . we "must needs honour the skilful archæologist, engineer, designer, author, the masterly "organiser of labour, the pre-eminent critic and encyclopædist of his art." Mr. Ruskin in his lecture on Cistercian Architecture, while doing justice on the one hand to "the "perfect science of his structural architecture," rates him on the other hand as "the most "sensible and impartial of French historians." An esteemed Fellow of this Institute, thoroughly conversant with ancient and modern architectural history, speaks of him in a letter to myself, as "the greatest writer on architecture that ever lived." He has ample grounds to support that opinion. In the works on this important subject, published within the last thirty years, no name is so often quoted as a leading and guiding light in all that relates to your profession. An untiring searcher after truth, for the ends of truth alone, assimilating knowledge from all sources, every statement and every deduction made by him is based on a clear and cogent train of ratiocination. From this great teacher we get for our instruction, not the opinion of amateur criticism, so loud of assertion in these days, but the conclusions of an authority thoroughly versed in the resources of art. In looking through his books we are everywhere struck with his remarkable faculty of two-fold expression. To the force of his logical diction he adds the fascination of a pencil which flowed as freely as his pen, bringing before our minds the visible forms, as well as the inner life and meaning, of the subjects under discussion.

If, as an old outsider in close sympathy with your pursuits, I might presume to give two words of advice to young students, I would say, never copy his drawings, valuable as they all are in themselves, without carefully studying the accompanying text of which they are the embodied expression; and, above all, imbue your minds with the precepts and teachings of those incomparable Lectures, which include a critical and historical survey of the course of architectural art in its chief stages from ancient to modern times—through the Greek, Roman, Byzantine, Mediæval, and early Renaissance periods. Accepting his terse but comprehensive definition that "Art is the form given "to a thought,"* he renders the anatomy, and I might even say the psychology of that noble product of the representative faculty we term architecture: in other words, while laying bare the structure of a building he expounds the mental processes of which that structure is the physical presentment. Until the most recent times, to take the sense

* The definition of art, with an analysis of the emotions excited by it, forms the subject of his introductory lecture. He contends that in its source as in its essence art is indivisibly one, although assuming divers forms to act upon the human mind. He relates, as an instance in point, a singular incident of his early childhood, in order to show how the harmonies of sight and sound may attune together, and strike in the soul one chord that vibrates at the touch of art:—"I was often intrusted "to the care of an old servant, who took me wherever his fancy happened to lead him. One day "we entered the Church of Notre-Dame, and he carried me in his arms, for the crowd was great. "The cathedral was hung with black. My gaze rested on the painted glass of the southern rose-

though not the exact order of his words, there have existed, between the peculiar genius of nations and their architecture, relations so intimate that the intellectual and moral history of those nations might be deduced from a study of their buildings. "Show me "the architecture of a people and I shall be able to appreciate them at their true worth." And again, in speaking of the edifices of the great ages, he says, "Their stones speak." Yes, but these graven documents need an interpreter like Viollet-le-Duc to decipher for us the whole of their story. Starting from that fountain whence, he contends, "for "more than twenty centuries every human work has derived inspiration through widely "different channels," he proceeds to discuss at length the supremacy of the Greeks in the realm of art; and I may well be excused for adding to these scattered notes a transcription of his initial remarks on this ever living subject, which may also be taken as a sample of the elevation of thought and sentiment that pervades his bright and sympathetic pages:—

"The study of Greek antiquity is, and probably ever will be, the surest means of "initiating youth into the study of the arts,—the most solid foundation of taste, and "consequently of good sense, for one cannot exist without the other; it teaches how to "distinguish truth from sophistry—it enlarges without confusing the mind. However "poetical the imagination of the Greek, it never leads him beyond the limits of the true; "his object above all is to be clear, to be understood, to be human; for he lives among "men, and to man he refers everything. As for ourselves, in the present day, we admire "the various manifestations of art among the Greeks; but the reproduction of those "manifestations is beyond our power—we live a different life. But their principles, "embodying eternal truth, we may appropriate to ourselves; we may, in a word, reason "as they did, though we do not speak the same language. . . . . Among the Greeks, "every event, fact, and phenomenon—all that was good, all that was evil, all that "existed in the material or immaterial order of the world—found expression in the "language of the arts; and that too, with a refinement of observation, a logical sequence, "a simplicity and energy of expression, which seem more than human. . . . . If "we open the pages of Pausanias, we shall find that even in his time the productions of "Greek art were considered worthy of preservation. That writer often speaks of cities "nearly deserted, but where the inhabitants respected the remains of their former "grandeur; where the ruined temples still retained the statues of their gods or "goddesses, though they were often made of material that was fragile, or of a nature to "tempt cupidity. At every turn we find a public monument commemorating some "sacred remembrance; but to confine ourselves to the subject of these lectures, what we, "as architects should most particularly observe in these Greek cities, is the manner in

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"window, through which the rays of the sun were streaming, coloured with the most brilliant hues. "I still see the place where our progress was interrupted by the crowd. All at once, the roll of the "great organ was heard; but for me, the sound was the singing of the rose-window before me. In "vain did my old guide attempt to undeceive me; the impression became more and more vivid, "until my imagination led me to believe that such or such panes of glass emitted grave and solemn "sounds, whilst others produced shriller and more piercing tones; so that at last my terror became "so intense that he was obliged to take me out."—C. W.

"which they are laid out, indicating that their builders had from the beginning an idea "of art. . . . . It is only when we remember how very little considerations of this "nature are appreciated in the present day, that we begin to realise with sadness the "wide abyss which separates us from those ages when the arts were loved. We call "ourselves a civilised people, yet what, for the most part, are our cities, and what in a "few centuries will they become, when, in all probability, the vulgar demand for the "satisfaction of material requirements will have utterly swept away the few remaining "relics of former ages? What are the cities of the new world? and what the great "manufacturing towns of England? That which we call civilisation has led us, in the "nineteenth century, to make wide streets, and to line them with houses of uniform "appearance. Our towns and cities have thus become deserts for thought; they have "the wearisome monotony of solitude without its grandeur. What is there throughout "these vast chess-boards of streets to suggest historical associations? Where is there "a centre of repose for the distracted mind of the spectator? Where does he find the "indication that a hundred generations have trodden the same ground before him? Not "indeed that I regret the tortuous and fetid streets of our old towns, with their houses "seemingly brought together haphasard,—their labyrinths of alleys, their public buildings "obscured by booths and disfigured by dirt,—accumulation without order,—an indes-"cribable chaos; yet in this chaos there is at any rate the imprint of man, of his labour, "—the memorials of his history,—something more than the indications of the merely "material interests of the time. I can well understand why it is that minds in sympathy "with art in the present day, so gladly fly from these deserts of stone, of wood, and iron, "—deserts indeed to them!—and hasten to refresh themselves amid the ruins of "Athens, Syracuse, or Pæstum; for these dead cities are to them more peopled than are "the streets of Lyons or of Manchester."

Intellectually a veritable descendant of these fathers of western civilisation, Viollet-le-Duc's mind was cast in that true Hellenic mould which blends the refinement of the Ionian with the vigour of the Dorian mood. His enthusiasm for all that is best in man's handiwork wherever manifested, aided by a steadfastness of resolve that never failed him, led him to explore and elucidate those original and truly national schools of mediæval French art, undreamt of, or at any rate unappreciated, by modern academies, before he published the results of his researches and superb draughtsmanship in the sixteen volumes of his *Dictionnaire.* It is there we find him peerless in his *vrai domaine royal*, as Sainte-Beuve aptly terms it in his brilliant essays on the Master:—"Unrecorded left for many an age," its traditions forgotten in its very home and birthplace, Viollet-le-Duc re-discovered the underlying principles and geometrical relations of the architecture illogically called Gothic; and revived technical methods either lost or altogether neglected. By what means and modes of procedure the mighty builders of the middle ages reached the height of their great argument in stone in the towering grandeur of the cathedrals of Paris, Rheims, Chartres, Bourges, Beauvais, Rouen, and Amiens, not to mention others, have been described perfectly and for ever by Viollet-le-Duc.

Victor Hugo, Sainte-Beuve, and other eminent writers, have extolled the west front

of Notre-Dame as one of the wonders of the world; but Viollet-le-Duc, by his masterly analysis of the whole composition, has ruled it to be so. *More suo* he describes the constituent parts of the leading lines and general features of the structure, and determines the *raison d'être* of every member and detail from portals to parapets. "May I "frankly confess," writes Mr. Gilbert Hamerton, "that until I had carefully studied it, "under the guidance of Viollet-le-Duc, the front of Notre-Dame never produced upon "me the same effect as the west fronts of some other French cathedrals of equal rank." There seems to be no doubt that the original architect intended to surmount his two towers with lofty stone spires, of much the same style and character as those designed by Viollet-le-Duc. It is, perhaps, too much to expect that some citizen, heavily laden with wealth, will be found to complete with these pinnacled crownings, in our day, the grand edifice begun by Bishop Maurice de Sully in 1160. We may, however, judge of what the result would be, by a glance at that supreme product of the restorer's plastic hand—the aerial and central *flèche.* Architectural and sculpturesque, it is at once the uplifted symbol of aspiration and the embodied poetry of applied mathematics.

While religiously preserving the spell of the *genius loci,* he has, by the strength and perfect workmanship of his restorations, given a long new lease of life to no small number of the historic buildings of France. Himself a master of every art and craft, he guided the hands and thoughts of a loyal band of artificers, who vied with one another in rendering the life and accent of working drawings, which are marvels of their kind, as manifold in conception as they are minutely finished. Among his architectural followers may be mentioned Millet and Ruprich Robert, no longer living, and Messieurs de Baudot, Corroyer and Trélat, who, with the many artists and craftsmen long engaged upon his works, retain a profound admiration for a leader who, in his absolute respect for the true, rose above the prejudices of the schools, and diffused light over the whole field of art; whose life was a practical illustration of his own affirmation that—"intellects of the highest "order are produced and developed by liberty. To secure their position they require "neither *organisation* nor *direction,* for it is they themselves that organise and direct."

Viollet-le-Duc has been most ably treated, on his military side, by the late Colonel Charles Chesney, in two long articles in *The Times* of Nov. 19 and Dec. 22, 1875, on his *Mémoire sur la Défense de Paris,* and his *Annals of a Fortress.* Of the *Mémoire* the reviewer says that, "Like all that emanates from that remarkable man, it bears the "stamp of originality and power; and, as a scientific criticism of what occurred round "Paris, from the investment to the final surrender, it possesses the very highest merit." Passing in review the altered circumstances of modern warfare as regards fortification, Colonel Chesney goes on to say—"It would be difficult to find a better guide in this "enquiry than M. Viollet-le-Duc, who, though celebrated as a bold and learned "architect, bids fair also, as a military engineer, to rival the most brilliant names which "France has supplied to this branch of learning. As is well known, this eminent man "was the first professional authority* to announce that the time-honoured and ingenious

* The late Colonel Charles Chesney in making this statement was probably referring to France and Frenchmen. M. Viollet-le-Duc's first volume of the *Dictionnaire,* containing an article on Military

" system of Vauban must be reckoned among the traditions of the past, in view of the " power of the artillery of this time; and it is understood that he warned Napoleon III., " and a Committee charged to examine the subject, that, in the event of a German " invasion, the nests of strong places on the French Eastern frontier would only be " centres of loss and disaster. Whatever success was attained in the defence of Paris " was also largely due to M. Viollet-le-Duc; and it is impossible to read his work on " the siege and not to feel convinced that he at least perceived the true method of " opposing the attack—nay, that, even with the imperfect means at hand, the invest- " ment might, perhaps, have been prevented, and certainly must have been much " impeded, had he been free to carry out his projects." These articles are, in short, a sustained panegyric by one of the ablest of our own officers of engineers on his famous contemporary. With such evidence as this, it will not be forgotten by the historian that it was a civilian of a warlike nation who foretold the impending disasters, and projected a system of outlying defences, since completed, for the safer protection of the frontier and capital. These deeds and counsels have won for him renown as a strategist; and, when to these are added his singleness of purpose and serene repression of self, we have fully brought before us the genius and heroism of a man with whom patriotism was the holiest of passions. Once, assuredly, the heart of this strong, brave man must have sunk within him; when riding from Versailles into Paris at the head of the troops, by the side of Marshal MacMahon, for the suppression of the Commune, the Ile de France was hidden from view in one mass of flame and smoke. In those dread moments he never expected, as he told us, to see Notre-Dame and the Sainte-Chapelle again, other than as forming part of the " hideous ruin and combustion " all round. In the second volume of the Lectures, published after the siege, he comments with calm severity on the shortcomings of his countrymen, and especially on those in higher places who were more directly responsible for the nationa lcrisis. " For my own part," he declares, with fearless independence of speech, " I feel no embarrassment in discussing the question, " as I ask nothing, hope for nothing, and desire nothing, except the re-establishment of " the prosperity of my country, and of its moral dignity and influence on the civilised " world."

Viollet-le-Duc possessed a dignity and grace of mien and bearing which at once impressed all who came within his presence. His fine intellectual countenance was dominated by a head massive and truly noble, latterly bald or silvered with hair which had replaced the chestnut curls of earlier life. On his white capacious forehead sixty years and more had not set a wrinkle. His blue eyes were bright with " the truth and " the fire of the Frank;" a glance from their clear, full depths discerned every detail of the object within view; oftener they seemed abstracted from surrounding things: he was looking within, as he would say of himself. To these lineaments were joined an

Architecture, bears the date of 1854; and in 1849 Mr. James Fergusson, F.R.S., published his celebrated *Essay on a proposed New System of Fortification, with Hints for its application to our National Defences*, which largely altered previous views on the subject, and partly led to his being appointed, some time later, a member of the Royal Commission for the Defences of the United Kingdom. M. Viollet-le-Duc's *Histoire d'une Forteresse* did not appear until after the Franco-German War.

erect figure and well-developed limbs, whose muscular strength was maintained to the last by yearly Alpine climbings, and by playing his favourite game of bowls, in which, I have heard his friends say, few excelled him. Firm and strong, I never saw a hand, except, perhaps, that of the eminent surgeon, Robert Liston, whose slightest movement accomplished so much. The artist who at Pierrefonds, among many other instances, has drawn to the life knights and retainers equipped for the tournament, the fray, or the chase, was, as might be expected, a good rider himself.

He belonged to his century rather than to a party or a class. Free from all sectarian prejudices, he was none the less a keen controversialist, with no lack of that Parisian irony which applies the caustic to the work of the scalpel. By his persistent criticisms of the classic dogmatism and academic formulæ of the École des Beaux-Arts, he brought about some at least of the reforms he had long advocated in the direction of broadening the scope of its teaching.* Those who ever entered that centre of irradiation, his studio in Paris, must recall the moments spent there as among the most quickening of their lives. There, every morning from eight to ten, when at home, he received a stream of visitors, including many of his confrères, from the old and new world. Passing from group to group of eager listeners, he conversed with everyone in turn, *quiequid dignum sapiente bonoque est.* Everybody went there to obtain enlightenment from one whose mind was a vast receptacle of facts and ideas, in which everything once stored was for ever after available. Sometimes he would impart a fuller meaning to an explanation by a flash from his pencil, or by putting his hand in an instant upon some drawing of his taken from among a thousand such methodically arranged in the cabinets around. Now and then one of his skilled workers would call for a detail to be wrought in his own special branch; and would rarely leave without some such word of encouragement as "Allez, mon brave, "voilà votre affaire, soignez-nous ça!" At ten, the entrance of the devoted old concièrge, who had thrice helped to defend his house during the Commune, was an intimation for all loiterers, no matter of what social rank, to leave the *bon maître.*

Every lover of the works of the past, every one interested in the spread of æsthetic knowledge, might spend profitably many hours in the Museum of Comparative Sculpture at Paris, which owes its origin to the far-reaching thoughtfulness of Viollet-le-Duc. In the last of his long and able reports to the Government, drawn up but a few weeks before his lamented death, he formulated the whole scheme as we now see it realised at the Trocadéro. Though not generally known as yet, even to travellers, it cannot become other than the archetype of all future museums worthy of being called national in the same department. Filling six spacious galleries, this collection of casts is typically representative of sculptural arts from the Gallo-Roman to the Renaissance epochs; ranging from incised slabs, monoliths, or other detached fragments, to portals and other

* "M. Viollet-le-Duc is well known to be one of the best draughtsmen in France; and he has long "laboured with unremitting ardour to introduce into our schools the reforms which our administrations "and academies, under the tyranny of a spirit of routine which has long obscured their counsels, have "refused to discuss."—Véron's *L'Esthétique*, translated by Mr. W. H. Armstrong. In this lucid treatise on a subject so generally confused by metaphysical dreaming, the editor of *L'Art* sustains his thesis by upholding the doctrines of Viollet-le-Duc, upon which, in fact, it is largely and avowedly based.—C. W.

architectural features modelled full size, with all their embellishments of statuary and chiselled ornamentation in endless variety. Even to those who have seen many of the originals *in situ*, this assemblage of facsimiles will furnish fresh proofs of the fecundity of a race highly gifted with the instinct of art. Viollet-le-Duc enumerates and describes in his masterly way no less than eleven provincial schools in the twelfth century alone, extending from those of Normandy and Picardy, on the northern, to those of Provence and Languedoc, on the southern border; each having a distinct vitality and character of its own; each one a lofty dialect in stone of local modes of feeling and expression.

These admirable casts are so many embodiments and data in concrete form of his historic method of investigation. Through these galleries we pass to another, the Salle Viollet-le-Duc, in which are permanently exhibited works of his belonging to the Government. On the walls are hung water-colour and other drawings, mainly of Swiss and Italian scenes, cartoons for his mural paintings, &c., but by far the larger portion are contained in a series of huge portfolios; commencing with the first-fruits of his travels, in which, as has been well said, he saw, examined, and reproduced, everything that came in his way. Besides compositions and designs of his own, there are plans, elevations, and sections, of great interest to the architectural student as showing how he proceeded by way of synthesis in his colossal restorations. M. de Baudot, his successor, than whom there is no better authority on this matter, asserts that these are equivalent in many respects to original creations. There are also collected an almost incredible number of those working-drawings of detail already alluded to, possessing that unfailing mark of purity of style which renders with perfect clearness the character of the object represented. The outlines of his statuary and sculptural ornamentation, generally, are firmly drawn in sepia, with a wash of monochrome for shadings, the reliefs being thrown out by the white ground of the paper. Designed as constituents of coherent and organic wholes, they are as remarkable for fitness of purpose in their practical application as they are for charm of sentiment on their decorative or æsthetic side. When studied in connection with those principles and deductions which constitute the framework of his writings, they form a combination of forces which must count as factors in the architectural evolution of the future. By the work of his own hand, as well as by his teachings, no man of our times has done so much to restore the ancient and close alliance of the constructive and decorative arts—those harmonious combinations of variety in unity which, in the brilliant periods, reached their fullest perfection.

I had the advantage of seeing these collections with my congenial friend, Mr. John Seddon, and also of looking over with him the works of the Master of not less value belonging to his son, whose kindness and hospitality through one long day of enjoyment we shall ever remember. None of the treasures of his salon has left a more vivid impression on our minds than the Theatre of Taormina, as ideally restored by his father. Raised upon the vestiges of the ancient foundations, and grandly placed at the foot of a mountain, beyond which, within the horizon, Ætna stands out in lurid relief against a blue sky above a bluer streak of the neighbouring sea; in the foreground are groves and gardens, rich in foliage and flowers; near the centre, a scene of

classical antiquity is represented with dramatic completeness by the renovated stage and its group of stately tragedians, stone benches, and circular galleries, open to the sky, crowded with spectators in every attitude, drawn by a hand possessing a mastery of gesture. In this surpassing work, the landscape painter, architect, and archæologist, in one, has reclothed and given a breath to forms of an extinct civilisation, with all the features of their environment gilded by the light of a southern sun. This, perhaps the finest example of his earlier manner, will, I have reason to hope, be exhibited next year in some London gallery, with many others of his works.

At our visit, M. Viollet-le-Duc *fils* informed us that he intends shortly to publish the voluminous correspondence of his father, from 1835 to the year of his death, which will include letters written by their author while abroad, often illustrated with sketches, grave or grotesque, hit off on the spur of the moment. The work will, doubtless, possess a value and charm of its own both from a biographical and artistic point of view. Since I met the editor in Paris, he has greatly favoured me by placing at my disposal six of the forthcoming letters, two of which, from their brevity and worth, I will trespass for a few moments longer on your time by reading. The first is dated August 23, 1869, and is addressed to M. Paul Bœswillwald, then a young architect completing his studies in Italy. I think it will be admitted that no sounder advice in so few words could be given to a student :—

Mon jeune Confrère et Ami,—I received your letter from Florence yesterday, and I thank you for all the details it gives of your travels and of your impressions as an artist. One ought to view objects without prepossessions, and without disturbing influences : that is the essential point ; and I perceive that you have examined matters so as to turn everything to good account. The Greek art is certainly the only architecture which leaves an impression free from all extraneous elements. Since, however, you are passing the winter in Rome, notice well the edifices of the Empire, not as an artist, but as an engineer, as a practical man, and you will observe how comprehensive is the plan of these monuments, how it was possible to raise them rapidly and with simple means. The Romans, who are represented as ostentatious to excess, in the books written by literary archæologists, were the most economical of all builders ; but this economy is very intelligent, and never descends to meanness. If at Rome you have the courage to disregard the Roman decoration,—which, in spite of its richness, is not worth much,—in order to occupy yourself with the mechanism of the Roman structure, in order to examine how it was possible to obtain so great results with such simple and inexpensive means, your time will be well spent. At Rome we see such a multitude of things, and many of them so interesting, that we are everywhere easily tempted to appropriate, to make numberless notes and sketches, without due connection, and without a dominating idea. When you return home you will perceive that all that is useless, and that labour concentrated on one of the dozen subjects you have glanced at would have been of great interest and real value. Therefore, my dear friend, see a little of everything, but try to utilise your stay in the great city of the dead by extracting something from it definite and limited. Above all, beware of the influence of the manner of living and studying adopted at the *Villa Médicis*. It is seductive and very pleasant, renders all work easy and agreeable, but when the cheerful days of comradeship have passed away, and one faces the reality, one sees that there is very little left at the bottom of the bag. Endeavour to draw from your own resources a subject to treat of there, and, devoting yourself to this object, whatever it may be, do not allow yourself to be diverted from it. I know by experience that this is difficult, for at Rome one is like a man with a good appetite in presence of twenty tempting dishes ; he would much like to eat them all, but, not being able to do so, he tastes them one after the other, and he finds at last that he has not dined.

I perceive that you have taken a rapid run over the environs of Rome, where there are, in fact, more objects of interest than in the city itself, where this age of ostentation has done so much to spoil

everything. You must well observe the small towns of the district, and Viterbo, Civita Castellane, and Villetri. There are many striking things to be found there of the mediæval period, still uninjured. You must visit the outskirts of Rome, so full of interesting ruins ; and the winter is favourable for these excursions. But what is really worth studying well is the Roman structure, and that has never been methodically done. You must begin with the Republic, and Etruria, and the monuments of Magna Græcia, and follow them down to the Empire. You will find there a mine of curious and practical observations of veritable interest.

I thank you sincerely, my friend, for your kind remembrance, and the compliments you have sent me with regard to the *cordon rouge.* [M. Viollet-le-Duc had just been made a Commander of the Legion of Honour.] If you think you will require any information, do not fail to ask me for it.—*Tout à vous.*

The second letter is written in quite another key, by a man who was one of the last to wear his heart upon his sleeve, but here we find it laid bare in sorrow for his country, and in the warmth of his friendships. It bears date Feb. 23, 1871, and is addressed to M. Révoil, author of *l'Histoire de l'Architecture Romane dans le midi de la France :—*

Pour moi, mon cher ami, I have met with no casualty during my days and nights before the enemy, but unfortunately, I have seen many of my brave comrades fall around me. My son has also escaped injury, but his child has died, like so many others, from privations which have been imposed upon us all. I pity you sincerely, my dear friend, and there is no consolation to offer you. [M. Révoil had just lost his wife]. It is not in middle life that one meets again with unalloyed affection, if one has had the good fortune to find it,—a rare thing. We must give ourselves up, however, to our now so afflicted country, and no one has a right to withdraw himself from the duties it imposes on him, whatever his family afflictions may be. We must all be convinced of this if we wish that our France should rise again ; no personal feelings should make anyone become a defaulter.

We are still shut in here, not being able to communicate with those outside without the permission of *ces Messieurs.* As for me, I keep to my post. We have had a hard time of it ; but the population of Paris has risen above all I dared hope. Ah ! if we had had some military chiefs ! But of what use are these regrets ? We must restore our country, cost what it may ; and it is necessary that all good citizens should rigorously set to work. Gasnier has taken refuge at my house, his residence at Suresnes being in the hands of the enemy. He has been there since the investment. Many of our friends are I know not where ; several left Paris before the siege ; of others I know nothing. Many artists have been killed, for in this war it is principally men of intelligence who have devoted themselves to the good cause ; the noisy, base, and cowardly *canaille* have lost credit in the minds of those simpletons who used to call them—the People. Let us hope that we shall gain a little experience and profit by this grievous lesson. Let us hope that we shall begin to reflect, to know how to conduct ourselves, and to disregard bad and incapable men ; but what a work there still remains to do !

Leaving Paris on the 18th of September, with my auxiliary corps of engineers, I did not enter it till the 27th of January. Wounded in mind and bleeding in heart, I set to work to forget, if possible. I see no one ; besides Paris is not what you have seen it, it is the shadow of itself. What more can be done ? I am working, trying to make the future profit by the lesson, for I do not consider myself as discharged from duties. Do the same yourself, in spite of your too well-founded grief : work is the only consoler.—*Donnez-moi de vos nouvelles et croyez-moi bien à vous.*

Among his lesser plans for the future, he had partly arranged an excursion with us to the Orkney Islands, to examine their rocks and correlate them with those of Switzerland; and also to sketch scenery that had impressed his imagination ever since reading Sir Walter Scott's romance of *The Pirate,* when a boy of eleven. This *ultima thule* of our cherished hopes it was decreed should never be reached. Viollet-le-Duc died suddenly of apoplexy, at Lausanne, in September 1879, before completing his sixty-sixth year. He had no warning that his race was run : all was reft at once. A fortnight before, he had said that, humanly speaking, he hoped to live twenty years longer—ten more for work,

and ten for rest. Only the day before he was struck down, he verified some geodesical observations he had recently made in the mountains, and gave the finishing touch to the last of his beautiful *aquarelles.* A few evenings earlier, for the first time in his life, this valiant worker was heard to say,—"Je suis fatigué." He died in the full strength of all his powers, whilst doing the State and mankind much service. Sovereigns and learned societies beyond France had bestowed honours upon Eugène Emmanuel Viollet-le-Duc; from this Institute, he received the Queen's Gold Medal, and from our Royal Academy of Arts, the diploma of Honorary Foreign Academician. These distinctions were valued by him at their true worth, from the motives that prompted the giving; beyond that, no man cared less than he for adventitious honours. Free from all trace of vanity or egotism, averse to every kind of personal display, he was quite content with the "golden "mediocrity of his fortune" won by his own labours.

His death was deplored on all sides as an irreparable loss, for in himself he united and made effective a combination of endowments hardly to be met with in one man during a century. Of the many marks of homage paid by France to her world-famous son, I will only mention the éloge delivered by the President of the Historical Monuments Commission, M. Jules Ferry, who at that time was also Minister of Public Instruction and the Fine Arts, with a few of whose eloquent words I may not unfittingly end this fragmentary Paper:—"M. Viollet-le-Duc," said the Minister, "be-"longed to those privileged ones of humanity who live again in ever-enduring works, "and who have gained, even in this lower world, their immortality. His memory is "for ever linked with those incomparable monuments raised up, restored, brought back "to light and life, by his science and genius, in every quarter of France during the last "forty years. His spirit lives again in those numerous writings which astonish by the "immense erudition, the encyclopædic knowledge of which they are the repository, not "less than by the untiring industry to which they testify in the midst of so many other "labours. And, lastly, he lives specially in that great Commission* of which he was one "of the earliest members, one of the chiefs most respectfully listened to, and of whose "activity, I venture to say, he was the most glorious personification. . . . It is amongst "you, gentlemen, that he will certainly find the biographer, the historian, needed for his "noble career, who will tell us some day, with the authority of a witness and a fellow-"worker, the immense task accomplished by this renovator, creator, historian. It has "appeared to you, gentlemen, as to me, that in order to honour the memory of M. "Viollet-le-Duc we could do nothing better than accept this legacy of a great mind, "this heritage of his last thoughts. I have consequently decided that the Museum of "French Sculpture shall be installed, in accordance with the arrangements that he "himself had traced, in the right wing of the Trocadéro. The Commission will under-"take the task of bringing together the mouldings, and of classifying them in historical "order with the types of comparison indicated by M. Viollet-le-Duc. We shall open "thus to artists, to *savants*, and to those practically engaged in æsthetic handicrafts, a

* The *Commission des Monuments Historiques*, in which M. Viollet-le-Duc, for many years, was an Inspector-General, is here referred to.

" source of information entirely new; and, at the same time, raise up a true monument " to French art, to the illustrious man who, by the renovation of ancient monuments, " has so deeply influenced the destiny of contemporary art, and, lastly, to that Com- " mission of which he was the soul, and which will reverently maintain his memory and " his lessons."

In multis sapiens, multa fecit.

CHARLES WETHERED.

Je serais bien heureux d'avoir
de vos nouvelles et j'espère
bien que vous viendrez faire
encore un séjour quelque jour ?

Tout à vous,
Wethered

XLV.

ILLUMINANTS AND VENTILATION.

By Mr. Vivian B. Lewes, F.I.C., F.C.S., Royal Naval College, Greenwich.

Thomas Worthington, *Vice-President*, in the Chair.

Mr. Vice-President and Gentlemen,—

ONE of the most important considerations in modern sanitary science, and at the same time one of the least understood, is the relation at present existing between illuminants and the proper ventilation of rooms; and I feel that I need no excuse for bringing before you this all-important question. I propose to review the various methods employed in producing artificial light, and the effects produced upon the air of a room per unit of illumination obtained; and finally the means at disposal by which the maximum illuminating power with the minimum pollution of the air we breathe can be obtained.

It would be manifestly beyond the scope of such a Paper as this to discuss at length all the various kinds of candles, lamps, and burners devised in modern times for the profitable consumption of those bodies which by their combustion supply us with light; and I shall therefore choose as the type of each class, one which use and experiment have shown to be the best.

The sources from which artificial light is obtained are:—(1) candles; (2) lamps, consuming oil; (3) coal gas; and (4) arc and incandescent electric lamps. This last-named lighting power, although perfect from a sanitary point of view, may be said to have scarcely emerged from the experimental stage, as it has yet to be shown that it can compete with existing illuminants in point of safety, cost, and general applicability.

Taking these sources of light in their historical order, I come first to candles, then to oil lamps, and finally to gas. If the composition of the light-giving waxes, fats, oils, and gases be examined, it will be found that in each case the constituents upon which they depend for their lighting and heating powers are the elements carbon and hydrogen, which by a selective process of combustion emit light. In each case the chief products of combustion, when it is complete, are water, vapour, and carbonic acid gas,

together with minute quantities of other gases, either formed from impurities in the illuminants or during incomplete combustion; and it is incomplete combustion which gives rise to the small particles of carbon that help to blacken our ceilings.

The unit of illuminating power as adopted in England is a sperm candle of the size known as "sixes," which, when burning under normal conditions, consumes 120 grains of sperm per hour. This gives a light known as "one-candle power;" and as I propose to quote the amount of carbonic acid and water vapour given off from the various illuminants *per candle power of illumination*, it will be convenient for purposes of comparison to consider the sperm candle as the type in general use.

The substance of which these candles are composed yields, on analysis, carbon 80·0 + hydrogen 13·3 + oxygen 6·6 = 99·9; and 120 grains, on complete combustion in air, yield 0·41 cubic feet of carbonic acid and the same volume of water vapour. In other words, these volumes of carbonic acid and water vapour are given off in an hour for every candle power of illumination derived from sperm candles.

Many kinds of oil have been used for illuminating purposes, but the only one which from its cheapness and illuminating power has ever threatened the popularity of gas is petroleum, paraffin or mineral oil; and of late years this has been obtained in such increasing quantities, that it bids fair to become an important factor among the illuminating and heating agents of the future. On analysis the average percentage composition of paraffin oil is:—carbon 86 + hydrogen 14 = 100; and the average consumption per candle power is about 62 grains per hour when burnt in the newest forms of lamps. The carbonic acid and water vapour produced by combustion of this amount of oil are, respectively, 0·28 and 0·22 cubic feet.

I now come to the consideration of coal gas, which on examination is found to consist of a mixture of several gases derived from the destructive distillation of coal, varying considerably according to the class of coal used, and the processes of manufacture and purification adopted.

Gas as supplied to the City and the Metropolis, north and south of the Thames, has an average composition as follows:—

Hydrogen	49·54
Methane	36·64
Ethylene or similar hydro-carbons	5·78
Carbonic oxide	4·06
Carbonic acid	0·03
Nitrogen	3·71
Oxygen	0·24
	100·00

Every cubic foot of gas consumed produces of carbonic acid 0·52 cubic feet, and water vapour 1·34 cubic feet, whilst the illuminating power per cubic foot of gas consumed depends upon the burner adopted.

Within the last few years a complete revolution has taken place in the methods employed in burning coal gas for illuminating purposes, and the threatened rivalry of oil and the electric light has been so beneficial that, at the present moment, there are

burners giving more than three times the amount of light per cubic foot of gas consumed than any in existence eight years ago. These improvements have been effected by the application of three distinct principles :—(1) by utilising the hot products of combustion to raise the temperature of the gas and air to be burnt, as in all the regenerative lamps ; (2) by burning a mixture of air and gas, and using the heat so generated to raise some incombustible substance to incandescence, as in the Welsbach, Clamond, and Lewis incandescent lamps ; and (3) by enriching the coal gas with some volatile hydro-carbon, as in the Albo-carbon light. This last-named method is beyond the scope of my inquiry, as the illuminating power and the products of combustion vary with the amount of hydro-carbon taken up by the gas ; and although the light given out by it is beautifully rich and pleasing, it is best adapted for use in lofty rooms and halls.

The first of these methods has as yet proved to be the best, and at the present moment regenerative lamps stand at the head of the list, and for gas consumed give the highest illuminating power.

Selecting the best burner of each class for photometric comparison and experiment, I have arrived at the following results :—*

Name of burner	Illuminating power in candles per c.f. of gas consumed	Products of combustion per candle power	
		Carbonic acid	Water vapour
Batswing	2·9	0·18 c.f.	0·46 c.f.
Argand (Sugg's, London)	3·3	0·16 c.f.	0·40 c.f.
Incandescent (Welsbach)	6·0	0·09 c.f.	0·22 c.f.
Regenerative (Wenham)	10·0	0·05 c.f.	0·13 c.f.

Taking now the amount of the products of combustion evolved per candle of illuminating power, I have arrived at the relative vitiating effect which the various methods of illumination exercise upon the air of a dwelling room, and can compare these results with the effects produced by respiration. Now, it has been found by experiment that an adult exhales 0·6 cubic feet of carbonic acid per hour, and also that, as the percentage of organic impurities in the air of a room increases with the quantity of carbonic acid, the amount of carbonic acid present may be taken as an index of the sanitary condition of the atmosphere.

The average quantity of carbonic acid present in good wholesome air is about four parts in 10,000 ; and it has been proved that in order to maintain health, air containing more than six parts in 10,000 should not be used for continuous respiration, leaving only a margin of two parts of carbonic acid gas per 10,000 of air present which can, with due regard to health, be added to the atmosphere of a room. From these data it is evident that an adult exhaling 0·6 cubic feet of carbonic acid per hour will require 3,000 cubic feet of air space for healthy respiration ; but inasmuch as ventilation

* These figures were obtained with gas, of the quality supplied by the London Companies, which during the past six months (prior to April 1888) has averaged 16·6 candle power.—V. B. L.

by the chimney, and diffusion through the walls, through crevices in door and window frames, change the air of a room at least three times in an hour, 1,000 cubic feet of air space has been decided on as the allowance per adult for rooms which are to be continuously used as dwelling apartments, although some authorities have placed it as low as 600 cubic feet. Taking now an ordinary room, say 16′ × 12′ × 10′, it would not be considered properly illuminated unless the light were at least equal to 32 candle power; and in the following table the amount of oxygen used up, and the products of combustion formed by each class of illuminant and burner in attaining this result, are given, the number of adults who would exhale the same amount during respiration being also stated.

Amount of Oxygen removed from the air, and Carbonic Acid Gas and Water Vapour generated to give an illumination equal to 32 candle power. (The amount of light required in a room 16′ × 12′ × 10′.)

Illuminant	Quantity of materials used	Oxygen removed	Products of Combustion		
			Water vapour	Carbonic acid	Adults
Sperm candles	3,840 grains	19·27 c.f.	13·12 c.f.	13·12 c.f.	21·8
Paraffin oil	1,984 „	12·48 c.f.	7·04 c.f.	8·96 c.f.	14·9
Gas (London)—					
Burners:					
Batswing	11 c.f.	13·06 c.f.	14·72 c.f.	5·76 c.f.	9·6
Sugg's London Argand	9·7 c.f.	11·52 c.f.	12·80 c.f.	5·12 c.f.	8·5
Welsbach (incandescent)	5·3 c.f.	6·30 c.f.	7·10 c.f.	2·75 c.f.	4·2
Wenham (regenerative)	3·2 c.f.	3·68 c.f.	4·16 c.f.	1·60 c.f.	2·6

From these data it appears, according to scientific rules by which the degree of vitiation of the air in any confined space is measured by the amount of oxygen used up and carbonic acid formed, that candles are the worst offenders against health and comfort. Oil lamps come next, and gas least. This, however, is an assumption which practical experience does not bear out. Discomfort and oppression in a room lighted by candles or oil are less felt than in one lighted by any of the older forms of gas burner; and the explanation of this is to be found in the fact that, when a room is illuminated with candles or oil, people are contented with a feebler and more local light than when using gas. In a room of the size described, the inmates would be more likely to use two candles, placed near their books or on a table, than thirty-two scattered about the room. Moreover the amount of water vapour given off during the combustion of gas is greater than in the case of the other illuminants. Water vapour, having a great power of absorbing radiant heat from the burning gas, becomes heated, and diffusing itself about the room causes great feeling of oppression; the air also being highly charged with moisture, is unable to take up so rapidly the water vapour which is always evaporating from the surface of our skin, whereby the functions of the body receive a slight check, resulting in a feeling of malaise. This view of the cause of the oppression noticed with gas illumination is, I think, not sufficiently considered. Again, in burning coal gas, though the gas may be pure and the combustion perfect, and though the products may be looked upon as carbonic acid gas

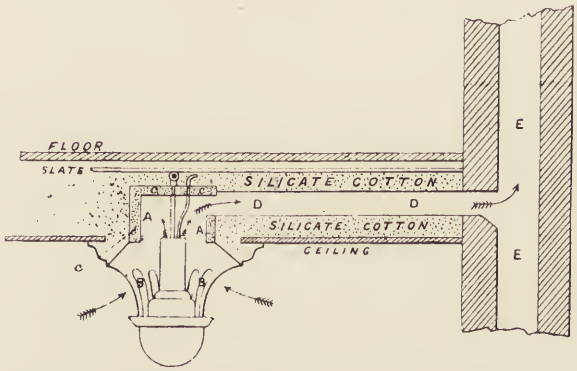
and water vapour only, there exist in all gas small quantities of sulphur compounds, and even the highly purified London gas contains 10 to 13 grains of sulphur, per 100 cubic feet, in the form of bisulphide of carbon vapour. This sulphur during the combustion of the gas burns to sulphurous acid, which if present in any considerable quantity would not only be injurious to health, but also destructive to furniture, drapery, and any books exposed to it. Moreover, when in the presence of much moisture or in solution, it is oxidised by the air to sulphuric acid. When, however, the trace of sulphur present in our London gas, and the enormous volume of air with which the resulting sulphuric acid is mixed, are considered—and that only a small percentage of this again will be oxidised in the room to sulphuric acid—I think it must be admitted that it is unreasonable to make gas the scapegoat of all the mischief laid to its account. A much more real and serious evil does exist in the products of incomplete combustion of coal gas, namely, carbonic oxide and acetylene, which even in small traces are most prejudicial to health. Whenever carbon is escaping unburnt from a flame, there is incomplete combustion; and if people will consider how impossible it is to employ an uncovered burner of any type without rapidly blackening the ceiling, they will realise how universal is this incomplete combustion. Finally, when gas is used, the hot products of combustion collect next the ceiling, and the emanations from the body and products of respiration—being at a lower temperature than those of combustion—do not rise through them, so that practically, as far as ventilation is concerned, the ceiling is lowered to the level of the gas burners. All these considerations lead to the conviction that for the sake of health adequate ventilation must be specially provided to remove the products of combustion, no matter what source of illumination (electric lighting excepted) be employed. If candles or oil be used, all that can be done is to secure the ventilation of the room by the ordinary methods, as the conditions under which these sources of light are employed prevent their being used as a ventilating power; but with gas this is not the case.

When coal gas was first employed during the early part of this century as an illuminating agent, the low pitch of the old-fashioned rooms and the excess of impurities in the gas rendered it imperative that the products of combustion of the sulphur-laden gas should be conducted from the apartment; and for this purpose arrangements of tubes with funnel-shaped openings were suspended over the burners. The noxious gases were thus conveyed either to the flue or open air; but this type of ventilator was unsightly in the extreme, and some few attempts were made to replace it by a more elegant arrangement, as in the ventilating lamp invented by Faraday, and in the adaptation of the same principle by Mr. I. O. N. Rutter, who strove for many years to impress the necessity of removing the products of combustion from the room. But with the increase of the gas industry, the methods for purifying the coal gas became gradually more and more perfect, whilst the rooms in the more modern houses were made more lofty; and the products of combustion being mixed with a larger volume of air, and not containing so many deleterious constituents, became, if not much less noxious, at all events less perceptible to the nose. As soon as this point was reached,

the ventilating tubes were discarded, and from that day to this the air of our dwelling rooms has been contaminated by our illuminants, with hardly an effort to alleviate the effect produced upon health. I say "hardly an effort," for the Messrs. Boyle (among the many benefits which they have conferred upon sanitary science) tried, by their concentric tube ventilators, to meet the difficulty, whilst Mr. De la Garde and Mr. Hammond have each constructed lamps more or less on the principle of the Rutter lamp; but either from their being somewhat unsightly, or from their diminishing the amount of light given out, none of them have met with any great degree of success. In places of public entertainment, where large quantities of coal gas are consumed for illuminating purposes, the absolute necessity for special ventilation gave rise to the "sun burner," with its ventilating shaft. This, however, gives but a very poor illuminating power per cubic foot of gas consumed, due partly to the cooling of the flame by the current of air produced, and partly to its distance from the objects to be illuminated.

The great difficulty which in the whole history of ventilation has opposed itself to the adoption of proper arrangements for removing the products of combustion, has been the necessity for bringing the tube to carry off the gases low down into the room, and of encasing the burner in such a way that none of the products should escape; but with the present revolution in gas burners this necessity is entirely done away with, and the regenerative burner offers the means not only of removing all the products of combustion, but also of effecting thorough ventilation of the room itself.

In most of the regenerative lamps the chimney is too long to admit of their being used in any but very lofty rooms for ventilating purposes, whilst the balance of supply of air and gas is so delicately adjusted that the draught caused would interfere with the shape of the flame and prevent its proper burning. In the "Wenham," however, the compact form of the regenerator and chimney enables the light to be brought close to the ceiling, whilst the flame is unaffected by anything but the most violent disturbance of the air currents.



Ventilating Lamp for Ordinary Rooms.

In order to convert a regenerative lamp into an efficient ventilating agent the lamp is inclosed in a metal case, A, which at the bottom forms a centre piece to the ceiling, and through this perforations, B, communicate with the room, whilst the upper part of the metal case or air box is sunk into the ceiling space, and is surrounded by an outer casing, C, the space between the two, of $1\frac{1}{2}$ inches, being packed with silicate wool, which, being a non-conductor of heat and perfectly incombustible, keeps the outer casing from rising

above a temperature of 78° to 100° F. This air box, containing the regenerative portion of the burner, is connected by a cased tube, D, passing through the ceiling space with a shaft passing either into the flue E, or to an external shaft; and up this the heated products of combustion induce a brisk draught, carrying off not only the noxious heated gases themselves, but also the heated impure air from the upper part of the room. I have made a number of experiments with a regenerative burner in its ventilating form, which I hope may be found not only of interest but of value.

A No. 4 Wenham burner, consuming from 20 to 24 cubic feet of gas per hour, was tested for illuminating power, and gave as an average of tests from 120 candles in a horizontal plane to 280 in a vertical. The burner, tubes, and regenerator were cased in a metal box, which had suitable openings at the bottom into the room, whilst the body of the box, fitted into the space between ceiling and floor above, was connected with a rectangular flue 6 inches by 4 inches, which, after being carried along in a horizontal plane for 6 feet, was then fitted by means of an elbow piece to an upright metal tube 18 feet long and 6 inches in diameter. A sliding door was constructed in the flue 4 inches from the point it left the burner, so that the velocity of the air current could be there determined. The air box and horizontal flue were cased and packed with silicate wool, small openings being made and closed by sliding lids, so that the temperature of the products of combustion could be ascertained; and this jacketing proved so effective that the highest external temperature, immediately over the top of the burner, was only in this case 77° F. = 25° C., and it rarely reaches 100° F.

The burner having been allowed to attain to its greatest heating and lighting power, the velocity of the air current in the flue was determined, 10 minutes being allowed to elapse between each determination, as follows:—

	Velocity in flue in feet per second, 4 inches from burner	Temperature of gases in flue 4 inches from burner
1	13·0	275° F.
2	12·4	278
3	12·3	276
4	12·4	278
5	13·0	278
6	12·4	276
7	12·3	276
8	12·4	276
	Mean . 12·5	Mean . 276·6° F.

That is to say, the products of combustion mixed with air from the room had an initial temperature of 276·6° F. or 136° C., and were moving with a velocity of 12·5 feet per second. The area of the tube was 6″ × 4″ or 24 sq. in., and this multiplied by 12·5 feet gives 2·083 cubic feet per second, equal to 7,498·8 cubic feet per hour. This when it left the room, however, was at 60° F.; and reducing the volume to this temperature, there remain 5,298·6 cubic feet of mixed air and products of combustion. During the hour 20 cubic feet of gas will have been consumed, and for its combustion

will have required 23·8 cubic feet of oxygen, equal to 119 cubic feet of air. Deducting this volume of air and the volume of gas consumed, there are left 5,159·6 cubic feet of impure air per hour removed from the room, to be replaced by cool fresh air, whilst none of the products of combustion are allowed to find their way into the air of the room.

A No. 2 burner was then experimented on. After being allowed to burn 30 minutes, it gave a vertical illumination of 119 candles, and a horizontal illumination of 47 candles, with a consumption of 10 cubic feet of gas. The arrangements of flue were in every way similar to those used in the last set of experiments, except that the horizontal rectangular pipe was 5″ × 3″ instead of 6″ × 4″, whilst the same upright of 6 inches diameter and 18 feet in length was used. The covered opening in the flue for taking the velocity was, as before, 4 inches from the top of burner and at the entrance to the flue. The results of the experiments are here given:—

	Velocity in flue in feet per second, 4 inches from burner	Temperature of gases in flue 4 inches from burner
1	7·7	250° F.
2	7·2	254
3	7·5	254
4	7·7	254
5	7·7	254
6	7·7	252
	Mean . 7·5	Mean . 253° F.

The products of combustion mixed with air leave the lamp at 253° F. or 123° C., and with a velocity of 7·5 feet per second, from which I calculate 2,812·5 cubic feet as the total volume passing up the ventilating shaft per hour at 253° F. This, after deduction of used-up gas and air, and reduction to 60° F., gives 1,983 cubic feet of impure air withdrawn from the room per hour.

In order to realize the full meaning of these results, and their bearing upon the question of ventilation, I must now direct attention to the condition of the impurities in the air. The emanations from the body, carbonic acid, water vapour, and organic matter, as well as all the products of combustion from whatever source arising, are at a higher temperature than the air of the room; the purer air, fortunately for the inmates, is in the lower part, the impure and hot near the ceiling. This can be at once proved by ascending a step ladder, or even standing on a chair, in a room where gas has been burning, or where several people are congregated, when it will be found that the nearer the ceiling, the hotter and more oppressive the air; and on analysis such air is found to be highly charged with carbonic acid and other impurities injurious to health. If this hot air be not immediately removed, it slowly cools; as it cools, it becomes heavier than the normal air below, and descends, mixing with the cool air in the lower part of the room and vitiating it.

In the ventilation of our living apartments very much yet remains to be done. In spite of the admirable contrivances which have been from time to time devised to meet

sanitary requirements, builders, especially of middle-class and cheap houses, still insist on leaving the ventilation of rooms to chimney flues, and faulty workmanship, while, fortunately for the health of the community, the grates use so much fuel, and cause in consequence so strong an up-draught in the flue, that an enormous volume of air is withdrawn; and as a rule the workmanship of doors, window frames &c. allows the entrance of sufficient air to supply its place. This, however, is done at the expense of creating draughts, while the hot foul air which remains in undisturbed possession of the upper parts of the room is only withdrawn as it cools sufficiently to enable it to descend.

Even in large modern houses, where every possible precaution has been taken to insure perfect ventilation, the powerful draught in the chimney often converts the openings near the ceiling, intended as outlets for the foul hot air, into air intakes, with the result that the vitiated air is brought down into the lower portion of the room, whence in time it is sucked out by the chimney, having, however, been present long enough to oppress and affect deleteriously the inmates of the room. It is evident, therefore, that in order to remove the foul hot air, due to products of animal life and illuminants, there must be provided at the top of the room a power equal to the task of withdrawing the heated products of combustion, and claiming its share of the air present.

This can be done by the overhead regenerative burners *under certain conditions*; and as it is upon these conditions that the whole success or failure of the method depends, I wish to direct attention to them.

The experimental determinations have shown that a Wenham burner No. 4 will withdraw all the products of combustion of the gas consumed, and also 5,000 cubic feet of air at 60° F. from the room per hour, under the conditions shown in the experiments. At first sight this appears to at once solve the problem, for here is a burner which not only gives the maximum illuminating power per cubic foot of gas consumed, but also carries away all its products of combustion without allowing them to come in contact with the air of the room; and, moreover, will remove the warm vitiated atmosphere, as it rises to the ceiling, at the rate of 5,000 cubic feet per hour. In practice, however, the arrangements are often so badly made that this action is rendered impossible. I will take a case of this kind. A badly ventilated room is to be fitted with a ventilating burner which it is hoped will do away with all the sensations of discomfort and oppression felt by those using it; a burner and fittings are procured, and the workmen are told to lead the shaft from the ventilating box into the flue in accordance with the instructions given by the makers of the burner. It is found, however, that the joists in the ceiling space run in the wrong direction for this, and are too weak to allow of spaces being cut through them for the passage of the shaft. In this dilemma it is decided to ventilate into the open air: the shaft is led alongside the joists and through the outer wall; a metal elbow is attached, and an upright pipe of probably two or three inches diameter is fitted on, and carried up outside the building, sometimes for only a few feet, sometimes up to the roof. The lamp is then lighted, and whilst the room has a door or window left open, it burns well; on closing the door,

however, the flame suddenly loses its proper form, flares down into the glass and blackens it, at the same time giving off a strong and disagreeable smell, due to the presence of the products of incomplete combustion, carbonic oxide and acetylene. On examining the air currents in the room, and measuring the velocity of the draught in the chimney flue, it is found that air is being taken away by the chimney at the rate of at least 15,000 to 30,000 cubic feet per hour ; but the lamp if burning properly would remove 5,000 cubic feet, and this amount it can readily obtain during the time the door is open, so that air has free ingress. When the door is closed, however, then the flue has to struggle to obtain the amount of air required for the up-draught in the chimney, with the result that, instead of the burner being able to obtain the air it needs, and so create an up-draught, it has to give way to the more powerful flue, and in consequence the ventilating shaft of the lamp is converted from an *up* into a *down* draught, not only bringing the products of combustion back into the room, but also destroying the illuminating power of the burner. In some cases of this kind a simple remedy may be found in partly closing the register of the stove, and so diminishing the chimney space, which results in a saving of coal and also in a reduction of the amount of air sucked out by the flue. Even when sufficient air is supplied for the satisfactory burning of the lamp, the products of combustion are rapidly cooled in their passage up the outside cold tube, by which the draught is diminished, and the water vapour condensing dissolves the sulphur products from the gas, and runs back into the elbow joint, there setting up rapid corrosion and subsequent choking or destruction of the tube.

The remedy for this state of things is evident. The room must be supplied with sufficient air both for chimney and burner, and this air should be brought into the room either by a perpendicular tube or other similar contrivance, above the level of the heads of people inhabiting the apartment. The lamp should have its draught flue leading into the chimney, and where possible it should be connected with a 3-inch glazed earthenware pipe leading up inside the chimney to the top, so as to prevent any fouling of the flue by soot ; and at the elbow joint connecting the vertical and horizontal parts of the flue, there should be a small box to catch any water which might condense in the upright flue.

The trouble with the air supply which I have pointed out, of course, is only found in the winter months, when it is usual to close as far as possible all air entrances, and at the same time create a tremendous up-draught in our flues by the size of the fire used. In summer, with no fire, the up-draught in the chimney is very small, and the burner finds no difficulty in obtaining all the air it requires. Another point also, which is greatly in the favour of this class of burner, is that in summer, when the air outside and inside the room is practically at much the same temperature, even with a window wide open, there is often less ventilation going on than in the winter with all openings closed. With the air inside at a much higher temperature than the air outside, as in winter, diffusion takes place through the walls and all available chinks, while in the summer the two equally heated bodies of air show but little tendency to set up an interchange. This, however, the ventilating regenerative burner obviates by

creating an up-draught, and sucking in fresh air from the outside to replace the vitiated air removed.

I will now consider the heating effect produced by illuminants, and the action this has upon the atmosphere. A luminous flame, whether it be of candle or oil or gas, burnt in ordinary incandescent or regenerative burners, heats the air and surrounding objects in two distinct ways:—(1) by convection, the hot products of combustion mixing with the cool air, and producing currents by which the temperature of the whole mass of air present becomes raised; and (2) by radiation from the incandescent particles of ignited carbon in the flame, in which latter process the heat rays do not directly heat the air, but pass through it, heating the solid bodies with which they come in contact, and also heating the water vapour present in the air.

It would serve no good purpose to discuss here at length the relative merits of heating by radiation or convection; suffice it to say, that it has been proved conclusively that the most healthy and at the same time most comfortable way of heating a room is by radiant heat, in which case the walls and solid matter present are heated, and they in turn warm the air of the room, the air being thus cooler than the walls and furniture. A moment's consideration will suffice to show that hot bodies lose heat by radiation to cooler ones, and in a room heated by hot air (such as is caused by convection) the walls are much cooler than the air and also cooler than the human body. If a person sit near a wall in such an apartment, his body radiates out heat to the wall, and a feeling of chill is experienced on the side next the wall, which acts on the human system in exactly the same way as sitting in a draught; whereas, if the room has been heated by radiant heat, the walls being warmer than the air, the heat of the body is lost evenly to the air, and no undue radiation of heat takes place in any one direction, so that no sensation of local chill is produced. Moreover, cool air is much more healthy to breathe than warm, as bulk for bulk it contains more oxygen.

Now the kind of heat emitted by a gas flame depends entirely upon the conditions under which it is burning, namely, the amount of solid matter in the flame capable of being heated to incandescence, and the temperature to which this solid matter is heated.

This may best be seen by burning a mixture of air and gas, as in the Bunsen burner, which gives a perfectly non-luminous flame and hardly any radiant heat, but which will quickly heat the air by convection; if now a coil of platinum wire be held in it, the wire becomes heated to incandescence, and gives out both light and radiant heat, and these are produced at the expense of the heat of combustion, which before expended itself wholly in heating the products of combustion and the surrounding air.

In an ordinary illuminating flame, whether of gas, candle, or oil, solid particles of carbon are present, which being heated to incandescence emit light and radiant heat, their liberation in each case being due to a selective combustion of hydrogen and carbon with oxygen. Hydrogen having a greater affinity for the oxygen of the atmosphere burns first, and the carbon, liberated for a moment, is heated by the burning hydrogen to the point at which it emits light; and the amount of light emitted depends

entirely upon the temperature of combustion—the more highly it can be heated, the more light it will give out.

In regenerative burners the heat of combustion is utilised to heat these carbon particles to the highest possible temperature, and so to extract from them the largest possible amount of light; and in so doing a certain proportion of the heat of combustion is translated into radiant heat. In order to ascertain the amount of radiant heat so emitted, a No. 2 Wenham ventilating burner was fixed in a room 12′ × 15′ × 10′, the average temperature of which was 66° F., and thermometers were arranged vertically below the burner at distances of 12, 18, 24, 36, 48, and 60 inches, with the following results:—

Distance below flame	Fahrenheit	Centigrade
12 inches	78·8°	26·0°
18 ,,	70·6	21·5
24 ,,	68·9	20·5
36 ,,	68·0	20·0
48 ,,	67·1	19·5
60 ,,	66·2	19·0

Thus, at a distance of five feet below the flame, the radiant heat only caused an increase of temperature of 0·2° F. above the ordinary temperature of room, and this increase can be entirely got rid of by suspending a sheet of glass a few inches below the shade of the burner, which, although it allows 88 per cent. of the light to pass through, stops the radiant heat.

The question will at once arise as to the amount of heat to be found at the surface of the flue which carries off the products of combustion, and which is liable to come in contact with the wood in the ceiling space, on its way to the chimney or a special flue. In the No. 4 burner the products of combustion mixed with air leave the lamp at a temperature of 276° F. or 136° C. and from the No. 2 at 253° F. or 123° C. or not very much above the boiling point of water; whilst the temperature can be reduced to an absolutely safe limit by casing the burner box with a $1\frac{1}{2}$-inch jacketing of silicate wool and applying a $\frac{3}{4}$-inch covering of the same material to the flue pipe. Under these conditions the maximum exterior temperatures are as follows:—

Air box immediately over burner	32° Cent.	89·60° Fahr.
Flue one foot from burner	38	100·40
Flue four feet from burner	36	96·80

I have endeavoured to formulate in as short a space as possible the relations at present existing between the illumination and ventilation of houses; and if I have appeared to favour the overhead regenerative lamp, it is on account of a firm conviction that it affords a measure of sanitary perfection and illumination not to be obtained in any other way.

VIVIAN B. LEWES.

XLVI.

THE TEMPLE OF JUPITER OLYMPIUS.

By Francis C. Penrose, M.A., *Past Vice-President* (*Royal Gold Medallist*).
Arthur W. Blomfield, A.R.A., *Vice-President*, in the Chair.

Mr. Vice-President and Gentlemen,—

AMONG the remains of classical antiquity there is perhaps no ruin more impressive than that composed by the gigantic columns of the Temple of Jupiter Olympius. It had not indeed the refined beauty of the Parthenon, but it had extraordinary massiveness as compared with the nearly contemporary great Ionic temples. The happy disposition of the remaining columns tends to give some idea of its original massiveness. The group of thirteen at the south-east corner is sufficiently important to give a suggestion of intricacy, and the isolated columns near the western extremity occupy a position not far short of the original length.

The completion of this great temple was only just achieved before the extinction of paganism. It had, however, been in progress for about 650 years, reckoning, that is, from the first foundation of the temple by Pisistratus; but as his work was entirely remodelled by Antiochus Epiphanes, about 170 B.C., the Corinthian temple as designed by the Roman citizen Cossutius, under Antiochus Epiphanes, took, in round numbers, about 300 years in building. It was several times interrupted, and particularly obstructed on the occasion of the taking of Athens by Sylla, when, as recorded by Pliny, he took away to Rome some of the columns which had been prepared for the temple. The work was again resumed in the time of Augustus, when the Kings and States in his alliance or under his subjection undertook to complete it at their joint expense. This is the account given by Suetonius in his history of Augustus.* But the dedication and completion of the temple were reserved for Hadrian, who after this work assumed the title of Olympius. The works, however, inaugurated by Antiochus

* "Reges amici atque socii et singuli in suo quisque regno Cæsarias urbes condiderunt; et cuncti "simul Ædem Jovis Olympii Athenis antiquitus inchoatam perficere communi sumptu destinaverunt, "Genioque ejus dedicare."—F. C. P.

Epiphanes were on the site and partly on the foundations of the temple which had been carried to a considerable state of forwardness by Pisistratus. Even before his time there had been a temple of Jupiter of great antiquity, of which the foundation was attributed, as Pausanias states, to Deucalion, who, it will be remembered, together with his wife Pyrrha, alone escaped the great flood which had overwhelmed the whole of Greece, and who restored the population miraculously—possibly some indistinct perversion by tradition of the Noachian deluge, the scene being shifted from Mount Ararat to Parnassus. All that is demanded at present from the tale is the high antiquity assigned to the first temple of Jupiter. I shall have occasion to point out a portion of the foundations which seem to have belonged to this Deucalion foundation whenever it was. But there are several clear evidences of the work of the Pisistratidæ which will be mentioned in their proper place. This second temple must have been considerably advanced before the expulsion of the founders, for it is recorded that one of the earliest employments of Phidias was that of adorning it with paintings; and Livy, referring apparently to a time previous to the new foundation of Antiochus, speaks of it as "unum in terris inchoatum pro magnitudine Dei." There is also direct evidence of the considerable progress made with this temple given both by Aristotle and his pupil Dicæarchus.

The account given of it by Vitruvius is well known—namely, that when Antiochus, the Macedonian king, had undertaken to defray the cost of the works, a Roman citizen, Cossutius, nobly performed the duty of architect in arranging the vast cella, the double rows of columns, and the distribution and symmetry of the architraves and their ornaments, with great skill and science.

The description of it by Pausanias is not very enthusiastic. He seldom rises to this; but on that very account perhaps his descriptions have greater value. He states:—"Before the Temple of Jupiter Olympius are images of Hadrian, two of Thasian "and two of Egyptian stone. This emperor of the Romans dedicated both the temple "and the statue, which is remarkable not so much for its magnitude (for there are "other statues equal to it in size, and the Colossi of Rome and of Rhodes are much "greater) as from its being made of ivory and gold, and with great skill considering "its magnitude. Before the columns stand brazen statues of Hadrian, presented by "those cities which the Athenians call colonial. The whole peribolus is about four stades "in circuit, and is full of statues of Hadrian, each of the cities of Greece having placed "one; but the Athenians have greatly surpassed them all by the Colossus, worthy of "examination, which they have erected behind the temple. The peribolus contains "the following antiquities: a Jupiter in brass, a temple of Cronus and Rhea, and a "sacred portion called that of Olympia, where is a chasm in the earth one cubit wide, "through which the waters of the deluge of Deucalion are said to have descended. "There is a statue of Isocrates upon a column, and a representation in Phrygian "marble of Persians supporting a tripod—both worthy of observation. Deucalion is "said to have erected the most ancient temple of Jupiter Olympius, and his tomb, "which is not far distant, is shown as a proof that he dwelt at Athens."

There is extant a drawing of the Olympieum by Carrey, the artist who accompanied the Marquis de Nointel, French ambassador to Constantinople in 1674, which shows that a small church existed amongst the group of thirteen columns; and a portion of the campanile was still visible in 1848, but has since been taken down. It was probably owing to the presence of this little church that the south-east group of columns has been preserved.

Spon and Wheler, who visited Athens about the same time as the Marquis de Nointel, describe the columns of the temple as part of the palace of Hadrian, which was supposed to have been built on the top of them, and describe the little church—St. John of the Columns—as nothing but a rubble construction without mortar, composed of fragments of columns. They speak of sixteen columns only.

When Stuart visited Athens there was still remaining a seventeenth, which, however, had lost its capital; but this column was shortly afterwards taken down by one of the Turkish Governors for the sake of the material. When I was at Athens, between the years 1845 and 1847, sixteen columns were still standing, thirteen in the south-eastern group and three isolated columns; but the middle one of these was blown down in a storm in 1852—a storm which did much injury elsewhere, and threw down the very curious western wall of the Erechtheum, with windows between the attached columns.

The columns of Jupiter Olympius which remain are remarkable not only for their great size, but for their extraordinary beauty. The opportunity is afforded of comparing the capitals with those of the time of Hadrian, namely, in the neighbouring arch of Hadrian, and the stoa of Hadrian in the town. The character of the foliage of the latter is of a much inferior and insipid character, whilst those of the columns of the temple are very fine, and resemble in a remarkable degree the early Corinthian example of the Tholus at Epidaurus by Polycleitus, of which the date was about B.C. 410. Joseph Woods, a very close and accurate observer, in speaking of this temple, after considering the probable epoch of the work now remaining, discusses the three possible periods, namely, Antiochus, Augustus, and Hadrian. He refers the date to the time of Augustus, and this because of several particulars which render it probable that these remains were earlier than Hadrian's time, particularly in the character of the foliage, and adds:—"If you ask me why I refer these columns to the time of Augustus "rather than that of Antiochus, to which these observations seem to apply at least "equally well, I must refer you to the authority of Pliny and the spoliation of Sylla, "for I have no internal evidence."

Woods, therefore, was disposed to refer them to the time of Antiochus, except for the assumed transportation to Rome of the columns prepared by that monarch. Pliny, however, only says—and he is speaking of ornamental marbles—"Athenis templum "Jovis Olympii, ex quo Sylla Capitolinis ædibus advexerat columnas," on which subject Woods also remarks that there is not at Rome a column or a portion of a column of large diameter of Pentelic marble. Besides this, a column built of a number of drums could not be taken down and refixed without utterly spoiling the perfection of the joints on which the ancients so much prided themselves. The fluting was always

worked after the columns had been set up. The experiment has been made in a few instances at Athens of re-erecting fluted columns that had fallen, and with results that entirely prove my position. What Sylla took away, there can be little doubt, must have been monoliths intended for the interior of the naos. I will again quote from Woods his impression of the effect produced by the remains:—"The workmanship "is excellent, though perhaps not equal to that of the Phidian architecture. Their "physical beauty is enhanced by the various effects of their grouping, as seen in different "positions and by the stains of a yellowish or rather of an orange hue which time has "produced on all the edifices of this marble. It is probably owing to the action of the "air on a small quantity of iron contained in the mica which the Pentelic marble is "never without. As perfect buildings perhaps the original colour was the best, but as "ruins their beauty is certainly increased by the present tints. These remains are "unencumbered by any modern building, except a little sort of hut erected on a piece "of the architrave, the traditional residence of a *Stylite*, and they are placed on an "artificial platform on a bank rising from the Ilissus, supported by a buttressed wall, "part of which still remains. The height of the bases is unequal, and the plinths of "the inner columns rest on blocks of hard limestone, but there is a sinking of about "two inches below them, as if to receive a marble pavement."

I am inclined to attribute some of the dignity of these columns to their moderate height as compared with the diameter, or, as I should perhaps have rather stated it, to the massiveness of their diameter compared with the height. The columns of the great Ionic temple at Didyme are ten diameters high including the plinths. These are only eight and three-quarters, or eight and a half excluding the plinths.

Nothing now remains above ground except the columns and their architrave and the upper of the three steps of the stylobate. Underground are foundations [Illustn. xv.] sufficient to restore the general plan of the temple, which will be described in their proper place, and a very few fragments of other parts which will assist in a probable restoration of the superstructure.

Until the most recent excavations had disproved it, there was a very general opinion that the temple was decastyle.

The decastyle view is strongly advocated by Stuart, who was perhaps the first to discuss the matter, and indeed the first to recognize that this was the Temple of Jupiter Olympius; and if the thing were capable of being proved by *à priori* argument, there would, I think, be no means of resisting the conclusion that it was so. Stuart says:—"For had it not been octastyle and at the same time a dipteros, the breadth of the "cell would have been contracted so as not to have admitted an internal peristyle "with the galleries round the inside of the cell, besides which the aperture of the "uncovered part which constituted it an hypæthros would then scarcely have been "wider than one intercolumniation of the external portico."

Vitruvius also speaks of it as one of the four most remarkable temples existing. One of these was that of Apollo at Miletus (also called Didyme), a decastyle measuring about 170 feet in the front, and 366 on the flank; another, Diana of Ephesus, although

octastyle, was both a little wider and much longer than the Didyme temple, about 170 feet wide, and more than 400 in length ; the third was the temple of Ceres at Eleusis, which does not readily compare with the others, but its chief external feature was a portico of twelve columns and nearly 180 feet wide. If the Temple of Jupiter Olympius had been decastyle with a frontage of 171 feet, it would have well vied with the three others, which it does not so well do if octastyle, and only 135 feet wide. The curious passage, too, in Vitruvius, in which he intended to state that the temple was octastyle, in the form in which it has come down to us, rather favours the decastyle view. His words translated are :—" The dipteral is octastyle in the pronaos and pos-" ticum, but has two rows of columns round the building, as is the Doric temple of " Romulus, and the Ionic temple of Diana at Ephesus built by Ctesiphon. But the " hypæthral is decastyle in the pronaos and posticum, in all other points it is as the " dipteral ; but in the interior it has two ranges of columns in height at a distance from " the walls, for the purpose of circulation [as in a gallery], like the portico of the peri-" styles, but the middle part is open to the sky and roofless, and it has entry by doors " both from the pronaos and posticum. Of this there is no example at Rome, but at " Athens an octastyle and in the Olympian temple."

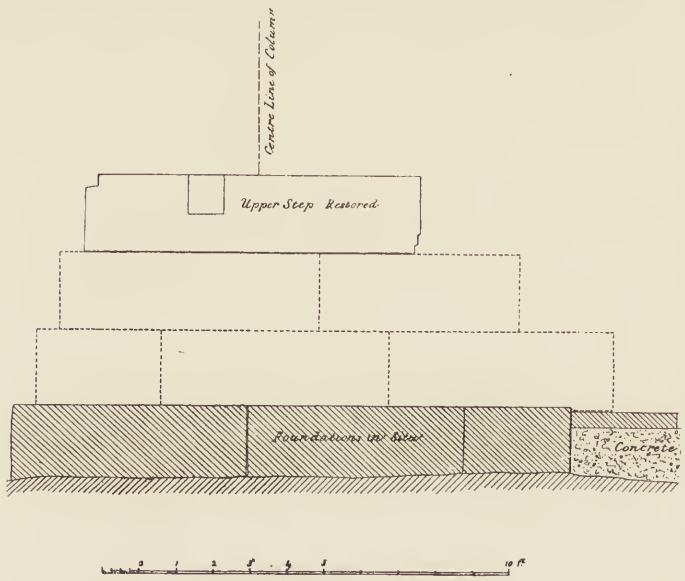
"Hujus autem exemplar Romæ non est, sed Athenis octastylos et in templo Olympio." In the attempt to interpret this passage with no aid external to the passage itself, it is not clear in the first instance whether the Temple of Jupiter Olympius *at Athens* is meant ; secondly, if it *be meant*, why was it not, if octastyle, put among the dipteral temples previously named ? In the part where it stands, if a hypæthral temple must be decastyle, and if Jupiter Olympius was an example of a hypæthros, *ergo* it was decastyle. Another *à priori* argument in favour of that view was the proportion of length to breadth, which, though not unparalleled among archaic examples if octastyle, would be much more of the usual type if the temple had been decastyle. But all this beautiful, and I think thoroughly reasonable, pile of *à priori* argument had a foot of clay ; it has been upset by the spade, and the temple turns out to have been octastyle. I was unwilling to come to this conclusion, and did not accept it until the evidence proved too strong to admit of any doubt on the point. I shall afterwards go briefly into the question whether it is possible that a decastyle temple could have been first designed, but that in consequence of the difficulty of completing the temple it was finished as octastyle for the sake of economy. I do not hold to this view, but it is worthy of being considered.

The Society of Dilettanti, with a view to a new edition of the *Principles of Athenian Architecture*, desired amongst other new matter to include an examination of this temple, and I undertook to conduct some excavations, if permission could be obtained, with a view to recover the plan of the cella. These excavations were begun in October 1883, and were subsequently continued at intervals during the three succeeding years. It was found to be an exceedingly difficult site to examine, partly from its great extent, partly because almost everything within six feet of the surface had been rooted up, and much had to be sought for twelve or fifteen feet deep ; also there had been

changes of plan during the building of the temple, and often those parts which were most wanted for explanation were absent, having been rifled by searchers for building stone. Further, I admit that the decastyle theory was a hindrance.

In the plan of the foundations [Illustn. xv.] the strong hatching drawn from right to left is intended to show the part which has actually been examined: the remaining walls hatched the reverse way are the necessary development of the foundations from the points which had been measured.

The foundation at the north-east corner was entirely laid bare, and the excavation extended with little intermission to some way beyond the north-western angle, a distance of upwards of 400 feet. Along this line for the whole length of the temple a floor of footings about sixteen feet wide, of rather large stones of hard limestone polygonally jointed, had been laid down to the rock. This floor was parallel to the existing columns, and served for the foundation of the columns of the northern peristyle. Its width extended far enough northwards to carry the lowest of the three steps. Nearly flush with the top of the course which remains was a pavement, and the bottom step partly overlapped the pavement course. Some portions of this pavement, about five inches thick, remained near the north-east angle, and at this level extended all round the temple. I found a suitable bed for it elsewhere, namely, near the south-east corner of the temple, and about the middle of the western front. It corresponds also (with a slight allowance for *currenting*) with the threshold of the small propylon or entrance to the peribolus which has been recently discovered. The level of this pavement below the main stylobate shows that the temple had three steps of equal height. The upper step only was of marble, the others were of hard crystalline limestone. Sufficient evidence of these is obtained near the south-eastern angle; and some massive portions of the marble upper step, displaced, were found in the excavations on the north side near the eighth column of the northern row—one of the confirmations of the octastyle arrangement.



Foundations at N.E. Corner.

About eighteen feet distant from the upper step was found a drain, of which the bed was from two to three feet below the pavement at the north-east corner,

and suitably currented towards the west, in which direction it had its outfall. The sides of the drain were composed of strong rubble, and the bottom and sides were cemented.

Near the fourth column (reckoned from the east) of the north row, was the foundation of a return wall carefully chased into that which was laid for the peristyle. At first sight this seemed to favour the decastyle theory, as no such wall could have appeared above ground in an octastyle temple; but its duty was probably that of a ground buttress to stiffen the pronaos wall. There was evidence that it was not merely a preparation, but that the wall had actually been built and subsequently uprooted. The foundation, or rather the rock bed, of this wall was also found further south. Search was made for a possible ninth and tenth row of columns, but it was quite clear that no preparation had been made for them. In the place which would have been due to the north-east column the rock was found rough and untouched, and in the corresponding place to the north-west a loose rubble floor suitable both in level and in quality for the pavement alone was found. The hard rubble connected with the drain before the latter was identified had, at first, seemed to favour a foundation for a ninth row, as though of Roman construction and presumably of Hadrian's completion of the temple; but when the drain had been developed, of course that idea fell to the ground.

Against the fourth column of the north row, reckoning now from the north-west angle, were traces of a cross wall, and this is where the posticum wall must have been.

The foundations of the seventh row of columns were found for a considerable extent. For about half the length of the temple these are laid with polygonal blocks similar to the foundation of the northern peristyle already described. But for part of the remainder some older foundations of different masonry appear to have been utilised, and the sign which marks this old character (of which there will be further evidence) is the obliquity of the joints. A cross wall was found working into this foundation, where there was a mixture of the older and newer constructions, and this was traced farther south until it terminated at the jamb of a doorway,—as it seems right to interpret it, namely, the door which communicated between the naos and the opisthodomus—"aditus valvarum ex utrâque parte in pronao et postico."

Southwards of the long foundation last mentioned, parallel to it, and ranging with the sixth column of the front, are the foundations of the north cella wall. These were traced for about eighty feet. They consist of squared blocks of tertiary limestone now generally called poros stone. A return wall falls into it about 100 feet from the east end, and terminates in a door jamb. This return, and part of the cella wall into which it is worked, is built of blocks of poros stone—which have been taken up from some other part, and were here used without any consideration for the beds and joints which were prepared for the wall to which they had belonged. The door jamb would be that of the principal entrance to the naos, and its corresponding jamb is found about twelve feet distant to the south. This latter jamb is part of the older construction, with its joints oblique to the temple.

Built up against the southern face of the north cella wall extends a wall of red

conglomerate [Illustn. xv. fig. 1. G] about eleven feet thick, serving for the foundation of the columns of the naos, which would have been necessarily placed rather near the cella walls, otherwise the space for the centre of the naos would have been very much contracted; but by this arrangement a central avenue of nearly thirty feet could have been obtained, and still passage room between the columns and the wall. There is a corresponding foundation for the southern row of the naos columns, and between them, a little westward of the centre of the temple and exactly central as respects north and south, is a mass of rubble which probably was the base of the great statue of Jupiter. The foundation of the naos columns, immediately south of this rubble, is built upon some carefully jointed work of poros stone [Fig. 1. D] of earlier date, and which is of sufficient extent to determine very closely the angle of its deviation from the work of Antiochus; and this, whether measured by the face or by the joints, gives an angle of about 2° 15′. This agrees extremely well with the other parts of the same construction which I have mentioned. There are very few actual remains of the southern cella wall, but there is sufficient evidence of its position and of the fact that it was built up against the oblique wall already there. At C [Illustn. xv. fig. 1] is a prepared mortar bed resting against the wall D.

This oblique wall, which served for the foundation of some of the columns of the naos, is stopped towards the east by an exceedingly rough wall of hard limestone of still older construction, to which I propose to return presently; but originally the oblique wall was carried further east, as is evident from the prepared rock bed further eastward; but where the columns of the naos of the newer temple were to be built, this part of it was not conveniently adapted for their foundation, and it was taken down and a new wall built corresponding to the red conglomerate wall on the north of the naos. Some part of the walling thus taken down, or of some work in connection with it, must have supplied what may be called the secondhand material which has already been mentioned as having been used near the eastern doorway of the naos.

The narrow double-shaded stripe [Illustn. xv. fig. 2] shows the place of the wall which was so treated, and on the opposite side of the naos there is another strip of the same shading, where it is most likely a wall was removed so as to widen the naos. The evidence for this change is found in the fact that, at a level several feet below the floor of the temple as planned by Cossutius, there is a concreted layer as if for a pavement. [Fig. 1. E.] It was found at three different and distant parts of similar character, but with slight differences of level. Presumably this was the bedding for the pavement as intended by Pisistratus, and this layer is found to have been cut off at a regular distance from the wall of red conglomerate, parallel to the line along which the southern wall was, as we have supposed, rebuilt.

The very ancient rough wall which runs north and south, which has been mentioned, was covered and partly concealed by the concreted layer just referred to. Northwards it runs underneath the wall G, and the southernmost extremity of it which was examined formed the foundation of one of the columns of the second row. There seems to me little doubt as to the builders to whom we are to assign these different walls.

The foundations parallel to the existing columns are, of course, the work of Antiochus; the finely wrought poros stone foundations, which I have called the oblique walls D, and the concreted pavement bed, E, ought to be attributed to Pisistratus, and there are some drums of the columns intended by him yet to be described. Of this oldest wall of all, we cannot say that Deucalion himself was its builder; but that it belonged to the original temple of Jupiter (an extremely archaic structure) may be readily allowed. In character it resembles the masonry of the very ancient temple recently discovered by Dr. Dörpfeld on the Acropolis between the Erechtheum and the Parthenon.

The foundation of one of the isolated columns was recently examined with a view to discover whether its foundations were trustworthy, having regard to the overthrow of the neighbouring column, as already mentioned, by a storm. And it was found to have been raised upon a cylindrical foundation composed of great drums of poros stone more than eight feet in diameter; and there are a number of broken drums of analogous size near the small propylon to the north of the peribolus, which were used for the foundation of some ancient building.

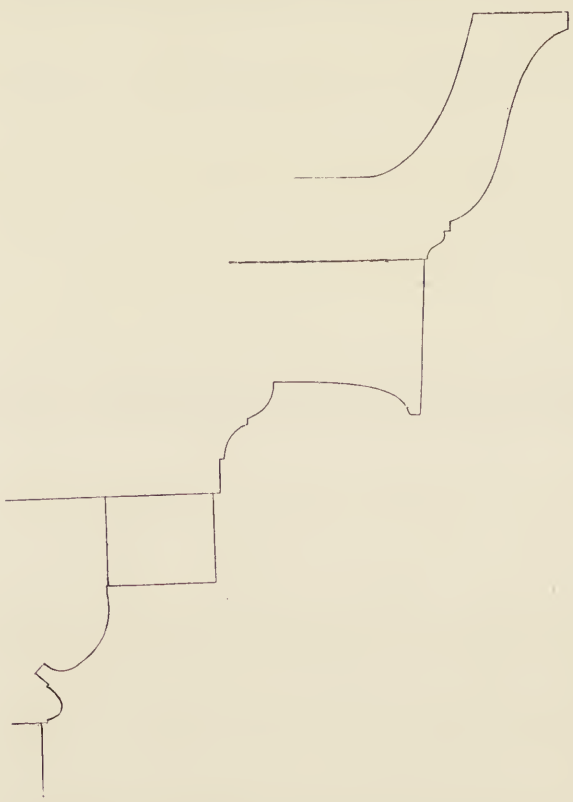
In the temple the isolated foundation of the column referred to is paralleled by another isolated but square foundation which remains of the third column (reckoned from the west) of the fifth row.

I have shown that a continuous foundation was employed in the eastern and central parts of the seventh row. The reason for these isolated foundations in the south-western part is probably explained by the much greater depth of the rock in these parts.

The peribolus [fig. 3] is now clearly defined, and the temple on the octastyle arrangement is found to be very accurately in the centre of it. The wall had a coping much resembling in section that of a Gothic battlement, which was mitred on to the buttresses. Quite recently the small propylon has been disclosed, of which the plan can be perfectly recovered as well as the pedestal and base of its columns and antæ. It ranges with a north and south line drawn from the eastern front of the temple. There was also probably a similar and corresponding portico westwards, but whatever existed has been entirely cleared away. The semicircular excrescence (still further west) is no part of the original peribolus. The architecture of the propylon may with the greatest probability be ascribed to Hadrian. The pedestals resemble those of the stoa of Hadrian. It was never completely finished. Near it are the foundations of pedestals of statues and parts of the pedestals themselves, with inscriptions of dedication to Hadrian. Near this portico, as shown on the plan, are the foundations, already referred to, of a building evidently earlier than the peribolus wall formed of the segments of large drums of columns of poros stone: the diameter of one of them is not less than 7 feet 10 inches. The walls of the peribolus are very probably older than the time of Hadrian, for the propylon is not symmetrically placed with regard to the buttresses, as it probably would have been if it had been all of one design.

The excavations, with the exception of the foundations, did not contribute many fragments of the superstructure, and absolutely no sculpture. There were a good

many drums of the external columns, and one small piece of an internal column, which, however, enables the columns of the naos to be restored with tolerable certainty. The diameter which I derive from the fragment referred to is 3·27 feet, and perhaps a trifle more. These columns I should distinctly assign to the time of Hadrian, and I conclude that, like those of the stoa of Hadrian and the small propylon above mentioned, they were mounted on pedestals. One of the orthostatæ or bottom stones of the cella wall, nearly six feet high, was also found, and some of the ordinary blocks of the wall; these latter measured 3·52 × 2·52 × 2·01 feet deep in the bed. Some fragments broken off of a bead and reel ornament of great size are strictly analogous to some which were found at Ephesus, and seem, therefore, to have belonged to the coffers of the ceiling of the peristyle. And there were some long stones which, I think, must have been used to connect the entablature of the naos colonnades with the cella walls, and have formed the principal part of the cornice. They were broken, but still one of them was nearly nine feet long and about two feet in the bed, and joggled so as to have fitted one into the other and formed a continuous floor. The above list includes all that were found in the excavations, which is rather disappointing considering the large surface, more than a quarter of an acre, which was ransacked. There were, however, a few other fragments not found on the site, but which we may feel confident must have belonged to this temple, and one of them is of importance. I found on the Acropolis two unmistakable pieces of the peristyle columns, known by the size and figure of the flutes, which shows that some materials from this temple must have been carried up there as building material; and another stone which must have belonged to the cornice, for the huge egg and dart moulding which this fragment exhibits would be strictly analogous to that used on the lower mouldings of the cornices of the great Ionic temples of Asia Minor; and as there can have been no other example at Athens requiring an egg and dart moulding at all approaching the scale of this fragment, I feel confident we may adopt it for the cornice of our temple. The proportion of this ornament to that of the rest of the cornice which the temple demanded, would form a good mean amongst the



Cornice of the Temple, from Fragments discovered.

examples of the known great Ionic remains. I refer particularly to the Mausoleum, the temple at Priene, and the Smintheum.

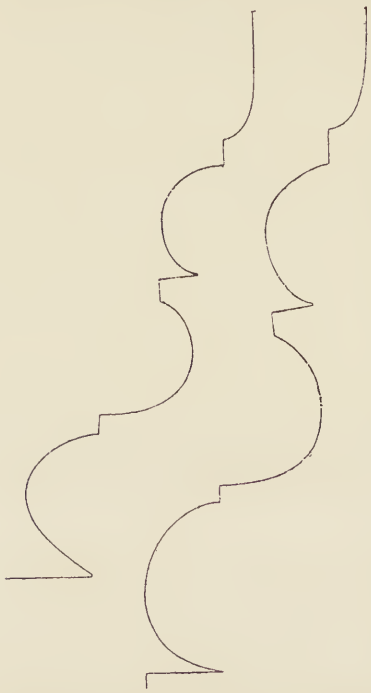
It will have already become abundantly evident that the temple as finished was octastyle; but as the *à priori* reasons for supposing it decastyle were so strong, it may be worth while to devote a little time to the consideration whether this was first intended, and that reasons of economy led to the adoption of the octastyle. (1) If, as I think, the peribolus is one with the scheme of Antiochus, the centrality of the octastyle temple is a strong point. (2) The assumed change of purpose must have supervened before any attempt was made to lay foundations for the ninth and tenth rows of columns. (3) As the north cella wall would have stood upon the foundation which in the octastyle temple carried the northern peristyle—a foundation sixteen feet wide, whereas the south wall, as we know, was carried on a foundation very little more than half that width—it would have been necessary to piece and widen the foundation which had been prepared for the cella wall,—on the decastyle theory,—to fit it for the new duty. There is absolutely no sign of change of purpose here, as the broad foundation spoken of is all of one construction. (4) The character of the masonry of the foundation used for the seventh row has the appearance of being part and parcel of Cossutius's design, and on the decastyle theory could only have been used for the northern row of naos columns. In that case there ought to have been a corresponding foundation for the southern row. There is no sign of any such thing. This was a great difficulty to me before the octastyle character of the temple had forced itself upon me.

Another argument may be drawn from the height of the columns. In the great decastyle example of Didyme, in which the breadth of the front is almost exactly that which this example with ten columns would have had, the height of the columns is more than sixty-three feet, whereas here we have only just over fifty-five, and according to all Greek precedent the columns should have been higher if the breadth had been so much increased. It follows, I think, therefore sufficiently, if, both in all reference to the foundation as well as to the proportions of its elevation, the remains are in accordance with the octastyle view, there can be no longer any place for the decastyle intention.

To proceed, then, to the plan as octastyle. The foundations show that the cella was divided into three portions, the naos in the centre, divided by two rows of columns, and with the statue near the west end. This was the usual arrangement in a Greek temple. The great doors east and west which entered the naos are also pointed out. The evidence is not sufficient to show whether there was a continuous wall at the west end, or whether there were columns or a door. The continuous wall is that which I have adopted after the example of Didyme, and this chamber may then be called the opisthodomus. They do show, however, that there were no columns in this apartment; but whatever way it was roofed, the roof or ceiling was carried from wall to wall, which, as it was only about forty-six feet, would have been no difficulty. The staircases shown in the plan are hypothetical. A suitable foundation was, however, found for the southern one. There are several existing examples of such staircases: one such is Didyme. At the eastern end there are foundations of the wall which would

have separated from the pronaos the apartment which I have called the hypæthrum. I follow the late Mr. Fergusson's view of this matter, which appears to me thoroughly reasonable. The evidence (as in the case of the opisthodomus) does not determine whether this foundation wall carried columns in antis or a continuous wall with a doorway. I incline to think that columns were used, and am to some extent supported by the example of Didyme. Within the quadrangular space, however, there were no columns. Under the whole of this space, as well as that of the opisthodomus and the greater part of the naos, extended the pavement bed, many feet below the floor of the later temple, which I have already referred to as the work of Pisistratus.

The plan having been established, I come to the elevation. The three steps had the same depth each as the existing upper step, together making one diameter of the column. Then came the bases of the columns, in which, as Stuart has shown, there is a difference between the exterior and interior orders. This must have had reference to the height of the eye of the spectator, standing on the level of the peribolus pavement more than six feet below the upper step. The columns have a very well-wrought and well-proportioned entasis, and their capitals, as already remarked, are well carved and thoroughly of Greek workmanship. The section to the right is that of the inner Order. The excess of height is 0·40 feet, and it stands about 0·06 higher still on account of the extra thickness of the plinth.



Bases of the Columns: Exterior and Interior Orders.

In the entire absence of fine Corinthian specimens of the best time (unless the Tholus at Epidaurus be an exception, of which as yet no sufficient data have been published), we must look to the great Ionic temples of Asia Minor for analogies to restore the entablature; having, however, very fortunately the architrave in possession.

Taking the undoubted examples of Teos and the Smintheum for architrave, frieze, and cornice, and those of the Mausoleum and Priene so far as they go, we obtain this proportion, namely: cornice to architrave, as 5 to 4; architrave to frieze, as 5 to 4. Using these ratios with our architrave, we obtain a total of 12·60 feet, which is exactly two diameters of the column; but before leaving the column, we may observe that the breadth of the abacus is one-sixteenth of the octastyle front, and the diameter is three-fourths of the abacus. The height of the capital is one diameter.

I have already referred to the lower members of the cornice as recovered from a strayed fragment. The cymatium is adopted from that of the temple of Diana at Ephesus, of which there is a portion in the British Museum; and an almost identical

XLVII. THE TEMPLE OF JUPITER OLYMPIUS (XV)

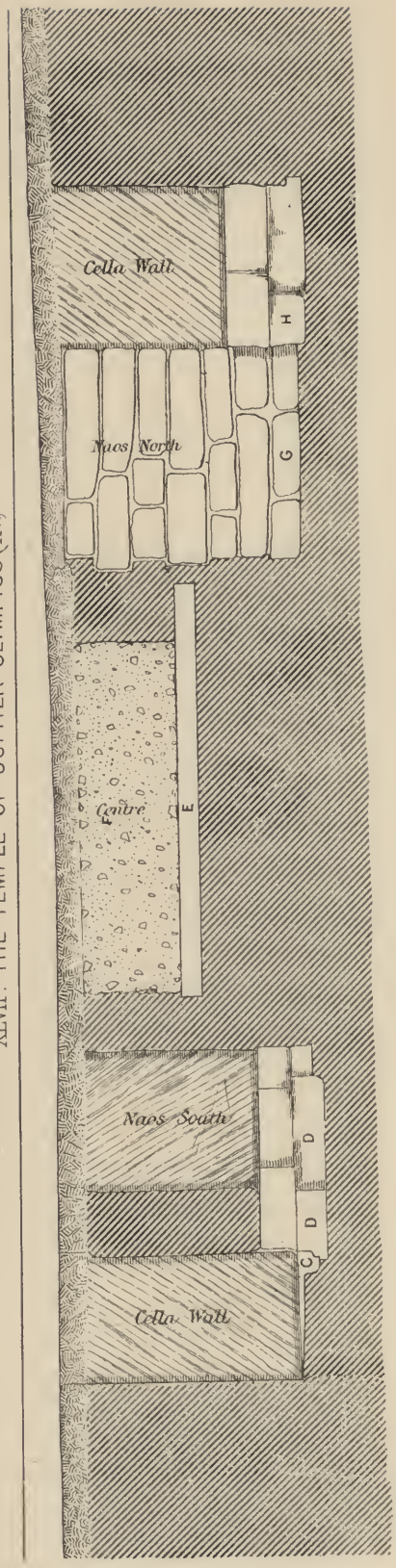


FIG 1. SECTION ON LINE A B OF PLAN, LOOKING WEST.

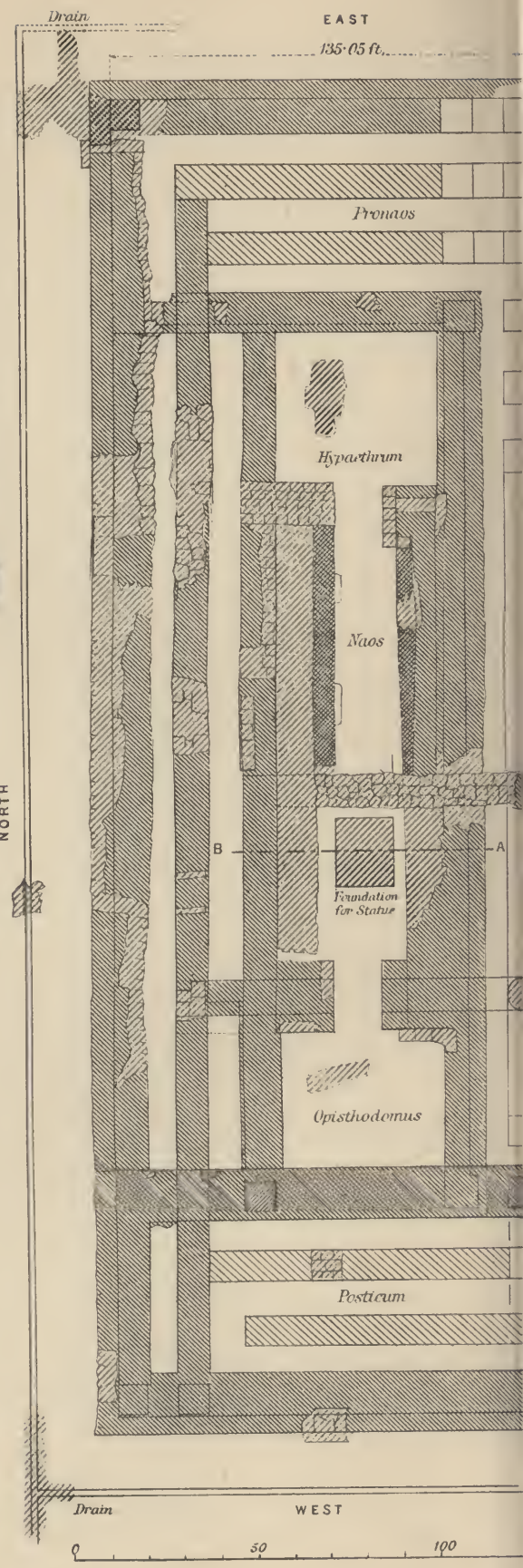


FIG. 2, PLAN OF FOUNDATIONS

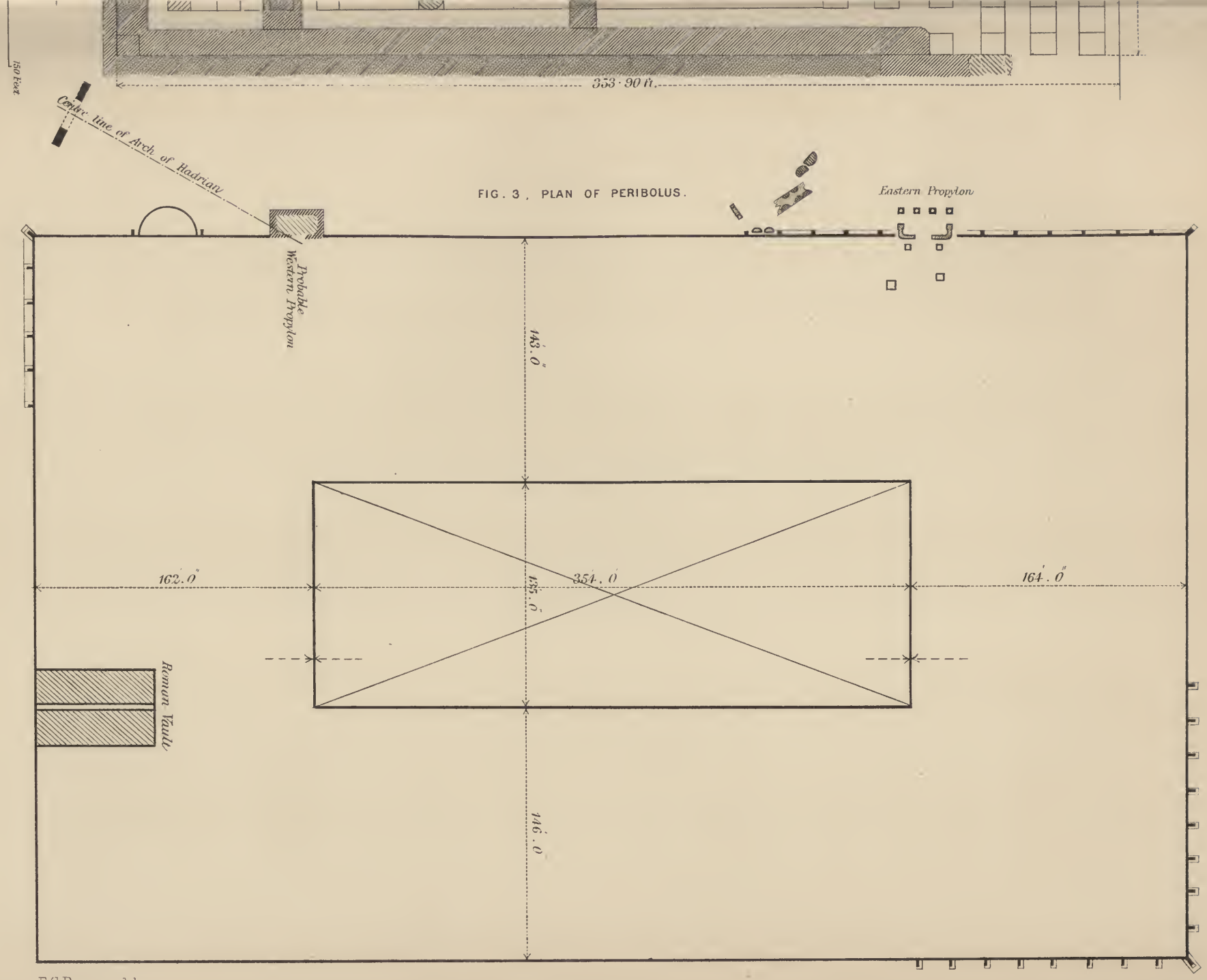


FIG. 3, PLAN OF PERIBOLUS.

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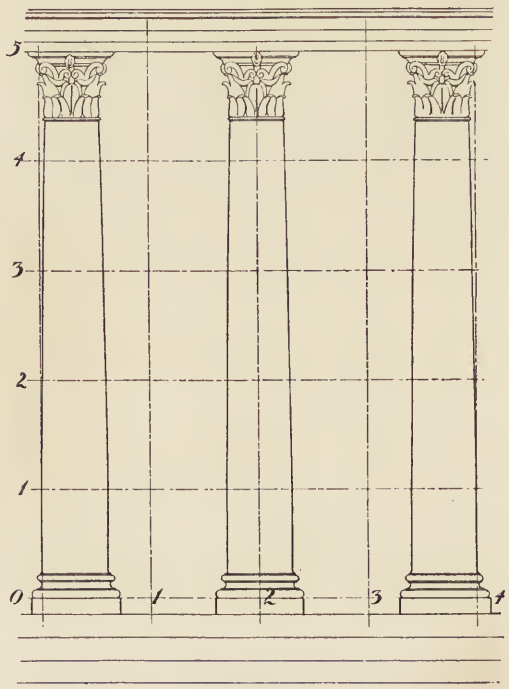
measure would have been obtained by proportion from each of the examples I have cited. Assuming, then, that the entablature has been recovered, and that the pitch of the pediment was 13° 30′, which would be strictly analogous to the best examples, we should have from the bottom of the steps a total height of ten times the abacus, or five-eighths of the breadth of the front; and the complement of the height compared with the column would be as 7 to 10, whilst the *Order* only is one-half the breadth of the front. These are proportions strictly in accordance with the laws of proportion which Mr. Watkiss Lloyd has scientifically investigated.



Probable Proportions.

Mr. Lloyd has shown, in a Paper* read to the Institute in 1859, that in the Parthenon the horizontal dimension which includes three entire columns, similarly placed to those shown on the diagram, is exactly equal to the height of the column. An analogous ratio, but with an adaptation to the loftier character of the Order, is found in the hexastyle portico of the Erechtheum, where the column is to the horizontal extent under consideration as 4 to 3. In the temple of Jupiter Olympius—not reckoning the plinth, which properly belongs to the stylobate—it bears exactly the proportion of 5 to 4.

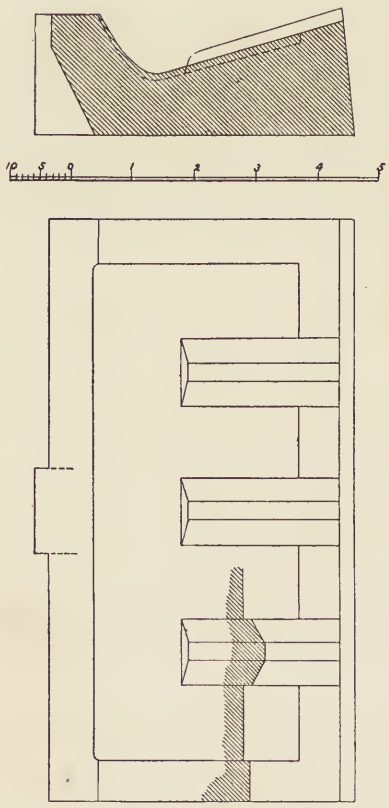
The temple I have been describing, notwithstanding that it has been shorn of two of the columns of the width which it was formerly supposed to have, reducing the number by twenty-four, was still a magnificent work. In the size of its mere plan it stood almost exactly upon the same area as the Madeleine† at Paris, and would rank with most of our own cathedrals in this respect. It was, however, much grander than the Madeleine, being dipteral instead of monopteral; in fact, a perfect forest of columns, and the columns themselves a foot thicker than those of the Madeleine. It is clear from the passage of Vitruvius I have quoted that it almost arrived at the rank of one of the seven wonders of the world, for he names it in no unworthy comparison

* See (Transactions, 1858–59, pp. 129–137) a Paper by Mr. W. Watkiss Lloyd on *The general theory of Proportion in Architectural Design and its exemplification in detail in the Parthenon*—described by its author as a "contribution to the scientific aids and resources of the art, as proving not merely "that the Greeks worked upon such and such arbitrary maxims, but that they had discovered certain "principles."

† Plans and elevations of the Madeleine are given in vol. ii. of Gourlier's *Choix d'Edifices Publics projetés et construits en France depuis le commencement du xixme siècle*, fo. Paris, 1825–50.

with one of them, the great Diana of the Ephesians, and I cannot doubt but that it deserved the character given of it by Livy:—"unum in terris inchoatum pro magnitudine Dei."

Since the above was written, some excavations have been made along the north wall of the peribolus and on the side towards the temple. A great many pedestals of statues were found—thus confirming the account given by Pausanias—and one interesting fragment of the temple, of which a plan and section, kindly supplied to me by Mr. R. Elsey Smith, our Greek Travelling Student, are here given. It is a marble block containing the upper part of the cornice and the stops of the roof tiles. From these we find that there were eight tiles to each columniation. The stops for the tiles were finished, but the cymatium and lion's head were not carved. The section agrees very closely with the profile of the proposed restoration of the cornice given above.



Fragment of Cornice.

It should be mentioned, with reference to the section of the *restored* cornice (page 98 *ante*), that the fragments which show the large "egg-and-"dart" do not give evidence of any dentils in connection with this moulding; indeed, if dentils originally existed, they must have been purposely worked off. If, however, there were no dentils on these particular fragments, it does not follow that the main cornice was without them; but they must have formed part of the pediment. The example of Priene may be quoted (see *Antiquities of Ionia*, vol. iv.) to show the combination of "eggs" with dentils over them in the horizontal cornice, and with a plain band in the raking cornice. In the fragment discovered, the distance from centre to centre of the eggs is 1·01, so there would be eighteen to the columniation.

FRANCIS C. PENROSE.

XLVII.

RECENT LEGAL DECISIONS AFFECTING ARCHITECTS.

By F. Meadows White, Q.C., *Hon. Associate.*

Arthur Cates, *Vice-President*, in the Chair.

Mr. Vice-President and Gentlemen,—

THE subject which I bring before you this evening is none of my choosing, nor do I voluntarily present myself as the reader of a Paper. I should not have flattered myself so much as to suppose that any remarks of mine would be of sufficient value to occupy your time at one of your meetings. But I was invited by those to whom are committed these arrangements to deliver a Paper on "Recent Legal "Decisions affecting Architects," and I am able to do so little to justify my honourable position as an Honorary Associate, that I cannot refuse to comply with a request which I assume would not have been made unless the wish that it should be complied with was entertained. I hope, therefore, to bring before you one or two cases which may serve as texts for some useful discourse, and I will do my best to make them available for our purpose. To define the word "recent," I will not go farther back than the date of the third edition of my friends Messrs. Jenkins and Raymond's excellent work, *The Architect's Legal Handbook*, published in the year 1880.

Now, the first case which I find on my syllabus is entitled Scott *v.* the Great and Little Clifton School Board, determined in 1884, and reported 14 Q.B.D. 500, and in Cababé and Ellis, Nisi Prius Reports, at page 435. This case, though earlier in date than some to which I will refer, deals with an early phase in an architect's transactions, for it concerns his appointment or contract to do work as an architect. In itself it is of a more extended interest than would at first sight appear, for it concerns the appointment by a School Board; and School Boards are multiplied in the land, and want school buildings. In that case, to a claim made by an architect for his fees for plans prepared by him for a School Board under orders agreed to by resolutions, and duly recorded in the minutes of the Board, a defence was raised that the orders and request to prepare the plans were not under the seal of the Board. It is to be observed

that the Board had had the benefit of the plans—that the architect had done his work. Now a School Board, by sec. 30, sub.-sec. 1, of 33 & 34 Vict. c. 75, "The Elementary "Education Act 1870," is constituted a body corporate having a perpetual succession and a common seal. It was said that in such a case the School Board being a corporation could only act under its seal, and that the orders to the architect were therefore as if they had not been given; and that he could no more recover his fees than if he had never been instructed at all. This apparently not very righteous* defence was based on authority: among other decisions cited being the cases of Hunt *v.* Wimbledon Local Board, 4 C.P. D. 48, and Young *v.* Mayor and Corporation of Leamington, 8 Appeal Cases 517. In the former of these cases the plaintiff, an architect, at the request made at a meeting, but not ratified by the seal, of the local Board, had prepared plans for buildings which were actually used for the purpose of inviting tenders. The Board refused to pay on the ground that the plans showed buildings of too expensive a character. The jury found that the Board had ordered and approved the plans. Nevertheless, the Court held that inasmuch as the orders to prepare the plans were not under seal, the architect could not recover. The amount of the architect's fees was over £50; and by sec. 85 of the Public Health Act 1848 it was enacted that every contract above £10, and by sec. 174 of the Public Health Act 1870 it was enacted that every contract above £50, should be in writing and sealed with the seal of the authority. The Court held this provision to be not merely directory but *imperative*, and that every other mode of attempting to contract was ineffectual.

To return to the case of the Great and Little Clifton School Board. Here Mr. Justice Mathew saw his way to a different conclusion. He pointed out that although the School Board was a corporation and had a seal, yet that by sec. 35 it might appoint a clerk, treasurer, and other necessary officers; that by rule 7 in the schedule to the Act "the "appointment of any officer of the Board may be made by a minute of the Board, signed "by the chairman and countersigned by the clerk, and any appointment so made shall "be as valid as if made under the seal of the Board." He found that the plaintiff was appointed "architect to the Board," that the architect to the Board was a necessary officer, and that the directions to him were also given at Board meetings and recorded in minutes. He held therefore that the plaintiff could recover, notwithstanding that the appointment was not under the seal of the Board. However, a moral may be drawn from these cases. It is possible for corporations—whether old-fashioned municipal or new-fangled statutory corporations, such as School Boards and Boards of Health—to raise defences of this kind. It may be that the turn of the wheel brings a new party into power. This was the fact in a case in which I was concerned, Mellis *v.* Shirley Local Board, 14 Q.B. D. 914, where the plaintiff was met by a somewhat similar defence, founded on a disabling clause in the statute; and although he had done all the work for which he charged, was cast in his suit. How important it is, therefore, for an architect, when dealing with a corporation or body of this kind, to be

* As to this observation, however, see Lord Bramwell's remarks cit. p. 528 of 8 Appeal Cases, who gives reasons for the legislation.—F. M. W.

assured that the proper formalities of contract in the particular case are observed, and that his clients are tied down by legal and binding forms. It is worth while in such cases to take legal advice. The forms directed by modern legislation may not be known, and disaster may be averted by a little timely counsel.

In connection with this matter of the architect's contract for his remuneration, I may here allude, out of its order, to the case last but one on the syllabus, Gwythor *v.* Gordon, reported in 3 Times L.R. 461 (1887). In that case a point of some practical importance was raised and determined. It was held that a letter from an architect accepting an offer contained in a letter from his employer, to do certain work for a certain sum, required a stamp. As this is the first case which I have cited from this useful compilation,* I may here express my indebtedness to it, and claim for it general and favourable consideration. Many of the cases there reported are not to be found elsewhere; being reported in the first instance for the general public, they are so presented as to be intelligible by laymen, and they are reported by gentlemen of the Bar, with sufficient accuracy, and reference to the legal aspects of the case, to make them valuable to the practising lawyer.

The next case upon my syllabus deals with a point which I hope will not arise in the practice of any of you; but it may be noticed in the dearth of material as a decision of some interest. The plaintiff, who was an architect, sued for remuneration in respect of employment under a contract made in 1877, and for damages for an alleged wrongful dismissal from such employment in 1880. The plaintiff was adjudicated bankrupt in 1878. It was held in the case of Emden *v.* Carter, 17 Ch. D. 169, confirmed on appeal, 17 Ch. D. 768 (1881), that the plaintiff could not recover, for that both the causes of action, for remuneration and damages, passed to the trustee in bankruptcy. The plaintiff was an architect, who had before bankruptcy carried on his business in the usual way with an office and clerks, and had continued to do so after the act of bankruptcy, and who claimed a large sum of money for plans and specifications, prepared by him (I think) both prior and subsequent to the act of bankruptcy, and also damages for alleged wrongful dismissal since the act of bankruptcy; but he had not yet obtained his certificate of discharge. It was contended for the architect that the earnings of the personal labour and skill of a bankrupt do not pass to the trustee. The contracts undertaken by the bankrupt could not (it was said) have been performed by his trustee, and therefore (it was said) the remuneration for them could not pass to him; but the Courts, both of first instance and appeal, held that, in this case, as in the case of the medical practitioner and other professional men, notwithstanding that personal skill might have entered into the consideration of the work for which money was paid, the money earned, inasmuch as the bankrupt had not obtained his certificate of discharge, passed to the trustee for the benefit of the general body of his creditors. It had been held that what a bankrupt earns by daily labour to support life, does not vest in the trustees; but if he earns a margin, that is a profit and goes to the trustee.

* The *Times Law Reports*, edited by Stanley Boulter, Esq., of the Inner Temple, Barrister-at-Law. Printed and published by George Edward Wright, at the *Times* Office, Printing House Square.—F. M. W.

I now come to a group of cases which have arisen in different ways out of contract provisions—respecting formalities as to extras; conditions of payment for work done—as to the architect's certificate. More litigation perhaps in building transactions has resulted from attempts being made by the parties to building contracts to get rid of the effect of provisions of this class than from any other cause. In some of these cases the contract may not, perhaps, have been clearly expressed; but more frequently the attempt has become necessary because the work has proceeded without strict regard being paid to the provisions of the contract, both parties being unwilling to be strict from various motives of expediency—as was supposed—and trusting that all would be well in the end. But a time has come when disputes have arisen. The work has run into greater cost than was expected; the employer is dissatisfied: perhaps things have gone less smoothly than they might between the architect and the builder; and it has come to pass in one way or another that both parties, or rather the one of them who has the right side of the legal question, appeals to the contract and to strict rights under it. It may be said of all these cases, that in the absence of fraud there are only two or three questions which can arise:—(1) the construction of the contract; (2) has it in point of fact been fulfilled, i.e. have the conditions (if any) insisted on been fulfilled; and possibly (3), have the parties waived by mutual consent the performance of the conditions (if any) which are insisted on? The lesson which is to be learnt by an outsider from such litigation—always painful, generally costly, and often in the result fruitless—is this: why make a contract if you do not intend to keep it? Why sign a contract in which these conditions are inserted, if in practice they are unworkable—if they are too onerous for practical application? But again, my experience in these and other kindred matters has taught me that in practice—driven by competition or recklessness—men, otherwise sensible men of business, will at times sign anything put before them; that in practice, in carrying out these contracts, they will run their chance, and prefer, for the avoidance of temporary inconvenience or trouble, or from the immediate desire of conciliating those in authority over them, not to act, or even attempt to act, on, but rather to ignore, such provisions in their contracts as those under discussion. Such persons, if a hitch should afterwards occur, have only themselves to thank for it, and must look to other contracts, past or future, to establish their average of convenience or profit—if profit can be anticipated at all in the long run from such a system of carrying on business. I am far from saying, however, that in my experience I have not found faults on both sides: the engineer and the contractor, the architect and the builder; for in this particular matter there are strong analogies in the framing and history of both classes of contracts. If on the one hand there may have been negligence or timidity, on the other there may have been too great a tendency not to insist at the right moment on the performance of conditions—to let matters slide, as it were, without sufficient effort to avoid irregularity or to encourage a strict adherence to the provisions of the particular contract. I cannot help thinking (although it must be admitted that my experience is derived from litigated cases), that, both in the case of contracts of

this special class, and generally, the best course is to abide by the contract, and to proceed regularly from the first, in accordance with its provisions; to have the matter fully understood, and the battle regularly fought out on the first occasion when questions of the sort arise, and to come to an understanding—to be expressed in regular form—if both parties agree that the contract should not be pursued in terms, but rather should be altered or modified. The architect, in many of these contracts, not only represents his employer, for whose protection the class of provisions to which I refer is primarily introduced, but is placed in a position towards the other party to the contract which demands the strictest judicial impartiality, and which certainly, as it seems to me, makes it a duty not only to insist at the proper time (that is, not at the end of the contract, but at the outset) on the observance by both parties of such provisions (unless indeed it be determined to waive or modify them, in which case the matter should at once be arranged by supplemental agreement in proper form), but also to give every help towards making that observance easy, and to discourage throughout any negligence in such particulars.

These general observations have been suggested to me by the two or three instances of litigated cases which have been publicly reported, and to which I will now call more particular attention.

The case of Botterill *v.* the Ware Board of Guardians, reported in Vol. II. of Times Law Reports at p. 621, may be read with Coleman *v.* Gittins, I. Times Law Reports 8 (1884), the former being a case of a contractor's contract under an engineer, the latter a builder's contract under an architect. The latter case was an action tried before Mr. Justice Mathew without a jury on October 28, 1884. It was brought to recover the balance alleged to be due on a building contract. One point raised was of interest. The following is an extract from the report:—" The contract, which was " made in August 1883, was to erect part of the refrigerating apparatus for the South " London Fish Market. By the contract payments were to be made at the rate of 80 " per cent. on the value of the work done as it proceeded, and the balance was to be " payable in two months after the architect should have expressed his satisfaction " with the completion of the work. By another clause of the contract the final " balance was not to be payable until the architect should have given his final certi- " ficate. By a letter in September 1883, the architect expressed his satisfaction with " the work, but the final certificate was not given until January 1884, and the action " was commenced within two months of the delivery of the final certificate." " His " lordship was of opinion that the intention of the parties, as expressed by the contract, " was, that the satisfaction of the architect was to be expressed by his final certificate, " and that, as the action had been commenced before the expiration of two months " from the delivery of the final certificate, the defendant was entitled to judgment. " The defendant, however, had not paid the amount at all, and his lordship said that, " as the defence was technical and devoid of merits, he should direct that the judg- " ment be entered without costs."

In the case of Botterill *v.* the Ware Board of Guardians, which came before the

Court of Appeal on May 13, 1886, many points were taken, on the consideration of the report of a special referee, to whom an action brought by a contractor against a rural sanitary authority, to recover moneys alleged to be due on a contract for constructing sewers, was referred for report. The point to which I now refer is one which had already been on numerous occasions before the Court, but the discussion drew from the judge observations it is well to bear in mind, and which are of general application to those transactions also in which the architect has a similar duty—and the builder has to submit to similar limitations—resulting from similar provisions which are very commonly introduced into builders' contracts. Mr. Philbrick, after the counsel for the plaintiff had been heard on the numerous points raised on the part of the defendants, contended that, on the report of the referee, the plaintiff was not entitled to judgment; and urged that one point alone was decisive against him, viz. that there was no such certificate of the engineers as the contract provided was to be a condition precedent to payment for the work. The referee had reported that the refusal of the certificates was *bonâ fide* and not fraudulent. Indeed, this question of the conduct of the engineers in withholding their certificate had been one of the chief contests of fact in the case. The following is the report of what took place. "The Court called "on the counsel for the plaintiff to meet this point. Mr. Rigby urged that the with-"holding the certificates, if wrongful, would not be a bar to the contractors' claim. "(The Master of the Rolls :—'The referee has found that it was not fraudulent.' Lord "Justice Bowen :—'And is there any case in which, where the engineer or architect "has honestly and *bonâ fide* withheld a certificate, the contractor has had any remedy "in law or equity?') It must be admitted that there is not." Lord Esher said :— "The contractor had accepted the conditions of the contract as to the certificate of the "engineers, and it was useless to complain of the conditions as hard." "It was "necessary to have the engineer's certificate of the completion of the work; and as "there was no such certificate, the return could not be maintained. If indeed there "had been fraud and collusion between the engineers and their employers, then the "withholding of the certificate might not be a bar to the claims; but its having been "'wrongfully' withheld was no sufficient answer to its absence (Clark *v.* Watson, 18 "C.B. N.S. 278). The judgment therefore was right, and the defendants were entitled "to the judgment of the Court, so the appeal must be dismissed." Lord Justice Bowen said :—"It was common for contractors who had put themselves into the power "of the engineers or surveyors of the employers to bring actions under a sense of "supposed wrong, in the wild hope of somehow or other getting a decision contrary to "strict law. . . . As to the legal grounds of the judgment, he agreed with the Master "of the Rolls. The want of the engineer's certificate was, he said, fatal. It was im-"possible for the contractor to get over it unless the certificate were withheld by fraud "and collusion (Scott *v.* Corporation of Liverpool, 3 De G. and J. 334). The argument "that the necessity for the certificate was got rid of by the wrongful conduct of the "defendants failed, for they had done nothing wrongful; they had only stood on the "contract, and if it were hard on the contractor it was his own fault."

The next case in the syllabus is Lapthorne *v.* St. Aubyn, reported in I. Times Law Reports at page 279. This case was tried by Mr. Justice A. L. Smith sitting without a jury on February 18, 1885. It is of considerable practical importance, as it affords another illustration of the principle established or illustrated by the case of Goodyear *v.* Mayor of Weymouth, 33 L.J. (C.P.) 12; and again by the case of Laidlaw *v.* Hastings Pier Company, reported only in the appendix to the useful work I have already referred to, Jenkins and Raymond's *Architect's Legal Handbook*, at p. 238 of the third edition; and also by the case of Richards *v.* May, decided in 1883 in the Q.B. D. before Cave and Day J.J., reported 10 Q.B. D. 400 (a case which ought also to have been named in my syllabus). The principle is this: that in the case of a contract in which there are special provisions as to extras and as to payment for them, followed or accompanied by a provision that payments are to be made on the architect's certificate; the employer, if that certificate is given, cannot be heard to say that the architect has included in his certificate as extras work which was not extra work at all, or as to which the special provisions of the contract as to extras were not observed, or which for those or other reasons ought not to have been charged or allowed as extras according to the contract; and that, whether or not there is also contained in the contract a special provision that the architect's decision is to be final. In Lapthorne's case there was such a provision; in Richards's case there was not. But first, to go a little more into detail as to the two cases. In the one, Lapthorne sued St. Aubyn and others to recover a balance of £522 odd alleged to be due on certain building contracts from the defendants, who were members of a building committee for the purpose of completing the erection of St. Mark's Church at Ford, in the parish of Damerel in Devonshire. The contract contained clauses; the sixth (which was that mainly relied upon by the defendants) "that the builders were not to vary or deviate from the drawings or specifica-"tions, or execute any extra work of any kind whatever, unless upon the authority "of the architect, to be sufficiently shown by an order in writing or by any plans or "drawing expressly given and signed or initialled by him as an extra or variation, or "by a subsequent written approval similarly signed. In all cases where such deviations "or extras exceeded £10 the order or plan was to be, in addition to the above, counter-"signed by two of the building committee." The tenth clause provided for payment to the contractors in certain sums at certain periods "within one month after "the said Alfred Norman shall have certified in writing, that the work to be paid "for is to his entire satisfaction." The eleventh clause provided as follows, viz.—"The decision of the said Alfred Norman, or such architect &c. with respect to the "amount, state, and condition of the works actually executed, and also in respect of any "and every question that may arise concerning the construction of the present contract, "or the said plans &c. or in any way relating thereto, shall be final and without appeal." It was pleaded by the defendants that "many of the items in the plaintiff's account "were unfair and unreasonable charges, and not in accordance with the building "contracts; that by those agreements no 'extras' over £10 in amount were to be "charged for unless the order for such extras had been countersigned by two of the

"building committee; that in many instances this rule had not been followed; that a "much larger sum than £179 5*s*. for 'work not done' should have been allowed; and, "finally, that the architect had granted to the builders certificates which he had no "right under the contract to grant, and they therefore did not bind the defendants."

The plaintiff relied on the tenth and eleventh clauses, and said in answer to the plea that before action the architect had pronounced a final decision, and had given his certificate that the amount claimed in the action, viz. £522 odd, was due and payable by the defendants to the plaintiff. The case was argued by Mr. Justice Charles, Q.C. (then at the bar), and Mr. Pitt Lewis for the plaintiff, and by Mr. Finlay, Q.C., and Mr. Warr for the defendants.

Mr. Justice A. L. Smith in giving judgment is reported to have said:—"He was "clearly of opinion that by entering into such a contract as the one in question, both "parties had put themselves entirely under Mr. Norman's thumb, and had agreed to "abide by his decision, whatever it might be, if there were no fraud; and now there "was no suggestion of that, the charge having been very frankly withdrawn. It had "been argued because under the sixth clause no deviations or extras over £10 were to "be charged unless countersigned by two of the committee, that therefore it was "expressly meant to limit Mr. Norman's power of decision; that, in fact, he was only "authorised to certify for work done and executed under those conditions, and not for "all the work actually executed. Was this what the contract meant? He could not "so read it; and it was, his lordship said, clear, on the authority of Goodyear's and "Laidlaw's cases, that Norman was to certify upon all the work;" and the tenth [query the eleventh] clause, the most important to his mind, stipulated that Norman's decision was to be final and without appeal. Norman had certified, and whether he had in his certificate made a mistake or not, it was not lawful for the defendants to reopen that certificate to correct alleged mistakes, or for the purpose of eliminating those extras not countersigned by two of the committee. There would, therefore, be judgment for the plaintiffs for £560, being the amount claimed, together with the interest due upon the same.

In the case of Richards *v.* May, 10 Q.B.D. 400, the same principle governed the decision. There was not, however, a clause in such express terms as in Lapthorne's case, providing that the architect's decision should be final. But the fourth clause of the contract provided that "all extras or additions, payment for which the contractor should "become entitled to under the said conditions, and all deductions which the proprietor "should become entitled to, should be respectively paid or allowed for at the price which "should be fixed by Mr. S. J. Lethbridge, the surveyor appointed by the defendant." The Court held that this clause not only gave Mr. Lethbridge power to certify the amount of extras, but also to determine what were extras; and that the defendants were bound equally with the plaintiffs by his certificate, and could not go behind it and show that he had made allowances in respect of what were not in point of fact extras; and the Court gave judgment accordingly for the full amount for which the certificate had been given.

These cases seem to me to be determined in accordance with good sense and the true meaning of the contracts. Anyone who desires a little further reading on the subject can consult Messrs. Jenkins and Raymond's work, and read the interesting and full report there of the case of Laidlaw *v.* the Hastings Pier Company, to which I have referred. In the next case noted in the syllabus, that of Locke *v.* Morter, reported in Vol. II. of the Times Law Reports, p. 121, was decided quite a different question. It is thus reported in the Times Law Reports :—

This was a claim by an architect for commission. The action was of rather an unusual character, being brought, not against a building owner, but against a builder. The claim was for 2½ per cent. commission for measuring up alterations, additions, and omissions in a building contract. In March 1881 a contract for the rebuilding of the Half Moon Tavern in Gracechurch Street was concluded between the defendant, a builder, and Mr. Porter, of the Half Moon Tavern. By a clause in this contract the employer (Mr. Porter) had the usual power to order alterations, and it was provided that the value of any omissions, alterations, or additions should be ascertained by the architect according to a priced bill of quantities to be sealed and deposited. The contract also provided that the builder, Mr. Morter, should be paid from time to time 80 per cent. upon each £500 worth of work certified for up to a certain point, and after that point the full value of each £500 certificate. There was no question that the plaintiff was originally employed by Mr. Porter as [his] architect. He prepared plans and specifications, and did all the usual work on behalf of the owner. From time to time various omissions and additions were ordered, and were measured and valued by the plaintiff in accordance with the above clause in the agreement. The 2½ per cent. commission which was the plaintiff's charge for such work was added to each certificate as it was given. Payments were from time to time made by Mr. Porter upon the certificates; but at the termination of the contract Mr. Porter got into difficulties, and subsequently became bankrupt, and a balance of £116 remained due to Mr. Morter upon the contract. The only question now in dispute was whether the defendant was liable to the plaintiff for the 2½ per cent. commission for measuring up alterations and additions. The contract was silent as to who was to pay this amount; and counsel for the plaintiff, in opening the case, contended that it was really due for services rendered to the defendant. He also relied upon the general custom of the profession that the charges should be paid by the builder. At the conclusion of the opening, Mr. Justice Lopes expressed his opinion that the money could only be recovered under a custom which made the builder liable, or as money received by him from the building owner for the plaintiff's use.

The plaintiff and his partner, Mr. Taylor, were then called, and gave evidence as to its being the universal custom in the profession that the commission for measuring alterations should be added to the amounts certified for and paid by the builder at the termination of the contract. They were, however, unable to say that it was the custom for the builder to pay such commission where it had not been paid to him by his employer. They also asserted that the defendant had been from time to time paid by Porter the sums certified for, including the 2½ per cent.; but did not dispute that on the final account under the contract a balance was still due to the defendant. It appeared that an action had actually been commenced by the plaintiff against Porter to recover this commission, but the plaintiff denied all knowledge of the fact until it was mentioned in court, and asserted that he had always looked to the defendant for payment. After hearing this evidence, Mr. J. Lopes (now Lord Justice) intimated that he was strongly of opinion that the plaintiff could not recover unless he could show that the commission was in the hands of the builder, in addition to what was due to him on the whole contract.

Judgment was given for defendant with costs.

It will be noted in this case, first, that a custom was set up by the plaintiff, but he failed to prove it; next, that the plaintiff was originally employed by the building owner as his architect, and that the contract provided that the architect, who was the owner's architect, was to measure: *primâ facie*, therefore, the owner seems to have contracted to pay the architect his fee for this work also, in the absence of some provision in

the contract, express or implied, to the contrary. This implication the plaintiff sought to introduce by proof of a custom to that effect. But, as I have pointed out, he failed to prove it. To prove a custom for such a purpose, you must show that it is so far sanctioned by the universal understanding of the trade or profession, and of all conversant with it, that its purport is necessarily read by them into every contract to which it is applicable, although there is no express provision to that effect. The plaintiff broke down in his attempt to show this, and in fact proved, if he proved anything, a different custom to that which he took upon himself to prove. I shall have occasion to allude to this subject further when I come to deal with the last case on my list.

Two cases are next set down in my syllabus, arising out of actions brought by the same plaintiff, Mr. Brunsden, a builder, in 1883 and 1884. The former in point of date, Brunsden *v.* Beresford, reported in Cababé and Ellis (N.P. Cases) 125, was tried before the late Mr. Justice Watkin Williams and a common jury on July 1, 1883. It was an action against the building owner for a balance alleged to be due on a building contract. By the contract the architect's certificate was a condition precedent to the builder's right to receive payment for work done. For the work payment for which was claimed in the action no certificate had been given. The defendant's evidence (which was contradicted) was that the defendant complained of defects in the work, and told the architect that he could not accept his certificate unless the defects were remedied. The judge is reported to have said :—" If you think that the architect, acting on his own judgment, " withheld his certificate, you must find for the defendant. If, however, you are of " opinion that the withholding of the certificate was due to the improper interposition of " the defendant, and *that he prevented the architect from giving his certificate*, you must " find for the plaintiff." Now the latter phrase in the ruling is perfectly right (if I may say so with respect), but I doubt that there was any evidence in the facts as reported (assuming plaintiff's version to be correct) to support it. Supposing the defendant had said what the witness said he had said, it was no less the duty of the architect to act on his judgment, and give his certificate. The only argument would be this (assuming the architect did in point of fact refrain after the plaintiff said it, and because he said it, from exercising his judgment and giving a certificate) : The defendant cannot be heard to say that he did not intend the architect to act on what he said ; and that in this sense the true inference for the jury to draw would be that he did prevent the architect from giving his certificate. But it appears to me that the jury would have been right in treating such a saying by the defendant as idle threats or words, looking to the position an architect holds in such a matter, and his duty not only towards his employer but towards the builder. In the other case, tried on February 13, 1884, before Mr. Justice Mathew without a jury, Mr. Brunsden sued the Local Board of Staines to recover £216 13*s.* 11*d.* balance alleged to be due in building the Town Hall of Staines under a building contract between him and defendants. This claim included £50 balance of contract price, and a claim for extras. Damages were also claimed for refusing to refer, according to an arbitration clause contained in the contract. In the contract there were clauses which made the certificate of the architect a condition pre-

cedent to payment for work, which rendered certain formalities necessary for the ordering and claim in respect of extras, and an arbitration clause very general in its tenor. The clause as to the extras claimed for had not been observed; the report is silent as to the extras allowed, but I rather gather that these had been dealt with in the same way. The contract work was finished in July 1881, and on December 21 in that year (so I assume, for the report is silent) the architect gave his final certificate in the following words:—"The architect reports that the works were com-"pleted July 16, and that Mr. Thomas Brunsden is entitled to receive the sum of "£386 11*s.* 3*d.*, being the final balance due for contract and extra works, less the "sum of £50 reserved till July 16, 1882." A cheque was sent on January 3, 1883, for £336 11*s.* 3*d.* (i.e. £386 11*s.* 3*d.*—£50), which plaintiff accepted on account. The defendants refused to refer the dispute to arbitration. The defendants paid into court £50—the balance of contract sum—and 1*s.* as damages for breach of contract to refer. The action was brought in February after cheque received. Now the contention was, that, as the architect in his certificate had dealt in some sort and to some extent with extras, and had allowed a certain sum for them, the plaintiff was entitled to go behind the certificate and to show that he had in fact done other extra work, and to show the amount of such extra work actually done by him. I suppose the contention was that because, as to some, the architect had certified, why not apply the same principle so sanctioned by the architect to the rest? This contention was not, you will say, bearing in mind the cases we have dealt with, a very sound or hopeful one. The defendants (it is clear from the cases already discussed) could not have reopened the certificate and contended, in point of fact, with reference to the extras actually allowed, the contract had not been complied with. Then, on the same principle, why should the plaintiff be entitled to reopen it? Mr. Justice Mathew held that the plaintiff must show a certificate to entitle him to receive the payment claimed. This he could not do. He had been paid up to the full amount of the extras which had been certified for. And with respect to the damages for refusal to refer, he held that the arbitrator could not have given more than the plaintiff obtained by his action: therefore the plaintiff who had brought his action had sustained no damage, and that the 1*s.* paid into court was sufficient. He said:—"Suppose this case is within the clause [of reference]: it cannot be "assumed that the architect would neglect his duty or give the plaintiff something to "which he is clearly not entitled by the contract; nor can the plaintiff, therefore, "recover any damages for a refusal to refer to arbitration, when, in my opinion, he would "not have been entitled to recover anything under it."

The last case which I have to bring before you is, perhaps, one of the most general interest to the profession which has recently occurred. I was concerned in it myself, and know that a serious attempt was made to establish and confirm what, as I am informed, is widely believed to be a custom of the building trade;* in which attempt,

* See a Paper by Mr. Cecil George Saunders printed in the *Transactions of the Surveyors' Institution*, vol. xii. pt. 1, 10, p. 279, and especially Mr. Arthur Cates's remarks thereon at pp. 294 *et seq.*; also a Paper by Mr. Rickman, vol. xvi. of same *Transactions*, at p. 117; Mr. Cates, p. 137.—F. M. W.

however, the plaintiff failed, in the opinion of the judge, Mr. Justice Stephen, who tried the case without a jury. I am somewhat hampered, however, in the full discussion of this case, because I am informed that it will soon be entrusted to my friend Mr. Edwyn Jones to conduct it in the Court of Appeal, and I must treat the subject, therefore, as being still *sub judice*, and confine myself as nearly as I can to a statement of the facts, and the judgment of the learned judge. I regret this necessity—so far as my present purpose is concerned—for I think I could have drawn one or two useful lessons from the result, and discussed more freely than I now can the evidence of the witnesses, and the exact circumstances which may possibly have led the judge to the conclusion at which he arrived. I have been kindly favoured with a copy of the pleadings, and the shorthand notes of the judgment of the learned judge; but I must, I fear, trust to my memory for certain important matters connected with the case, such as the exact words of the contract, which circumstance will render my statement of the case of less value than I otherwise might have hoped it would be. The case has received some illustration, however, from a letter in *The Builder* of January 21, 1888, from Mr. Henry Northcroft, and in an able leading article in *The Building News* of January 27, 1888, in which the case is stated, its incidents described, and certain comments made upon it, to which, so far as they deal with the legal aspects of the case, I must not be taken as giving my assent, or as indicating my dissent from them if I pass them by without notice, for I feel, as I have said, somewhat embarrassed in this respect from fully expressing my own views, pending the appeal. In the case to which I refer, Messrs. Priestley and Gurney, the builders, sued Mr. Frederick Stone, a quantity surveyor, or at any rate a gentleman who acted as a quantity surveyor in this particular instance, to recover from him damages and losses which they alleged they had sustained by reason of inaccuracies in the bill of quantities prepared by him, which had (as they said) in certain particulars misled them, and induced them to margin out certain specified work at too low a figure. I need not pause on the details of the alleged damage. These would have been inquired into out of court. Suffice it to say that, so far as my recollection serves me, there did exist (apart from doubtful items) certain errors and short quantities in the prepared bill, which would no doubt have entitled the plaintiffs to recover had they been able to establish a liability to them in the matter from the defendant at all. The defendant had been employed by an architect, who in his turn had been employed by certain persons to prepare designs, procure tenders, and superintend the erection of a Roman Catholic church at Chiswick, to take out the quantities from his designs, in order that tenders might be invited for the work. There was no question raised as to the architect's authority as between him and the building owner to employ the defendant. The defendant accordingly prepared a bill of quantities—the architect prepared the contract and specifications—and the plaintiffs made the successful tender. The bill of quantities contained the following memorandum, which I cite from the shorthand writer's notes of Mr. Justice Stephen's judgment:—"Add "surveyor's charges for preparing the quantities 1½ per cent. on the above amount (this "margined out £55 2*s*.) [and also 1½ per cent. in the amount of second estimate and

"third estimate (this margined out at £3 6*s*. and £10)]. Add for lithography £11 10*s*." There was a marginal note added by the quantity surveyor,—"To be paid out of the "first instalment."

This bill of quantities was handed to those who tendered and applied for it in the usual way at the architect's office, and among others to the plaintiffs.

The building contract itself contained the following clause, which played an important part in the case, both in the cross-examination of the plaintiff's witnesses and in the judgment of the judge. I again cite the clause from the shorthand notes of the judgment of Mr. Justice Stephen. "The contractor will be allowed the opportunity, and "must previously to signing the contract examine the drawings and specifications, and "compare them (if requested) on the site with his estimate, so as to satisfy himself that "his price includes all the work and materials shown or described in the specifications "and drawings which constitute the contract, as no departure or alteration will be "allowed to be made from or in his tender in the event of any error therein being "discovered, however arising." Now under these circumstances the plaintiffs based their case, mainly, on two grounds. First, they relied on a direct * contract established by the circumstances of the case between themselves and the quantity surveyor—a contract which, on the one hand, made them liable to the defendant, the quantity surveyor, for the price of his labour; and on the other rendered the quantity surveyor liable to them for the breach of the duty, implied in the case of all professional men, to use due diligence in the exercise of his profession; in other words, they sought to hold him liable for negligence as on a direct contract between them. Secondly, they sought to make him liable on a principle which, they contended, was of sufficiently general application to include their particular case: as laid down by the present Master of the Rolls in the case of Heaven *v*. Pender, 11 Q.B. D. 503, 509, but which the learned judge held "did not apply to such a case as the present, where a man was 'injured in his pocket, and might not be extended beyond the class of cases in which "the principle had been applied."

The Master of the Rolls put the principle thus:—"The proposition which these "recognised cases [certain illustrative cases which he stated] suggest, and which is, "therefore, to be deduced from them, is, that whenever one person is by circumstances "placed in such a position with regard to another, that everyone of ordinary sense who "did think would at once recognise that if he did not use ordinary care and skill in "his conduct with regard to those circumstances he would cause danger of injury to "the person or property of the other, a duty arises to use ordinary care and skill to "avoid such danger."

This statement has been commented on in the profession as being too wide and general in its terms. With regard to its applicability to the present case, however, I will, for the reason above given, refrain from commenting on it or expressing my own opinion on the subject. I will only quote from the judgment of Mr. Justice Stephen the following passage, in which the learned judge deals with this matter:—"The case

* See Taylor *v*. Hall, 4 Irish Common Law Reports, p. 467, Monahan, C.J., at p. 479.—F. M. W.

"which is referred to, of Heaven *v.* Pender, and which comes near to this, is founded "on a class of cases which are mere cases of physical bodily injury, either a bodily "injury to a man or a physical injury to a thing. That is a matter which stands on "quite a different kind of footing from being misled by a person's conduct. I feel, "therefore, there is no privity here either between the quantity surveyor and the person "who ultimately has tendered an amount, and who may be injured with regard to his "estimate by mistakes [qu. of the quantity surveyor] if such mistakes were made."

But no doubt the chief burden of proof which the plaintiffs hoped to sustain was this. They hoped to establish a direct privity of contract between the quantity surveyor and the builder, and on this principle: it is perfectly clear that if A and B contract, and afterwards they meet with C, and the three agree that the contract shall henceforth be carried out not between A and B but between B and C, and that B shall be discharged altogether from the transaction for bad or good, and C substituted in his place, this may legally be done, and in fact in many transactions of life it is done. Now the plaintiffs sought to do this, and substitute themselves for the building owners who originally, by the agency of the architect, contracted with the quantity surveyor, in the contract with him, admitting themselves liable for the balance of his fees [meeting this liability, however, by their counterclaim for negligence] and seeking to hold him directly liable for negligence as being a contracting party with them. And this they sought to do by importing into the case a custom of the building trade by which all persons engaged therein—architects, builders, quantity surveyors, and building owners alike—were equally bound; unless by the express provisions of the actual particular contract it was excluded, either by direct language or by clauses inconsistent with its incorporation into the particular contract. The custom is thus stated in Messrs. Jenkins and Raymond's book, chap. iv. p. 31, 3rd edition, par. 29:—"We will now "briefly summarise the rules, to be deduced from these authorities [i.e. Moon *v.* "Guardians of the Witney Union, 3 Bing. N.C. 814; Scrivener *v.* Pask, L.R. 1 C.P. "715], by which the transactions of the parties as to the quantities would be "governed in the absence of any agreement to the contrary.*

"When an architect is employed to prepare plans and specifications for a new "building, he is impliedly authorised to contract, as agent for his employer, with a "surveyor to take out the quantities, such being the usage. On the contract thus "made by the architect the employer is liable. But (the contract being conditional) if "a tender be made and accepted, and the works proceeded with, the liability will shift, "and the contract will then be taken to subsist between the builder and the surveyor. "In this case the surveyor is not the agent of the employer or building owner."

Now, it seems to me to be going somewhat too far to say that the proposition (the important one for this case), that the contract shifts when a tender is accepted, may be deduced from the authorities referred to. Some such usage seems certainly to have been in the minds of the Court when they had before them the case of Moon *v.* The Witney Union; but it was not necessary to go farther in that case than the second

* See reference to *Transactions of Surveyors' Institution*, in footnote *ante*, p. 113.—F. M. W.

proposition, viz. that until a tender is accepted (what happens after was not in issue in that case) the building owner at any rate remains liable, as he was in the beginning.

Mr. Justice Stephen points out in his judgment that the authority of Moon *v.* Witney Guardians does not go farther than this. There is, however, nothing inconsistent in the judgment in Moon's case with the proposition that after tender accepted the contract shifts. I think I may add thus much, that although I have the authority of the article in *The Building News* to which I have referred (and without expressing any opinion of my own, I may appeal to this assembly of experts on the point whether it is so or not), "that the principle is recognised in the profession of architects, builders, "and quantity surveyors," yet, as a lawyer, I must confess that it cannot be said that this custom is so far part of the law of England that it can be recognised without proof, as e.g. the customary three days' grace in bills of exchange transactions is recognised as part of the law merchant. So the plaintiffs had to prove the alleged custom; and the list of witnesses, whom I will not name from my own knowledge but from reference to the article in *The Building News*, shows that the plaintiffs produced as witnesses a body of gentlemen of high respectability in their respective professions of quantity surveyors, builders, and architects. Nevertheless the plaintiffs failed, in the judgment of Mr. Justice Stephen, to establish any such custom as alleged. Now, although great pains were bestowed on the preparation of the case, it turned out, in my opinion, to be a somewhat unfortunate one for raising the issue which it was desired to try. The clause in the contract as to the builder having the opportunity to compare quantities with estimate, and that no departure should be allowed from his tender by reason of errors, however arising, which I read at length just now in the statement of the case, certainly tended to confuse the witnesses, when their attention was specially called to it. Let us see how the judge dealt with it:—"Several of the "witnesses," he says, "said that they never would have signed a contract which had that "clause, and they gave their reasons, and I am not surprised at what they said. Now, "this clause being put in, however, shows really two things: first, that the building "owner and his architect, and more particularly the architect, were well aware that "they might be liable for the estimate on which the matter was based. Secondly, that "they determined that they would not be liable, but would throw the liability upon "the builder himself by the express terms of that clause 11. I could hardly "conceive there could be another intention than that which appears to me to be "plain common sense in itself, *that the contract is between the owner and the contractor,* "and that the owner will not be liable for any alteration or anything that there may "be in any want of correctness or any error, however arising, which has taken place "in the early stages of the matter. It does not, of course, follow [qu. of course it "does not follow] that because the building owner has protected himself, that there-"fore the quantity surveyor is liable. The quantity surveyor would be liable to the "building owner for any damage he has caused. Apart from that, I cannot see "that there is any further liability unless such liability can be proved."

Now, I express no opinion on this part of the judgment (so far as it depends on

the effect of clause 11) one way or the other, for the reasons before given; but it is obvious that it is quite possible that this clause 11 *may* be read as being inconsistent with a custom which clearly (as is alleged), after tender accepted, shifts the liability and rights of the quantity surveyor, making him liable to, and giving him rights against, some other person than the building owner; for why provide against a contingency which, in such an event, could not exist or happen? Therefore, I say, the case was an unfortunate one in this respect, inasmuch as there existed in the contract this special clause. There is no maxim more true than this, or more practical: when you intend to select a case for the purpose of testing and trying a custom, select one without any special feature and of the simplest nature—with no exceptional clauses in your contract to which you seek, by proof of custom, to annex an incident. There was another unfortunate circumstance, and that is that the witness called first for the plaintiffs, in answer to some clever cross-examination by the defendant's counsel —with a view to test him—said that, in his opinion, if the quantity surveyor was a man of straw or bankrupt, in that case he would have a right to look to the building owner—a proposition quite inconsistent with the custom alleged, the essence of which was that the liability shifted altogether as soon as the tender was accepted. If the custom was as stated by this witness, it was a qualification of the custom; it was not the custom which the plaintiffs undertook to prove. Whether the other testimony was sufficiently clear to outweigh this particular answer, or whether the answer is inconsistent with the custom alleged, the Court of Appeal will have to decide, and I refrain from further discussing the matter. No doubt certain of the witnesses said that they had acted to their prejudice according to the custom as alleged, on the assumption of its existence; but the judge, I think, in his judgment specially refers to the witness to whose evidence I have called attention, and from whom he had to take his first impression of the plaintiff's case. You may refer on this special matter to the letter of Mr. Northcroft in *The Builder* of January 21, 1888, who gives his own experience in certain bankruptcy proceedings as being quite contrary to the statements of the witness in cross-examination to which I have referred.

Now, unless this case is reversed on appeal, or a new trial directed, with a different result, it strikes a severe blow at the custom or usage under discussion. Something must therefore be done. Mr. Justice Stephen suggests at the conclusion of his judgment, as the proper course . . . adopting the statement of a witness, "if we do not "think much of a quantity surveyor, and entertain any doubt about him, then we take "care to have the quantities put into the contract. If you like," said the learned judge, "to leave the quantities at large, you take your chance, and take your remedy— "whatever it may be—from the building owner or from the architect, or from the "building owner through the architect; but if you wish to be safe in the matter, and "wish to have it clear that the quantities and no others are to be worked upon, then "your remedy is to put it into the contract, and in that way you will be saved all "trouble." Of course the learned judge assumes here that, as he had decided, no custom or contract to charge the quantity surveyor directly exists; but the same observation

applies: if you think it best that the liabilities should go as the alleged custom fixes them, then, for the future, until the custom is established in another case more fortunate in its circumstances than this at present has been proved to be, let not the builder rely on the custom, but let him define the liability by clear and express terms in a contract, either with the building owner, or with the quantity surveyor, or both.

As to the policy of so contracting expressly, as distinguished from or compared with the convenience of relying on trade usages, I express no opinion. My own views as a lawyer are naturally in favour of clearly expressed contracts. Were I selfish or regardful of the pecuniary interests of my own profession, they would not be so; for nothing fees us and feeds us so bountifully as the consequences of leaving business matters to imperfectly expressed documents, which are left to be supplemented at haphazard by reference to so-called usages or customs of trade or business. But such vagueness has at times its advantages; so, at least, I am told by business men. Nevertheless, I may conclude this statement of the case of Priestley and another *v.* Stone by saying that from what I had heard * in the course of my professional life—during which I have had the pleasure of meeting many gentlemen of your profession—I had looked on this alleged custom as one of those which in the event of litigation it would be easiest (so far did I understand it to be agreed to) to establish by competent testimony. Watch, then, for the judgment of the Court of Appeal,† as to the probability or chances of which I do not in this place think it useful, or indeed discreet, to offer any opinion whatever; but I may add that that Court will in all probability act on the evidence—so far as the question is one of fact—already given in the Court below.

There is an Irish case ‡ which is sometimes cited as a legal authority for the existence of the alleged custom; but it does not go so far as this, and is of no value as an authority in favour of the custom, and it was therefore not cited before Mr. Justice Stephen. One of the judges who gave judgment in that case expressed his opinion to be that by the evidence given in the case there was proved to exist in England a *usage* to that effect; but the Court was of opinion that the proof in the particular case fell short of establishing a "custom" binding adversely on all parties, and incorporated into their contracts in all cases where not expressly or by implication excluded.

Mr. Vice-President and Gentlemen, I have thus brought before you the most recent decisions which I have been able to find, or which have occurred in my practice, affecting architects. The material has not been very rich; on which circumstance I congratulate the profession, for it proves that at least in public they have not been vexed with litigation. For my present purpose, however, I would that I had had more interesting material at my disposal; I am afraid the subject is extremely dry and the

* See footnote on p. 113 referring to the *Transactions of the Surveyors' Institution.*—F. M. W.

† See next page.

‡ Taylor *v.* Hall (*supra cit.*), 4 Irish Common Law Reports, p. 467. See the full report of that case. See also Schofield *v.* Barnardo and Gregg, *The Times*, November 24, 1887, for a dictum of Lord Coleridge; but the case was decided not on the alleged custom, but on its special circumstances; and a Paper on the subject by Mr. Alfred A. Hudson, barrister-at-law, printed in vol. ii. of *Professional Notes*, published by the Surveyors' Institution, p. 220.—F. M. W.

material scanty. I have to thank Mr. Raymond, the author of the *Architect's Legal Handbook*, who kindly gave me the benefit of his notes. Of course he is always on the watch for decisions on this subject, and he kindly helped me to the cases which he had noted in the interval between the third edition of his book and the present time. I considered these cases carefully, and I have endeavoured to present them to you in an intelligible shape, with such comments as seemed to me desirable.

F. MEADOWS WHITE.

Since this Paper was read to the Institute, Priestley and another *v.* Stone has been decided by the Court of Appeal, on July 30, 1888. The decision of Mr. Justice Stephen was affirmed without calling on the respondent's counsel. The Court held that Heaven *v.* Pender did not apply, and they affirmed the decision of the learned judge that the custom alleged was not proved: moreover, as I am informed by Mr. Edwyn Jones, one of the learned judges expressed a doubt whether such a custom, which had the effect, if established, of creating privity of contract, where none in fact existed, could be sustained in law.

The gentlemen who so kindly received this Paper and who made observations upon it suggested abundant material for discussion in the very fruitful way in which they dealt with the subject, and if I pass over any points which they raised, I trust it will not be considered that I have treated them with disrespect. Now, the first matter, I think, came from the Chairman. He asked whether Mr. Justice Stephen, in the case of Priestley and another *v.* Stone, did not rely upon the alteration of the specification and plans after the quantities had been taken out. That was the case; but I did not notice it, because I wished to bring before the Institute what seemed to me to be those points in the case which were of general importance. I did not bring this special point before you at all. I purposely left it out because it did not cover the whole case, and so far as it applied it was obvious that the quantity surveyor could not be responsible for the quantities of altered or added work of which he had not taken out the quantities. But the plaintiffs met the point mentioned by the Chairman by the allegation that the alterations were entirely clear in themselves, and that the original errors in the quantities of which they complained were not affected or brought about by the alterations; and these points of detail would have come before the referee if the case had got to that stage. The questions of general importance for which I cited the case were the alleged custom, and the applicability to the case of the decision of Heaven *v.* Pender. These were the main questions of principle; all these matters of alteration were treated by me as counsel for the plaintiffs—and I cannot help thinking rightly treated—as being matters which the arbitrator would have to inquire into.

The next point raised was by a question: What would be the result if the building owner paid the quantity surveyor and obtained the quantities from him, and afterwards himself supplied the quantities to the builder? Clearly that would depend upon the terms of the contract afterwards made between the building owner and the builder

with reference to the supply of the quantities or the erection of the building: such a case, as I understand the case put, would not fall within the alleged custom, and the quantity surveyor would not be responsible to the builder. I should, however, advise the building owner to make it clear that he did not guarantee the accuracy of quantities furnished, or at any rate that the parties should make it clear by express language what was their intention in the matter.

It was stated during the discussion of this Paper that a clause is sometimes introduced into specifications expressly excluding any liability to the builder from the building owner in respect of the quantities supplied by the quantity surveyor. This would have its effect if correctly framed for the purpose, but would leave the question of the liability of the quantity surveyor either to express contract, if any were made; or to the alleged custom, which Mr. Justice Stephen held was not proved to his satisfaction. This question as to the mode of meeting the difficulty in securing due responsibility for the accuracy of quantities, I would say, is of great importance in view of the history and decision of the case of Priestley and another *v.* Stone. It would be most advisable, in my humble opinion, as that case has turned out, to put the question henceforth on a firm basis of express contract, and to provide for its solution: either by expressly admitting, excluding, or limiting liability, as between the building owner and builder; or by a supplementary contract, to be made in express terms, reduced to writing, between the builder and the quantity surveyor.

There is no doubt but that the successful performance of a building contract depends much on the mutual confidence and goodwill between builder and architect. My desire, however, has been to point out that their relations depend on the terms of the contract, and to enforce what I conceive to be important, and is sometimes, according to my experience, in litigated cases, neglected, viz. the duty, on both sides, of throughout pursuing, and not deviating from, the provisions of the contract relating to extras—that the builder and architect alike should from the first support each other and insist on the observance of such provisions and conditions. I fear that any so-called "elasticity," imported into a contract by some superior power, viz. the architect, is not in accordance with this view, and would rather tend to give countenance to calculated deviations from contract provisions. If experience shows that the provisions of a particular contract are unworkable, or that it would be better to vary them, this should be at once made the subject of further agreement between both parties properly formulated.

It remains only to notice a point as to the necessity or otherwise of contracts with School Boards being under seal. It certainly had occurred to me, in considering these questions, that a difficulty does arise when the contract between an architect and a School Board does not follow on or arise out of work done by him as an appointed officer of the Board, but is the result of an isolated transaction in the ordinary way of business. In such a case, I should consider it very doubtful indeed whether the architect could recover where the contract was not under seal, and I should certainly advise the architect under such circumstances to obtain a sealed contract.

F. MEADOWS WHITE.

XLVIII.

THE EXAMPLES OF MOGHUL ART IN THE INDIA MUSEUM.

By Mr. C. Purdon Clarke, C.I.E., M.R.A.S.

Arthur Cates, *Vice-President*, in the Chair.

Mr. Vice-President and Gentlemen,—

BEFORE commencing the subject of this Paper, I beg leave to say a few words respecting the India Museum, which since 1880 has been incorporated with the Indian Section of the South Kensington Museum.

A miscellaneous collection of curiosities in the East India Company's House in Leadenhall Street was first classified by the late Dr. Royle, who induced the Company to attempt the scientific illustration of the products and manufactures of India. Afterwards at Fife House, and then at the India Office, the collections grew in importance under the care of Dr. Forbes Watson, who for many years advocated an admirable scheme of a combined Indian and Colonial Museum, which scheme was afterwards partially adopted, and is now to be carried into effect by the Imperial Institute.

The Paris Exhibition of 1878, with the great display of Indian presents of H.R.H. the Prince of Wales, and Sir George Birdwood's historical handbook, brought the Fine Arts of India into great prominence; resulting, on Dr. Forbes Watson's retirement, in the division of the India Museum into an Industrial Art Museum, which was transferred to the Science and Art Department, whilst the commercial products and natural history collections were presented to other institutions. When taken over by the South Kensington Museum in 1880 the architectural collections were not entirely separated from the rest of the objects exhibited, but models, casts, and drawings were scattered about the galleries, and used more as decorative features. The addition of the Sanchi Tope Gateway, and of the carvings from Futtepoor-Seekree, Umbernath, and Saitron, was the first step towards forming a collection illustrative of the architecture of India; but at the same time the India Museum sustained a great loss in the presentation to the British Museum of the Umravatee carvings, some of the most valuable illustrations of Buddhist art yet discovered.

Having been employed in the rearrangement of the collections in 1880, I was sent to India, at the close of that year, to acquire objects to fill up deficiencies in the collection; and during the two years of my stay there the greater part of the illustrations of Indian Moghul art were secured for the Museum. Wishing to ascertain how far the art manufactures of India were indigenous, or whether they owed their introduction and patronage to different lines of alien princes who have ruled India since the country had a history, I made an especial study of the technical features of the several arts, and for this purpose caused objects to be made in all parts of the country; and in all cases I saw the workers, and got from them as much information as they were inclined to give me. With pottery, textiles, and metal work, it was not a very difficult task to collect good modern illustrations, and with some trouble many old examples were secured: the most difficult work was in tracing the histories of many of the sumptuary arts, the principal localities of whose manufacture had more of a political than an economical cause for their existence.

The connection between architecture and the decorated arts being perhaps closer in India than with us, I was continually meeting with those concerned in building; so, leaving the historical, I endeavoured as much as possible to study technical, details—a branch of knowledge which could only be acquired *in sitû*. Very soon, however, I found that trade customs, rule-of-thumb methods, and workers' family names, contained a mine of history hitherto unexplored; and following this vein, I was led to the general conclusion that none of the ornamental arts were natives of the soil: they could be all traced to foreign sources, and they had all to some extent become debased. Where good design existed it was owing to the vital power of ancient customs or formulæ, as in the two oldest of their arts (mat making and goldsmith's work). Sir George Birdwood has proved that the strong influence of Chaldean astrological symbolism kept the ornament fairly pure and unchanged from a remote period. He has been working very hard at this subject for the last few years, and he finds that an immense deal of Indian symbolism belongs to Chaldea, and there is no doubt it originated in Chaldea, being older than the present Hindoo religion and the invention of the Hindoo Pantheon. This symbolism has preserved unchanged much of the ornament in such arts as jewellery and mat making, and many forms apparently meaningless are, when translated by the help of Chaldean symbolism, full of life and poetical expression.

Within the compass of a Paper it would be impossible to give even the chief points of my notes, but briefly it seemed to me that the ornament of the Punjab and of North-West Persia owed its origin to Greek art, and that of Bombay to Egypt, through Assyria. Bengal was strongly influenced by China; a country also the parent of that most debased style, the Burmese. In Bengal a great quantity of glazed tile work has been found in recent years at Gaur. For about twenty miles of country, wherever you dig you find glazed tiles, and with scarcely any exception nearly all those tiles are purely Chinese in character. The treatment of the clay, the glazing, and the ornamentation, and almost all the details, are Chinese; the mosques and the Hindoo temples preceding them are covered with old Chinese carved ornament, although

the domes and the columns are of the debased Hindoo type. I call them debased because the column, instead of being a noble shaft, is a pillar constructed of odds and ends, squares, and circles, one over the other like a string of odd beads.

Southern India and Ceylon remain with a style of peculiarly national type, and this seems limited in architecture to ecclesiastical buildings except where, as recently shown by Mr. Simpson, an aboriginal tribe build their huts with architectural features resembling the older temples. In the north, however, the temples in Cashmere still preserve some of the dignity of their Greek parent, whilst the Nassick Cave and other caves of Bombay show some of the grand lines of ancient Egyptian architecture, although debased in transmission through Sassanian Persia. Always considering the utilitarian purpose of an industrial art museum, I sought principally for examples of domestic rather than ecclesiastical art; and knowing that our collections would be probably studied by future generations of Indian officials, my aim was to bring together such examples of good Indian building as would enable them to check the tendency towards the trivial and grotesque, which so much marks many of our efforts in Indian styles of building.

I shall not attempt a history of the Moghul or Monghul style, because no one has yet collected sufficient information respecting its designers and builders, and the periods of the works which, starting at Old Delhi and Agra in the time of Baber Shah, and continued by Ukber at Futtepoor-Seekree, so rapidly developed from Puthan to Moghul, and within a few generations became almost the perfect Saracenic style of to-day. To ascertain the correct date of a Hindoo temple and the name of the builder is very difficult, or almost impossible, but of Mohammedan buildings Government could collect the information with the greatest possible ease: with the exception of buildings totally abandoned there are generally people in connection who have preserved careful records of every transaction relating to the foundation, the cost, and the care of the building up to the present day. Inscriptions giving names of founders and dates are nearly always to be found; but unfortunately the tendency of antiquaries in India is more towards exploring an almost mythical past and neglecting the history which is only a few hundred years old, even when monuments are in many cases fast perishing, or, worse still, being restored by incompetent people. The examples of Mohammedan art in the India Museum afford a very inadequate illustration of the Moghul style, but if examined in their proper sequence there is enough to mark some of its most important changes. I will exclude the fine old three-storey house-front from Ahmedabad,* as the style of that town is actually Hindoo, also the Gaur stone carvings for the same reason, and begin with the casts and columns and other details from Ukber's palace in Futtepoor-Seekree. Here a distinct departure from the Puthan style can be easily detected, the somewhat broad and massive lines of Puthan art giving way before Ukber's command to assimilate the various styles into one. The change at first was for the worse, as many ornamental Hindoo features were introduced which lessened the

* This is known, at the Museum, as the Wooden House of Ahmedabad, No. 1890.—C. P. C.

dignity without adding to the grace. This will be seen in the over-ornamentation of the columns * of the Panch Mehal, and the use of brackets in the so-called "throne "column" of the Dewan-i-Khas. On the other hand, some of the surface decorations of the Sultana's palace show an introduction of Turkee design evidently taken from painted decoration, but this delicate ornamentation accords badly with the Puthan lines and too massive features of the work.

The next examples of importance belong to the time of Shah Jehan, and it is only then that the Moghul style separated itself from its Puthan predecessor. The earliest of these is probably a set of columns † supporting a lintel with portion of a bracketed cornice, all in a pale green marble very similar to Irish green marble. These formerly formed part of one of the palaces built by Shah Jehan around the artificial lake at Ajmeer. Several of these still stand and are in good condition, although much cut up by partition walls used to convert them into Government offices and private dwellings. They are in white marble, and I am not aware of any portion of the green palace being still in existence. This portico is a very interesting one, and if compared with the row of columns ‡ from the palace at Agra, it will be found that there is little difference in their detail or proportion. At this time the column ceased to bear any traces of the coursed and banded columns of the Puthans, and although differing from verandah columns in Afghanistan, Persia, and Central Asia, yet was more closely allied to them than to the storeyed columns of India. The composition is simple, the base is a square slightly tapering upwards, double chamfered at the four corners so as to become a dodecagon at the top; the shaft uniform and twelve-sided carries a capital starting without a necking, having as many sides as the column, worked up with niche-like splays to the square abacus above. This peculiar splay is no doubt in imitation of stalactite work, and a peculiarity must be noticed, that as there is no necking the capital is about a twelfth of a diameter larger than the shaft, and comes down square without any attempt to round off the corner. When I first noticed this apparent want of finish I attributed it to the possibility that the shafts did not belong to the capitals and bases, the structure being probably made up with old material, but this feature was afterwards found to run through the work of this period. A model § of one of these Ajmeer palaces in painted wood gives a general idea of the construction. In this case it is more a garden pavilion—in fact, a stone tent made to give shade and shelter, but not for residence.

The inlaid marble columns in the Museum were never erected, but were made for some building in connection with the Royal bath at Agra. Unfinished, when the palace was taken by storm in the last century by the Rajah of Bhurtpoor, they were buried by him, with the intention of removing them to his own State, and thus were

* Plaster casts of these columns in the Museum bear the number 44; the "throne column" is numbered 56.—C. P. C.

† These green marble columns from the portico of Shah Jehan's Palace at Ajmeer bear a descriptive label.—C. P. C.

‡ Numbered 167.—C. P. C.

§ Bears a descriptive label.—C. P. C.

protected until their discovery a few years ago, since which they have suffered greatly.

A few words about this inlaid work. Having seen the Medresseh at Ispahan, and noted traces of the style in various parts of Northern India, I am sure there is no foundation for the popular idea that the Taj Mehal was built or designed by Italian artists, as the people who built the palaces at Agra were quite capable of doing such work; besides which the plan and construction of the building differs little from hundreds of Persian tombs in India and west of India. The history of the Italians at Agra is pretty well known. Travellers who visited Agra about the time of Shah Jehan came in contact with them, and there is a record that the estimates of the Taj Mehal were drawn up by an Italian. There seems to have been a good deal of quarrelling in this matter, which probably led to Austin de Bordeaux being sent to Cochin as an ambassador, instead of remaining at Agra as a decorative artist. He was about ten years in that country altogether, and he had about sixty Italian workmen with him. The writers of that time say that the glory of Agra consisted in the diversity of its styles of building. They mention houses in the Roman, which would mean the Constantinople or European, style; they mention houses of the Chinese and other styles, and say that Agra was a city in which you could see all styles. I consider that these Italians who went out there were employed in building houses, and they certainly left traces behind them. Several of the Umbala buildings show how that European style has survived. You will see Moghul verandahs stuck on to the fronts of Italian houses, and all the rest of the details are ordinary Italian. With regard to the Taj Mehal, I object to its being called Italian, because, perhaps, the only detail inside which might have been influenced by Italians is the screen. I have seen several pieces of screens which are supposed to have come from the Taj Mehal, but which are really from the Palace of Delhi, and this screen is covered with very beautiful carving in stone. When examined, the design consists of a water bottle and tazza, but almost lost in floral decoration which certainly looks very Italian. I think, however, an Italian would have done better in that case, and brought out the leading lines more. It is a peculiar form of debasement common to the North of India, especially amongst the Sikhs. There is a record that some Persians went to Italy to study in the sixteenth century. How far they influenced architecture is not known, but they certainly brought back a school of painting which lasts to the present day, and is distinctly European. The round-headed arch, which we now see all over Persia, belongs to the country and is in the domestic style. You see it in the *Takht-i-bostan* of the Sassanians, and it seems that the people in Persia have always worked in the debased Romanesque style when building houses. They kept the pointed style, which they look upon as the alien style, for their mosques and public buildings. The style we attribute to Persia they call Turkee or Afghanee.

At the Palace of Delhi, on the contrary, the traces of Italian workmanship are quite plain—in fact, the recess behind the throne is purely Italian; and, what is more, looks very modern in the well-known birds and fruit, and other Florentine

designs for the decoration of letter-weights and table-tops. The central panel of Orpheus, now in the Kensington Museum, shows how impossible it could be for the Italian or Frenchman who did this work to have had anything whatever to do with the exquisitely designed surface decoration of the Taj Mehal, the palace at Agra, and the Royal bath at Delhi. Of these latter buildings large cartoon drawings * can be seen in the Museum, giving portions of the different pavilions, and I think it is worth mentioning that in the panels in the bath, and more particularly in the Dewan-i-Khas, I noticed, on examination, the frequent insertion of a sacred fire pattern, a design belonging to Tibet and China. It is very peculiarly drawn, and would puzzle an Italian as much as it would any Hindoo or ordinary Mohammedan workman.

From the Agra columns to the Bolendshahr house-front † is a period of over 200 years, and the only material I have to illustrate changes in that time will be found in a stone screen from the tomb † at Old Gwalior, in which the style goes back to the Puthan days; a model of a merchant's house in Ajmeer, probably 100 years old; a model of the Golden Temple at Umritsa, and another of the Deria Dowlet Palace at Seringapatam (also belonging to the last century). The merchant's house at Ajmeer shows the modern style fully developed, and in a small way presents the features of the great Rajpootana palaces, most of which were built in the somewhat settled time of Shah Jehan, and are Moghul in style. Any comparison between these buildings and those of Ukber and his predecessors will show how enormous is the difference; the pier and lintel of the Hindoo, which seemed dominant in Puthan work, where the arches only supported the filling between, give way before the wall pierced with openings; and these openings are constructive arches.‡ Even the Delhi Palace consisted principally of piers and arches, but in the later style light columns of that remarkable Italian-looking pattern—the baluster shape—came into use, and as supports to three or five openings they were used with charming effect and great skill, especially when thick walls had to be supported,—in which case they were doubled, one being placed behind the other. The well-known Seth's house at Ajmeer with its numerous courtyards and verandahs is the best example I know of in which this style is applied to domestic purposes. The model of the Golden Temple § of Umritsa shows another development, which gives the modern Moghul style of India its chief character, namely, the curved cornice to the façade, and the introduction of the curves into the domes of pavilions which are used to give an agreeable skyline to most of the palaces built since that period. There is no doubt that these four-sided and octagonal pavilions are but a development of the Mohammedan tomb with its four piers, four arches, and

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* These drawings are numbered 164.—C. P. C. † Descriptive label on each.—C. P. C.

‡ There is no doubt that the arch in India is not structural. The late Major Mant was knocking his head against a wall in trying to make a structural Indian arch. The large arch of the Gwalior Gateway in the Exhibition two years ago was fourteen feet wide including the abutment, the opening being twelve feet across. The arch was a single stone fourteen feet wide, eleven feet high, and eighteen inches thick. This stone, when in India, was hoisted into its place as a single slab, and then the masons cut an arch in it.—C. P. C. § Numbered 43.—C. P. C.

a dome. It was a happy thought to relieve the monotony of a row of these constructions on the roof of a building; first of all by making some oblong with three arches on the long side to one on the narrow, and to dispose of them between pairs of round pavilions; then, to better mark the centre one, by giving a curve to the cornice and dome. The effect would be bad if it stood by itself, but it is perfect when seen flanked by two other pavilions with straight cornices. This temple, though built by the Sikhs, is strictly Moghul; in the same manner the palaces of Deeg, Ulwer, Oodipoor, and Jeypoor * are of the same style, though built by Hindoo princes. That in Old Gwalior Fort is purely Hindoo. The model of the Seringapatam Palace I have included, but it is a falling off from the style and wanting in the qualities of the northern work. All through the Deccan country the Mohammedan architecture differs from that in the North, and requires a separate classification. I may, however, mention the very strong similarity between some of the buildings in Hyderabad with the architecture of Morocco. I am making no mention of the numerous examples of tile decoration from Moultan and Lahore, as they belong more to Persian than Hindoo Saracenic art, nor of wood carvings from Shahpoor, where the old wooden style of the Punjab can be seen in perfection.

Coming to the series of illustrations of the Moghul style of to-day, the earliest examples are to be found in the projecting bay-window and a small oriel window by the side of it, both from an old house which was destroyed when the Water-works were built at Lahore. The bay-window may be as old as the beginning of the century, and differs very little in its proportions from a stone window, with the exception of the sliding shutters. At first sight it bears a strong family likeness to the *meshrebeeyeh* windows of Cairo, but not so much as other lattice windows I have seen in Lahore and the North. When I say that the construction and proportion would be very much the same if executed in stone, it is to remark that the trades of wood carving and stone carving are very much mixed in India, and that whilst the carpenters treat their wood in building very much as masons do stone, the masons use stone very much like wood, which can be clearly seen in the Bolendshahr house-front, where no courses are kept. To avoid horizontal joints the whole construction of the front is one of stiles, rails, and panels, separated by strong string-courses, the stiles being ten and twelve feet in length, and actually stuck on to the front of the house more as a veneer than part of the actual construction.

In the Punjab the houses are nearly all of brickwork; the Sikhs thoroughly understand brick arches, and often build arches without centres which we should hesitate to build with centres. In many parts of India, even large domes are constructed without any centering. The men build course after course, trusting that the mortar or plaster will set quickly: for they have little or no scaffolding, and the workman has to lean over the course just finished to catch the bricks thrown up to him from below.

Keeping to woodwork, the front of a shop † in the Surruk Chowk at Cawnpore

* See, in the Museum, a brass model of a portion of the Palace at Jeypoor, numbered 53.—C. P. C.

† Numbered 2,003.—C. P. C.

affords an excellent illustration of the carved work of the North-West Provinces. It consists of a shop below—the front a frame containing three arches, thus called the *sei dari*, or three doors—and above a balcony and a verandah of eight columns, with a projecting cornice above. The spacing of the columns is peculiar to this style; the three openings in the shop beneath are repeated but diminished, each of the three arches being separated by a pair of columns and a narrow arch; but the two outside flanking pairs of columns are of greater width apart, this division actually representing two wide piers at the ends, and two narrow columns at the centre. The history of this acquisition might interest you. Whilst looking for some suitable wood carving at Cawnpore, I noticed a shop-front which was apparently but recently finished, and asking the owner of the shop the name of the man who did the work, I was told it was a certain Fukeer mistree, and that the price agreed upon had been 330 rupees, but he was obliged to take something off this amount for bad material. The man was sent for, and I made a similar contract with him, and, although warned, he used some sap-wood in the cornice, but for all that he claimed the present he was to have if the work was thorough. At the time 300 rupees represented £24, a sum which affords an idea of the cost of ordinary wood carving and house building in India.

The staircase shown in Illustn. xvi. is more English than Indian in plan and section. The stairs shown in Illustn. xix., representing a modern doorway at Delhi, have the high-pitched riser which is purely Oriental, and common in the East.

Starting from Syria, where staircases reverse our rules by having the risers very high and the treads very narrow, you find often a four-inch tread with a twelve-inch or fourteen-inch riser. In the Lahore example, probably owing to British influence, the tread is made rather wider. As a rule, the staircase of an Oriental house is concealed. Often in a courtyard you will see a row of doors or casements all looking alike. Of these, three will belong to a room, a fourth will open upon a cupboard, while the fifth leads you to a narrow flight of stairs; and perhaps there are three or four other staircases all equally concealed. I was last year in Cairo, arranging for taking down a house there, and I found in one room (a large saloon) five staircases. Of these, one was visible and possessed a certain amount of pretension; it was the principal staircase from the yard, yet so small and mean that we should regard it in this country as a back staircase. The others were concealed behind cupboards: on one side alone there were two staircases, one going up to the roof, the other down to a cellar, another went out into the street, and the last, a few steps, into the Turkish bath, from which there was another staircase leading out. Eastern staircases have to be put into a narrow space, as Orientals wish to hide them as far as possible, and to conceal the windows lighting them. In Lahore very little stone is used for this purpose. The stairs are of brick, with a wooden sill, as the bricks are poor, and inferior to the mortar, which is always excellent.

A few words about what I venture to call a revival of Moghul art. About sixteen years ago the Collector of Mirzapoor (Mr. F. S. Growse) persuaded some of the richer natives to rebuild the public ghaut or washing place on the river side, and shortly after started a town hall,—in both cases keeping strictly to the Moghul, the palatial style. Being

transferred to Muttra, Mr. Growse also started the improvement of the town, and, owing to the greater wealth (or intelligence) of the native community, not only was the ghaut built, but many merchants began rebuilding the fronts of their houses; a museum and other public buildings were started, in all cases without any help from Government or the Public Works Department. All these works were remarkably good, and in the same style. Mr. Growse induced some of the wealthy bankers to restore the temple of Bindrabun, and for so doing incurred the disapproval of the late Mr. Fergusson. It is very probable, however, that had Fergusson come in contact with Mr. Growse, there would have been no disputing between them, as they were both so honest and both meant the same thing. A fight with the Public Works Department, in which the public sided with Mr. Growse, probably led the Government to transfer him to a place on the other side of the river. a good distance from any stone quarries, and the centre of a lot of mud-built towns, the inhabitants of which were not very likely to be stirred into enthusiasm over buildings in stone. But there Mr. Growse most distinguished himself, and the front of the Bolendshahr house in the Museum is an example of one out of many hundreds of façades which grew out of the mud of Bolendshahr and Khoorja. Some of the plates from the *Indian Art Journal* * will show more of these buildings, and I feel it is an honour to be among the first in England to call attention to one of the most remarkable episodes in the history of building in India. Mr. Growse's buildings would, if gathered together, form a second Futtepoor-Seekree, and would certainly compare favourably with much of Ukber's work. Before finishing with him I may give a few details of the cost of his work. Some of the property of the Court of Wards in the market place of Bolendshahr consisted of a row of seven shops of equal frontage. Upon Mr. Growse's recommendation the shopkeepers agreed upon a uniform rent, and a design was made by a native.† In a short time the place was built, and the shops and dwelling-houses cost exactly £80 each, the material being pink sandstone for the façade, and within good burnt bricks and hard mortar. This terrace led to a wholesale rebuilding: the proprietors of property all round the market place immediately rebuilt without exception; a mosque and tomb, and the Hindoo temple, both of very mean appearance and greatly dilapidated, though modern, were also rebuilt. I believe that at the present day the whole of the important streets in Bolendshahr are stone built in the Moghul style, with plenty of highly ornamental houses; there is a magnificent town hall, and lastly there is the great stone gate. The town of Khoorja followed the same example; a view of the market place there is given in the *Indian Art Journal.*

Leaving the modern stonework for wood, the verandah of an upper chamber in a workman's house ‡ at Moultan illustrates the Moghul style in its humblest form. Going to order some cases to be made, I noticed a very pretty verandah across the end of the court of a small house of three rooms belonging to a carpenter. Asking him the price

* Among the illustrations of recently executed works at Bolendshahr are a Bathing Ghaut, the Market Place, the interior of the porch of the Town Hall, and some houses.—C. P. C.

† A remarkable design, carried out in 1881—shown by a photograph. ‡ Numbered 1,056.—C.P.C.

of such a verandah, he told me that it was not built by himself, but he had just built a room on his roof to celebrate the marriage of his son, and that the room had cost him for decoration and building, 200 rupees, or about £16. I employed him to make a full-sized copy of all the woodwork in this room, but for want of space only a portion of it is now shown in the Museum. The room consisted of three walls, with three windows on one side overlooking the street, niches on the two other sides, whilst the fourth side was open to the roof terrace, but partly closed by a screen of three arches supporting a slightly projecting verandah roof with a fringed cornice. The ceiling of the room was supported by two beams, each resting on an ornamental bracket, which projected about eighteen inches from the wall, and upon these beams rested joists about two inches wide by three inches deep, upon which again were nailed small square wooden panels, the space between them being covered by a flat cross-fillet. Upon this ceiling was thrown about a foot of earth, finished off on top with a layer of mud and plaster. The ceiling is elaborately painted, but the rest of the woodwork is the natural colour of Deodar cedar. The proportions of the several parts, the slight use of carving, could not be excelled, and it was this verandah I used for reproduction in the Colonial and Indian Exhibition.

In conclusion, it may be as well to allude to the position of native architects. In India, as in Persia, the architect and builder are the same individual. Their social position is not a high one, and as far as I can ascertain the builder-architect is regarded as inferior to the ordinary shopkeeper. He has no special education as an architect; but, on the other hand, has received a thorough training as a builder and as a master craftsman in one of the arts he employs. Three separate builders I employed in Persia had each been workmen, and could design, carve, and paint. In India it is the same, but the builder is more often a carpenter, while in Persia he is often a plasterer. In India, if a carpenter he is a carver too, and also a designer; he has in his apprenticeship learned a certain stock of plans, and is intelligent enough to adapt them to the circumstances of site. As the ornament varies very little, and is always dependent upon the construction, he is not troubled with making any elaborate provision for it in setting out his work, either in wood, brick, or stone. There is scarcely any portion of a building which may be looked upon as purely ornamental, with the exception, perhaps, of the chuttree pavilions at the angles of roofs; and these, as well as other features, vary but slightly in their outline or detail. It would be unwise to hamper such a man with large detailed drawings, and, indeed, a drawing of a façade strictly to scale would greatly puzzle him; the length and height, the position of the door or doors, and the number of windows, would be quite sufficient. Such proportions are not guess-work with Orientals, but are laid down strictly by their "canons." The number of curves in a foliated arch, and its shape, whether bulbous or pointed, depend entirely upon the proportion of height to width; the exact curves so difficult for us to draw are laid down in a table which I saw in use in Persia, and Major Jacob at Jeypoor found was commonly used by his men while building the Garden Palace there. This I can briefly describe. They first select from a stock of patterns a foliated arch

drawn on paper ruled with small squares. The outline of the full-size arch is obtained by dividing the space into the same number of squares, and drawing the arch through it in the same manner as scene-painters enlarge from sketches. Every part of the ornamental detail of a building has a name and a reason. A drawing sent to me by Mr. Kipling, of the School of Art at Lahore, has been marked by him with the names of the parts of an arch and a column; and where the names differed when sent out by Hindoo or Mohammedan workmen, each has been given.

I have shown, in Illustrations xvi.–xviii., a building erected at Lahore, the plans, elevation, and section, having been drawn from measurement by one of Mr. Kipling's pupils.

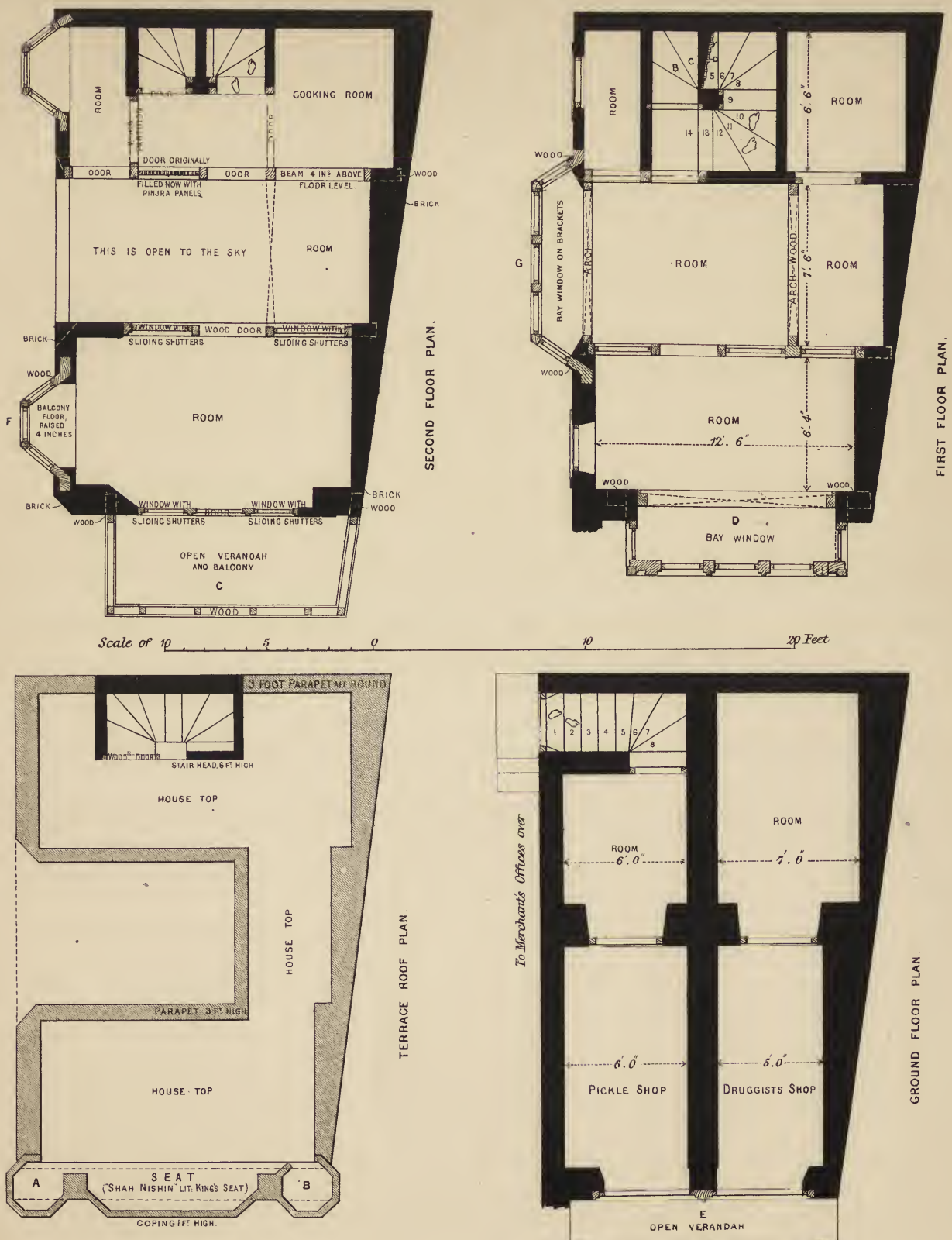
I should like to say something about the present condition and future of Moghul art in India, but this would require a Paper to itself. The bad period is passed, and after attempting to impose upon the natives of India, through the Public Works Department, the use of the so-called classical style, we are now encouraging the native princes and municipalities to build in their own style [Illustn. xix.]. I am afraid to give a list of the names of men who are at present working in this direction, for fear that some may be omitted. The fashion of building caricatures of Italian art has happily passed away, and in the Central Indian Agency I hear that Sir Lepel Griffin is persuading the Rajahs, several of whom are young, to build palaces worthy of themselves in the old style of their peoples. The public offices of Madras, the several works at Baroda, the colleges at Ajmeer, Mr. Growse's buildings in the North-West, followed by the wholesale rebuilding recently started in Central India, will all be as much regarded as monuments of our rule as the magnificent Gothic edifices with which the Government and the Municipality of Bombay have adorned the Western Capital of India.*

C. PURDON CLARKE.

*** See the plans, elevations, and sections, and a description of a Persian house, by Mr. C. Purdon Clarke, in Transactions, 1880–81, p. 166; also Mr. W. Emerson's illustrated Paper on the Taj Mehal, in Transactions, 1869–70, pp. 195–203. See, further, a description, with illustrations, of the New College for the Gaekwar of Baroda, by Mr. R. Fellowes Chisholm, who was among the first in India to erect buildings in the native styles, in Transactions, 1882–83, pp. 141–146; and Mr. Emerson's drawings of the new Hospital at Bhownuggur, and of the Muir College at Allahabad, erected from his designs, in Transactions, 1883–84, pp. 149–157. Reference to a Paper entitled "Government Architecture in Bengal," by the present Secretary of the Institute, in Transactions, 1873–74, pp. 141–156, will enable the reader to better appreciate the recent extraordinary movement described by Mr. Clarke.

* In this Paper, names of places such as Cashmere (*Kashmir*) and Cawnpore (*Kanpur*) are spelt in the manner familiar to readers in this country; but other proper names, less known at home, are spelt as pronounced in India, as for instance Ukber (*Akbar*), Puthan (*Pathan*), the *u* being always short as in "luck," and the *a* always long, as in the expressions "Ma" or "Pa."

XLVIII. THE EXAMPLES OF MOGHUL ART IN THE INDIA MUSEUM. (xvi).



From drawings by Kirpal Sing

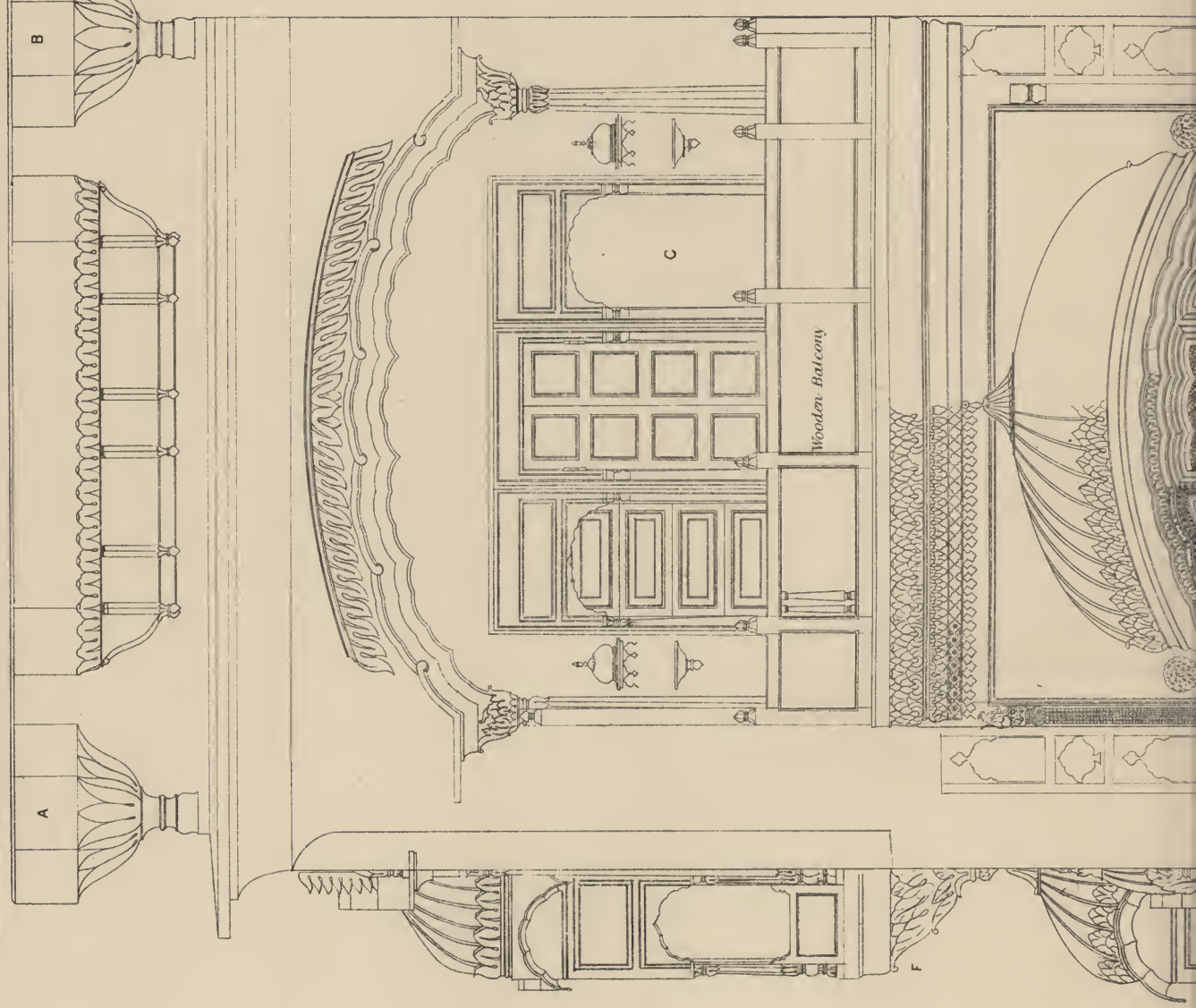
IN THE CHATTA BAZAAR, LAHORE.

TWO SHOPS WITH A MERCHANT'S OFFICES AND RESIDENCE OVER.

[See Illustration xvii and Pages 129, 132]

C. F. KELL. PHOTO-LITHO, 8, FURNIVAL ST. HOLBORN, E.C.

Drawn from measurement by Kurpal Sing
Student in the Mayo School of Art, Lahore. J. C. Kipling, Principal



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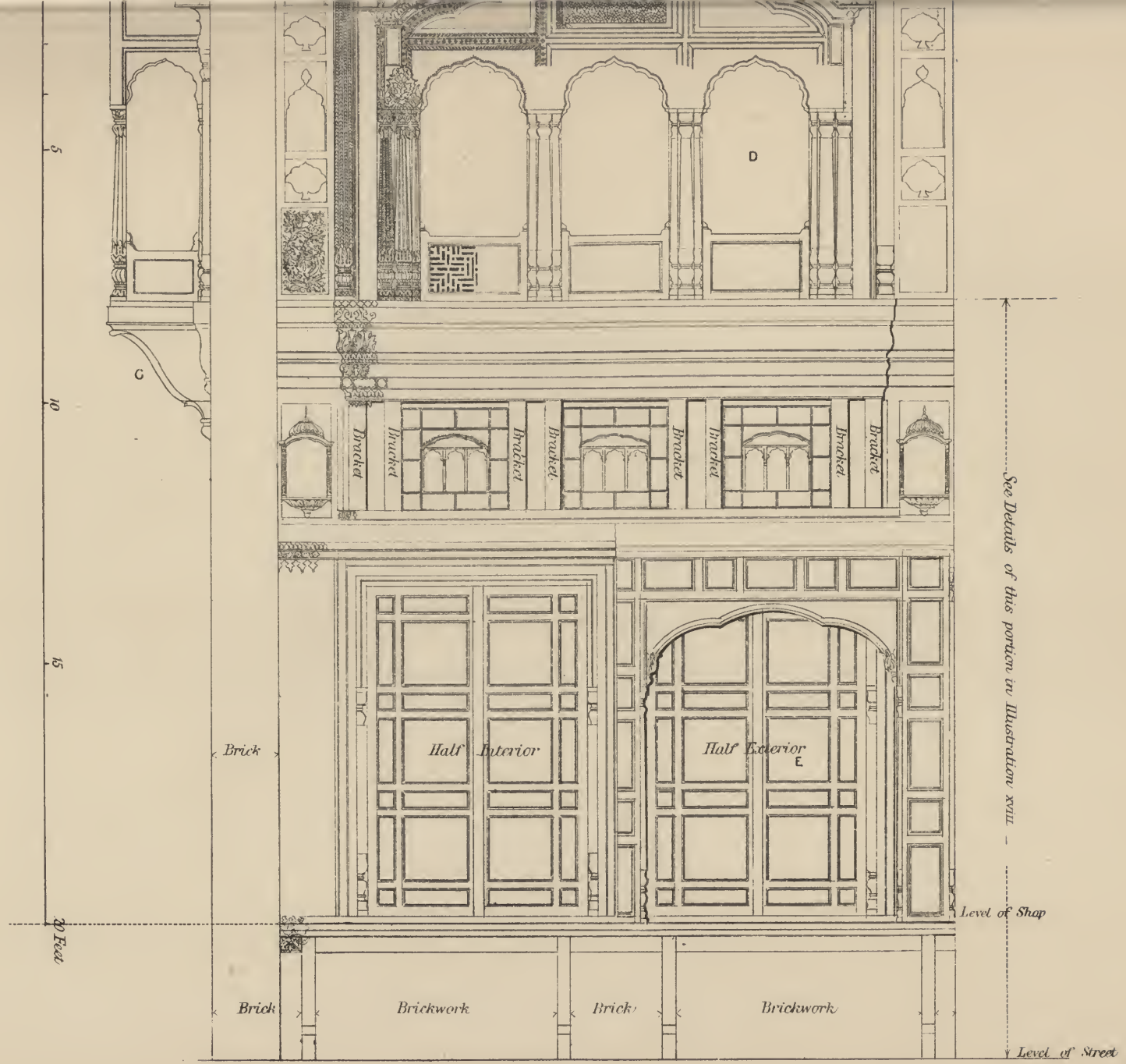
C. F. KELL, PHOTO-LITHO, 8, FURNIVAL ST HOLBORN, E.C.



TWO SHOPS WITH A MERCHANT'S OFFICE AND RESIDENCE OVER, IN THE CHATTA BAZAAR, LAHORE.

[See Illustrations xvi and xviii, and Page 122]

Drawn from measurement by Fateh Din and Kirpal Sing
Students in the Mayo School of Art, Lahore, J. C. Kipling, Principal

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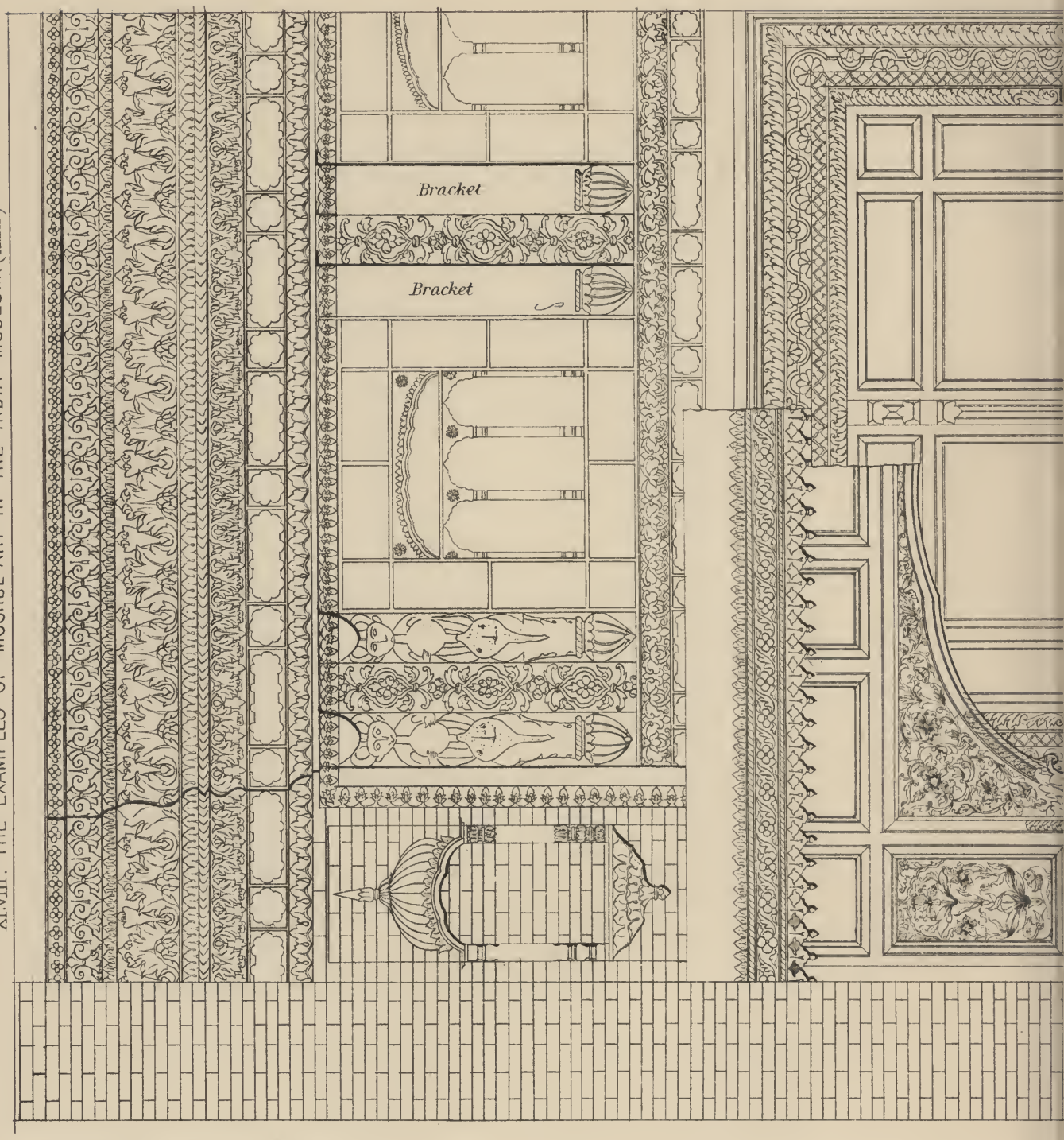
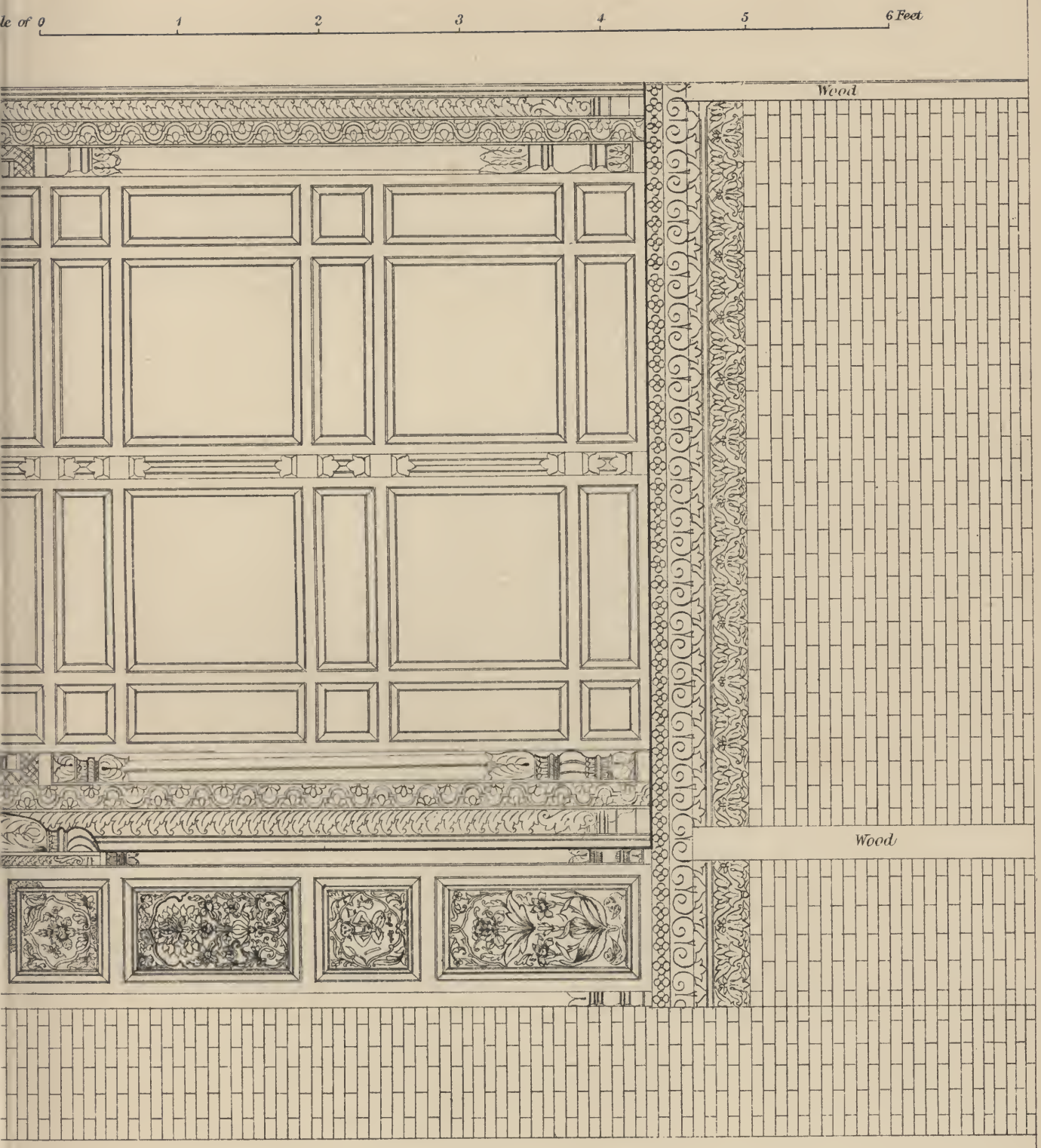


TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. IV, NEW SERIES.

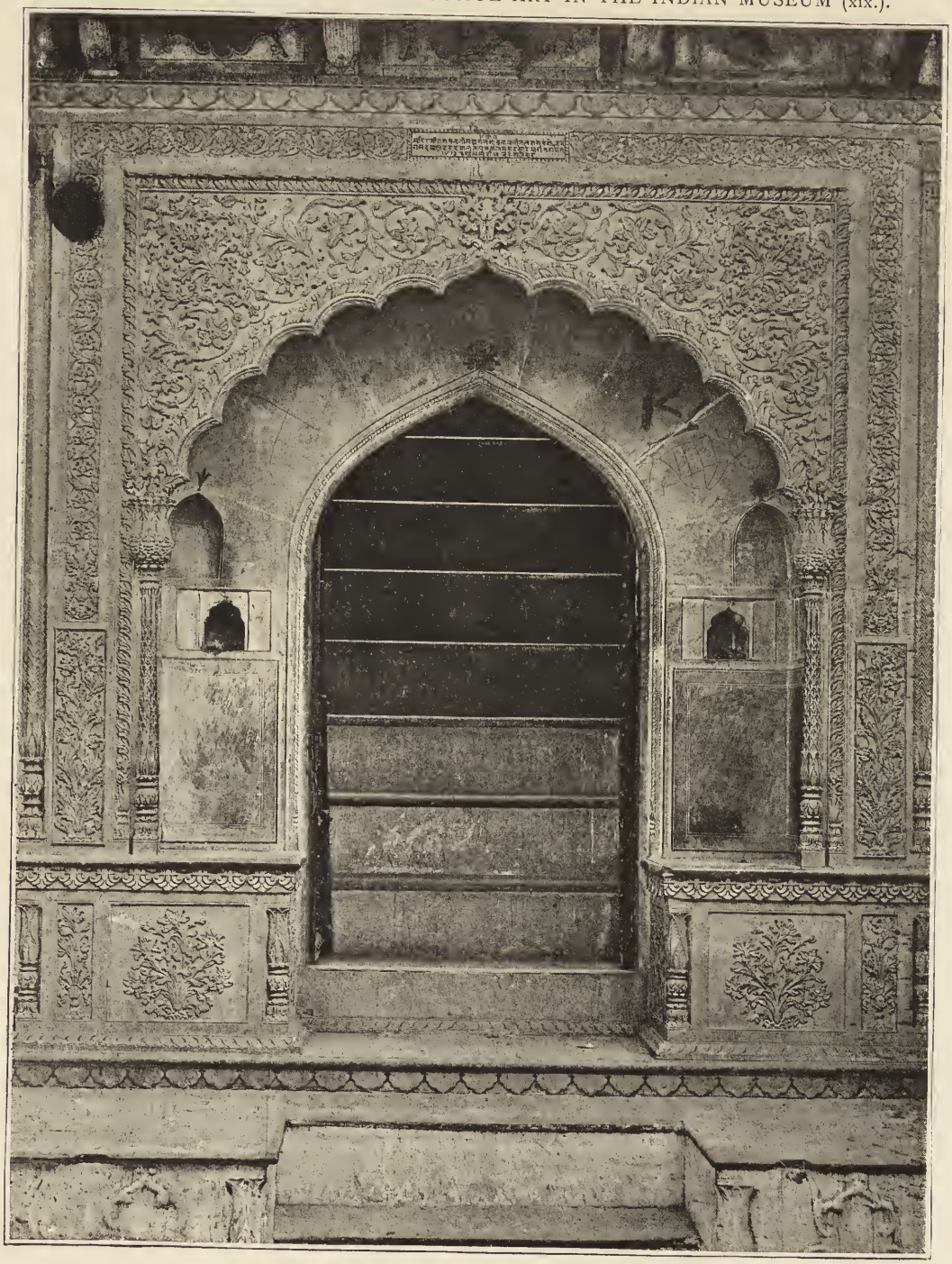
XLVIII. THE EXAMPLES OF MOGHUL ART IN THE INDIA MUSEUM. (xxiii)

C. F. KELL, PHOTO-LITHO, 8, FURNIVAL ST. HOLBORN, E.C.



DETAIL OF PART OF THE ELEVATION SHOWN IN ILLUSTRATION XVII.

XLVIII. THE EXAMPLES OF MOGHUL ART IN THE INDIAN MUSEUM (xix.).



The Phototype Co., 309, Strand, London

MODERN DOORWAY, IN GREY SANDSTONE, AT DELHI.
FROM A PHOTOGRAPH.

[Pages 129, 132.]

XLIX.

EXTRACTS FROM THE NOTES OF A TOUR IN PROVENCE AND LANGUEDOC.

By Mr. A. Needham Wilson, *Soane Medallist*, 1886.

[*Addressed to the Council.*]

Mr. President and Gentlemen,—

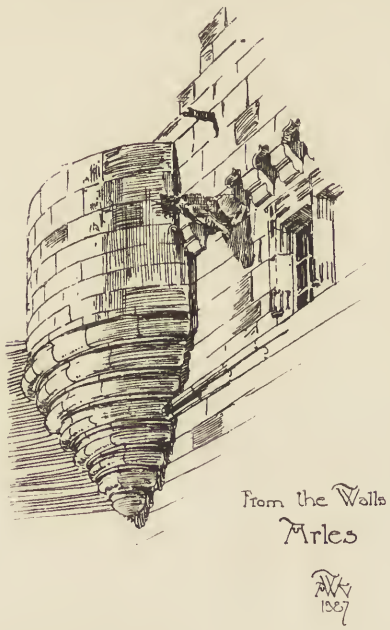
HAVING had the honour, in 1886, to gain* the Soane Medallion, I resolved, with the idea of deviating somewhat from the recent tracks of sketching tours, to visit Provence and Languedoc. Accordingly, the first week in May 1887 found me at Nîmes, with the intention of making it my headquarters for a considerable portion of my tour. Through the kindness of a distinguished Honorary Corresponding Member of your body, M. Révoil, Government Architect, I found no difficulty in obtaining access to historical monuments and other buildings of interest, and commenced work at the well-known *Maison Carrée*, though it was impossible to gain permission to rear a ladder against it, as I had hoped to do. My sketches and measured drawings of this building have been submitted to you.

After making a series of studies of the Tour Magne, the Amphitheatre, and the *Fontaine*, or reconstructed Roman baths, I turned my attention to the Cathedral, the Romanesque west front of which, with its frieze of scriptural carvings and its remaining flanking tower, exist untouched—if a Renaissance door be excepted. The belfry stage of this tower, with a side entrance, and an odd window or two, were the only examples of Gothic I was able to discover, though this is accounted for by the long centuries of desolating wars, which swept away what few erections were possible in those troubled times. The revival of building, however, on the advent of Francis I. enriched Nîmes with many and

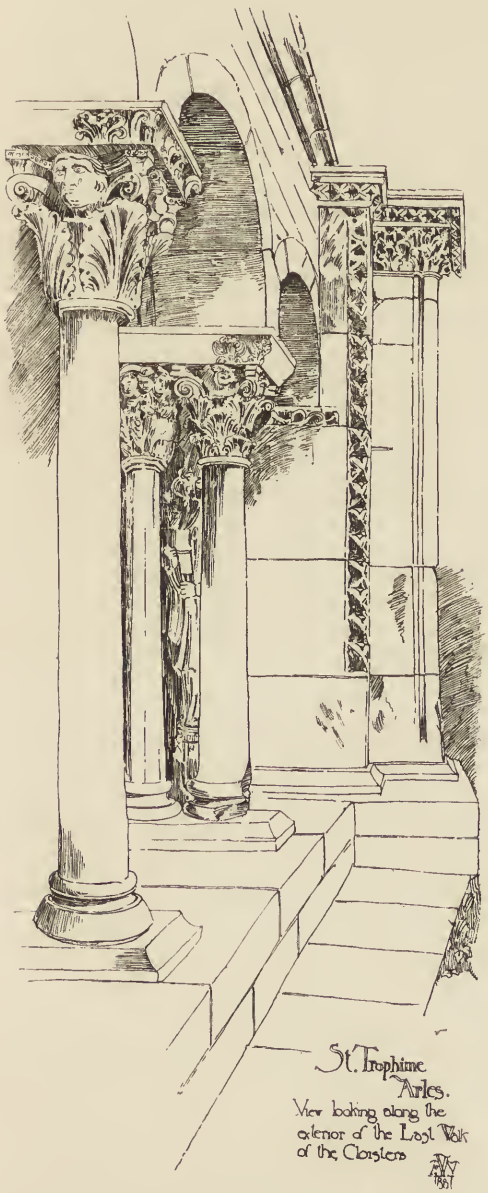
* See the Journal of Proceedings, Vol. II. n.s. page 167.

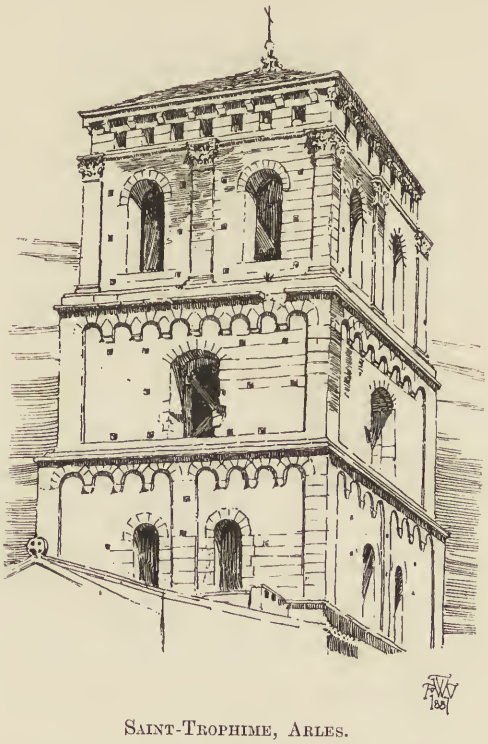
varied examples of the Renaissance, in the almost innumerable doorways and courtyards that a careful search through the town reveals, though they are rapidly becoming hidden by modern alterations and demolitions. I was fortunate in obtaining admission to many of these buildings, and several of the courtyards were probably sketched for the first time by a foreigner. Nîmes is well worth a visit for its Renaissance antiquities alone; though, owing to its dry situation, the heat is almost intolerable during June, July, and August. As I was, unfortunately, ignorant of this, my health suffered so much as to preclude more than one visit to neighbouring places of interest; the exception being Beaucaire, situated on the banks of the Rhône, at the foot of a lofty rock, on whose summit are the ruins of an extensive castle. The town is very quaint, and the houses, in many cases, span the streets; a not uncommon feature, where protection necessitated confined limits within fortifications. There is a fine Gothic Church of the Cordeliers, and a Renaissance building, dedicated to St. Paul, with a curious dome, and modest campanile. The Hôtel de Ville, apparently somewhat antecedent in date to the latter, is worth study; as are, also, many of the houses.

On leaving Nîmes I journeyed by *diligence* to Arles, which, with its ancient walls encircling the numerous churches and towers—conspicuous above all being the belfry of Saint-Trophime—and its generally quaint aspect, interested me greatly; while the antique and becoming costume, peculiar to the Arlésiennes, lends additional charm to the picturesque streets. The boast, that, during the Middle Ages, half the town consisted of churches, almost seems justified; for I found, in and about the place, no less than nine, either dismantled or desecrated. Of those within the walls (Saint-Trophime excepted), the Church of the Dominicans is most worthy of notice. Its ruins, situated close to the river's edge, are now utilised in a way that threatens them with speedy destruction. The church itself, early Gothic in character, presents nothing remarkable on plan; though the interior, now a stable and cart-shed, is of good proportions, and has plain quadripartite vaulting, and the usual apsidal east end. The west end shows some traces of Romanesque, but the most interesting portion is an addition of a Renaissance south porch [Illustn. xx.] at the end of a short passage; the severe treatment it has received adding to its picturesqueness, though a few more years of ill usage will probably destroy it. In a chamber, found in the remains of the adjacent monastic buildings, can be traced the relics of a barbarously defaced fresco of mediæval Arles, but too far gone to copy. Second in interest are the Churches of Sainte-Croix and Saint-Martin, although the towers [Illustn. xxi.] alone remain intact, the rest, in both instances, being used as stores and dwellings respectively. The most interesting spot in the town is the square facing the Hôtel de Ville, where stands a fine Renaissance building, erected by François Mansard in 1673, and said to have been offered as compensation to the inhabitants for the loss of the celebrated "Vénus d'Arles," removed to the Louvre by Louis Quatorze; the entrance hall, which is vaulted in a curious manner, is alone worth a special visit. The centre of the square is occupied by an obelisk, 53 feet 4 inches high, from the quarries of Esterelle, near Fréjus; it was discovered in 1389, buried in the mud of the Rhône. The corner of the square, next to the Hôtel de Ville, is occupied by the west façade of the Church of Saint-Trophime, with its striking entrance; and opposite is a church, now used as a museum, containing the various fragments of interest found in the neighbourhood and in the river. The features that will attract most notice in Saint-Trophime are the before-mentioned door and the famous cloisters. The former is said, by M. Viollet-le-Duc, to be "romano-grecque syriaque" in character, and "comme statuaire elle est "gallo-romaine avec une influence byzantine prononcée" [Illustn. xxii.]. Its iconography is interesting, the tympanum being occupied by a seated figure of Christ, crowned in His glory, holding the Gospels and in the act of blessing; the rest of the space being taken up by the attributes of the Four Evangelists, while, under the soffit of the slightly pointed arch, two ranks of adoring angels culminate in



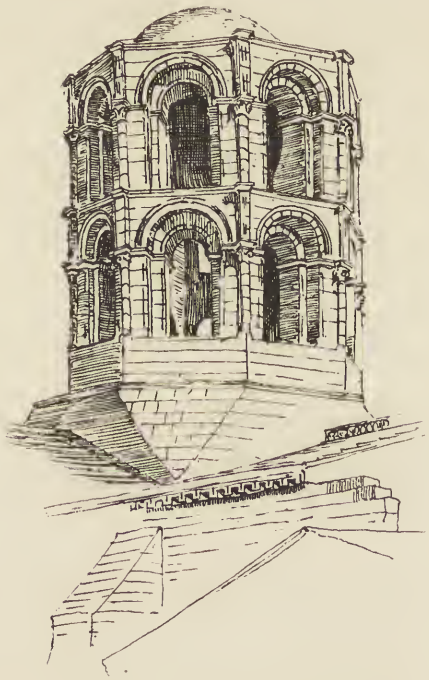
St. Michael under the keystone, though his balances have disappeared. On the lintol are the Twelve Apostles seated, the small compartment to the right of the Christ representing Abraham receiving the elect in his lap. The frieze on this side shows the elect, headed by two bishops, and the women following the men; while on the corresponding frieze are seen the damned, bound by a chain and walking amid flames, conducted by a demon. Upon the return of the north side, is the usual representation of souls being weighed in a balance, those found wanting being carried off by a demon. The capital of the column supporting the lintol shows St. Michael resting on a lance. The columns carrying the large frieze bear upon curiously carved bases, above a plain plinth, the small frieze behind the capitals giving apparently a battle on the one side, and, I think, a procession on the other. Between the columns are the Four Evangelists—two on either side—the niches separated by exquisite arabesque sculpture, while the returns on each side of the entrance hold figures of saints of the early church, one, vested as a bishop, probably being intended for St. Trophime himself. The interior is plain and massive, and is chiefly remarkable for the loftiness of the nave, which has a waggon vault. The choir calls for no special comment, though the curious twisting of the chevet chapels may be mentioned. The rise of the site eastwards is rapid enough to make these chapels practically underground, and, from the same cause, the cloisters are considerably elevated, and are approached from the south choir aisle by a flight of steps. The north and east walks of these cloisters, which are claimed to be the finest in the South of France, are apparently coeval with the original edifice, the other two walks having been rebuilt in the thirteenth century. Each of the first-





Saint-Trophime, Arles.

mentioned galleries has a barrel vault, and consists of three bays, subdivided into arcades of four arches, supported on twin columns of grey marble. The intermediate and angle piers are very strong, arches springing from them to assist in giving strength to the vault; while, in addition to two vault arches, a diagonal one springs from the angle pier, covering the intersection of the two vaults, which are rampant arched in section. Externally, above the arcades, a projecting channel, falling towards each corner, indicates that the original pitch of the roof was much steeper than at present, and rested very closely on the extrados of the vault; but during the rebuilding of the south and west galleries, in the thirteenth century, this roof was made with only sufficient fall to carry off the water in order to form a terrace. A wealth of carving enriches all four walks, no two capitals being alike throughout: the piers of the older portions exhibit various scriptural scenes and characters, carved in the grey marble dressing; and the spandrils show many allegorical sculptures. The two later galleries are very beautiful, with quadripartite vaulting, the piers of the north walk having delicate canopies and pedestals, apparently of somewhat later date. A good view is obtained from here of the massive and sturdy belfry tower. The buttresses supporting the east gallery were apparently added during the alterations above mentioned, and are ornamented with large dog-tooth mouldings.



Lantern Tower, Saint-Honorat, Aliscamps, Arles.

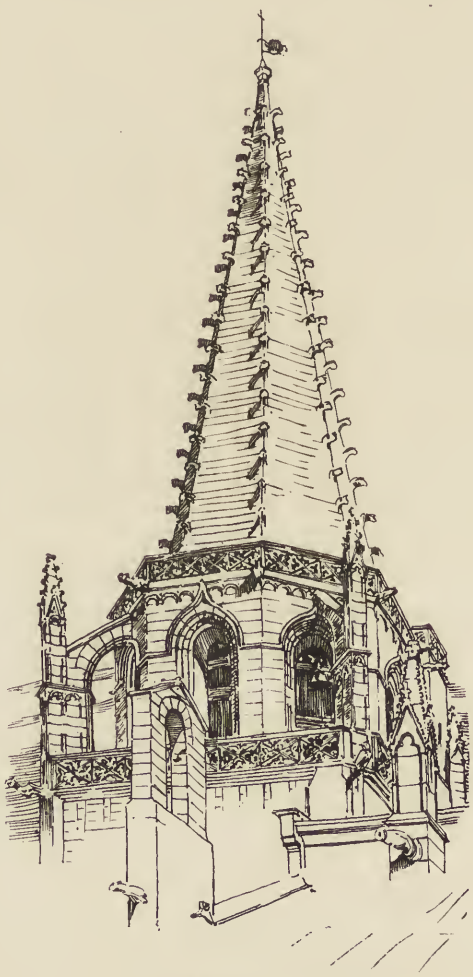
The Roman amphitheatre here is better situated than that at Nîmes; and a broad flight of steps gives access to it, on the river side. Both structures are very similar in detail, and held about the same number of people, viz. 24,000. A noteworthy feature is in the construction of the outer gallery floor, by carrying substantial flags on spanning arches, a method seen in many Roman baths.

At the remains of the Roman theatre, I made a drawing of the two isolated columns of breccia, which formed part of the *scena*, and with the *cavea* are the most interesting portions of the ruins.

Near Arles is the ancient cemetery, known as the Aliscamps, from *Elysii Campi*, used from the earliest Gaulish times, and successively by the Romans and early Christians. A beautiful avenue, lined with massive Roman sarcophagi, and innumerable stone coffins half buried in luxurious undergrowth, conducts to the ruins of the ancient Church of Saint-Honorat, picturesquely closing a charming vista. At the entrance of the avenue there is a small chapel, connected with an arch of what was probably a gateway, both apparently of eleventh-century work, though the interior of the chapel, known as the expiatory chapel, from a legendary story, has a fine "lierne" vault. Before reaching the great church, a small chapel, little more than a grotto, and to which another legend has given the name of the Porcelet Chapel, attracts attention. The ruins of the Church of Saint-Honorat show specimens of ecclesiastical architecture of numerous epochs, for, on the site of a pagan temple, of which a relic remains, in the form of a crypt under the apse, a chapel was erected in which St. Trophime is stated to have preached the Gospel, twenty-seven years after Christ, and was incorporated in the subsequent church, which appears to be anterior to the eleventh century. Of this building, the nave was destroyed early, the remainder being walled up at the commencement of the second bay. The unhealthy situation was the cause of much neglect; though at various epochs the ruins of the nave seem to have been formed into an inclosure, in which chapels were erected. One only of these remains, though there are many fragments of altar tombs discernible where chapels formerly stood. Two other Gothic chapels were added, opening from the transepts; and later, two more, in the style of Louis Quatorze, lighted by lanterns carried on the vaulting, and bearing

traces of sumptuous decoration. A lantern tower marks the intersection of nave and transcpts, and is carried on four columns of extreme massiveness, the two nearest the nave being ten feet, and the other seven feet in diameter, thus giving a curious effect of false perspective. The church was only abandoned after its desecration, during the Revolution of 1789–92.

Ten miles from Arles is the magnificent Church of Saint-Gilles, in the town of that name; and though apparently coeval with Saint-Trophime, its triple doors surpass in beauty the porch of the latter, despite of much similarity in detail. Beneath the church there is a fine crypt, in which is the tomb of the Saint, the scene of many memorable pilgrimages. The first abbey founded by Saint Gilles must have been very grand, as the ruins of the choir amply testify. Opposite the church exists what is said to be the oldest house in France, its style denoting the end of the twelfth century, and in which Pope Clement IV. (1265–68) was born. I gladly take the opportunity of acknowledging my indebtedness to the Curé for his kindness in explaining the antiquities. On leaving Arles for Avignon I revisited Beaucaire, and sketched the charming little Romanesque chapel in the castle; and then, passing over the river to Tarascon, occupied myself with the Church of Sainte-Marthe, a structure full of interest, with a south entrance of twelfth-century work, and a crypt, probably of the same date, giving evidence of a much earlier building than the present church, which is mainly of Late Gothic. It contains some excellent ironwork, amongst other interesting features within. The magnificent castle on the river's bank is also well worth a study; though, being a State prison, it is inaccessible for sketching, which is unfortunate, as there is some exquisite Gothic work in the courtyards. The town is not particularly interesting, though among the few objects worthy of notice is a fine hospital founded by Molière.



Sainte-Marthe, Tarascon.

Between three and four miles from Arles, and occupying a strong defensive site, amid beautiful scenery, are the ruins of the Abbey of Montmajour, much of which remains. The highest point of the rock is occupied by immense ruins of monastic buildings erected at a later date, and in the Italian style, which compete in massiveness with the far earlier constructions comprising the church (lacking, like Saint-Honorat before referred to, its nave), the cloisters, &c. So enormous is the thickness of the walls that the whole monastery partakes largely of the character of a fortress; a sturdy tower of defence, which commands an extensive view over the plain, being included among the buildings. I devoted my attention to the church and cloisters. The former is very like that of Saint-Honorat at Arles, though evidently later in date, but the cloisters appear to be earlier than those of Saint-Trophime, and are much simpler. Beneath the church is a remarkable crypt with an early example of chevet chapels. I should also mention that beneath the monastic buildings there exist three *oubliettes*.

Nearly at the foot of the cliff on which the Abbey of Montmajour stands is the early church, dating from the fifth century, and mostly excavated in the side of the cliff. Though extremely rude it is worth a study, for the confessional and waiting-room are entirely hewn out of the rock. Within the

enceinte of the Abbey stands a mortuary chapel of the eleventh century, and the surrounding rock is honeycombed with graves. The plan of the chapel is a Greek cross, with four spherical vaults of equal diameter, the arches of which carry a cupola with a square base, a small bell-turret crowning the whole.

Continuing my journey to Avignon, I was unable to venture on sketches of the famous Castle of the Popes, owing to recent frontier troubles and consequent activity in spy-hunting, but was fortunate in being conducted through it by M. Révoil. The cathedral higher up the slope of the rock of Domns is by no means of uniform architecture, the original Romanesque edifice having been considerably transformed. Among the churches, that of Saint-Pierre is the most interesting, though it is too small for the amount of detail lavished upon it; and the west façade of Saint-Agricol will also repay a visit. The tower, which is nearly all that remains of the original structure of the ancient Hôtel de Ville [Illustn. xxi.], is now surrounded by a modern *Mairie*, in the Italian style. There is an excellent architectural collection at the Museum, in which I was able to sketch, also through the kindness of M. Révoil.

Iron Bell-cage at Camaret, near Orange.

At Villeneuve-lez-Avignon, on the opposite bank of the river, I visited the church, which possesses a fine tower; also the ruins of the Abbey of Chartreux, where some acoustic vases may be seen in position; and the Castle of Saint-André, now containing a hamlet.

At Les Angles, some five miles away, is the Château des Issards, situated on a lofty ridge and commanding an extensive view of the valley of the Rhône. Though very much "restored," it is perhaps worth a flying visit.

Leaving Avignon and its interesting walls, I went on to Orange, and after sketching the famous Arc de Marius, heard of some interesting work among the mountains, which I visited; but before doing so, I found in a village, five miles from Orange, a curious gateway, surmounted by a fine example of the iron bell-cages so frequently to be seen in these parts; and I took advantage of its near proximity to the eye, to sketch it.

A delightful journey of twenty miles, amidst most charming scenery, brought me to Vaison, both in interest and in situation the most fascinating place I visited. On one side of a small gorge, at the bottom of which runs a mountain stream, the old town overhangs the very edge of a lofty rock, up which the houses creep, till they almost reach the castle-crowned summit; a winding and steep road leads to the single entrance, beneath a tower inside the town, and the narrow and picturesque streets mount so rapidly between the quaint and ruined houses, as to quite preclude the use of vehicles. As we toiled up the slopes on our journey hither, I had seen dotted here and there, in the vast amphitheatres between the mountains, several villages still preserving their feudal character, as if nestling closely for protection to the naturally defensive heights, on which stood the grim ruins of the strong-

holds that originated them. But here was a veritable feudal town, of an antiquity as old as the time of the Roman occupation, and existing to-day very much as it did four centuries ago. Without any special attractions, from an architectural point of view, with the exception of the ancient church across the gorge, this place made a deeper impression upon me than any other I visited. The glorious scenery and delightful mountain air, added to the glamour of desolate mediævalism, all dominated by the pervading presence of Mount Ventoux with its snow-clad summit, gave a charm not easy to forget. The whole seemed to burst upon me as an intense surprise, for I had been led to expect nothing so fascinating in this town buried among the mountains, and I found the three days I spent there far too short. But time pressed, and I wanted to visit Carpentras. I cast many a longing eye on the distant villages, doubtlessly small Vaisons, and made many a mental note with a view to future exploration.

Here, it is true, a painter would find more material for his brush and pencil than an architect, but to an archæologist I can strongly recommend Vaison and its neighbourhood; and I should like to take an opportunity of expressing my indebtedness to all with whom I came in contact at Vaison, as well as the other places I visited. I was treated with the utmost consideration and courtesy. Much of this was due to the influence of M. Révoil, who so kindly interested himself on my behalf, and to whom I owe much of the success of my tour; and I can never forget the good feeling everywhere shown and the help everywhere offered to me.

Belfry of the
Former Cathedral
Vaison Vaucluse
1887.

In old Vaison there is a small church—Late Renaissance in character—on the very verge of the precipice that overhangs the stream. There are other religious buildings, but not of special interest; and the deserted mansions, as well as the picturesque views at every turn, attract deep attention. Here and there are to be seen quaint conduits; and as you climb up street after street, the houses tumbling into ruin on either hand, and the vines straggling across the way on their rotten supports, no sound but the faint echo of a goat's bell perhaps, far below, can be heard till the castle is reached over the slippery rock. Little remains now, and that little not of architectural interest, though some of the ruins gave me the impression of being Roman in origin.* Beneath the rock on the castle side runs a small aqueduct apparently, though I could not trace its exact use. A road has been recently made to wind up the slope on this side, evidently with the idea of increasing the value of property in old Vaison, but without effect, as one can positively get a house for nothing there.

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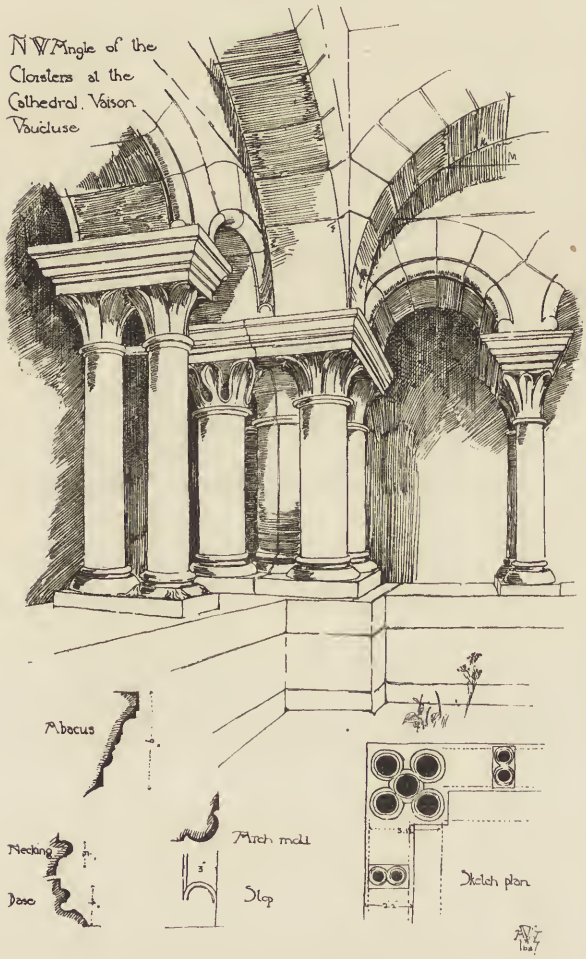
* More than half a century ago, Prosper Mérimée, Inspector-General of the Historical Monuments of France, wrote of Vaison (*Notes d'un voyage dans le Midi*, &c., Paris, 1835, pp. 173–4), as follows:—"Le pont qui sert de communication entre les deux parties de la ville est romain, et à l'exception du "parapet, qui est tout moderne, il ne paraît pas qu'on y ait jamais fait de réparations. . . . Au-delà du "pont, vers la plaine, au pied d'une petite éminence, on voit deux arcades antiques à grand appareil, "et quelques restes de gradins taillés dans le roc. C'était là le théâtre, fort petit à en juger par le "diamètre de son hémicycle. On distingue à la gauche du théâtre les restes d'une voie romaine, et "çà et là quelques substructions antiques que les travaux d'agriculture ont mises à découvert. Toute "la plaine est jonchée de débris de poteries et de briques, de marbres, surtout d'une multitude "innombrable de petits cubes noirs et blancs, provenant de mosaïques détruites. Sur le même point "nous observâmes des débris d'hypocaustes, et quelques fragments de pilastres et de lambris de "marbre." Mérimée's notes of the Cathedral of Vaison are also very full and interesting.

Vaison, once a cathedral town, with its suburb on the river's edge, contained, it is said, 80,000 inhabitants; but the population, from various causes, is now reduced to 4,000. The inhabitants prefer living on the lower ground on the other side of the stream, and so few care to climb the rock that old Vaison is nearly deserted. A small building in the style of the twelfth century, formerly the cathedral, remains in its original state, the only additions being two Gothic tombs. It has small cloisters, very similar to those at the Abbey of Montmajour; and the north-west angle is remarkable for the curious construction of the pier, which is composed of five grouped columns, cut, with their caps, bases, and abacus, from two solid stones, the joint passing up the middle column.



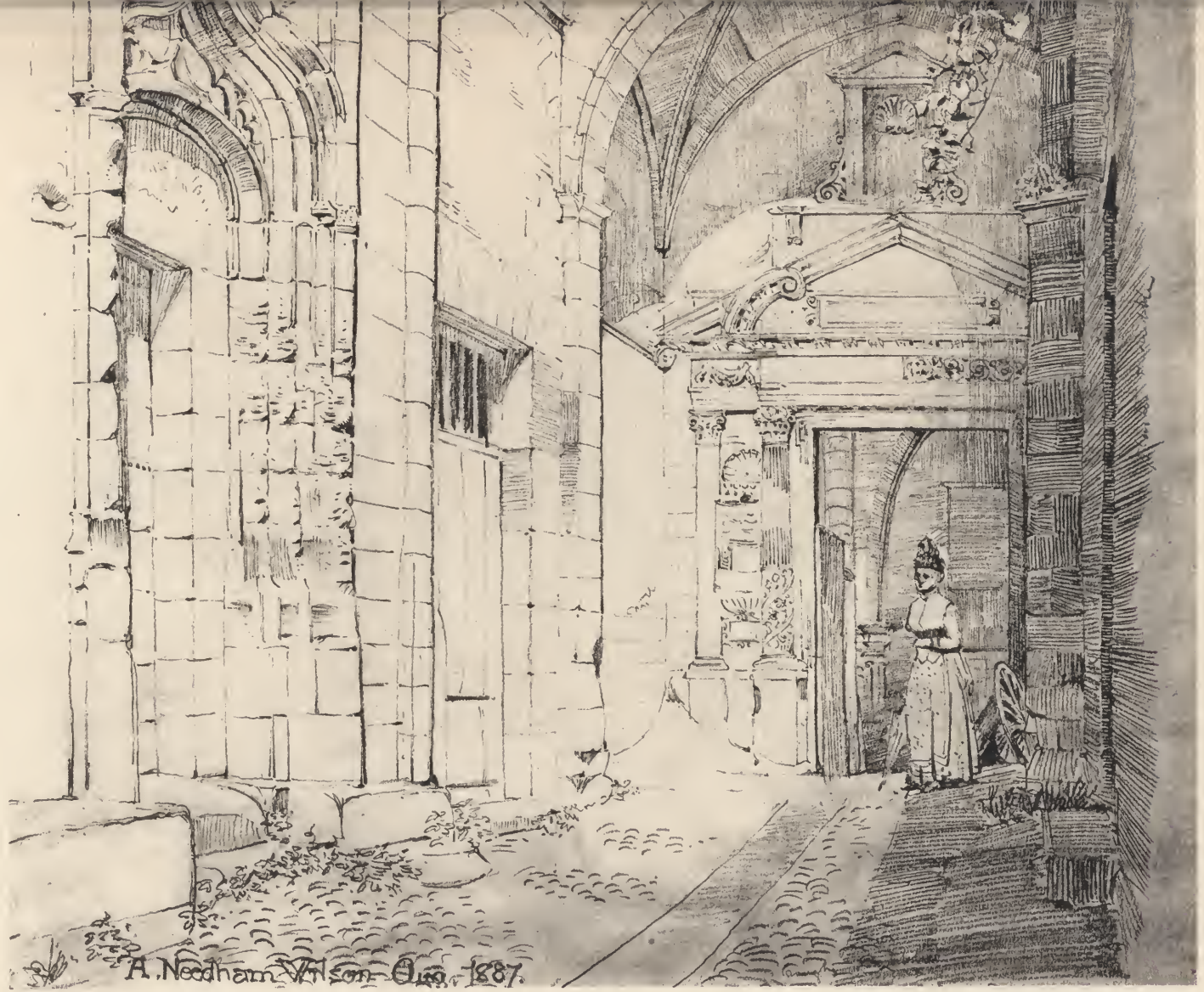
Cloisters of Vaison Cathedral.

I was surprised to find many fragments of Roman buildings stored in these cloisters, and learnt that a Roman theatre once existed near by. I fancy this interesting place must be comparatively unknown, as its position makes it difficult of access.

I completed my tour at Carpentras, which town, though very beautifully situated, contains little of interest. The walls have not been long demolished, I think, but a fine tower and gateway, known as the Porte d'Orange, remains. Within the Palais de Justice, a good building in the Italian style, exists a Roman triumphal arch; and the hospital, also in the Italian style, merits a visit. The most interesting building at Carpentras is the former Cathedral of Saint-Siffrein; its west façade and south porch are especially fine. The tympanum of the latter has a painting of the Crowning of the Virgin, which is a curious feature, I believe. There are several remarkably fine fountains in the town, one of which is situated opposite this porch [Illustn. xxiii.]. Before returning to Orange, I visited Carombe, one of the many interesting and little-known towns dotting the slopes of the mountains. It seemed a reproduction of Vaison, though on a much smaller scale, and the church, principally early Gothic in character, is chiefly remarkable for a fine chapel, wherein the vaulting is supported by a single central column, into which the vaulting ribs and arch moulds die away, without the interposition of any capital. After visiting Carombe I returned to England, having completed a tour of twenty-six weeks.

ARTHUR NEEDHAM WILSON.

XLIX. NOTES OF A TOUR IN PROVENCE AND LANGUEDOC (xx.)



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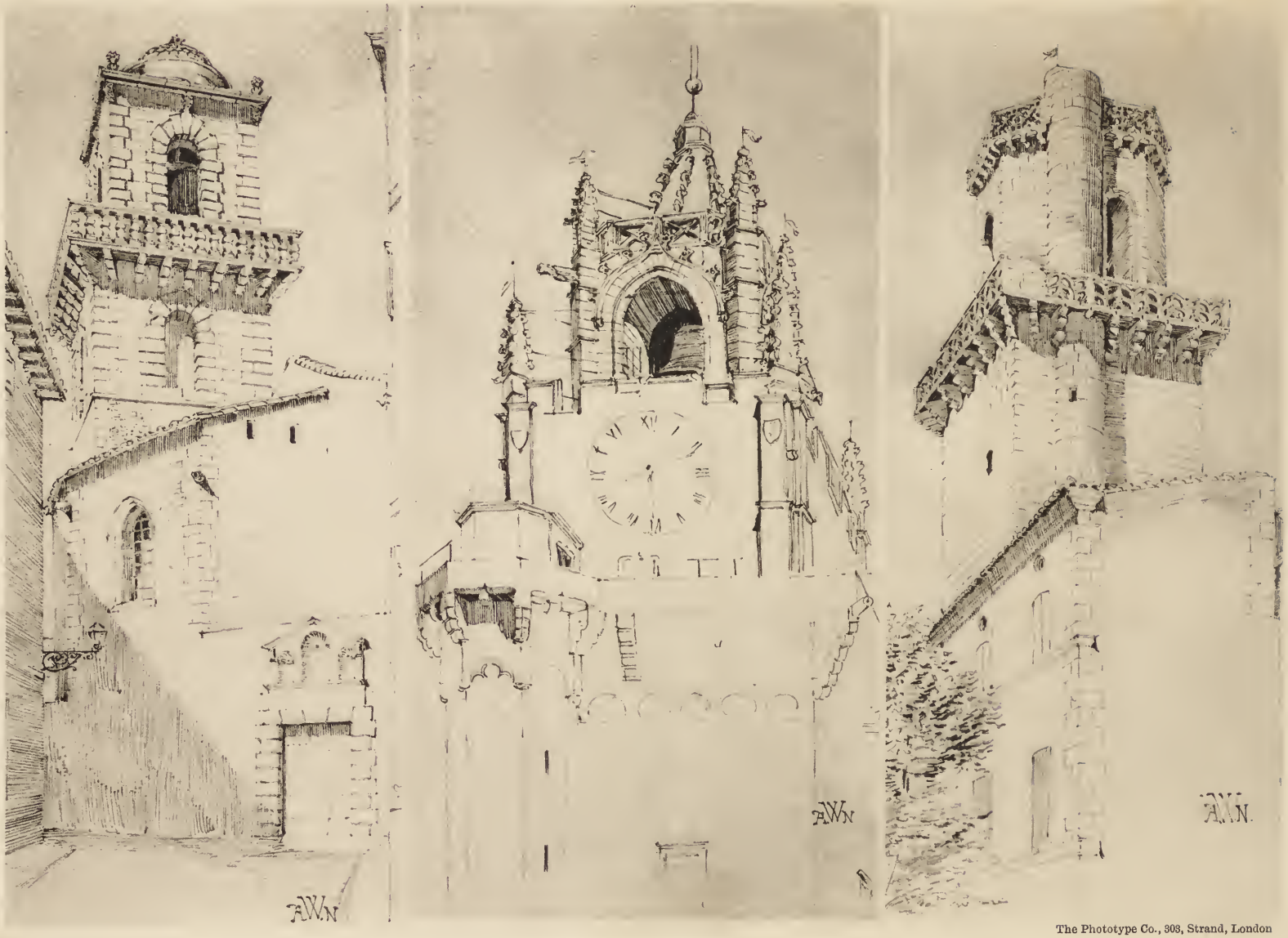
SOUTH PORCH OF THE DOMINICAN CHURCH, ARLES.

FROM A PENCIL SKETCH BY MR. A. NEEDHAM WILSON.

[Page 134.]

XLIX. NOTES OF A TOUR IN PROVENCE AND LANGUEDOC (xxi.).



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SAINT-MARTIN, ARLES. HOTEL DE VILLE, AVIGNON. SAINTE-CROIX, ARLES.

FROM PENCIL SKETCHES BY MR. A. NEEDHAM WILSON.

[Pages 134 and 138.]

XLIX.—NOTES OF A TOUR IN PROVENCE AND LANGUEDOC (xxii).

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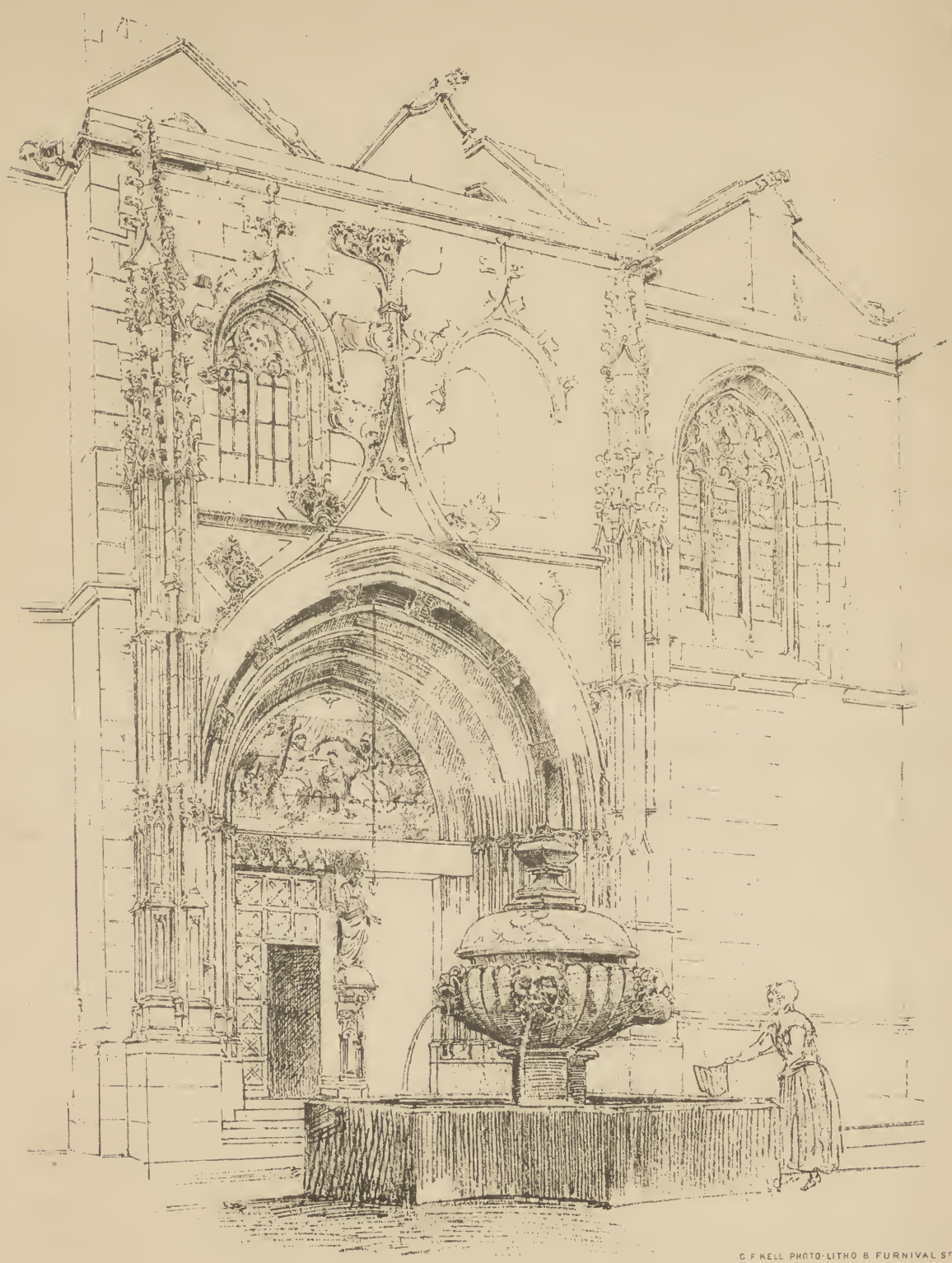
THE WEST PORCH OF SAINT TROPHIME, ARLES.

FROM A PENCIL SKETCH BY MR. A. NEEDHAM WILSON.

[Page 134.]



C. F. KELL PHOTO-LITHO 8 FURNIVAL ST. HOLBORN E.C.

THE SOUTH PORCH OF SAINT-SIFFREIN, CARPENTRAS.
FROM A PENCIL SKETCH BY Mr A. NEEDHAM WILSON.
[page 140]

L.

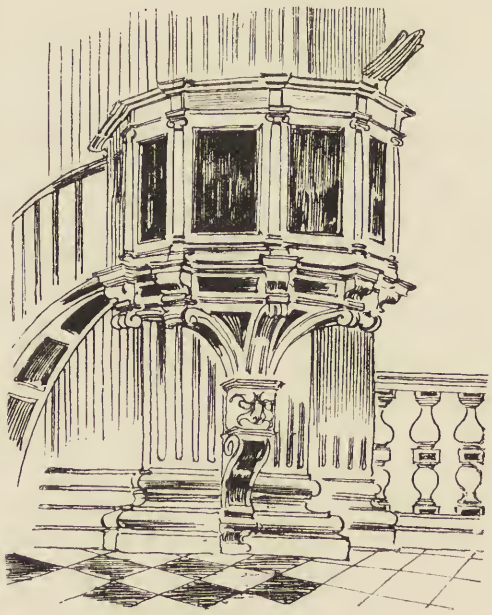
EXTRACTS FROM THE REPORT OF A TOUR IN NORTH ITALY.

By Mr. Gerald Callcott Horsley, *Owen-Jones Student*, 1887.

[*Addressed to the Council.*]

Mr. President and Gentlemen,—

I HAVE the honour to present to you the following Report of my recent tour as Owen-Jones Student,* and the drawings made during that tour. The route chosen by me comprised some of the principal towns in Northern Italy, namely, Como, Bergamo, Brescia, Cremona, Mantua, Verona, Vicenza, Padua, Venice, and Ravenna. This route was adhered to, and the different towns visited in the order in which they are given. The funds of the Studentship enabled me to be away nearly ten weeks, including the days occupied in travelling to and from Italy. My chief reasons for choosing this route lay in the fact that I had during the previous year visited a portion of Central and Southern Italy, and I felt a strong desire to become acquainted with the architecture and decoration to be found in the towns I have named, particularly in Venice and Ravenna. And here I should state that my principal aim was to make a further study of old work executed before the later Renaissance periods, being, at the same time, perfectly unfettered and free to admire and profit from any beautiful and living work executed at any time. My previous visit to Italy had brought many impressions to me of the great advantage to be gained from studying the work of the early and middle centuries of the Christian Era.



Pulpit in the Cathedral of Bergamo.

Como.—I arrived here on Saturday afternoon, September 24, 1887, having stayed a few hours at Bourges, Autun, Nevers, Dijon, and Bâle, on the way. The effect of the glazed and coloured tile roofs at Autun, Nevers, and Dijon is very striking. The patterns formed by them are, in many instances, delightful. At Bâle Cathedral the roof is being relaid in these glazed tiles, the design of which is,

* See the Journal of Proceedings, Vol. III. n.s. page 300.

however, severe and regular in appearance. The interior of the Cathedral at Como was not very pleasing to me. It is gaudily, but at the same time cleverly, decorated, although with little end or aim to teach. My chief pleasure in Como was the small apse of the Church of S. Fede, a drawing of which I have submitted. The variety obtained by its different coloured marbles is most pleasing.

Bergamo.—I spent two days at Bergamo before going on to Brescia. The chief interest in Bergamo is the old *città*, situated on a hill above the more modern town. Here is the Cathedral with the famous doorways. The interior of the church, fine and spacious, of rich Renaissance work, is cleverly and most effectively decorated. The scheme is white and gold, with dark masses of colour introduced in certain parts. The whole of the rich cornices, capitals, pilasters, and panel-moulds wherever they occur, are lavishly gilt on their raised parts, the grounds and hollows being white. The ceiling is divided into panels with very large spaces of white and gold carved work between each, and in the panels are paintings of various subjects, very dark and full in colour. The contrast thus formed appeared to me most effective and successful. The walls are hung with rather pale green seventeenth century tapestry, and this material is also hung from the musicians' and singers' galleries which project on each side of the choir below the organs. The pulpits or *ambones*, of which there are two, are rich in white and green marble, and are connected and supported in effect by the choir balustrade made of the same materials; the choir screen and stalls are remarkably fine specimens of Intarsia work ; and with the large rood over the screen covered with a baldachin of soft red damask silk, the whole forms an impressive piece of colour decoration. I think the flooring is chiefly white and red Verona marble, which, with the rich dark wood seating in the nave, gives a fine base of colour to this interesting church.

Brescia.—This is even a more interesting place than Bergamo, and to an architect fond of Renaissance ornament and detail Brescia is a rich hunting ground. But I did not stay beyond the three days which I had allotted for the place. I found a great decorative feature in the balcony railing in the courtyard of the Broletto. Of this I have submitted a drawing and another of a portion of the street front. The Roman and Christian museums are most interesting. The former contains the bronze statue of Victory (size, rather larger than life) which was found some years ago near Brescia. It was discovered in a singularly perfect state—the only portions necessary to complete the representation, and which constitute, I believe, the only restorations, being the shield and helmet [see opposite].

Palace in the Corso Garibaldi at Cremona.

Cremona.—The decoration of the Cathedral at Cremona, almost entirely with frescoes of different subjects, is sombre and rich in effect. But the period of work is late and without any signs of having been painted for aught else than show and fine colour. The exterior appeared to me to have many claims upon an architect in search of architecture allied with colour and decoration; for although chiefly of brickwork, the effect of its broad, simple masses, relieved by different pieces of marble against the blue sky, is full of teaching. The Baptistery with its fine octagonal dome should be considered much with the exterior of the Cathedral.

I was much disappointed in meeting with so few good pictures; although I should not include in this the Church of SS. Agostino e Giacomo in Braida, which contains a very beautiful Madonna and two saints by Perugino; and on the north side of the church there are fresco portraits of Francesco Sforza and his wife Bianca Maria Visconti. Many of the palaces at Cremona are exceedingly attractive for their decorative qualities, especially

one in the Corso Garibaldi, built in the sixteenth century, and having a large cove decorated with colour.

Mantua.—From Cremona I went to Mantua and visited the great Gonzaga Palace. Here the remarkable series of ceilings (about all the decoration remaining in the building) is most striking. In

most instances colour no longer exists, though in the apartments of Isabella d' Este it is well preserved. I have submitted sketches taken from the ceilings in this portion of the palace. All the ceilings are of the Renaissance periods, but varying very much one from another ; most are of arched form, and the different compartments formed by the vaulting divisions have given a large field for the plasterer's, carver's, and painter's art. In the case of rooms which have their ceilings formed by horizontal beams, the depth of the latter, and the bold mouldings of the panels between, form, with their scale and proportion, remarkable specimens of their kind. The palace generally is in a poor state, the rooms are empty, and some of the ceilings are partially destroyed; but enough remains to show its former magnificence. The Palazzo del Tè contains but few hints beyond, perhaps, size and spacing of work; some interesting stucco ornament by Primaticcio ; and a pretty piece of panelling in one of the rooms. The paintings of Giulio Romano do not commend themselves to me for much study.

Verona.—I arrived at Verona for a ten days' stay. The treatment of church roofs, so identified with San Zeno, I was more than glad to have an opportunity of seeing. The roof in the sacristy has many details similar to that in the church itself. The screen at the end of the choir steps has sculptured figures in red marble of Christ and the Twelve Apostles. Remains of Gesso and colour exist upon most of them, as well as on the large statue of San Zeno himself in the south choir aisle. The frescoes in this church were the first of their date which I had met with during the tour, and, although some are poorly executed, yet many are particularly valuable. It is a little curious to notice how the Veronese of that epoch were not behindhand in possessing the general lack of interest of the time for work done before their age. I have drawn a portion of an eleventh or a twelfth century fresco, which had once been entirely covered by one of the thirteenth century. A few years ago a portion of the latter was hacked away, revealing as much of the earlier fresco as I have drawn. Near to this example is a wall which has the remains of three frescoes, one over the other : the uppermost not being later than the fourteenth century. The scheme of colour of the early fresco I have mentioned is exceedingly interesting. Mainly it is white, the folds of two of the dresses being drawn in colour, the remaining dress being very light in tone. A fresco of the thirteenth century of St. George and the Dragon, on the opposite side of the church, has a background of a very beautiful blue ; and it is instructive to notice the difference in its shade with that of the prevailing blue ground of Giotto's chapel at Padua. The marble wall-tomb in San Fermo [Illustn. xxiv.] has remains of gilding on the carved leafage ; the angels have also been coloured, and the ground behind them has traces of a green colour upon it.

Remains of fresco painting on the fronts of houses still exist in Verona. One in the Corso Cavour, marked by a tablet, is skilfully divided into panels, and illustrated with a dashing figure on horseback, with the Three Graces, and other subjects. In the piazza are other remains, which are very fine in colour, of the sixteenth or seventeenth century. The colouring of the Palazzo Consilio has recently been restored. The lower portion of the building is marble and gold, and, aided by the very fine proportion of the colonnade, is very successful. But the upper part with poorly painted imitation marble and medallions is most disappointing and uninteresting. The "swags" and ribbons on the frieze below the windows have been badly drawn and coloured. Amongst other remains of the old Roman city, Verona possesses some very beautiful pieces of floor mosaic. I have drawn portions of two pieces, one of which is now the foot-pace of the altar in the crypt of San Zeno and the other is in the museum. These are of small delicately-sized tesseræ, and can be compared with a large piece of later Roman pavement—coarser in detail and design—which has recently been opened up.

Early frescoes of great character and *cinque-cento* roof-painting are to be found in Sta. Anastasia. The ground of the painting is white; the church is vaulted, and the colour extends the whole length of the nave. The diagonal ribs of the groining are painted at the intersection with stripes of colour and white; and a wide border of foliage is painted on either side of the ribs. In the centre of each compartment is painted a medallion, containing either a device or a figure. Like so many Italian churches, Sta. Anastasia is rich in the colours of its pavement. The beautiful marble of Verona, used with others of white and grey, gives a field for variety in pattern, and that design which its builders could not help.

Vicenza.—Time did not permit of more than a visit to the chief buildings of interest in Vicenza, including the theatre of Palladio with its clever and interesting perspective treatment, the museum, and the chief palaces in the town. The Cathedral offers a fine field for colour decoration, but it is now bare and whitewashed. Altogether I was struck with the general absence of colour in Vicenza, amongst the amount of ornament to be observed.

Padua.—I made a stay of about five days in Padua. The great Church of San Antonio and the exquisite Chapel of the Arena, at the opposite end of the town, possessed attractions for a longer stay, had not the feeling strongly possessed me that Venice lay ahead with all its known and imagined

Donatello Relief in Bronze, San Antonio, Padua.

treasures. With respect to San Antonio, apart from the exceedingly great interest in the building, it contains decorative features of the highest value. The church has now little remains of actual colour, although the exterior shows many beautiful combinations of brick and marble. But, as is well known,

in San Antonio there are some masterpieces by Donatello in bronze and terra-cotta. I submit a drawing taken from the series of the symbols of the Four Evangelists in the choir. As one passes through the elaborate bronze choir gates, two are on either hand let into prepared spaces in the walls. The one I have drawn (St. Matthew) has its background similar to the others. The small circles shown are gilt; the recesses in the aureole, the ornament on the stole, and the leaves of the book are treated in the same manner. I fully realised the privilege of having time to study the frescoes of Giotto in the Arena Chapel, and those in the Church of the Eremitani by Mantegna; the one so different from the latter, yet both so full of life and vigour. The influence of tradition in the former is greatly to be observed, and I noted at the same time that this presence of traditional forms does not appear to have prevented Giotto from expressing his highest thoughts and feelings in his art. It is instructive to contrast such a scheme of colour decoration with the gold interior of St. Mark's at Venice. It is pleasant to leave both, certain that each is equally right and equally splendid, though apparently so different. I have to notice the interest occasioned by seeing the large Hall at Padua (the "Sala "Ragione") and the manner in which it is decorated in colour. The walls alone retain their original decoration in the form of numerous frescoes executed in the time of Giotto. These fresco pictures, of different Christian and mythological subjects, are arranged in a manner which I think is perfectly successful.

Venice.—I reached Venice on October 31, 1887. Most of my time there was spent in St. Mark's. I have submitted different drawings made in the church. This opportunity of studying the mosaics was particularly valuable to me, as I had had the great pleasure of seeing those in Rome during the previous year. Nothing made such an impression on me during my tour as the interior of St. Mark's. The marvellous effect of the mosaics, their grand design, their symbolism, the history of the religion they tell, with their beautiful material—all these it is unnecessary for me to dilate upon. Their perfections are well known, and I can only feel grateful for having been enabled to see them. Happily the restorations which go on daily in St. Mark's do not destroy the general effect of the church. Standing at the west end, a view is obtained which with a bright afternoon's sunlight upon the mosaics is indescribable. It is not only the material which is so remarkable, nor its unusual quantity, but the arrangement, the scheming, and position of the different subjects show the artistic courage and vitality of the old workers in mosaic, and the vigour of their ideas. Where the same spirit runs through nearly all, it is practically easy to take an example, where this power of design appears very prominent. On the south transept arch, on its broad unbroken width, is represented the Last Supper. A long table stretches across the arch, and Christ occupies a position on a throne at the end, and several Apostles are ranged on the side of the table away from the spectator [Illustn. xxv.]. Considering the size of the space to be filled with mosaic, this would apparently be a serious subject to treat, needing many different colours to express it properly; but the representation is, in fact, given in the simplest manner. The background is gold, the table and table-cloth and the garments of Christ (with the exception of one upper cloak) are also gold. The necessary drawing is obtained by merely indicating the folds of the cloth, dress, and the general outlines of the table, throne, cups, and platters in red lines. The Apostles are in dark dresses, but only the upper portions of their bodies are seen. These together with the red brown upper garment already spoken of, and a footstool below the throne, complete the only parts which tell out as "darks." A representation of Christ washing the feet of the disciples, immediately below this, is carried out in the same broad, simple, and impressive manner.*

It is very interesting to notice the large amount of white mosaic used in the Baptistery; china-white in colour, it gleams and gives an infinite charm.

A piece of marble carving, representing two animals feeding from the foliage of a tree, exists in the north front of St. Mark's. The carving is very carefully finished, and it has not been restored [Illustn. xxvi.]. †

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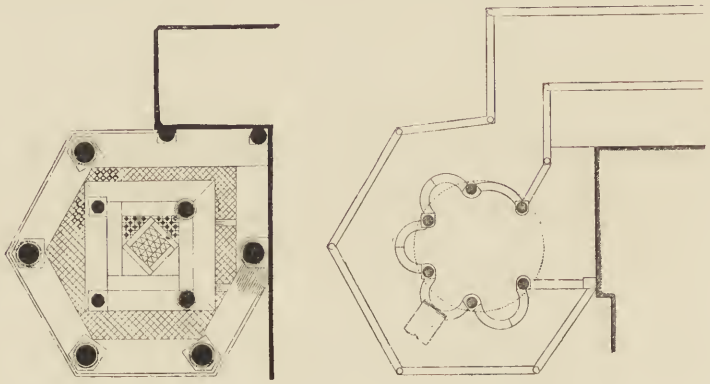
* A similar treatment is to be seen at Ravenna, where, in the mosaic of the virgins bearing gifts in San Apollinare Nuovo, their dresses are gold like the background, the folds alone being indicated by red lines, their veils are of a whitish colour with blue lines, and richness is given by the gorgeous girdles worn by ladies of the time. In all cases faces, hands, and hair approach natural colouring.—G. C. H.

† The same plate [Illustn. xxvi.] contains the reproduction of a drawing, made during my stay at Ravenna, of the marble pulpit in the church of San Apollinare Nuovo. The marble is white, with veinings of a purple colour. Underneath the pulpit, and helping to support it, is a column of porphyry.—G. C. H.

I have submitted a measured elevation [Illustn. xxvii.] of one side of the double pulpit in St. Mark's; and I have, besides, numerous notes in a sketch-book of the ornament found upon it, and of the different marbles. This pulpit is entirely of marble, with the exception of its dome, which is of wood. The columns in each storey are of different marbles, and the body of both is composed of slabs of porphyry and green serpentine. The base moulding of the lower storey and the panel moulds of the upper one are of grey marble. The dome is gilded, and has an arabesque pattern, of a dark colour, upon it. The angel supporting the lower book-rest, and the eagle on the upper pulpit, are also gilded.

It would have been interesting to have given much more time to the Treasury of St. Mark's, but I was only able to view the different objects which are shown, especially the Palla d'oro. The great delicacy of the gold lines in the enamel work of the latter struck me very much. The gold lines expressed more than I had previously seen in enamel work.



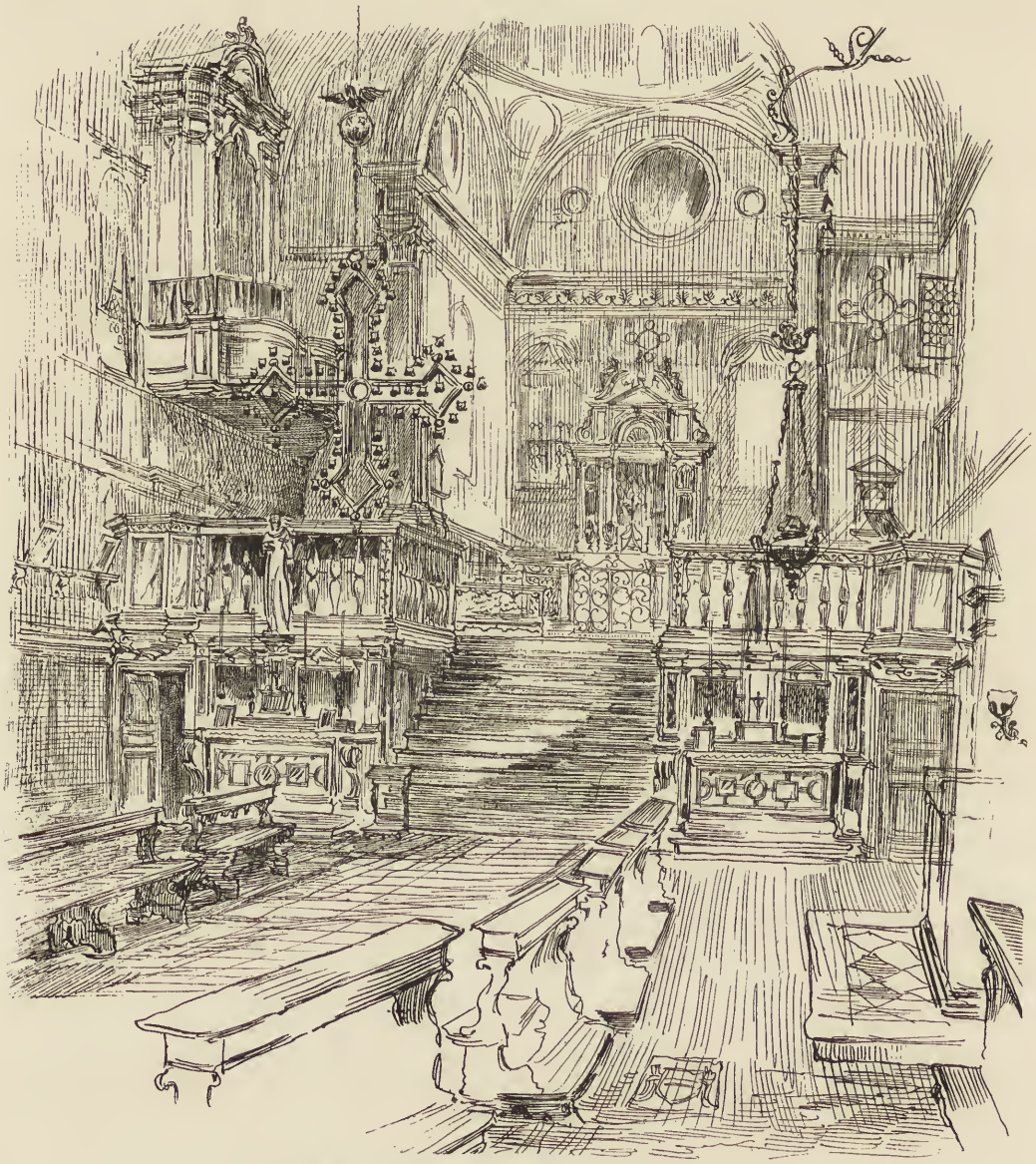
Plan at A. Plan at B.

Pulpit in St. Mark's, Venice. [See Illustn. xxvii.]

A day was afterwards spent at Torcello, and another day at Murano. The exterior of the apse of San Donato, once so rich in colour, is now entirely reworked. The remarkable outlines still remain, but the triangular pieces of marble are new, and their surroundings have been made entirely fresh and new. I was not prepared for the beauty of the mosaic in the apse: the wonderful interceding Madonna, in the centre of a vast field of gold. I have submitted two drawings of the little chapel of San Giorgio degli Schiavoni. It is difficult to imagine that such a chapel, so valuable for its wealth of colour decoration, can have any fault; but there is, in my opinion, one, namely, its want of light. Yet when the chapel was built, and Carpaccio painted the pictures for it, this want, if it be one, no doubt received full consideration. Carpaccio has lavished an amount of patient and priceless work in this chapel, which is equalled only by other great masterpieces sometimes found behind doors and in dark corners. It is instructive to compare this panelled and painted chapel with Isabella d' Este's room at Mantua. The same scheme prevails; a panelled room with a deep frieze of canvas-painted subjects occupying about one-third of the total height; the date of the woodwork being nearly the same. The pictures, however, at Mantua are of later date and very bad, yet they enjoy the advantage of a beautiful light. The decoration of the chapel struck me as appealing especially to modern artists. The architect and the painter are here in perfect harmony, and in a relief of St. George and the Dragon, over the doorway outside, it is at once seen that the sculptor is too. I should like to point out the difference to be noticed between the framing of the pictures here and those in the large rooms of the Doge's Palace. There the largest canvases in the world are divided one from the other by four-inch gold frames. In the Schiavoni Chapel each canvas is inclosed in its own three-inch frame and set back half an inch within five-inch carved pilasters.

On the following page is a reproduction of a pen-and-ink drawing made by me from a photograph taken some eight years ago. The present appearance of the interior of Santa Maria dei Miracoli is now different in some respects, owing to the restoration works which have been going on in the church during the last few years. Some features have been removed, such as the picturesque organ on the north side, and the two altars and statues right and left of the choir steps. The statues are at present in the sacristy of the church. The delicate carving and beautiful detail of the choir balustrade and pulpits has not been injured in any way, I believe, and the handsome hanging cross, decorated with little lamps, in the same style as the cross in St. Mark's, has not been removed. Further study in Santa Maria dei Miracoli would have been very pleasant, especially of the very fine panelled ceiling,

rather different in its design to others of its period (Middle Renaissance) which I had seen during the tour.



Sta. Maria dei Miracoli, Venice, before Restoration.

Ravenna.—It would be exceedingly difficult to describe the effect which the great basilicas at Ravenna, rich in colour decoration, made upon me. I am aware of the advantage I have enjoyed by seeing them, and studying in them, and I tender my best thanks to you, Gentlemen, for having elected me an Owen-Jones Student, for I feel that my tour will always be of the greatest service to me. I have submitted two drawings I made while in Ravenna [see footnote, page 146 *ante*]; the rest of my time there was spent in studying the mosaics in San Apollinare in Classe, in San Apollinare Nuovo, San Vitale, the Tomb of Galla Placidia, the Baptistery, and the Archiepiscopal Palace. I left Ravenna on Wednesday, November 23, 1887, and arrived in London on the 25th.

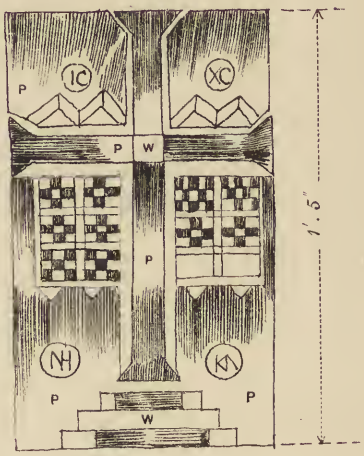
GERALD CALLCOTT HORSLEY.

The Phototype Co., 308, Strand, London.

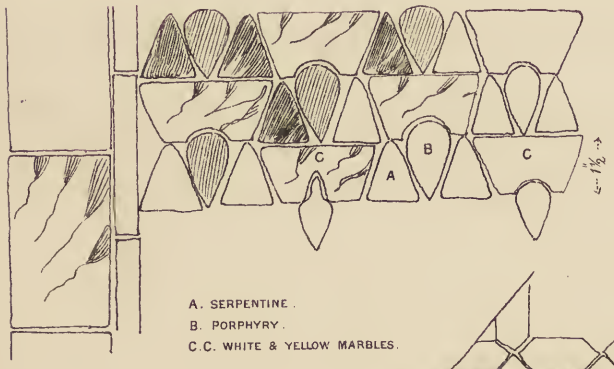
MARBLE WALL-TOMB IN SAN FERMO MAGGIORE, VERONA.
FROM A PENCIL DRAWING BY MR. GERALD C. HORSLEY.

[Page 144.]

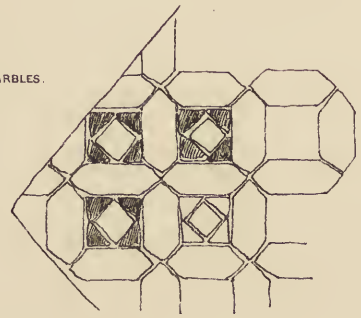
ST MARK'S, MOSAIC OF THE LAST SUPPER.
See Page 141

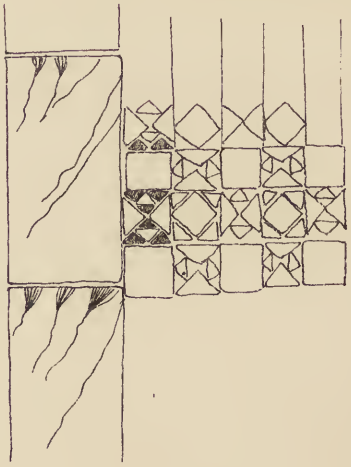


MARBLE WALL PANEL.
P. PORPHYRY
W. WHITE MARBLE



A. SERPENTINE.
B. PORPHYRY.
C.C. WHITE & YELLOW MARBLES.



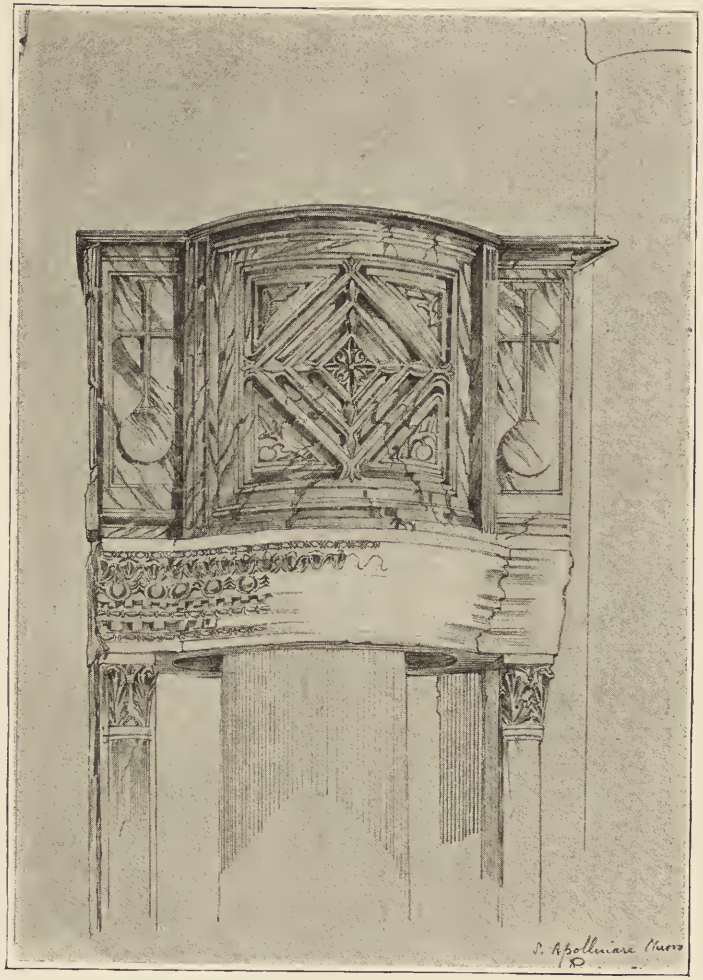


OLD PAVEMENTS, ST MARK'S.

Gerald C. Horsley del

C. F. KELL PHOTO LITHO 8 FURNIVAL ST HOLBORN, E.C.

L. REPORT OF A TOUR IN NORTH ITALY (xxvi.).



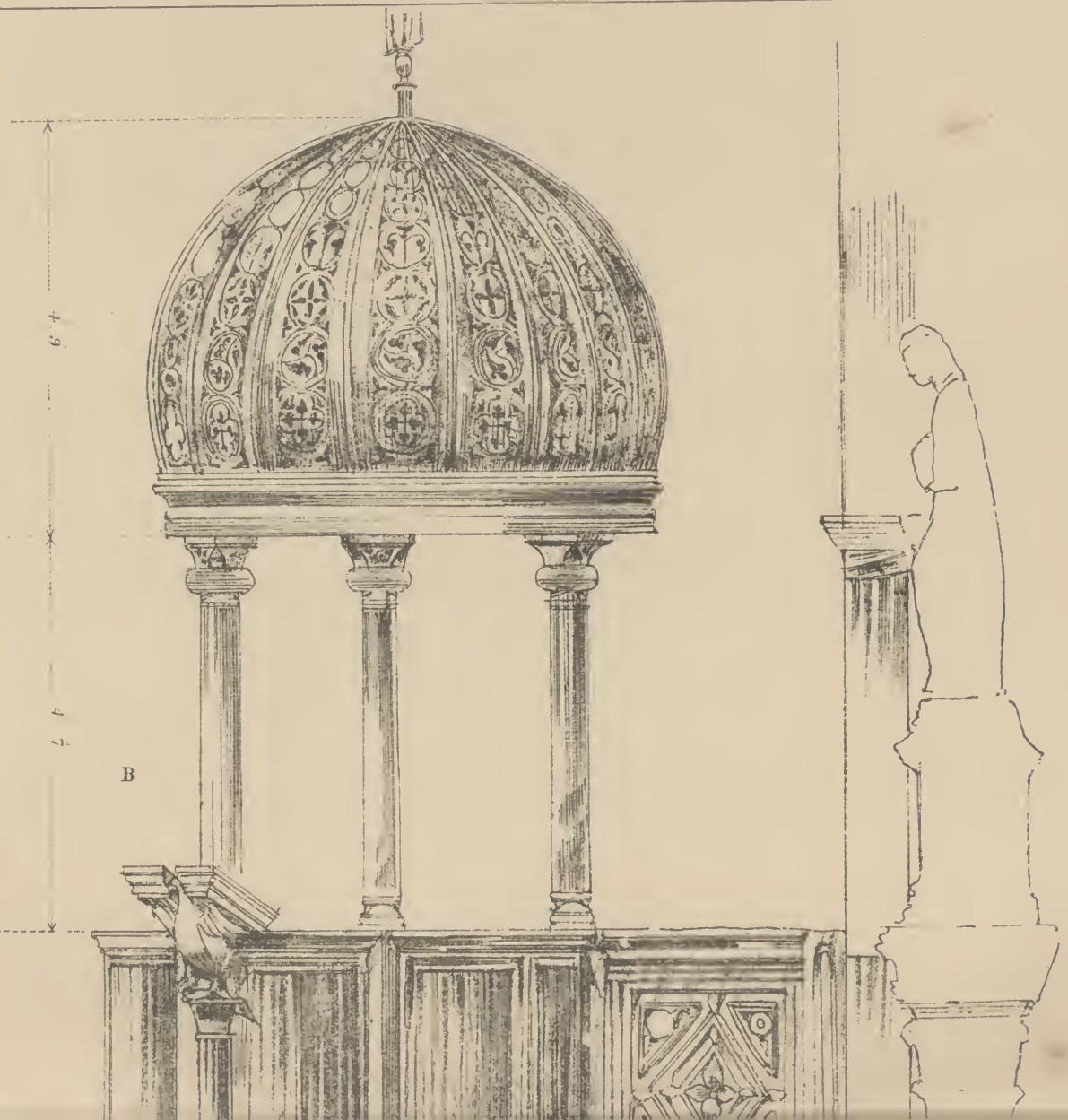
The Phototype Co., 303, Strand, London.

MARBLE PULPIT IN SAN APOLLINARE NUOVO, RAVENNA.

CARVED PANEL ON N. FRONT OF ST. MARK'S, VENICE.

FROM PENCIL DRAWINGS BY MR. GERALD C. HORSLEY.

[Page 146.]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Scale of half an Inch to one Foot.

ELEVATION OF A PULPIT IN ST. MARK'S. VENICE.

FROM A PENCIL DRAWING BY MR GERALD C. HORSLEY.

[See Illustration VI and page 147]

C. F. Kell Photo Lith & Printer 8, Furnival St. Holborn, London E.C.

LI.

THE DEVELOPMENT OF CHURCH PLANNING:

A PRIZE ESSAY, SESSION 1887-88.*

By Mr. Herbert Arnold Satchell, *Institute Silver Medallist* (*Essays*).

[*Addressed to the Council.*]

Mr. President and Gentlemen,—

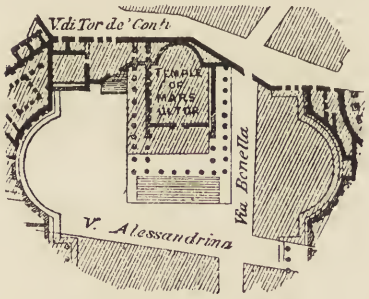
THE only record we possess of the earliest church or meeting-place is contained in the simple words of the New Testament narrative,—"They [the Apostles] went up into an upper room." In this chamber, part of the house in which they lived, they met for prayer, for "breaking of "bread," and for the election of a successor to the apostate Judas. Out of this homely meeting-place, this simple memorial meal, and this elementary act of Church government, was to develop, in the progress of the succeeding ages, a series of buildings which should rival the descriptions of the Temple of Solomon for grandeur. To trace out the connecting links in a chain which stretches in an unbroken although somewhat tangled line, and connects this "upper room" at Jerusalem with our nineteenth-century churches, is one of the objects of this present Essay. That the history of Church Architecture can only be rightly understood in so far as its connection with the history of the Church's inner life is demonstrated, is certain. The one is naturally the outward expression of the other. While, therefore, endeavouring to confine the consideration of this subject to strictly architectural limits, it will be necessary for its proper understanding to admit some of the side lights which history and archæology so bountifully supply.

The infant Church has left few remains of buildings from which a history of the starting growth of Christian architecture can be compiled. But this period of infancy is necessarily alive with inward workings, the results of which appear when, in the fourth century, the Church blossoms forth in the full luxuriance of an institution recognised and fostered by the shielding arm of Rome. In tracing this early development two facts should be remembered: first, that the early Christians, and Paul pre-eminently, were good Jews; and secondly, that the Founder of the Faith left no specific directions either as to the liturgical observances which His followers were to practise, or as to the places in which they were to assemble for worship. The Christians, at least for some years, attended the Temple and

* See the Journal of Proceedings, Vol. IV. n.s. pages 121 and 263. Mr. Satchell's Essay has been considerably reduced, but no radical alterations have been made in the text, and he is necessarily responsible for the statements, historical and descriptive, made therein. Amongst the authorities consulted by him, generally, are Fergusson's History, Gwilt's Encyclopædia, Parker's Glossary, the Architectural Publication Society's Dictionary, and Professor G. Baldwin Brown, M.A. Other authorities consulted are mentioned in footnotes under the several divisions of the subject. The illustrations in the text, except where specially noted, are reproduced from Fergusson's *History of Architecture* (last edition) and are all to a scale of 100 feet to one inch. See also Illustn. xxviii. between pp. 172-173.

the provincial synagogues as of old, supplementing these services by informal meetings amongst themselves, and by the breaking of bread from house to house. Gradually, the number of Christians began to multiply, and the sect was heard of in many of the important cities, including Rome itself. At first the Imperial Government marked no difference between this sect and other sects of the Jews, to whom its clemency was extended. This toleration probably lasted during the first century; but before long the differences between the Christians and the Jews grew wider and more obvious, until at length the State began to recognise the existence of the Christians as a separate body, allowing them, as it did other members of friendly or burial societies, to assemble in their cemeteries. In A.D. 250, however, this clemency was withdrawn, and the Christians under Decius and Valerian were forbidden to assemble, or to visit the cemeteries. Hence they had to betake themselves thither at night in secret, while the disused stone quarries and other similar hiding-places proved harbours of refuge to the outcast sect. In these secret labyrinths they could find safe interment for their martyrs' remains, and hence such places became objects of solemn visitation. Happily, before ten years had elapsed, they were once more permitted to assemble in the cities and the cemeteries, and permission even was not refused them to erect houses for their meetings. One more storm, before they reached a haven of certain shelter, was destined to overtake them, under Diocletian, at the beginning of the fourth century. Their churches were destroyed, and once more they had to betake themselves to the friendly shelter of the catacombs. This cloud soon passed, and on the accession of Constantine (A.D. 306) they were able once more to emerge from their hiding-places. Within a few years Constantine himself had become a convert, and that Emperor's famous Edict of Milan proclaimed that the Christian sect was a body corporate, "whom the "king delighteth to honour."

Of the buildings used by the Christians during those first three centuries there is documentary evidence, though scarcely any examples remain. The subject is most interesting as helping to show from what elementary forms the fully developed churches or basilicas of the fourth century were evolved. This question, however, of the origin of the form of the Christian church is still a subject of inquiry: one side holding that the Christian temple derives its form from (and in some cases actually is) the pagan basilica; the other, that it is the logical outcome of the buildings in which the Christians had hitherto assembled, only modified by the propinquity of the pagan basilica. Without entering on the controversial side of the question, it may suffice to describe those early buildings of which traces remain, and to which Christian uses can be ascribed; and to show how the later buildings, although perhaps founded on the basilica, still preserved some traces of their descent from earlier forms. It has been noticed above that the early Christians continued to assemble in the Jewish synagogues, and it is recorded that Paul preached in these to mixed congregations. When the Jews became virulently hostile, Paul "separated the disciples," and adjourned to the "School of "Tyrannus." Besides these public gatherings we read of meetings of a more private character being conducted in private rooms, such, for instance, as the "upper chamber" at Troas in which Paul preached, and the meetings held in Paul's own house during the last two years of his life. Similar meetings seem to have been held until the fourth century, although after the first century they were supplemented by others held in special places.

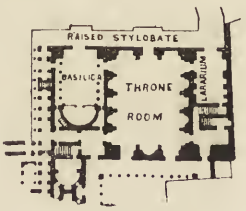


PAGAN TEMPLE IN ROME.
From Professor Middleton's *Rome*.
Scale 200 ft. to 1 in.

The use of *atria* or courts for Christian meetings is mentioned in the theological romance, the *Recognitions* of Clement, and it is probable that the Christians had other places for meeting than those, which would not have been always available for the purpose. It has already been stated that the Christians were classed by the State amongst the other corporate associations of the time; and it is highly probable that, copying the customs of such "lodges," they should have built themselves *scholæ* or lodge rooms likewise. Two have been unearthed at Pompeii, each of which has an apse at the end opposite the entrance. In addition to those societies whose lodges existed within the city walls there were funeral societies, and their *scholæ* were attached to the cemeteries. One of these latter has been described as a *cella* with a single entrance, having an altar in the midst, and around the walls a bench

accommodating fifty persons. Such a building used by Christians has been discovered by de Rossi at the entrance to the ancient catacomb of Domitilla. Similar to these were the *cellæ* erected in the cemeteries for the due performance of funeral rites. Of Christian examples of these we possess several records. Eusebius (quoting a writer of the second century) relates that the trophies, or memorial chapels, to the martyrs Peter and Paul were to be seen in his day on the Vatican Hill on the road to Ostia. De Rossi has also discovered in the catacomb of S. Callisto at Rome, two ancient buildings which he identified as Christian *cellæ*, dating, as he thinks, from the period previous to Diocletian. Their plan shows three apses set on three sides of a thirty-feet square, the fourth being left open. In these were celebrated the memorial feasts of the martyrs, the company assembling round the building, while the presbyters and deacons performed the religious part of the ceremony within. Many of the large Roman basilicas (SSS. Peter, Paul, and Lorenzo, and Sta. Agnese) are outgrowths from the memorial chapels of martyrs whose bones rest beneath them. An interesting example of this may be seen in a monument on the road to Tivoli, a few miles out of Rome. Over the grave of Sta. Sinforosa and her seven sons a memorial *cella* was built with three apses, similar to the one already mentioned on the burial-ground which belonged to S. Callisto. In process of time the accommodation it afforded for memorial services became insufficient, and a church of basilican type was erected by the side, the apse of which just touched the corresponding apse of the *cella*, and an opening was made through the walls that the tomb might be visible from the church. Another description of buildings used by the Christians in the early centuries of which we possess records, are the underground chapels in the cemeteries.

The private basilica, hall, or *atrium*, probably exercised as much influence on the forms of the fourth century as did the memorial *cellæ*. Although not specially erected for Christian worship, it was most admirably adapted to it. The private basilica was a necessary adjunct to the house of a noble who discharged the duty of the magistracy, and in it his court was held. It differed from the public basilica in having no range of columns at the end, and in thus allowing the end apse or tribunal to dominate the whole. A good example is found in Domitian's basilica at Rome, which closely resembles a Christian church, but only one example of a building of this description, dedicated as a church, remained to modern times. It was the church of S. Andrea in Barbara, Rome, which was destroyed at the Renaissance. The date of its erection is placed by de Rossi as A.D. 317, and it bore an inscription that it was bequeathed to the Church in the fifth century. All these forms of buildings existed prior to the time of Constantine, and in the Christian basilicas erected in his reign their influence, slight though it may be, can be traced. The simple buildings first erected required enlarging with the growth of the Church. This was effected (1) by the erection of side aisles, and (2) by the addition of an apse, due partly to the associations with the memorial *cellæ*, but chiefly to its intrinsic suitability to the services of the Church. From the union of these elements, and under the shadow of the pagan basilica, arose the church of the fourth century.

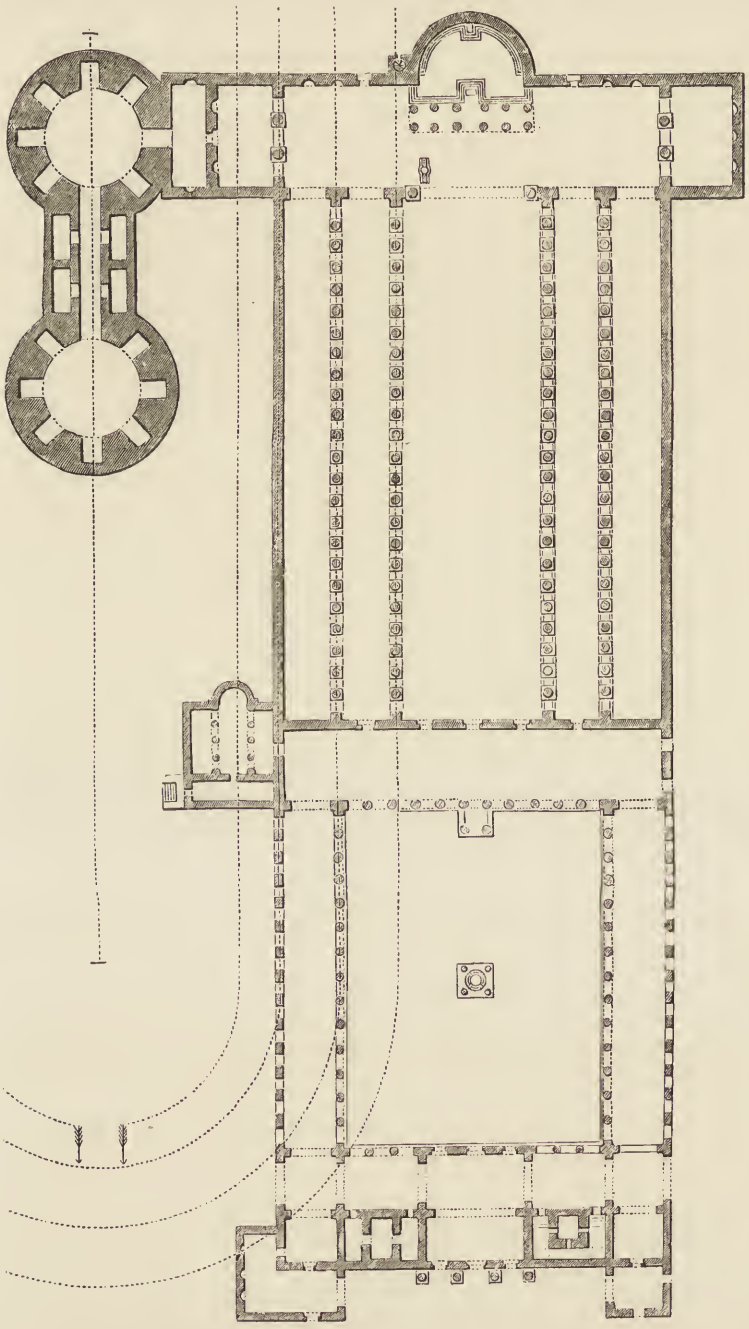


DOMITIAN'S BASILICA.
From Professor Middleton's *Rome*. Scale 200 ft. to 1 in.

The pagan civil basilica answered two purposes. It was (1) a court of justice, (2) a mercantile exchange. A typical example of one of these buildings (which Vitruvius says should have a width of not less than one-third or more than half its length) consisted of a spacious central hall, surrounded by a continuous aisle or portico, divided from the central space by columns. It was entered at one end through a vestibule; opposite this entrance, in the further wall, was formed a deep semicircular recess, or apse, about the width of the central division. Between the body of the hall and this recess a wide aisle intervened, the line of division being marked by a range of columns similar to those at the sides. This aisle was used by those in attendance on the Court. The apse or tribune contained in its centre the curule chair of the prætor, and on a raised platform around its wall seats were arranged for the judges and other distinguished persons. On the centre of the apsidal chord was placed an altar, used for daily sacrifices and probably also for oaths. The tribune floor was raised by several steps above the level of the hall, and it was inclosed with a dwarf wall breast high, with occasionally a range of columns in front. Beneath, a cell was often placed for the temporary confinement of prisoners.

Basilica was the name applied by the Christians to the early churches, either from its intrinsic suitability (its meaning being "palace of the king" or "royal house"), or because its form was eminently suited for their services. In it they found a large and convenient space for an assembly or a

congregation, together with a provision for the separation of the sanctuary. The form and arrangement of an early Christian basilica may be divided for purposes of description into two parts, exterior and interior. As regards the former, it will be assumed that the building stands in the conventional position of east and west. At the western end a vestibule or *propylæum* gives access to the *atrium*. Here all who desired to become members of the Church underwent a preliminary examination. Here, too, the penitents of the first order had to remain and appeal for the prayers of those entering. Through the vestibule was reached the *atrium*, which was a quadrangular court surrounded by a portico or covered passage; of this passage three sides, those on the north, south, and west, may be considered as belonging to the *atrium* proper, while that on the east side, which was often of greater width than the others, belonged rather to the church, and often existed where there was no *atrium*. The centre of the *atrium* contained a fountain, that all might wash themselves before entering the building. Under the shade of the surrounding porticoes pilgrims were often lodged. The fourth or church side of the *atrium* was called the *narthex*, and seems to have derived its name from the ferule or rod used for self-chastisement by the second order of penitents who stood within it. From this portico three or more doors led into the interior. The centre of these doors, which was wider than the rest, was called the "royal gate," and gave admission to the nave. The doorways were hung with curtains, which were drawn when the part of the service to which alone those



Basilica of S. Peter, Rome (on the site of the Circus of Nero).
[See Illustn. xxviii. fig. 6.]

standing outside might listen, was finished. The nave was flanked by an aisle on either side, the one on the north being reserved for the women, and that on the south for the men. Between the columns separating the aisles and the nave curtains were drawn. In a part of the western portion of the nave the third order of penitents found a place, and the remainder of the western portion was occupied by the fourth or last order of penitents. The nave finished eastwards with the so-called arch of triumph, which separated it from the apse or sanctuary. In cases where there was a transept, the arch was placed between it and the nave. Extending westwards from this for some distance was a slightly raised platform surrounded by dwarf walls or a marble screen. On each side were the pulpits, that on the south side being the Gospel pulpit, and the one on the north forming a lectern for the Epistolar. This platform, or ritual choir, was entered from the nave by a gate in its west wall. The easternmost portion was called the *solea* or *senatorium*, and was reserved for persons of rank. Within the choir sat the inferior clergy, sub-deacons, singers, and readers. Several steps, within the arch of triumph, led up to the *sacrarium*. In the centre, within the arch and under the sacrarium floor, was placed the confessionary or martyrdom. This was the martyrs' tomb, and was the germ of the mediæval crypt. Directly above, elevated on a footpace, was the altar, and at its back the tribune extended eastwards from the eastern wall. In the centre of the tribune was placed the *cathedra*, or bishop's throne, on an elevation which was reached by a central flight of steps. The throne by its position dominated the whole building. On each side, at a lower level, were placed, in rising tiers, seats for the presbyters. The tribune was divided from the choir by a screen having one door, or in large churches three doors; and these only the superior clergy were allowed to pass. On each side of the tribune was a square or apsidal apartment. That on the north was used for the reception of the sacred vessels. The corresponding one on the south served as a sacristy or vestry. Both of these apartments occasionally contained an altar.

Such was the early Christian basilica, changed from its pagan prototype :—(1) by the isolation of the apse; (2) by the extension of the platform or *bema*, and its isolation ; (3) by the introduction of an inclosed space in the centre of the nave ; and (4) by the introduction below the altar of the bodies of saints (to honour whom the church was erected) in a confessionary or crypt. In all these alterations the dominant hierarchy of Rome, repudiating the republicanism of the early days of the Church, adopted the more convenient doctrine and arrangement of absolute separation of the congregation into clergy and laity. Although some parts of the service, such as baptism and confirmation, were at first performed in other and separate buildings, yet not many centuries elapsed before these became superseded ; and the basilica, aggregating within itself all the offices of the Roman Church, became the only acknowledged ecclesiastical building. The original simplicity of its form, too, was by degrees departed from. Apses were introduced at the upper ends of either aisle ; the cross form became developed by the projection beyond the side walls of the passage separating the nave and apse. Apses were added to other parts of the building, and side chapels were added.

One other class of buildings which grew side by side with the Basilica, sometimes becoming incorporated with it, were those of circular or polygonal form. There is little doubt that this form was copied from the Pantheon [Illustn. xxviii. fig. 1], the Minerva Medica, and the various temples dedicated to Vesta which were always circular. The earliest examples extant date from the time of Constantine, and were generally used for Baptisteries or Memorial Chapels.

An endeavour has been made to analyse the forms implanted in Italy, in the fourth century, from which all church architecture has grown. It has been attempted to show that their root fibres are buried deeply in, and obtain nourishment from, the forms established in the preceding centuries. From the transference of the seat of empire to Byzantium, the branches begin to part company with the parent stem, and in all Christian countries to become influenced by the idiosyncrasies and peculiarities of the soil into which they were transplanted. In all, however, the influence of their common ancestry can, even to the present day, be more or less clearly discerned. It now remains to trace these developments through a series of typical examples in each of the countries possessing a Christian architecture ; and it is proposed to devote a large share of the space which remains at disposal to the consideration of Italian buildings, since Italy was not only the birthplace, but also the cradle and nursery, of ecclesiastical art. Consequently to her, pre-eminently, belongs the privilege of handing down through ages an unbroken succession of progressive buildings.

Italy.*—The oldest basilica still existing in Rome is S. Giovanni Laterano. Rebuilt, however, in later times, its existing plan—the ambulatory round the apse having been added by Nicholas IV. at the end of the thirteenth century—is not wholly original. Still the body of the church, with its nave, four aisles, portico or *narthex*, and incipient transepts, probably retain their ancient form.

Another basilica, erected by Constantine, is that dedicated to S. Peter. Its position has already been alluded to, and also its orientation, and a plan of it is given on page 152 *ante*. Its *atrium* consisted of a quadrangular enclosure. The *narthex* was, as usual, under the portico, which extended round the other three sides. A bold range of buildings stretched along, and somewhat beyond, the east side of the *atrium*, the central portion forming the porch. The body of the building was entered from the *narthex* by six doors, and was divided, by four ranges of columns, into a nave, about eighty feet wide, and four aisles. At the west end of the nave, extending somewhat beyond the width of the body (an unusual arrangement at that time) was the *bema* or transept. The use of this form possibly arose from the necessity of connecting it with the tombs of the west side. The south would, of course, be extended for symmetry. Opposite the nave and corresponding to it, or rather to the arch separating it from this transept, was the tribune, a semicircular apse. Its floor space being small had to be carried forward some nine feet into the transept and was raised on steps placed on each side of the confessionary. The arrangements of the apse were similar to those already described. The confessionary beneath the high altar contained the sarcophagus of S. Peter. The choir extended some distance into the nave.

The third example in Rome of an early four-aisled basilica is that of S. Paolo f. l. mura, now destroyed. Its plan closely followed that of S. Peter's, but had its tribune the full width of the nave and a transept with slighter projections. This building, with its deviations from the existing type, marks the first great step in the development of church building. Internally a range of twenty columns separated nave and aisles.

The basilica Liberiana, now known as the church of Sta. Maria Maggiore, is the sole example known of a civil basilica given up to the Christians by Constantine. The basilica of S. Lorenzo f. l. mura, at Rome, is interesting as preserving the original means of descent into the Catacombs.

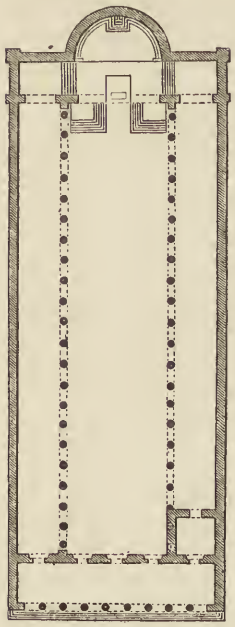
S. Clemente, Rome.

The basilica of S. Clemente is of unique interest, as it retains, in their original disposition, the ancient internal arrangements and church furniture; and it possesses the only perfect *atrium*, dating from early times, now existing in Rome. It is entered by a four-columned portico (of later date) and has a second entrance on the south side. The body of the church consists of nave and two aisles of different widths (that on the north being the wider). At the end of the aisles are two apsidal chapels, one of which at least is a modern addition. The position of the choir, and the accompanying arrangements of the *sacrarium*, form the chief features of interest in the interior. The choir is an oblong space nearly one-half the width of the nave and about one-third its length. Its floor is raised one step, and it is enclosed with a marble screen wall which surrounds every part save where the *ambones* and the three entrances occur. In this example no trace of a transeptal arrangement occurs.

The early portion of the sixth century was a time of great disorder in Italy, taking advantage of which Justinian re-united the country to his hereditary dominions. Under his auspices Ravenna, which had become the seat of government, was adorned with many new basilicas. S. Apollinare in Classe (now standing alone on a desolate, marshy plain) was formerly part of a thriving seaport some 2½ miles from Ravenna; it differs in plan from the more important basilicas of Rome, in having no transeptal feature and in the width of its nave, which is two-thirds its length. At the west end is a large porch or *narthex*, and originally

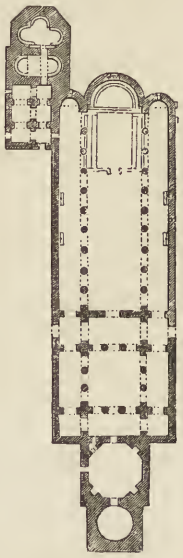
* In the preparation of this portion of the Essay the following authorities, amongst others, were consulted:—Professor G. Baldwin Brown, M.A. (*From Schola to Cathedral*); Professor Middleton, M.A. (*Ancient Rome*); Hübsch (*Monuments de l'architecture Chrétienne*); H. Gally Knight (*Ecclesiastical Architecture of Italy*); Montigny and Famin (*Architecture Toscane*); Osten (Lombard Architecture); L. Scott (*Renaissance of Art in Italy*); Street (*Brick and Marble &c. in Italy*); Willis (*Architecture of the Middle Ages in Italy*).—H. A. S.

there was an *atrium*. Its tribune, which is semicircular internally and five-sided externally, affords the earliest evidence of the use of a polygonal apse. This and S. Apollinare Nuovo attest to the advance then made in the planning of such edifices. Fergusson considers that the great merit of these basilicas arises from the circumstance of Ravenna having possessed no ruined temples the spoils of which could be used in the construction of new buildings. The architects consequently introduced a harmony into their designs utterly unknown in the Roman examples. In S. Apollinare Nuovo, he thinks that the pillars are pleasingly placed, and that their capitals, surmounted by a block, suffice for the support of the arches springing from them. The whole, he adds, is "an immense stride in "advance of the Roman style."



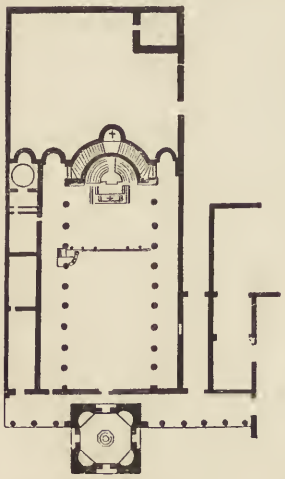
S. Apollinare Nuovo, Ravenna.

The plan of the cathedral of Parenzo (Istria) affords a remarkably perfect example of the early basilican arrangement. Its group of buildings comprises a baptistery, *atrium*, with two entrances on each side and one from the baptistery, and the basilica proper. The body of the basilica consists of a nave and of single lateral aisles; these latter terminate in small semicircular apses, which show square in the exterior. The tribune or central apse is semicircular internally and six-sided externally.



Cathedral of Parenzo.

The cathedral of Torcello, supposed to be a copy of Parenzo, which lies just across the gulf, has also a triapsal eastern termination. A broad nave is flanked by very narrow aisles, from which it is separated by nine columns. The three easternmost of the nave bays are monopolised by an eleventh-century choir enclosed by a screen. The chief internal feature of interest consists in the arrangement of the apse, which still exists to confirm the correctness of the typical arrangement already described. The altar has advanced considerably beyond the chord of the apse, being almost on the range of the first columns. Round it, against the apse walls, are six semicircular stone steps, which rise above each other, forming seats for the presbytery, and lead up to the bishop's throne, which occupies the central spot at their summit. At the west end there is a covered portico or *narthex*, and adjoining it, opposite to the main entrance of the nave, is the baptistery.

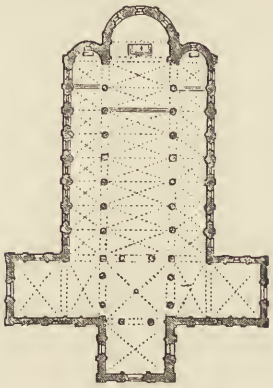


Cathedral of Torcello.

S. Ambrogio, Milan, was originally erected in the fourth century, and in it S. Ambrose was buried. The present building was raised in his honour. A basilica of normal type, with apsidal nave, it is one of the few which still possess an *atrium*. The rows of chapels along the sides of the nave were probably additions when the church was rebuilt three centuries later. Of this building, Fergusson says:—"The "atrium is practically a nave; in other words, if the church had been "erected on the colder and stormier side of the Alps, a clerestory would "have been added to the atrium, and it would have been roofed over; "and then the plan would have been nearly identical with that of "a northern cathedral. If, besides this, there had been a baptistery "at the western entrance, as at Novara, Piacenza, or Torcello, we "should have had a building with two apses,—a complete German "cathedral."

The cathedral of Novara consists of *atrium* and basilica, with an apsidal projection, and exhibits several peculiarities:—(1) the *atrium* has no colonnade on the west side, which gives access to the baptistery; (2) the interior consists of nave and two aisles, each of which is skirted by a row of chapels, practically forming an extra pair of aisles; (3) the semicircular apsidal termination, eastwards, is projected two square

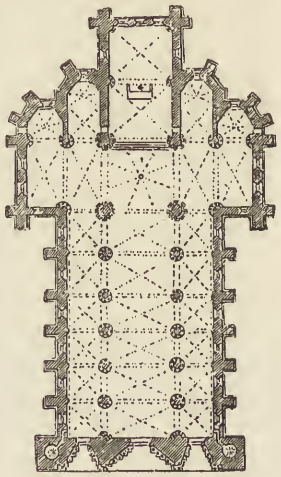
bays from the building, forming an extension almost as long as the nave; (4) the east bay of the nave, much wider than the rest, is flanked on either side by a private chapel, the width of aisle-chapel and aisle, which is open to nave and aisle.



S. Antonio, Piacenza.

The ancient church of S. Miniato, near Florence, having fallen into ruins, was rebuilt (A.D. 1013) on the basilican type. It affords the first example of an interesting feature often met with later. The building is divided longitudinally into three compartments, the lower floor of the eastern one being occupied by the crypt, which is open to the nave. Above this crypt the sanctuary is reached by a long flight of steps.

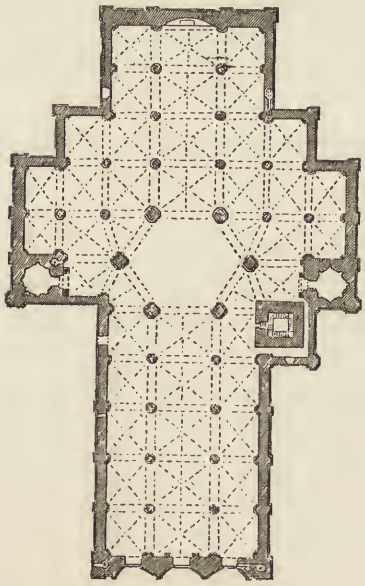
S. Antonio, Piacenza, is an early example of the free treatment of the transeptal form, which had now become an integral part of the arrangement of most churches. The transept here is placed close to the west end of the building and forms a wide façade. It projects, north and south from the building, a distance about equal to its own width. In addition to these projections the nave has a square projection from the western wall, towards the west. This building may be considered as possessing an early indication of the direction in which changes were carried in the northern mediæval buildings.



S. Andrea, Vercelli.

In the early part of the thirteenth century, the church of S. Andrea, Vercelli, was founded by Guala Bicchieri, legate to Henry III., who for his services presented him with the church of S. Andrew, Chester. It contains the first appearance in Italy of an interesting feature frequently met with in other countries, and which becomes in France one of the distinctive features of the Cistercian churches. This is the attachment of a pair of apsidal chapels to the east arm of the north and south transepts. This arrangement was possibly, like its name, influenced by his English associations.

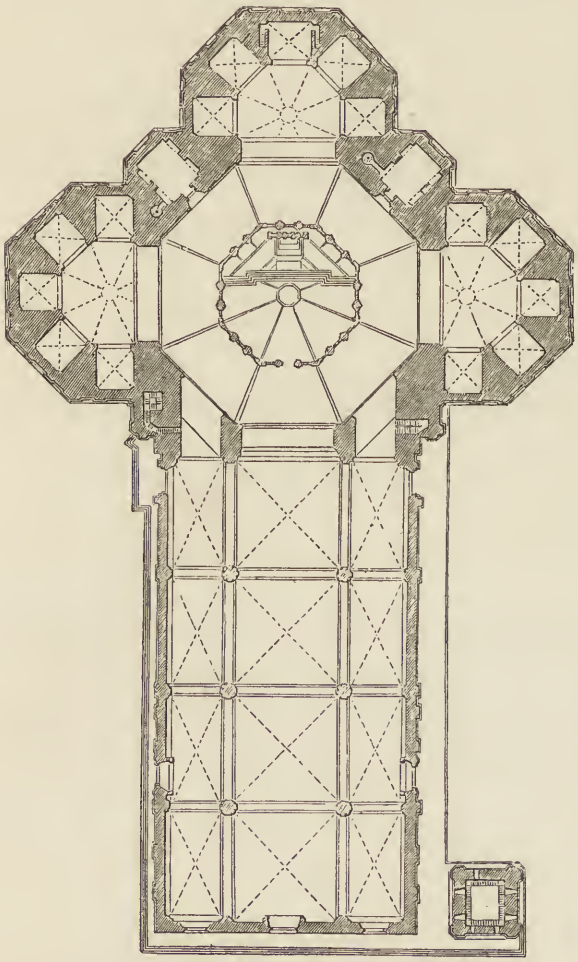
The cathedral of Siena, although founded on the simple basilica model, and containing a nave and three aisles of almost equal width, possesses some peculiarities of plan:—(1) The aisle of the nave is continued round the transepts. (2) The unusual number of six supports, which carry the superstructure, rising over the intersection of nave and transepts; in length from east to west they extend through only two of the three bays of the transepts, while the north and south supports narrow, but do not intercept, the nave aisle. (3) Each transept has a square external chapel at its eastern end. (4) The building has a square east end. The whole plan, however, was remodelled from an older building, and this may account for its irregularities.



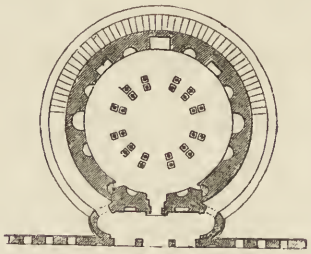
Cathedral of Siena.

Sta. Maria del Fiore, the cathedral church at Florence, although a natural outcome of the lines of development followed out in Italian buildings, if placed beside a fourth-century basilica, without the connecting links being shown, would scarcely seem akin, at least not in the first degree. It may be described as a Latin cross, the north-east and south arms of which are equal, and all of which have polygonal terminations. This disposition, common to the early churches of Cologne, was repeated in what may be called the last great effort of the Middle Ages, or the first of the new school in Italy—S. Peter's. In the interior of Sta. Maria a vast nave, flanked by aisles, leads into an enormous octagon, over which rises the dome; and whence branch three triapsal arms.

In Italy the great period of the Renaissance scarcely broke the continuity of the development of church planning. The same spirit which led its architects to seek, in the old examples by which they were surrounded, the inspiration for their designs, led them to construct buildings on a scheme of plan differing little from those which had been used before. One distinctive feature, however, in the plan of these Renaissance buildings is the number of small chapels which they contain. An example of this may be seen in the church of S. Spirito, Florence (the plan of which is a simple Latin cross), erected by the Florentine apostle of the new style, Brunelleschi (1377–1444), in his native city. S. Andrea, Mantua, by Alberti (1404–1472), the successor to Brunelleschi, is similar in outline, but has its single aisle choked up with private chapels, of which there are, although it is a small building, in aisles and transepts, just sixteen. These examples will suffice to show that the Renaissance, largely as it affected the general design of the buildings, scarcely introduced any novel developments into their plans. Hence, when, in the fifteenth century, Pope Nicholas V. desired to raise on the site of the old S. Peter's a building which should exceed in magnificence all that had been built before, and be worthy of being the metropolitan cathedral of the Western Church, although his (or rather Rossellini's) complete design has been lost, yet that part which was carried out, viz. the western tribune, differs only in scale from such as had been built before. The new building, like the old one, has its high altar at the western end. The Pope's *cathedra* is placed behind it, and thus he is enabled to officiate with his face towards the east.



Sta. Maria del Fiore, Florence.



Sta. Costanza, near Rome.

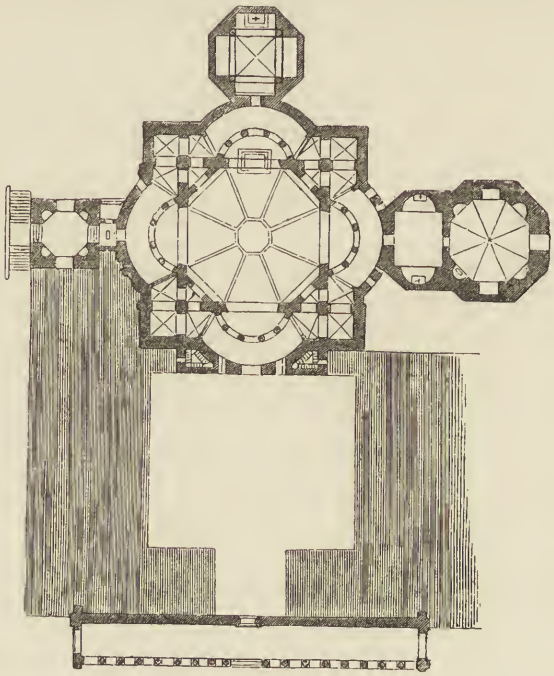
The earliest example of a Christian monumental sepulchral building in Italy dates from the time of Constantine; it was built by him as a sepulchral chapel for his mother, the Empress Helena, on the Lavinian way, about three miles from Rome. The tomb or, as some think, baptistery, of Sta. Costanza, for whichever it may have been erected, is a circular building. It is a rotunda, and has an entrance protected by a portico. The interior has four round and four square niches in the thicknesses of the walls. A central space is screened off by twelve pairs of coupled columns placed concentrically, radiating from the centre. The building is entered through a small crypto-portico having a semicircular end. In front of this is a large oblong space with circular ends. It was converted into a church by Alexander IV. in the thirteenth century. The tomb of Theodoric at Ravenna was a two-storeyed decagonal building enclosing a cruciform crypt. The last example to be noticed is the sepulchral chapel constructed by Galla Placidia, daughter of Theodoric, for

herself and family. This, although dating from the fifth century, like that of Theodoric, is cruciform externally, the west limb being just double the length of the others.

When, in the previous century, the Church began to be organised, the rite of baptism became a sacrament, and special buildings were set apart for its performance. It has been stated that these buildings shared the duty with that of providing a place of burial, but this scarcely lasted beyond the fourth century. Adult baptism was almost universal, and with it was combined the rite of confirmation. Hence both ceremonies had to be performed by the bishop in person, and were confined to the three Festival times: Easter, Pentecost, and Epiphany. As the number of the followers of the Church grew, spacious baptisteries were required to accommodate the crowd of candidates. To provide for the necessary immersion each baptistery contained a large bath, to which the neophytes descended by steps. The inconvenience of the increasing multitude, the age of the bishops, whose strength thus became overtaxed, and the progress of refinement, led to a change of system. Parochial ministers were allowed to baptise, plenary immersion was no longer insisted upon, and confirmation became a separate rite. The ceremony of baptism was transferred to the church, baptisteries became deserted, and after the thirteenth century no more were built. Baptisteries seem to have had no fixed position, but were placed either opposite the church, at its side, or even in its *atrium*. The baptistery of Constantine is one of the first buildings of which we have record erected for this purpose. The baptistery of Ravenna, adjacent to the ancient basilica, is one of the oldest ecclesiastical buildings in that city. The baptistery at Novara (attributed by Hübsch to the fourth or fifth century) is attached to the west side of the cathedral *atrium*. The baptistery of Florence (supposed by some to have been actually the old temple of Mars, which formerly stood on the site, was probably erected in the time of Theodelinda, Queen of the Lombards, at the end of the sixth century; originally it was the city cathedral and baptistery combined, but was superseded by the present Duomo in the thirteenth century. At Nocera dei Pagani, with the unusual dedication for these buildings to Sta. Maria Maggiore, there is a circular sixth-century baptistery similar to that of Sta. Costanza, Rome. The baptistery at Parenzo (sixth century) differs somewhat from those that have been described, in that it has its internal octagonal form concealed within a square exterior. All its internal faces have niches. The Duomo at Brescia (seventh century), a large circular building, although apparently not built specially as a baptistery, may be noticed here, as it probably exerted a greater influence on the design of Aix-la-Chapelle and other similar churches in Germany than did S. Vitale, Ravenna. The centre of the group of churches, called S. Stephano, Bologna, is another building that may have been originally a baptismal or sepulchral edifice. The baptistery at Torcello (seventh century) is similar in plan to that of Parenzo. The baptistery of Pisa, founded in the twelfth century, is on plan 100 feet in diameter. The baptistery at Verona (twelfth century) is so different in form from all other buildings of the class, being a three-bayed triapsal basilica, that its original appropriation for this purpose may be doubted. The baptistery at Parma is almost the last separate building erected for the purpose in Italy. In early times most Italian cities were only allowed to have one baptistery attached to the cathedral; Rome, however, was an exception to this rule. In the Middle Ages, when different sects arose, two were occasionally found, as at Ravenna. Before the idea of moving the font into the church was carried out, priests were allowed, as for instance at Milan, to carry the holy water in procession from the cathedral to their parish church.

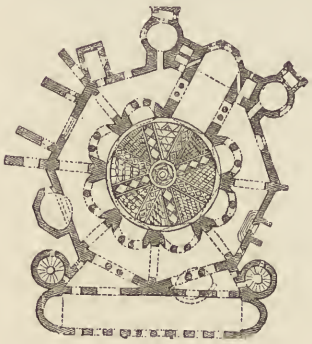
One class of churches remains to be noticed. This class includes examples which may be described as having been inspired by the developments the basilican type underwent in the Eastern capital of the Roman Empire. There are not many examples of such buildings in Italy, and in nearly every case the Greek influence which controlled their arrangement can be traced. In the Eastern empire, contemporary with the elaboration of rectangular buildings in Italy, the Byzantines were occupied on the same task; but, being freer from the trammels of tradition, they early arrived at quite divergent forms, and their style, reacting on that of Italy, produced the interesting class of buildings now under consideration. By the time of Justinian, in the sixth century, the basilican oblong had been shortened to a square with a view to the addition of a dome, which the Byzantines had learnt how to support. This square equally retains the crucial form, and therefore, to distinguish it from the Latin type, it is called the Greek cross.

The earliest of these buildings is that of S. Lorenzo, Milan, the centre of a group of contemporary buildings at the end of the fourth century, as the cathedral of the city. It is an early attempt to reduce the circular church to a square. Its plan is a Greek cross surrounded internally by a vast ambulatory equally wide throughout, separated from the central space by a screen of piers and columns whose outline follows exactly that of the external wall. In front is a handsome colonnade of pillars leading to a square *atrium*. To the east is an octagonal building dedicated to S. Hippoleto, which was probably a tomb-house; to the north is a similar building which now serves as a vestibule; and to the south is an octagonal chapel to Sta. Aquileia. This, formerly the baptistery, is connected with the church by a building of a later date.



S. Lorenzo, Milan.

S. Vitale, Ravenna, an extremely interesting building, was erected at the command of Justinian when, under his rule, the East and West empires, which had drifted apart, were reunited for the last time. Its plan shows strong affinities to the cathedral of the Eastern capital, which had just been completed. Isabelle, however, traces in its plan at least a copy of the Roman building, the temple of Minerva Medica, erected in the third century. It is of a peculiar design, often copied in the West, and even in Italy. In France there are churches which recall its disposition, but at Ravenna the resemblance is too close to be purely accidental. The setting out in both is the same. The Christian architect has added a surrounding wall which forms an internal gallery. But this, if not of Roman origin, was often used by Roman builders. Isabelle considers its Byzantine influence chiefly shown in the decoration. The foundation of the plan of S. Vitale is externally a regular octagon which circumscribes a smaller one internally, the latter surrounded by *exedræ* or small apses, bounded by two columns and opening into the aisles at regular intervals. One side of the internal octagon is appropriated to the sanctuary, which is divided off from the surrounding aisle and is projected from the external wall, terminating in a three-sided apse. The entrance (a reminiscence of those at Sta. Costanza and the baptistery of Constantine) is a wide vestibule with semicircular ends, placed athwart one angle of the exterior of the octagon, and giving access to the interior on two adjacent faces.



S. Vitale, Ravenna.

The church of S. Mark, Venice, built in the tenth century, is undoubtedly of Eastern origin. Its plan [Illustn. xxviii. fig. 3] is rather an imitation of the Church of the Holy Apostles at Constantinople, which no longer exists, than of Sta. Sofia. Its general design is that of a Greek cross, somewhat veiled by the additions to the third side, which form the western arm of a wide portico. The east end of the nave is apsidal. A magnificent screen separates the body of the church from the sanctuary. The plan is so completely of the Eastern type, which will be presently described, that it requires no further mention here.

The last of the buildings of Italy to be noticed is one found in the city which formed the last Western possession of the Eastern empire, that of S. Cyriaco, Ancona. Unlike the foregoing, although built under strong Eastern influence, it is little altered from the Latin type. Its plan has equal arms, which are, however, longer

than usual, and it is described by Professor E. A. Freeman as a nearly Latin church with an unusually short nave.

In concluding this main division of the subject, it may be well to recall the broad types of plans which have been hitherto met with:—

I. Rectangular simple buildings: (1) nave without aisles; (2) nave flanked by single or double aisle on either side, terminated with or without an apse. II. Rectangular buildings, either square or apsidal-ended: (1) nave without aisle; (2) nave and aisles as before. III. Circular buildings with or without projection. IV. Polygonal buildings, simple or involved.

Byzantium and the East.*—The typical Eastern cathedral, although of gradual growth, has many features akin to its basilica prototype; and although, by being considered first, it will perhaps appear to be inserted rather out of chronological order, yet it will be interesting to see what was being aimed at from the first, and to note the fluctuations which led the builders to incline now to the basilican and now to the Eastern type. The circular churches met with in the East may be divided into two classes:—(1) baptisteries; (2) churches dedicated to S. Elias, who seems to have enjoyed a peculiar privilege in this respect. Here may be briefly noted one characteristic trait in the development of Eastern churches. Starting, like the Italians, with correct copies of the pagan circular temples, and using them more frequently than did the Italians for general purposes, the Eastern mind was continually busy on the problem of how to convert them into more convenient buildings for worship.

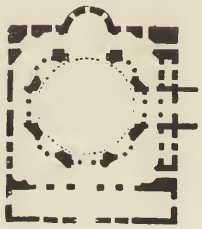
Byzantine architecture is usually divided into four periods, viz:—(1) From Constantine, fourth century, to Justinian, sixth century; (2) from Justinian to the eleventh century; (3) from the eleventh century to the Mohammedan invasion in the fifteenth century; (4) fifteenth century to modern times. The early churches of the first division were, at first, almost as often round or octagonal as oblong. The basilican type, when used, had naves of short extent, with apses more frequently semicircular than polygonal, and generally three in number. In the second division the square form is found fully developed; the apses increase in number and are usually polygonal, and square piers in the interior take the place of columns. In the third division the *narthex* became less prominent, choirs were more important, women's galleries disappeared, and the cruciform shape lost its significance by the absorption of the aisles; thus out of the basilican type had been evolved a Christian church, complete in all its details and far removed from classic prototype. A complete Byzantine church or Greek cathedral in its essential parts differed, to no very great extent, from a building of the same class in Italy. Like a similar building in the West it comprised:—(1) *atrium*, not universal; (2) porch or *narthex*, with frequently a second or *exo-narthex*, a feature not unknown in Italy; (3) nave, with aisles extending clear from east to west; (4) choir, and altar space. The arrangement of these parts and their use, however, was somewhat modified, and this was specially noticeable in the interior. The Easterns seemed only to recognise three divisions of the congregation: the ministers, who were admitted within the sanctuary occupying the usual position; those admitted to communion, to whom the nave was allotted; and catechumens and penitents, who had to remain outside. The portico or *narthex* was sometimes carried round the building, and had seats provided for the accommodation of these outsiders. The *narthex* itself seems to have served the purposes of baptistery, chapter-house, vestry-room, and lych-gate. The separation of the sexes was very rigidly carried out, especially at first. Women were almost universally relegated to galleries over the aisles. When these did not exist, as in some town churches, they were limited to the *pronaos* or *exo-narthex*, which, within the *narthex*, was separated from the church by a wall with three doorways. Within the building the nave provided accommodation for the worshippers. Separated from it by a screen called *iconostasis* (image-bearer) or *tabulatum*—a feature peculiar to all Greek churches—is the sanctuary at its eastern nave. This screen was pierced by three doorways. The centre one, "Holy Gate," was enclosed by a pair of gates some five or six feet high. Those on either side were covered by curtains. West of the screen, extending into the nave, was a platform called the *solea* (from the chancel steps which bounded it) or the *cantus cantorium*. When this was divided from the nave by gates, the centre one was called the "Royal." This space was occupied by the singers and inferior deacons. Most Greek churches had only a single altar.

* In the preparation of this portion of the Essay the following authorities, among others, were consulted:—Couchaud, Salsenberg, Texier and Pullan, and the Marquis de Vogüé.—H. A. S.

Sometimes, however, side chapels were supplied with secondary altars for the daily services. The high altar, as in the Western churches, was placed on the chord of the central apse. The north and south apses were devoted to the use of the priests who served the altar; occasionally one of these was formed into a small chapel. Opposite the holy door of the *iconostasis* was placed the *ambo*, which answered in position and purpose to the mediæval rood-loft.

The cities of Central Syria, which have disclosed so large a number of Christian churches, seem to have existed in full prosperity until, at the Mohammedan invasion, they were all deserted as in one day, and hence the Byzantium basilica may be there seen in all stages of development. The cathedral of Bosrah, in the Hauran (Central Syria), exemplifies the progress of development from a pagan temple to a Christian church. In plan it is externally square and internally circular [see Fergusson's *History*, Vol. II. page 307]. From one side of the square are projected two side chapels with an apse between them. Its date is nearly two centuries later than that of Constantine's tomb-church at Jerusalem. That has no apse or sanctuary, and was in every essential a pagan building as far as disposition of plan was concerned. This, however, has all the requirements of a Christian church.

In Constantinople two churches are preserved from the time of Justinian. One, the survivor of a pair of churches dedicated to SS. Sergius and Bacchus, which stood side by side and shared a common *narthex*, is a square with internal octagon exactly similar to the plan of S. Vitale at Ravenna. Such an arrangement seems to be common about this date.



SS. Sergius and Bacchus.

The other is the famous Sta. Sofia, in plan nearly square exclusive of apse and *narthex*. The interior [Illustn. xxviii. fig. 2] consists of a central square with half a square at either end flanked from east to west by a broad aisle; from this the central square is shut off by a range of columns. The east half of the square is bounded by a semicircular apse; the west half is similar, but the central apse is there occupied by the principal entrance. Although the plan is evidently founded on a Greek cross, the novel arrangement of its part seems almost to conceal this. The baptistery, which is situated at the south-west corner of the church, and is entered from it by the north door, is doubtless a typical example of the early form of those buildings in the East. It is externally square and internally octagonal, and has a west vestibule; opposite this is a small apse in which the altar was placed.

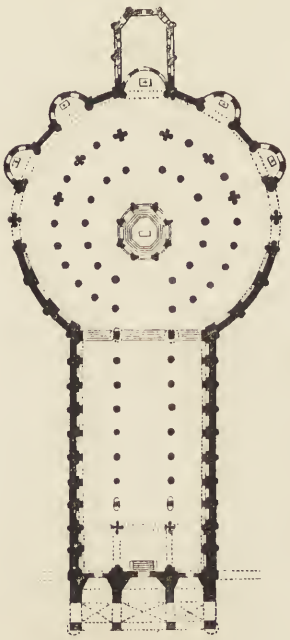
The development of ecclesiastical architecture in Russia forms an interesting sequel to that which has just been considered, emanating as it does from Byzantium, but it can only be noticed here in the briefest manner. The Christian religion was not introduced into Russia until the tenth century, in the time of Vladimir, who, acting on the advice of ambassadors sent into every country to report on the forms of religious worship, adopted that found at Constantinople; and the Greek church consequently became the ruling type. Although founded on this type, and in many respects closely following it, Russian churches exhibit several differences in arrangement. Two of these may be noticed:—(1) The plurality of altars placed, not, as in Western churches, at the end of the transepts or in side chapels, but in the same direction and at the same end of the church as the high altar. Their position is indicated by a niche or apse, sometimes concealed externally, similar to that by which the principal altar is marked. This may have been derived from the triapsal arrangement into which the basilica plans were early developed. The *iconostasis* in Russia, in the eleventh and twelfth centuries, consisted of small columns or gratings. It was only later that it became fully developed into its modern form. (2) No separate accommodation was provided for women, and the *gynæceum* never appears. The typical Russian cathedral is made up of many aisles—Kieff has as many as seven—generally terminated with semicircular apses, and is often an oblong with axis north and south. Each of its altars is screened by the *iconostasis*. In front of this screen are two thrones with baldacchino; that on the left for the emperor and that on the right for the metropolitan.

Spain.*—The Christian architecture of Spain may be described as a Western version of the Eastern style, but the presence of the Moors, from the eighth century to the thirteenth century, opposed a formidable bar to its progress. Again, during these early centuries, the country was split up.

* The authority consulted is Street (*Architecture in Spain, &c.*).—H. A. S.

Some parts were never conquered by the Saracens; other states freed themselves by degrees, and the date of their success synchronised with the successful period of Christian architecture. The earliest type of church plans—cruciform, triapsal—was, like similar plans in France, the result of Eastern influence. Another type, of which Santiago (eleventh or twelfth century) is an example, still shows close kinship to those in Aquitaine and Auvergne. This consists of nave, aisled transept with apsidal chapels, and of apsidal choir with circumambient aisle and circlet of chapels. In later churches the French *chevet* became a distinctive feature, as at Toledo (thirteenth century), which has double apsidal aisles, circled by five chapels. It is in the internal arrangements of Spanish cathedral plans that the national peculiarities are chiefly noticed. The position of their *coro*, or choir, remains to the present day almost unique. The causes of this new departure, in which the ritual choir is severed from the altar, seem to lie, (1) in the smallness of the early central apse, which necessitated, as in the early basilica, the projection of the choir into the nave, and (2) the wish to provide increased accommodation in the transepts that all might congregate about the altar. Whatever its origin, its result is to devote the eastern half of the nave (which was rarely a long feature and often followed closely the ancient favourite proportion of a double square) to the choir stalls, and these are returned at the west end. To these the only entrance is through the eastern screen. To connect this outlying portion with the altar it was usual to set apart a narrow passageway along the centre of the church and rail it off. Two gates, placed either side, and closed during service time, permitted general passage north and south. High metal screens, *rejas*, enclosed the east end of the *coro* and west end of the sanctuary or *capilla mayor*. The remainder of the nave, west of the cross, was then left unoccupied, and the early custom of gathering in the nave seems to have fallen into complete disuse. One external feature of Spanish churches, arising perhaps from climatic causes, must be referred to: an external cloister placed around the walls of the nave helped to keep the building cool, as at Burgos, Valladolid, and other places.

France.*—One of the most ancient of existing buildings is the baptistery of Riez. A pagan temple, it was converted for Christian use in the fourth century, and served as a model for several other baptisteries, including those of Fréjus and Aix. Another early baptistery, dating from the fifth or the sixth century, is that of Poitiers (now called *Tempe de Saint Jean*). It is a nearly square chamber with an apse opposite the entrance, five-sided internally and three-sided externally. The church of Charroux, on the Loire, is a remarkable example, to all appearances, of an ancient baptistery or tomb-house converted into a church by the addition of a nave; although it is more likely to have been a direct imitation of earlier works after they had undergone alterations or conversion of the kind. Fergusson considers that it forms an intermediate link between the original church of S. Martin, at Tours, known only by description, and the more modern one, the erection of which was commenced in the eleventh century.



Church of Charroux.

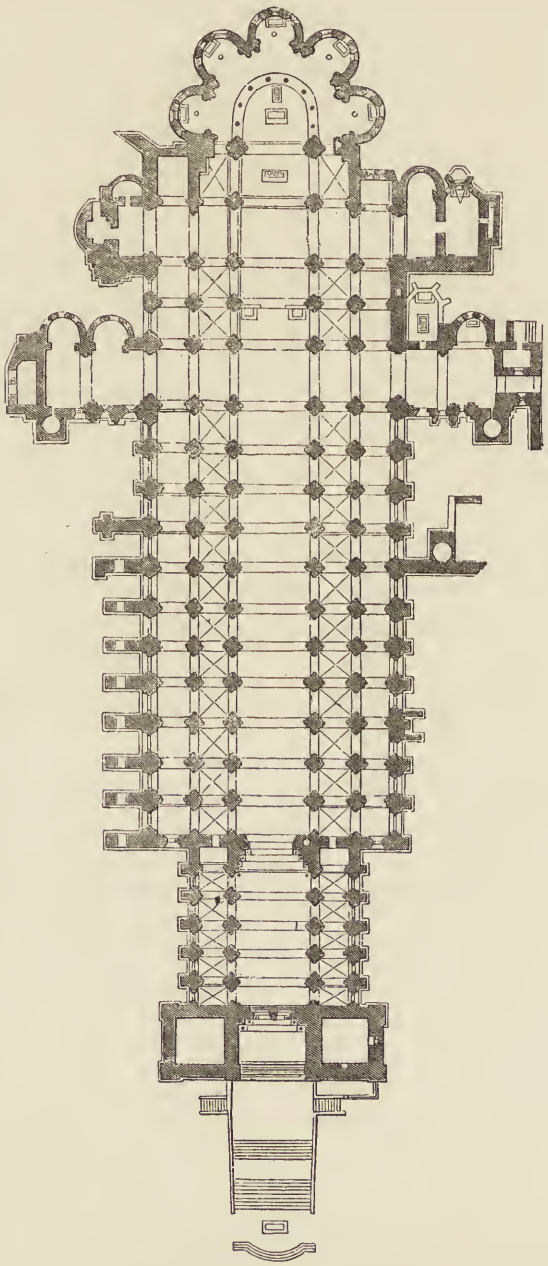
The isolated basilica had become the centre of a group of buildings out of which grew the mediæval abbey, with its church, cloisters, hospitals, and dependencies; but before proceeding to enter into details it will be well to notice the examples of church and cathedral, all of an early date, which bear traces of Byzantine influence. These are found chiefly on the borders of the Rhine, and in Aquitaine and in Provence. Their characteristic is the adaptation of the Latin plan for the reception of one or more domes. They generally consist of a single aisle with or without transepts. Nearly all the examples remaining were erected between the tenth and twelfth centuries. One of the most celebrated is that of S. Front, Perigueux (eleventh century). Its plan [Illustn. xxviii. fig. 4] is a Greek cross. Another church of the same

* In the preparation of this portion of the Essay the following authorities, among others, were consulted:—Isabelle, Ramée, Sharpe, Street, and Viollet-le-Duc.—H. A. S.

class is that of Souillac, and is very similar in plan. The cathedral of Angoulême differs slightly in having shallow internal transepts, externally lengthened by the addition of a tower at either end.

The church architecture of France was influenced to a very great degree by the monastic orders which flourished in the country. The principal of these were (I.) the Clugniacs, (II.) the Cistercians, (III.) the Franciscans, (IV.) the Dominicans, and (V.) the Jesuits.

I. The Clugniacs. This Order was founded at Cluny (909). The Abbey church of Cluny was built in the tenth century. At the entrance to its *narthex* were two towers; in one the archives were preserved, while the other was a court-house. The *narthex* here forms a sort of ante-church, and has side aisles. The nave of the church was lined with double aisles (as at S. Sernin, Toulouse); over the entrance in the thickness of the wall a chapel was formed, an arrangement peculiar to the Clugniacs. The one quite exceptional feature (in France) found at Cluny is a double transept. The peculiarities of arrangement peculiar to this Order, as demonstrated in the above and their other churches, are:—(1) spacious *narthex* or ante-church; (2) niche or chapel over the entrance; (3) transepts usually without aisle; (4) two towers flanking the entrance and four more placed at the external angle of intersection of choir and transepts; (5) chapter-houses (*salles capitulaires*) usually placed in continuation of the transepts.



Cluny Abbey Church (now destroyed).

II. The Cistercian Order was founded at Citeaux towards the end of the eleventh century. The forms of their churches were prescribed in a set of rules called the "Charta Caritatis." Those which had reference to the plan included:—(1) all churches to be built in the form of the Cross; (2) choirs to be short—these rarely extend more than two bays beyond the crossing; (3) end to be square—apsidal ends, however, were introduced later; (4) transepts to have two or three chapels on east side of each arm, and no aisle—in earlier examples the chapels are separated completely by divisional walls; (5) a *narthex* to be used, but kept shallow; (6) no lofty towers—but these began to be introduced later; (7) none but royalty to be buried within the church, monks in cloister, and abbots in chapter-house; (8) sacristy to adjoin church on south side of transept; (9) no Lady chapel required, as the whole of the church was dedicated to S. Mary. Amongst the many abbeys founded by this Order may be mentioned Clairvaux (Aube), first to have circular apse and apsidal chapels; Fontfroide, choir has polygonal apse; and Fontenay.

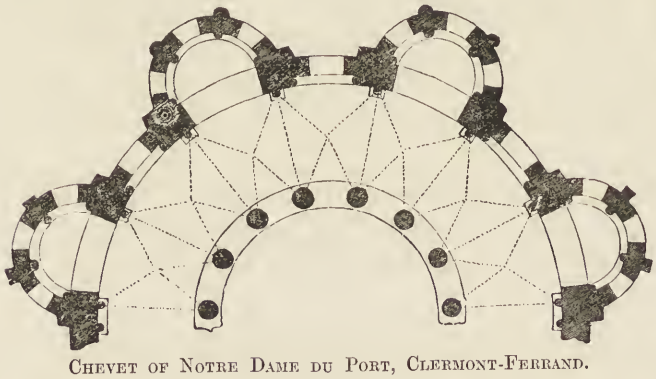
III. Franciscans, founded in the twelfth century by S. Francis of Assisi, had, as peculiarities in

their churches :—(1) use of a single aisle, which was used by the congregation at sermon time; and (2) a choir which rarely had aisles.

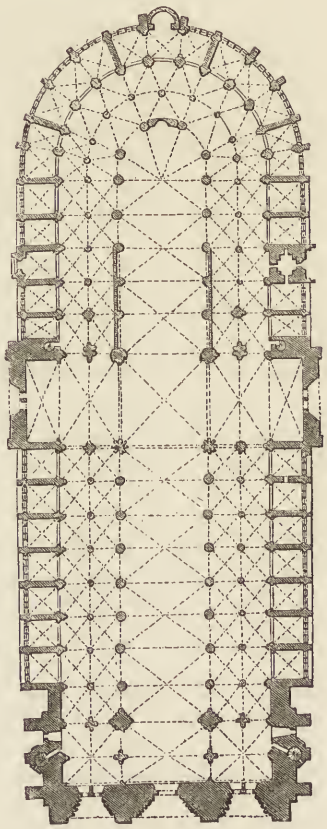
IV. Dominicans, founded early in the thirteenth century, were, like the Franciscans, a preaching Order. Their plans were chiefly distinguished for their simplicity. Also, like the Franciscans, they had generally a single aisle and nave terminating square with an aisleless choir.

V. The Jesuits adopted no distinctive treatment of church plan except that they placed their principal altar at the west end, and had no choir.

Returning to the general consideration of ecclesiastical architecture in France, it may be remarked that, in the cathedrals built between the middle of the twelfth and thirteenth centuries, chapels were formed in the *chevet*, but not elsewhere. Those formed in Bourges and Chartres are scarcely large enough to hold an altar. Notre Dame, Paris, was finished without chapels. A few years later the east wall was opened and a circlet of chapels erected which practically formed a double aisle. Still later these were continued down the side aisles of the nave, their continuity only being broken by a transept invisible externally, which serves for north and south entrances. In somewhat similar manner have the original plans of the cathedrals of Laon, Rouen, Coutances, and Sens been modified to receive chapels. Rheims, like S. Ouen (Rouen), has no nave chapels. The cathedrals, however, of Clermont-Ferrand, Limoges, Narbonne, and Troyes were originally conceived with chapels. The feature the development of which beyond all others characterised French churches is that of the *chevet* with its circumambient aisle and circlet of radiating chapels. Fergusson and Walcott account for its treatment by deriving it from the junction of the circular tomb-house, which was often placed at the east end of the building, with the basilica itself. This junction, they say, was effected by removing the west half of the tomb and the wall of the apse, and then prolonging the arcades and side walls of the basilica until they joined the remaining semicircle.



Chevet of Notre Dame du Port, Clermont-Ferrand.
(No scale.)

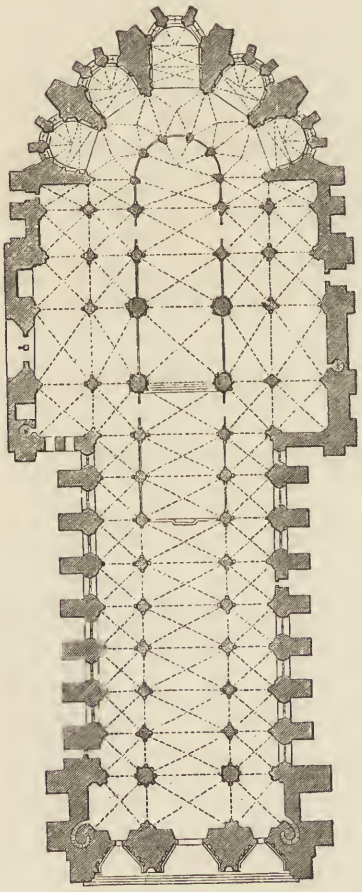


Notre Dame, Paris.

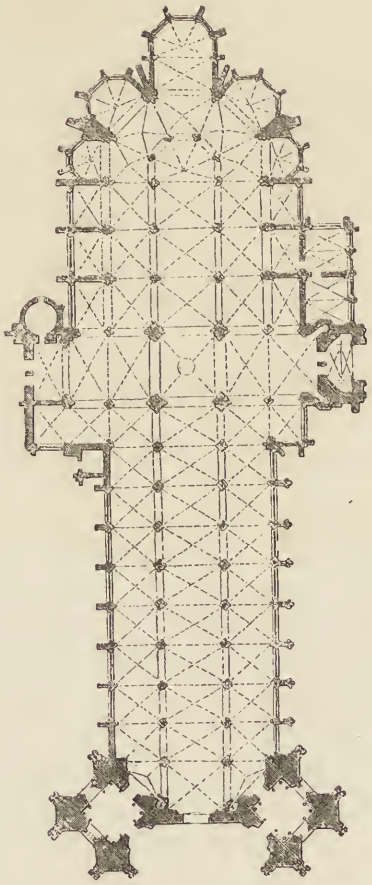
The peculiar features which characterise the plan of the French cathedral are (1) shortness of length in proportion to breadth, usually about four to one, as compared with English cathedrals, which are often six or seven to one; (2) the apsidal east end—in France a square east end is as great an exception as the apsidal termination is in England; (3) the expansion of the simple apse into a *chevet*, with its surrounding aisles and chapels, which form a leading feature in the plan; (4) the position of the principal towers, which generally form part of the west front, rather than being raised upon the intersection; (5) slightness and often total suppression of external evidence of transepts. At its entrance a portico replaces the former *narthex*. The font now placed within the building is either just in front of the central door or in the middle of one of the aisles. At the entrance to the

choir are the tribune, the *ambones*, and, later, the *jubé*, from which the epistle and gospel are read. A screen shuts off the choir from the nave. As in Italian buildings, the entrance to the confessionary is flanked on either side by the steps leading to the sanctuary. The arrangements of the latter feature also remain unaltered.

In S. Ouen (fourteenth century), the nave had no chapels, and its transepts were aisled. One aisle alone surrounded the *chevet*, and this, one of the largest examples of its class, was bounded by a uniform range of five apsidal chapels. After the fourteenth century the arrangement of churches in France became nearly uniform through the union of the various provinces which had been brought into subjection to the royal power. During this and the following century the country was



Cathedral of Rheims.



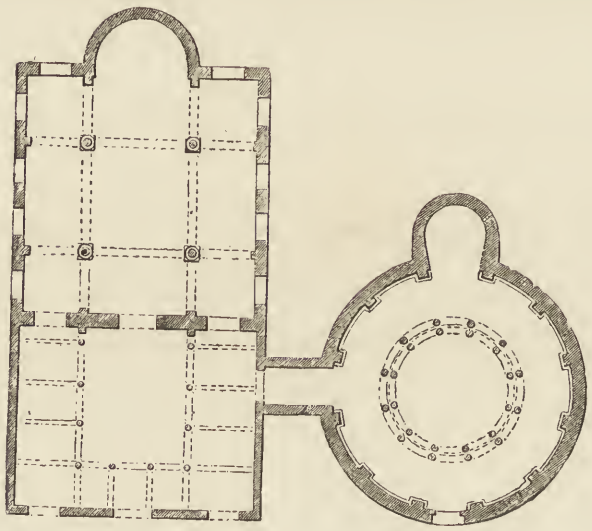
S. Ouen, Rouen.

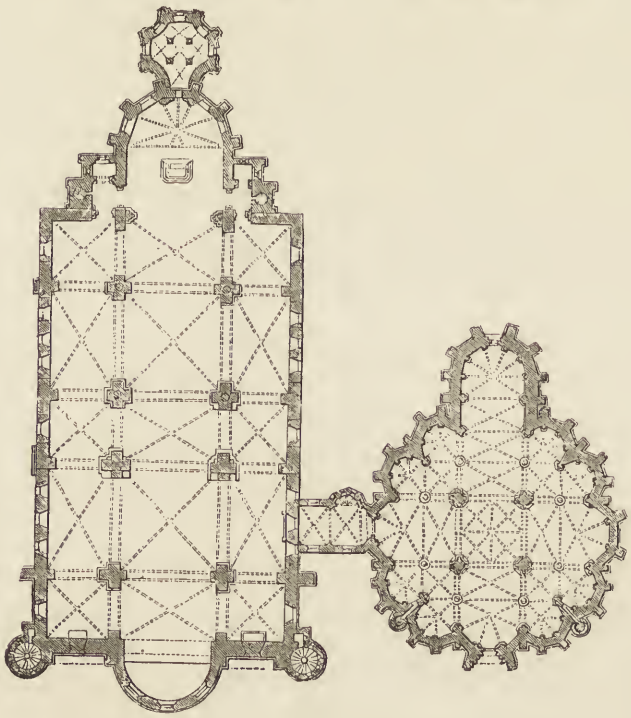
too much engaged in war to allow of its erecting any very important buildings, but at the close of the fifteenth century and beginning of the sixteenth, ecclesiastical architecture began to revive, and many of the cathedrals were completed and restored. The Reformation, however, put a stop to architectural progress, and in the religious struggle which followed the newly restored buildings suffered much damage.

Germany.*—Charlemagne is the chief around whom the early history of ecclesiastical architecture in Germany is grouped. Of the church at Trèves and its companion chapel, built by S. Helena, some

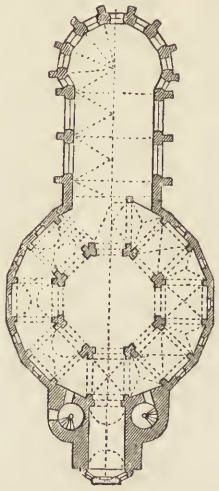
* The authorities consulted are chiefly Hübsch, Lübke, Möller, and Whewell.—H. A. S.

remains exist to modern times, but as at present rebuilt, it seems rather to belong to the eleventh century. Besides this little early work remains. Trèves Cathedral consisted of a rectangular and a circular building in close proximity erected by S. Helena. The latter building was pulled down in the tenth century to make way for the Maria Kirche, which seems to have closely adhered to the original outline. The rectangular building originally had an *atrium*. This was roofed over when the church was rebuilt in the eleventh century, and a west apse was added. Beyond the east apse a small memorial chapel now exists. The style found in Germany in the time of Charlemagne seems to have come from the north of Italy, held in joint sway with the Provinces of the Rhine, under the Carlovingian kings, who fixed their capital at Aix-la-Chapelle. In this city, therefore, we find the earliest important ecclesiastical building, the chapel built by Charlemagne, possibly for a ceremonial church and baptistery, as well as for his last resting-place. In Italy it has been shown that the circular form was only gradually superseded, but in Germany the change took place earlier and was more complete. The Cathedral of Aix-la-Chapelle as it now exists dates only from the fourteenth century. Charlemagne's original building was a sixteen-sided structure, 105 feet in diameter. The Duomo of Brescia probably rather influenced its architecture than did S. Vitale at Ravenna, although tradition describes it as a copy of that building, which it certainly resembles.





The Cathedral of Trèves before and after the Eleventh Century.



Cathedral of Aix-la-Chapelle.

The general typical characteristics of German basilican churches may be described as follows:—(1) An apsidal-ended, cruciform ground plan (in early churches an E. and W. apsidal arrangement is often found—at first the apses are circular, but later they become polygonal—with double transepts and even double choirs); (2) occasionally, as in the group of churches at Cologne, the transepts are apsidal as well as the nave; (3) in early churches the nave is long and the choir short; (4) though apsidal E. ends are common, there is an absence of the *chevet* arrangement which was so common in France; (5) groups of towers, especially in early churches, are frequently used about the intersection and the apses, and also at the W. ends—the last being typical of the later style; (6) perhaps in consequence of the use of W. apses, entrances at the western end are generally abandoned, and lateral doors substituted.

Cologne, capital of Germany in the twelfth century, has a group of churches (before mentioned) remarkable for their almost unique triapsal arrangement. The oldest of these, Sta. Maria in Capitolio, is alone in having its aisle carried round all three apses the full width. The Cathedral of Cologne is the finest example of the German use of the French termination; but though the east end is French, the opposite end has the typical German feature of two western towers. Fergusson has called it one of the noblest buildings ever raised by man in honour of his Creator; and in spite of the many centuries it has taken to build, the original design of the cathedral has scarcely been departed from.

In Germany, the period of the Renaissance produced no very remarkable ecclesiastical buildings, at least none of sufficient importance to mention in an abbreviated notice like the present.

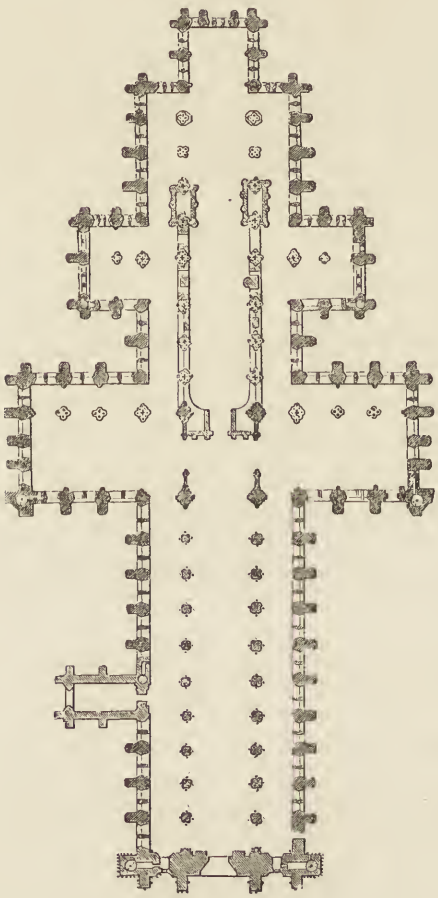
Great Britain.*—The earliest period of the Church in England, commencing with the arrival of St. Augustine in the sixth century, was a time of busy building enterprise; the early foundations of Canterbury, Rochester, and Westminster were then commenced. Few, however, of the churches under the Saxon rule survived the Norman Conquest except in the records of history. From the remains of those early churches which still exist it is evident that two distinct types existed simultaneously:—(1) the Roman type, which has been before described; and (2) the British type, similar to that found in the early Irish churches, and of which the special features are:—the typically and essentially English square east end; transepts lower than and subordinate to the nave; a central tower, a single west tower, and a narrow arch at the entrance to the sanctuary or chancel. With the Norman Conquest much of this method of building was swept away, and a fresh start was made.

It is not till after the thirteenth century had produced its masterpieces of church building that we can find a plan which may be termed purely English in thought and execution. The features which characterise the English style, as exemplified in its cathedrals, may be summarised as follows:—(1) Great length in proportion to breadth. A favourite proportion with the ancients was that of a double square. The French advanced on this, and made the length and breadth as much as 4 to 1; while England adopted a length frequently five times (Peterborough), sometimes six (Norwich), and occasionally as much as seven times their breadth (Canterbury, Winchester). It is noticeable that as mediæval buildings increased in length, so did the east arm of the cross become more important. (2) A square east end. This, England's peculiar property, is as rarely found abroad as is the circular form here. The circular terminations found in the earlier cathedrals were the direct result of the French influence exerted by the Normans. Transitional examples, as might be expected, display polygonal apsidal terminations, which formed the stepping-stone to the square east end. It has been shown that this feature existed in the Saxon churches long before the Conquest, but its origin seems wrapped in mystery. (3) Use of lesser eastern transepts (so described to distinguish them from the double transepts, found in early German churches). These probably arose from the development which the choir had undergone from its original position in the early basilica. At first it was an addition to the sanctuary, which projected into the nave, and might be compared to a large pew. It was certainly no constructional feature, but a movable arrangement situated originally in front of the sanctuary, but placed elsewhere if more convenient. In England, however, the course of development, which had to provide a large area for the congregation, so "that the service might be massive and devotional, and not

* Besides most of the authorities before-mentioned, I have consulted, in the preparation of this portion of the Essay, Brandon (Parish Churches), Murray's Handbooks, Rickman, Scott, Willis, Professor Freeman, and others.—H. A. S.

"frittered away in private devotion or scattered services," moved it out of the nave eastwards past the intersection of the eastern arm of the cross with the transept. The result was that, as at Salisbury, from being unconstructional the choir became a constructive feature; and the screen, which was always placed under the chancel arch, now separated the choir from the nave, instead of, as formerly, the sanctuary from the choir. Hence these two latter became juxtaposed without any distinctive separation. The eastern transept supplied this deficiency, and marked boldly the line of boundary of both choir and nave. Having thus alluded to those features which served to individualise the English churches, it may be interesting to note their adoption in two or three illustrative cathedrals.

Canterbury possesses in itself a brief epitome of the progress of church architecture from the time of Bede's *Romani Fideles* down to the period at which the transition to mediæval arrangements was completed. Its history may be broadly divided into stages. First, Eadmer, who lived in the twelfth century, records that on the arrival of St. Augustine in the sixth century, he found a Roman church in ruins already existing on the present site. This he replaced by a basilica built on the model of S. Peter's at Rome, and, in addition, an oratory and altar to S. Mary at the west end, forming practically a western apse, together with a tower at the north and south-west sides projecting beyond the aisle. This apse was built above a crypt. Secondly, Lanfranc, the first Norman metropolitan, found this church in ruins and rebuilt it, taking as his model the church he had just left, viz. Saint-Etienne at Caen. The only difference consisted in the English cathedral possessing a crypt, on which the choir was raised by many steps. Both had two western towers, and both had apsidal chapels on the east wall of the transept. The choir was moved to east of the central tower (for the first time). The position of the old nave and transepts was practically retained. Thirdly, in the twelfth century the form of the church was once more altered; but William of Sens and William the Englishman preserved much of the existing disposition of its plan, although they extended the presbytery, together with the crypt below, four bays eastward beyond the existing apse, and terminated it with a five-bayed apse having a processional aisle around. At the east end a circular chapel was added. The whole of this addition was made in honour of St. Thomas, and on the spot of his martyrdom was built the present Lady Chapel.



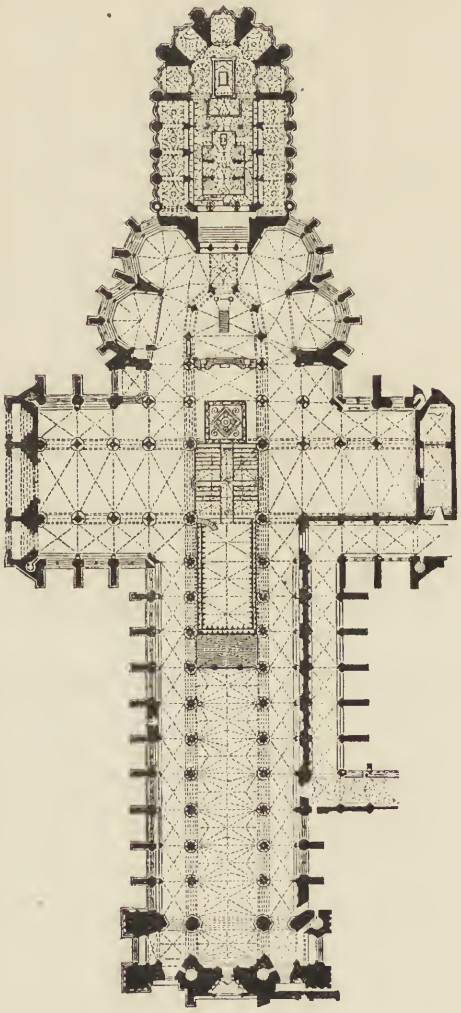
Salisbury Cathedral.

I will now pass on to that perfect early English gem at Salisbury. Its principal features are (1) a rectangular east end; (2) a processional path passing behind the row of triple arches by which the presbytery is terminated; (3) the high altar is placed in the presbytery about half-way west of its east termination; (4) the limit of the presbytery proper is marked by the eastern transepts; (5) the eastern arch of the crossing is marked on the plan by the "gradus presbyterii," and the western arch by the "gradus chori;" (6) the canons' choir extends from the lesser to the greater transept.

The English cathedrals erected after Salisbury showed little novelty in their arrangement, and do not seem to require special notice; but before leaving the subject a slight allusion must be made to their essentially and almost exclusively national adjunct, the Chapter House. The English Church met frequently in deliberative assembly, and discussed every question as a necessary preliminary to its being promulgated as a law. Hence for this, special and commodious places of assembly were required.

Until the middle of the twelfth century the shape of these buildings was rectangular, and sometimes apsidal. Those attached to convents were almost invariably oblong, like the "Salle Capitulaire" in France; Worcester, which is circular inside and decagonal outside, is a solitary exception. After the middle of the twelfth century polygonal and circular forms begin to be adopted. The normal position of the chapter house is on the east side of the cloisters (as at Westminster), but it is often found on the north of the cathedral (as at Wells), and entered directly from it by a vestibule.

Westminster Abbey, which, until the Reformation dissolved the religious orders and freed S. Stephen's Chapel for the purpose, had been the nation's parliament house, is an exceptional building and requires a brief notice. Although its eastern end is a decided adaptation of French design, yet its nave and wide-spreading transepts are entirely English in their conception. Before the addition, at its eastern end, of Henry VII.'s memorial chapel, the circlet of apsidal chapels formed a termination which was purely French: only in their junction with the side walls of the choir is the want of familiarity with this form of treatment shown.



Westminster Abbey.

Besides her cathedrals England possessed conventual abbeys, but the influence of the churches of the conventual orders had no such effect on the architecture of England as it had on that of France. Their buildings, the abbeys, although so numerous, differ in no material respect from the arrangements adopted by them on the other side of the Channel. England has also round churches, and it has been well said that "To enter "into the spirit of our round churches we must travel "with the Templars or pilgrims to the Holy Sepulchre, "and come back with a longing, by a feeble imitation, to "recall its associations." Of the buildings thus implied there are four examples:—the Church of the Holy Sepulchre at Cambridge, where a Perpendicular chancel and aisle have been added to the older and circular church; the Temple Church, London, which consists of a circular nave, chancel, and aisles, and is supposed to correspond in position with the Church of the Resurrection and Martyrium at Jerusalem—the nave dates from the twelfth century and the chancel from the thirteenth century; Little Maplestead Church, which is smaller than the other examples, but which, with the exception of the porch, is wholly of original design; and S. Sepulchre's, Northants. This last-named has a circular nave with aisles of the thirteenth century, to which a chancel having a north and south aisle has been added later. There are no baptisteries in England to swell the list of circular churches; their place in English architecture may be said to be taken by the chapter houses. Halls designed for worship without any provision for the separation of classes may be defined as chapels. The practice of erecting such buildings seems to have arisen with the colleges, in whose services all present took part. One exception to this origin may be mentioned, that of S. Stephen's, Westminster, which is a close counterpart of the Sainte Chapelle, in Paris, erected a century earlier. Both examples are raised on crypts, but, as might be expected, the French example has an apsidal termination, while its English copy has a square east end. In this connection may be mentioned the smaller chapels or chantries attached to many English churches, the endowment of private individuals. In small churches they

are frequently placed at the ends of the aisles. The Chapel of Henry VII. at Westminster Abbey is an example of one of these founded on a royal scale.

Parish churches are very numerous. One broad division between them and a cathedral is that in the latter the ritual divisions are marked by the transept, and then the tradition of the chancel arch is lost, while in the former the chancel arch retains its old significance. The rood screen is, of course, the perpetuation of the curtain, of the older system, which screened the sanctuary from view. Owing to the deep root which the parochial system has taken in the social life of England, parish churches possess much more importance here than they do abroad. The typical parish church consists of a nave and two aisles; a chancel, narrow and deep, divided off from the nave either by a chancel arch or by steps, or by a chancel screen, without aisles; and terminated with a square east end; a well-marked transept, running north and south; a sacristy and vestry adjoining the chancel; a belfry tower at the west end with often an entrance door below, while the principal entrance is by the south door, which is generally screened by a porch, over which is often found a muniment room.

St. Paul's Cathedral [Illustn. xxviii. pp. 172-173] is the conception of one great mind, whose privilege it was to watch over the work from its lowest stone to the top of its golden ball. The first plan which Wren prepared, and to the last his own favourite, was almost a Greek cross. An aisleless nave stretched from west to east, and was crossed by a transept of similar width. It bore a curious resemblance to the early design prepared for St. Peter's. Fergusson was of opinion that this earlier scheme would have proved more useful for congregational purposes than the one adopted, and certainly the early plan had no columns to intercept the view. Wren's designs may be grouped under three classes, and most of them remain to the present day:—(1) The basilica form, a circular nave, with two aisles separated by columns, as St. Bride's, Fleet Street. (2) A Greek cross with cupola, as St. Stephen's, Walbrook. (3) A simple apartment without columns. Out of these simple materials he produced his wealth of happy plans.

It is assumed that the scope of this subject is not intended to include the criticism of church plans of the present day, since this might prove perhaps invidious. But it may form a fitting epilogue to the consideration of the fascinating subject which has been under review in the preceding pages of this essay, if one or two reflections, to which the thought of modern church plans gives rise, be set down. A good plan must above all things be a suitable one—suitable, that is, for worship. The groups of worshippers of the present day may perhaps be broadly classed under two general heads, viz. —Sacramentarians and Congregationals. Sacramentarians may again be subdivided into Romans and Goths. To the Roman, worship in its highest form requires the broad and simple surroundings which are to him associated with the memories of the Church's early days. The Goth, on the contrary, revels in the "dim religious light" which shrouds in their essential mystery the thoughts that mortal words cannot express. Opposite to both of these, as pole to pole, is the Congregational, who demands the light of reason to make all things clear. To the Roman Sacramentarian the classic temple speaks with living power, while to the Goth Sacramentarian the stately pile of the mediæval cathedral affords all that he can desire. The Congregational, however, only needs the simplicity found in the "upper chamber" at Jerusalem. Whether these different bodies will ever be enabled to approach each other so far as to meet under one common roof, in a church of the future yet to be developed, is matter for speculation.

HERBERT A. SATCHELL.

LII.

DEVELOPMENTS OF CHURCH PLANNING EXEMPLIFIED IN SOME WELL-KNOWN WORKS. By T. B. Whinney,* *Associate.*

[*Addressed to the Council.*]

Mr. President and Gentlemen,—

As in the course of time certain well-defined epochs and events stand out as guides to assist the memory of the student of History, so in the progress of Church Architecture certain plans indicate the stepping-stones of the development of the buildings erected to meet the requirements of the performance of the sacred rites of the Christian religion. From the first meeting places, the humble *scholæ* or upper chambers, the next step is made to the cemeterial chapel, whence persecution drives the sect to the underground caves of the Catacombs. When that persecution ceases for awhile, the church with its arrangements for worship, simple perhaps at first, shelters the faithful congregation; another period of persecution ensues, during which the majority of the churches are swept away. Then the dawn breaks at last; the faith, firmly established by Constantine, has nothing more to fear, save from internal dissension. Churches arise on every side, the large Christian basilica side by side with the domed church of the East; the two types of all succeeding plans.

At the time when Constantine began to build churches, Christianity was already some three hundred years old and had had time to gather together many traditions, and had developed an orthodox form of ritual; churches answering to the requirements of that ritual had been erected with plans which no doubt owed something to ante-Christian tradition, but only to tradition moulded to suit the new faith; the synagogue and the heathen temple might both have suggested features. As congregations increased, and it became necessary to provide more accommodation, the early Christian builders would naturally meet the requirement in the traditional manner, modified as before to suit their ceremonies; the basilican form had always been that which was adopted for the plan of large meeting places, and so this plan was to a certain extent followed by the Christians. The plan of the early Christian basilica as erected by Constantine was rather an approximation to a plan already known to the Christians than a direct imitation of any building. This basilican plan, more or less modified, has remained in force ever since its first adoption. The other type, the domed church of the East, was, on the contrary, begotten, not as the basilican type of ritual, but of construction. That the Roman architects could build a dome the Pantheon shows, but it was always a dome set upon a circular building; it remained for the Byzantine architects to inscribe it in a square and carry it on pendentives. This dome inscribed in a square became the governing principle of the Byzantine plan:

* Mr. Whinney was placed second in the competition for the Institute Silver Medal (Essays), 1887–88, and was awarded a medal of merit for his essay, which is now in the Library. His present contribution has been prepared expressly for the Transactions, as a sequel to Mr. Satchell's work in the preceding paper.

it was not the question of the separation of the sexes, or of the division by the Arch of Triumph of the sanctuary from the body of the church, but the idea of a spacious hall crowned with a cupola carried on massive piers. The object sought after was rather sublimity of effect than subservience to the required purpose. Both of these types influence the planning of churches in succeeding ages, and from the modifications and amalgamations which were made by the efforts of man, sprang that beautiful and sublime building, the Gothic cathedral of the Middle Ages.

The circular plan had always been with ancient nations, and especially with the Romans, a favourite form of building. They adopted it equally for their temples as for their tombs, of which latter the most notable examples are the tomb of Cæcilia Metella and the mole of Hadrian, now the castle of S. Angelo. There are remains of some circular temples, as at Tivoli and in Rome, and doubtless many others were built.

The Pantheon [Illustn. xxviii. fig. 1] no doubt was erected as a temple, although the exact date and purpose of its erection are unknown. There is no question that the portico and the rotunda are of different periods, the effect of the two being inharmonious. But apart from this defect, it will always remain one of the most remarkable buildings of the world. The span of its dome, which is 145 feet, combined with the fact that it is the earliest in point of time, would alone suffice to make it so; not to speak of the marvellous effect produced in the interior by the light streaming in from the eye of the dome. The Christians, following in the footsteps of the pagans, also made use of the circular form. The tomb of S. Helena is a circular building set on a square base, with niches in the thickness of the wall. The church of the martyrs SS. Marcellinus and Peter, at Rome, is a small edition of the Pantheon. In Sta. Costanza a further development takes place in the introduction of columns in the interior. In the Pagan circular temples peristyles were nearly always employed, but in the Christian circular building all external decoration is abandoned, the columns being introduced in the interior, and forming an aisle round the central space, as in Sta. Costanza and the building known as the baptistery of Constantine.

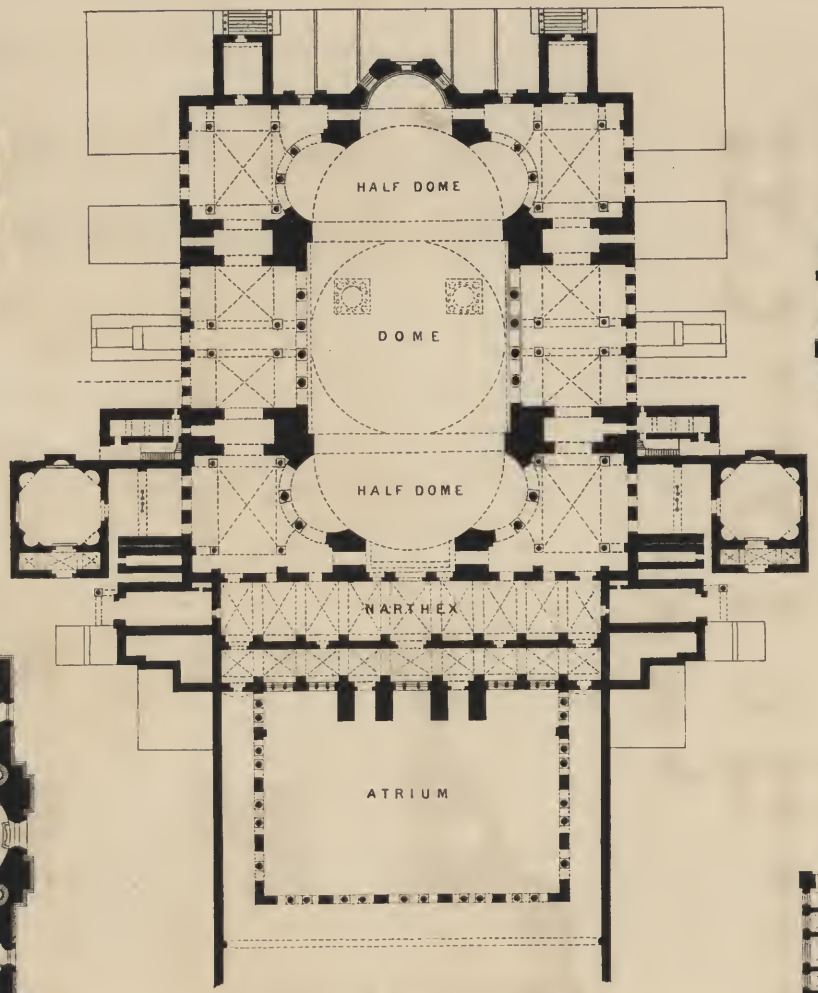
Whenever the Roman architects used the dome, it was always carried on circular or octagonal walls, in fact nothing more than the drum, which in later ages was always inserted between the dome and the mass supporting it; they never attempted, by the employment of pendentives, the plan of placing the dome on a square base; there is, it is true, an effort made in this direction in a building of doubtful origin known as the temple of Minerva Medica, but it is only in the placing of a dome upon a polygonal base, and not in the more difficult case of a circle on a square.

In the East, however, the square exterior was more commonly used, and it was not long before the Eastern builders attempted to utilise the internal waste of space which the transition from the circular to the square form necessitated. The course of that development may be traced in studying the plans of Eastern churches prior to the time of Justinian, notably in the Cathedral of Bosrah, built in A.D. 512, where the angles of the square are pierced with very large niches; in the Church of S. George at Ezra, built in A.D. 515, where the internal range of columns, as seen in Sta. Costanza, is introduced, thus forming an aisle around the central octagon; here, too, the angles of the square are occupied by large niches. The same idea is employed in the planning of SS. Sergius and Bacchus at Constantinople, contemporary with these last; but here a further development is made in the arrangement of the supports, an arrangement which appears again in S. Vitale at Ravenna, where, however, the main plan of the building is octagonal, that of SS. Sergius and Bacchus being a square.

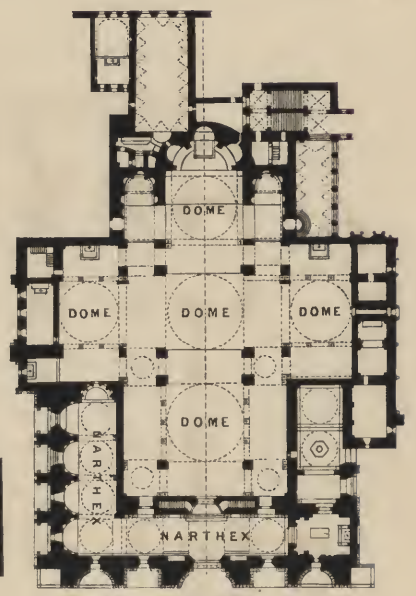
All these churches were probably erected just before the Emperor Justinian rebuilt the wonderful church of Sta. Sofia in Constantinople [Illustn. xxviii. fig. 2], finally dedicated in A.D. 563. In its plan are employed all the features which had been developed by the Eastern architects in their successive attempts in the treatment of the dome inserted in the square. The idea of great space contained under one dome is there carried out in a most marvellous manner. The central dome, which is only about 100 ft. span, or 45 ft. less than the Pantheon, is carried by pendentives on to a square base, but by the addition, at either end, of a half dome, not only is a large amount of space added to the already vast central area, but a most magnificent internal effect is produced by their employment. These again are each pierced by two large circular niches; thus, while everywhere the circle is used in the plan, the building externally is bounded by right lines, and this object is attained without any abnormal thickness of wall. Thus, Sta. Sofia stands a triumph of constructive skill: the lines of its plan were not determined, as in the case of the basilica, so much by the requirements of the Christian ritual, but

LII. DEVELOPMENTS OF CHURCH PLANNING EXEMPLIFIED IN SOME WELL KNOWN WORKS (xxviii)

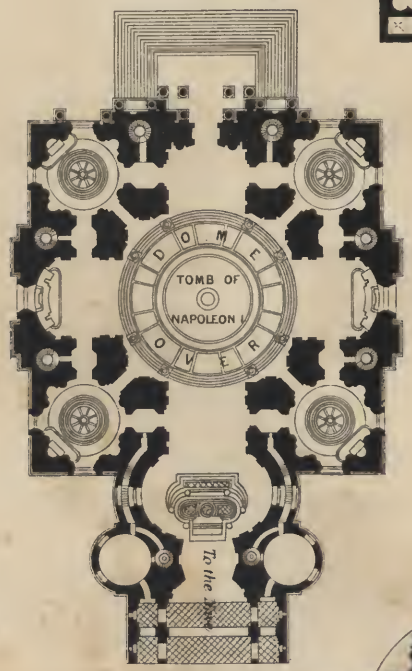
1. THE PANTHEON, ROME.



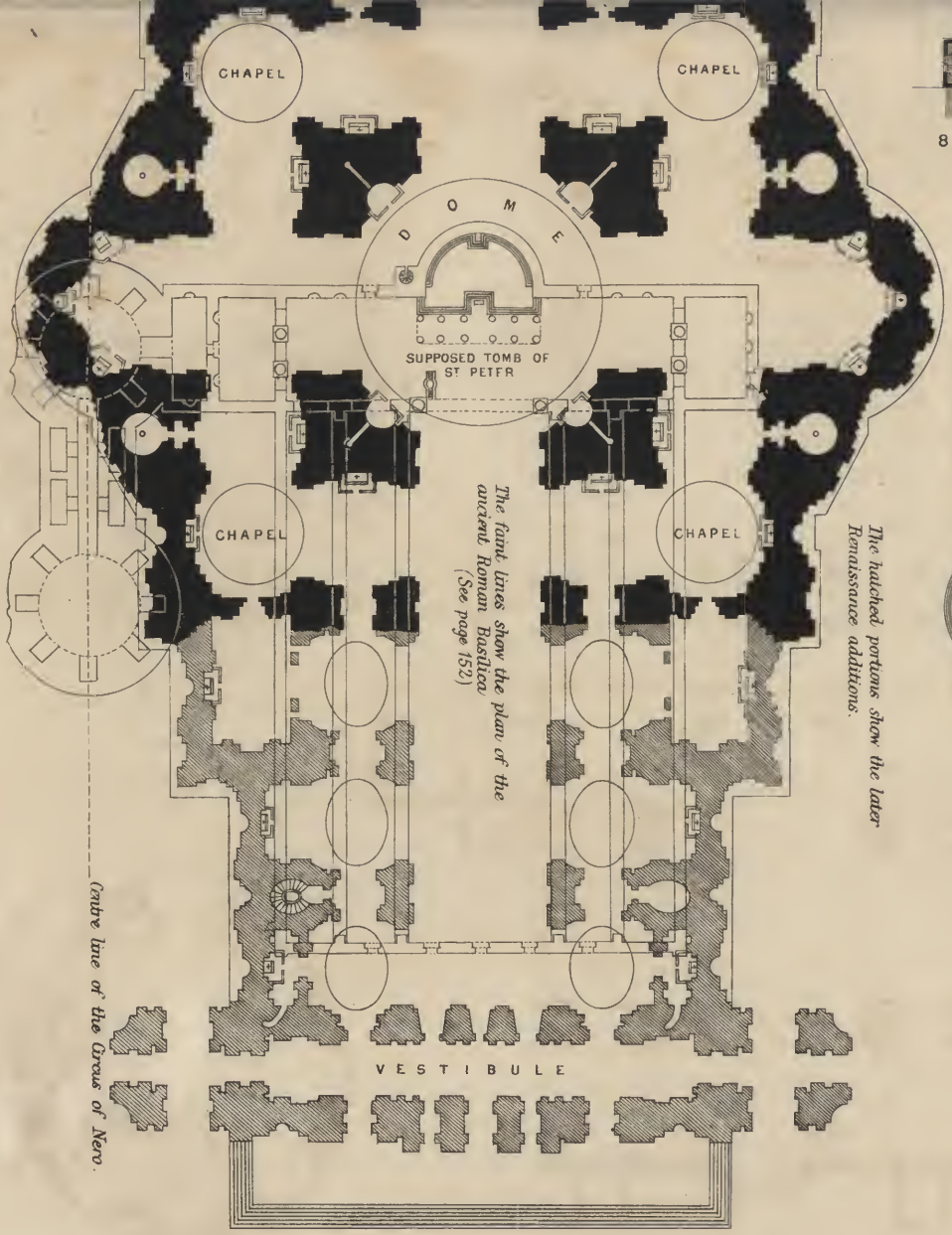
2. ST SOPHIA, CONSTANTINOPLE.



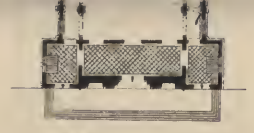
3. ST MARKS VENICE.



5. THE INVALIDES, PARIS.

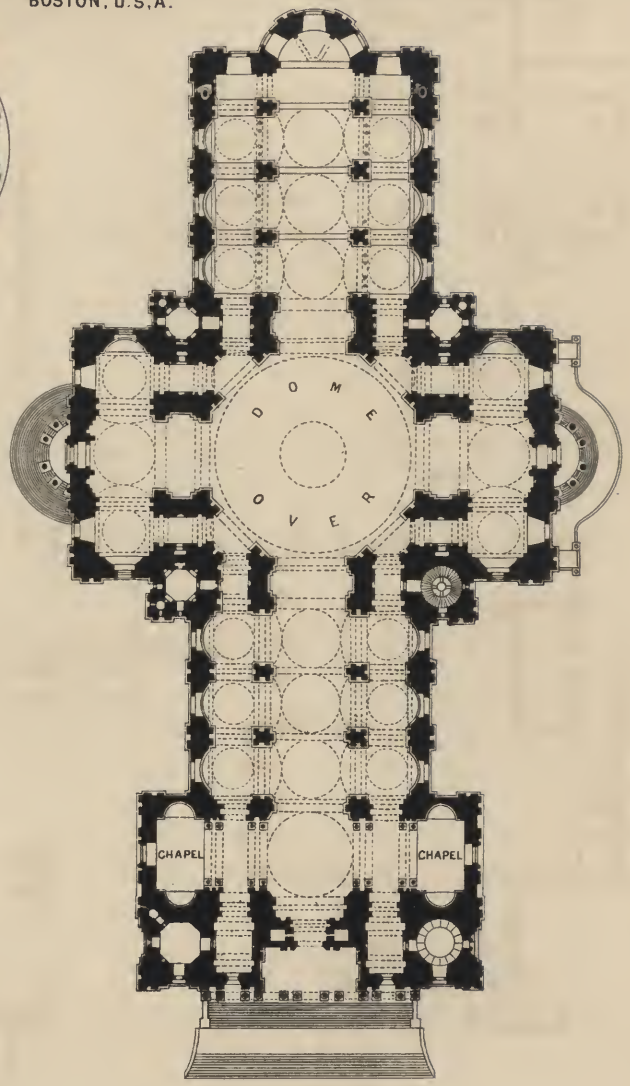


6. ST PETER'S ROME.



8. TRINITY CHURCH. BOSTON, U.S.A.

4. ST FRONT, PERIGUEUX.



ST PAUL'S, LONDON

[From Fergusson. Scale of 100 Feet to one Inch.]

C. F. KELL LITHO. 8 FURNIVAL ST. HOLBORN, E.C.

rather by the solution of problems of planning and construction—by the idea of the erection of a mighty hall crowned by dome carried on dome till the whole is enclosed in one vast concave.

In the plan of the church of S. Mark, at Venice, erected nearly five hundred years later in a style, which, if not absolutely copied from Byzantine models, is yet thoroughly Eastern in character, and more elaborate in its decoration than any of the Eastern examples, there is, as it were, a reaction against the purely constructional disposition of the plan of Sta. Sofia. According to the plan published by Hübsch, the now-destroyed church of the Holy Apostles, erected by Justinian at Constantinople, must have been the immediate prototype; in that plan is seen the same disposition of nave, transepts, and sanctuary, in the form of a Greek cross, each arm a square, surmounted by a cupola on pendentives, and surrounded by aisles. The churches were of nearly equal dimensions, but there is added, at S. Mark's, a porch of very elaborate character, surrounding the western portion of the cross.

Thus there is a return to the conventional arrangement of nave and aisles and transepts, more accentuated perhaps than in the earlier examples of that arrangement, as if it had been discovered that such accentuation would naturally lead to the employment of the symbolical form of the cross; and while preserving on the one side the constructional element of the Byzantine, and on the other the ritualistic development of the Roman styles, introducing further the symbolism which was so dear to the early Christian. In fact so complete is the union of the three elements, even in the church of the Holy Apostles, that one is inclined to doubt if the plan published by Hübsch is the original plan of Justinian's church, for, as Fergusson points out, the Byzantine architects of that time, in their disposition of five-domed buildings, generally arranged the four subordinate domes diagonally and not cruciform in plan. The form of the cross had been used, it is true, before Justinian's time, but only so far as is known in such small buildings as the tomb of Galla Placidia at Ravenna, built in 449, and in a tomb of still earlier date at Hass in central Syria; and where in larger buildings there is an approach to this form, it would appear rather to be the result of mere accident than of deliberate intention.

A few years later than S. Mark's, Venice, the church of S. Front [Illustn. xxviii. fig. 4], similar in plan and dimensions, was erected at Périgueux in Aquitaine, the work, according to Viollet-le-Duc, of a Greek colony—thus introducing into France a new system of planning which before long was to be one of the stems whence, with modifications introduced from other roots, the French Gothic cathedral was developed. The plan of these cathedrals was developed after many experiments by the fusion of the circular churches of sepulchral origin with the church of basilican type. In all the earlier phases of a style are to be seen these two forms in separate buildings; as the style advances, the fusion of the two is attempted, and developed until it is finally complete. Thus are seen the basilica and the tomb rising side by side, both assuming larger proportions, until after the introduction of burial in churches the circular tomb is seen with a choir, and later in France with a nave, attached for the accommodation of the worshippers of the saint buried in the tomb. This fusion of the circular and the rectangular church is the point from which the Gothic architects started. Examples of their first efforts in this direction are seen in the churches of S. Martin, Tours, and the church at Charroux. S. Front differs very considerably except in the plan from S. Mark's, Venice; all the arches are pointed, and the interior has none of that marble or richness of decoration which marks the Venetian church. Instead of this is found a bare and gloomy interior erected on a plan which the French architects rejected as alien to their country; though, if the plan of S. Front was never actually repeated in France, its influence is to be traced in the plans of succeeding churches. The abbey church of Fontevrault is an example, and has a nave of four square bays surmounted by cupolas; it has no aisles and the east end is finished with a *chevet*. In the cathedral of Angers, which is similar in plan, the covering of each bay is a diagonal vault.

It was in the consideration and solution of the problems of vaulting that the French architects developed the plan of the Gothic church, and this plan of a large square bay of the nave and an oblong bay of the aisle was the starting point, the first step being the introduction of two bays of the aisle to one of the nave. This plan was the favourite German method, but the French still further developed it, until the position was reversed; one square bay of the aisle was used with an oblong bay to the nave, with its narrow end next the aisle. The Italians adhered to the original plan from which the French started.

This amalgamation of square and round churches would appear also to be the starting point of the

architects of the Renaissance, who endeavoured in that of S. Peter at Rome to build the church of all ages. It will be seen on reference to the plan [Illustn. xxviii. fig. 6] that the centre of the present dome occupies exactly the same position as the high altar of the ancient basilica—the reputed tomb of S. Peter—and, therefore, that the main idea of the plan of the new cathedral was to build around this tomb a circular temple surmounted by a dome, in which circular building the figure of the cross should be still preserved. Four large chapels occupy the aisles and make up the transition from the circle to the square; the nave, which was originally intended to be short, was in fact nothing more than the vestibule of the great dome; but it was afterwards lengthened by the later architects.

The original plan, the work of Bramante, is one of the finest that the world has seen, but as much cannot be said for the work of the architects who succeeded him. Before the production of this plan, Bramante must have studied many of the circular buildings at that time existing, for in it he shows a complete acquaintance with the developments introduced in previous buildings of this form. The arrangement, for instance, is not really far removed from that of S. Lorenzo at Milan, except that the octagon of the latter is changed to a circle in the former, and of course the scale of the buildings is very dissimilar. In considering the criticisms that have been levelled against the arrangement of S. Peter's, on account of its want of scale, it should be remembered that the original plan was not intended to be a Latin cross but a Greek cross, with consequently a short nave, which would have remedied the defect where it is most apparent, namely, in the nave. In Illustration xxviii. fig. 6 is also given a plan of the ancient Vatican basilica of S. Peter, with the two round buildings which are presumed to have been tombs. This basilica was the first, as it was the largest, of those erected by early Christians in Rome. The line of descent from the earlier building to that which now occupies its place is not at first sight very clear; yet a study of the history of church-planning would completely give the links of the chain binding them together, and further, it is from the amalgamation of the sepulchral building, which is here attached to the transept, with the basilica, that the form of building of which S. Peter's is the culminating point took its rise. This plan of S. Peter's is very original, not so much because its various features cannot be found elsewhere, but they are brought together and further developed on a magnificent scale, in a land where development of church-planning had been almost defunct for many centuries; where the church of the Middle Ages, as seen in Sta. Anastasia at Verona, is almost identical in plan with the basilica of the sixth century, while in the other countries where Christianity flourished the Gothic cathedral had been developed with all the various national characteristics carefully considered and insisted on. The architect took up the plan where it was abandoned by the Romanesque architects and whence also the Gothic architects started; and, utilising the same idea of the fusion of the tomb and the basilica, developed in S. Peter's a plan wholly free from the shackles of Gothic tradition. Whilst retaining all the traditions of the early Christian age, he utilised all the developments which the mediæval architects had made use of.

Perhaps it was only in Italy where Gothic architecture had never fairly taken root, and where, in Rome above all, it succumbed to the weight of classic tradition, that this plan, the plan of the Renaissance, could have been produced; for, in almost the next cathedral of importance which was built, viz., that of S. Paul, London [Illustn. xxviii. fig. 7], while the genius of Wren could produce an original plan such as his first plan of S. Paul's, that plan founded on classic traditions was rejected for one which, on examination, proves to be nothing more than the English Gothic plan developed in the Middle Ages, with the cupola of the Renaissance grafted upon it,—this last being probably the only point on which the architect was able to insist. The plan of S. Paul's is, beside that of S. Peter's, comparatively meaningless and unsympathetic, and in fact might be compared to the various specimens of Gothic architecture executed by Wren; but it must be remembered that in making this plan he was doing that which was wholly foreign to his nature, the wonder being that he should have erected upon the Gothic plan, which officialism forced on him, such a splendid specimen of the Renaissance art.

The plan of the dome of the Invalides at Paris [fig. 5] is very like that of S. Peter's at Rome, only on a smaller scale. This building was erected about the same time as S. Paul's by Jules Hardouin Mansart, who was also the architect of Versailles. In this building he has managed to produce some wonderful internal effects, but so far as the plan is concerned it is a copy, and a very fine copy, of the Renaissance plan of S. Peter's at Rome.

In fact, it would appear, after the erection of S. Peter's, that church-planning was reduced to mere copying and reproducing of ancient features, apart from any conditions of convenience or requirements

of ritual. S. Paul's was just a little too early; the revival of classic art in England had not had time to sweep away mediæval traditions, and the Gothic plan was insisted upon. In France, when Mansart planned the Invalides, the art of the Renaissance had degenerated into mere pedantry. It is this weight of tradition which has at all times fettered the architects of modern days in their planning, just as at Rome the traditions of the classic period prevented that development of the basilican plan which is seen in other countries where the architects had a freer hand. This is to be seen when, after the Gothic revival of the present century in England, Sir Gilbert Scott, R.A., designed the cathedral of S. Mary, at Edinburgh, upon the old familiar lines of the mediæval plan—a plan conceived more in the spirit of the scholar and the mediævalist than in that of a true architect. What had sufficed for the Middle Ages was here held to be the right thing, without making any allowance for the many changes that had taken place since the days of the mysterious ritual which produced Salisbury. No doubt the architect was fettered by that spirit which demanded a traditional cathedral, with all its component parts arranged as if it had been built in the Middle Ages.

New Cathedral, Edinburgh.

It is only natural that in America, where innovations are not only tolerated but sought after, and where there is no weight of mediæval tradition to hamper the work of the architect, an effort should be made at developing a more modern plan. In Trinity Church, Boston, Mass., U.S.A., such an attempt has been made by Richardson. This church, finished in 1877, is not a large one, its seating capacity being about 1,450, or equal to some of the larger London churches. The plan [Illustn. xxviii. fig. 8] is in the form of a Greek cross: a large central square with transepts and short nave, with galleries to all three, and an Eastern apse; the approach being from a large *narthex*, occupying the whole western front. The whole arrangement, as befits the service of the present day, is exceedingly simple, and allows some fine architectural effects. The central square is covered, not with a dome, but with a large square tower.

Here and there in England, an architect has left the beaten track of tradition, and erected a building for ecclesiastical purposes on a plan more adapted to modern principles, but these efforts have generally been on behalf of various Dissenting Bodies and not for the Established Church. The plan of Union Chapel, Islington, is such a one, another well-known example is the church erected for the Rev. Newman Hall in Westminster Bridge Road, and a more recent effort is the chapel built upon Haverstock Hill from the designs of Mr. Alfred Waterhouse. In all of these the dominant feature of the plan is a large octagon withoutlying galleries or transepts at the cardinal points. In all of them piers and columns which would obstruct the sight are studiously avoided, and the main object has been how best to provide for the accommodation of a large congregation without regard to any traditional plan. In the vast majority, if not in all the Established churches which are built in the present day, the traditional plan is adhered to. That many arguments could be advanced in favour of such a retention there is no doubt. It would take too long to discuss them here, but if church architecture is ever to become more than a mere revival of ancient forms, if more vigour and more originality are to be imparted to it, the plan must show more suitability to modern requirements and not so much obedience to tradition; for it is from the plan that the development of most architectural features has sprung. No one was more persistent in the statement of this fact than Street, and he shows his intense belief in it by always, in his writings, considering the plan first, and so arriving at the why and wherefore of the disposition of the building. It is not necessary in further developing the church plan that tradition should be disregarded, but rather that we should profit by the lessons our forefathers have taught us in their solution of the various problems presented to them, and that, working in the same spirit of progress, we should seek to produce plans which are not mere copies, but the outcome of the reasoning powers of men who practise a living art.

THOMAS B. WHINNEY.

LIII.

SCULPTURE IN ITS RELATION TO ARCHITECTURE.

Extracts from Contributions * by the late JOHN BELL, R.A., the late Professor DONALDSON, *Past President*, the late Sir M. DIGBY WYATT, *Past Vice-President*, the late FREDERICK P. COCKERELL, *Hon. Secretary*, and by H. B. GARLING, *Fellow* ; with an introduction by Professor GEORGE AITCHISON, A.R.A., *Member of Council.*

AS it is to be hoped that the public will take more interest in architecture than they have hitherto taken, and that they will see that bare pediments, friezes, and panels, empty niches and pedestals, are filled with sculpture or statuary,† it is thought well to reprint Papers on the application of figure sculpture to architecture, contributed by distinguished men—Papers, alas, that had long since been buried and forgotten in our archives.

Architecture as a fine art may be compared to music ; they are both obtrusive arts that compel attention, and are more or less governed by the same laws. Both arts may enthral, fascinate, and transport ; but as music without words is vague, so is architecture without figure sculpture and figure painting. There is, however, this difference, that when combined, the music is made for the words, while the sculpture and painting are made for the architecture, except when the architecture is only an accessory of either ; and it should be remembered by architects that no graver charge can be brought against them than the unfitness of their buildings to enshrine the highest achievements of the sister arts.

Not long ago Mr. Alma Tadema, R.A., pointed out that the architects provided pediments, panels, niches, recesses, and pedestals for sculpture, but so little were the fine arts cared for, that the public were content to leave the buildings unfinished ; and he pointed out, that the baldness of the dome of the National Gallery was wholly owing to the absence of the sculptured groups to which it was intended to

* Revised and reprinted from Papers in early volumes of the TRANSACTIONS, Original Series.

† Statuary used in its original sense as bronze work.—G. A.

form a background. Now, however, that the well-to-do have the advantage of Slade Professors at the Universities, and that we are taxed to provide cheap drawing schools throughout England, there seems to be some chance of a revival of a taste for sculpture.

There are, doubtless, difficulties in the way of sculpture in the present day; it is impossible to have it when the realism of the everyday clothes is insisted on. Man's dress, at least, is not only so hideous, but so ignoble, that nothing can be produced but an eyesore or a scarecrow. Reynolds, in his tenth Discourse, aptly remarks that "the desire of transmitting to posterity the shape of modern dress must be acknow-"ledged to be purchased at a prodigious price, even the price of everything that is "valuable in art . . . and it seems to be scarce worth while to employ such durable "materials in conveying to posterity a fashion of which the longest existence scarce "exceeds a year."

If sculptors must conform to the vulgar passion of the populace, whose notions of sculpture are obtained at Madame Tussaud's, for seeing the hero or genius in his real clothes, an insignificant bas-relief on the pedestal would be enough, while some emblematic figure, allowing scope to the sculptor's genius, should form the monument; an added bust or medallion would preserve the features. In this way may be treated such accessories as carriages; the gig or coach perfectly accords with the ignoble costume, while nothing can make a nobler crown to a building than a quadriga with a Victory.

In the greatest epochs of Art the sister arts were animated by the same desire that animated the Romans in regard to the State; they thought only of the perfection of the building. Sculptor, painter, and architect tried their best to make the whole perfect, and not to concentrate attention on their own art at the expense of the whole. The sculptor—for now we cannot speak of the painter in Greek buildings—subordinated his work to the architecture, yet for all that his work has been the wonder and admiration of mankind ever since, while inside, the architect subordinated the architecture to the colossal statue. With what regret do we think of the sublime art of Phidias being lavished on such materials as ivory and gold, when marble would probably have preserved to us his matchless work.

It is a mistake to suppose that the wise architect asks the sculptor to accept his canons; he only asks the sculptor to so arrange his work, that at the distance at which the whole building can be seen, the sculpture forms an integral part of it, and enriches it by a different texture, and enhances its rigid vertical and horizontal lines by flowing ones. Diagonal lines, curved contours, and what, architecturally speaking, are irregular masses, give value to the formal and rigid lines of the building, as these give value to the sculpture. Even as a finial, I do not know that the architect asks for a symmetric statue, he only asks for one that looks well; a vase must always be more symmetric. To put a portrait statue on a column is purely barbaric; even the Romans had sense enough to put Trajan's Column in the small court of a Basilica, so that most of its storied shaft could be seen from the galleries, and the statue from the terraced roof.

I must enlarge on some of the difficulties with which the sculptor has to contend in the present day. Allegory, being out of fashion, is no longer comprehended, and now that there seems to be a tendency to forbid the study of the Scriptures we may shortly be in the position of the members of Napoleon's staff in Syria, who asked one another why Palestine was called the Holy Land? Still, while churches exist and this generation continues, we have the Jewish lawgivers, prophets, and kings, for ecclesiastical buildings. We have no gods and goddesses, no nymphs and fauns, no national heroes of primitive times, who can afford us types of dignified simplicity. We have no dragons, gorgons, chimæras, griffins, syrens, or harpies, not even a centaur or a satyr; and the bulk of our people would not comprehend anything in story that was older than Dickens. The oldest traditions that are known to the populace are, with us, clothed in mediæval dress—St. George and the Dragon, Jack the Giant Killer, and Robin Hood and his men,—so the sculptor must be contented with the old Greek myths, and with the admiration of the educated. Viollet-le-Duc said that the steam engine had style, but I should be sorry to see nothing but sculptured machinery on our public buildings.

It seems to be overlooked that the present generation lives wholly in the present, owing to the discoveries in science and to mechanical invention. This age is cut off by a gulf from the past; for us Pelops and Jason, Theseus and Achilles, Romulus and Remus, Numa and Egeria do not exist. Our oldest heroes are Smeaton and Brindley, Trevithick, Watt, and George Stephenson, the Brunels, Hodgkinson, and Fairbairn, Davy, Dalton, Faraday, and Wheatstone. But these men and their surroundings cannot from the nature of things be included in the domain of sculpture.

There is one application of the figure that no nation since Greek times has had the heart to give up, viz., Persians or Caryatides; these were highly grateful and suggestive to the Greeks, who saw in them the effigies of those who would have enslaved them, enslaved themselves, and bearing the heaviest burdens. The mediæval sculptors could not resist the effect of this feature, though they not very appropriately made their Prophets and Saints fulfil this degrading and irksome office. The sculptor of the Caryatides at the Pandrosium has never yet been equalled in the appropriate and dignified way in which he has treated these figures; his making them into a hollow square, as if they had stopped for a moment while marching with their load, with all their faces the same way, was a brilliant achievement of genius. Some have professed they could observe that the shoulder corresponding to the bent knee is the highest, so that the slanting lines of the shoulders converge both ways to the centre.

In John Bell's Paper you have the advantage of the remarks and advice of an eminent sculptor from whose opinion on his own art I do not venture to disagree; but architecturally speaking, the oval form of Bird's Conversion of St. Paul leaves the angles of the pediment too bare. There are in the Paper two admirable suggestions, viz., that when a separate monument in front of a public building is wanted, there should be a committee of sculptors and architects to see whether it should be a single figure, sitting, standing, or on horseback, or whether it should be a group; and when

the commission is given, that the plaster model with its pedestal should be put in place before the work is executed in marble or bronze. It is curious that he should have chosen the Sistine Chapel as an illustration, because the whole chapel has been sacrificed for the exhibition of colossal figures, out of all proportion to the building they were meant to adorn.

F. P. Cockerell's Paper on the architectural accessories of sculpture gives most valuable information on the subject of pedestals, and as the lamented author was not only an accomplished architect but by nature a sculptor, it is doubly worth attention. To those interested in classical archæology I may mention that there is the gold heel of a shoe enriched with figure sculpture in the British Museum, showing that the adornment of the sandals in the chryselephantine statue of Minerva by Phidias was taken from the life.

Mr. Garling has treated the application of sculpture to architecture from a purely architectural point of view, and his Paper contains many valuable precepts. His concluding remarks on the rules of art deserve to be committed to memory.

Though it is, doubtless, unnecessary to draw the attention of architectural students to the marbles of the British Museum, or to Mr. Perry's Gallery of Casts at the South Kensington Museum, few seem to be aware that, at the Crystal Palace, there is the finest collection of casts of Greek, Roman, Renaissance, and Mediæval sculpture to be found in the world.

In conclusion I may say that there is a great field for those sculptors who are willing to devote themselves to that part of their art in which foliage is used, not unfrequently in combination with men and animals. It is partly because the capitals, panels, and friezes of buildings were executed by sculptors and not by mechanics, that the early Italian Renaissance so charms us. I may remark too that Michael Angelo himself did not disdain to carve that string in the Medici Chapel which is adorned with masks, in which every mask is different. When architects have pedestals to design for sculpture or statuary, or frames for reliefs, the object is to set off the sculpture; not to allow the architecture to compete with it, much less to overwhelm it, but to make the architectural parts duly and artistically subordinate. When an architect has the chance of having his work enriched by painting or sculpture his first aim should be to secure the services of a real artist. Bad architecture may be pardoned, as it also serves a utilitarian end, but painting and sculpture are purely for ennobling and delight, and you know what was said about the cognate art of poetry,—

> But gods and men and booksellers refuse
> To countenance a mediocre muse.

The loathing with which an artist turns from the ill-proportioned, badly drawn, and dislocated figures of a mechanic, often prevents him from observing the merits of the architecture. I think I ought to mention my personal obligations to painters and sculptors, who have not only aided me with their knowledge but with their labours, and that too often at a great pecuniary loss, because they were animated by the desire to

present artistic work to the educated eye, and to show it was not their fault that most buildings are adorned with sculpture only fit for the figure-head of a ship or the ornaments for a round of beef.—G. AITCHISON.

The late John Bell, R.A.,
ON THE GEOMETRIC TREATMENT OF SCULPTURE.*

Although no doubt a work of sculpture, as a unit, and isolated, is the better for being of a symmetric outline, still more is this the case when regarded in reference to situations in which sculpture is usually placed, which also, I conceive, may nearly all, more or less, be considered architectural. In a garden, for instance. Those gardens which are suitable for such decorations as vases, statues, or fountains, are more or less on a symmetric plan, and may all in degree be considered as extensions of the house itself to which they are attached—as its outer works, as it were, and as affording apartments with walls indeed, but with no roof but the sky. Under this aspect, none of such decorations of art as are introduced in these situations are altogether beyond and without the bounds of architecture, but their effect will be influenced in a large degree by the same laws under which they appear within the immediate courts, halls, and apartments of the edifice itself. When, therefore, a work of sculpture on its pedestal is placed in a garden, the two together, as a mass, will have the best effect if they justly subserve some theory of decorative arrangement which requires in that spot an architectural feature of that quality. I say this in order to acknowledge that, even when not directly associated with architecture, it may be very well for sculpture to hold itself bound by the same ties of geometric harmony as if in nearer relation. Of course, when more closely connected with the sister art, as in statues to fill niches, relievi to occupy panels, figures to become the finials of columns, or extended and diversified compositions to adorn and enhance the tympanum of a façade or the summit of a triumphal arch, the geometric treatment of the sculpture becomes more intimately an architectonic question. So vital a matter, indeed, does this appear in these cases, as regards the eventual effect of both the building to be adorned, and the sculpture to adorn it, that there seems to be but a remote chance of a happy result, unless a geometric laying out of contours and masses, and light and shade, has formed the groundwork of the design. In such cases the most delicate and artistic detail will fail to make up for deficiencies in geometric plot, which latter consideration, however, having been regarded, no doubt the more beauty of finish in details the better, as the Athenian has so well illustrated in the exquisite workmanship of those figures which remain to us from the tympana of the Parthenon, which were viewed at an elevation of more than fifty feet. It appears, therefore, that sculpture should never lose sight of those family ties which bind it to architecture, and by which

* Extracted from Transactions, 1858–59, pp. 29–40.

so much mutual benefit is to be attained. The freedom of sculptural lines which she draws from the contours and movements of vital forms may well give flow to the stricter types and masses of architecture; while, on the other hand, the latter, spreading out and aspiring more under the steadfast laws that inform the mineral kingdom, may lend in turn to sculpture the most valuable hints of geometric construction. And this holds even in cases where the sculpture is not in direct association with architecture, but is a principle also affecting the art by itself.

It may be, however, as well to make here, *in limine*, an acknowledgment that there are exceptions to these precedents. In such cases, however, we cannot tell how far such examples as do not possess this even adjustment were intended to act as one of a pair; in which case, although when considered as units they do not balance, yet, as parts of a twin decoration, they might do so most agreeably, as is the case with the ears of a sarcophagus, or the handles of a vase, which as units are irregular, yet as a pair regular, and though singly uneven, yet when justly disposed are mutually responsive, as is seen in the two side figures of the Medici tomb. Had either of these two figures been found separately and alone, in an ancient ruin, its form would have been deemed irregular; but as they exist now, according to the artist's original plan, they are an apt example of geometric and responsive arrangement. I may as well acknowledge, however, that the more I see of works of art, the more vain it appears to me to attempt to erect *perfect* canons of taste or treatment. A perfect canon in such matters appears as impossible an existence as that of a perfect specific in medicine. Thus, in this case, although geometric treatment is undoubtedly an element of fine sculpture, and although certain cases of apparent divergence from this rule may be argued away, yet without pedantry or special pleading it cannot but be allowed that there are some noble works which appear to play truant to these rules. This remark, however, chiefly applies to figures in the round, in which in any decided action it will be recognised at once that a form of geometric symmetry could scarcely be obtained in all views. In these cases it will be admitted that that arrangement is the most happy which gives the front and principal view, with the best balanced decorative form.

The noble statue of the Belvedere Apollo, and the Borghese Diana, are in some views of an irregular contour, and yet in others they present one sufficiently geometric to render them suitable for central forms without a pendant, especially in the centre of an ample space, and comparatively aloof from such lines of architecture as would emphasise their departure from the balanced character of an architectural finial. Although, however, some views of these and other figures may be irregular, yet I conceive that, even in these cases, the desire is perceptible to obtain, as much as the subject and action admitted of, a well-balanced and geometric form. Also with respect to the above-mentioned two statues, we do not know how they were originally placed. The colossal chryselephantine works of Phidias, the Jupiter at Elis, and the Minerva of the Parthenon, are recorded as having been evenly-balanced works, while we are also informed that they were symmetrically placed within the temples that contained them. Without further introduction, I would now advert to two forms of geometric character

to which various of the best works in the round of ancient and modern sculpture appear to incline. It is on this account, and on that of their simplicity, that I speak of them especially, and not, of course, with any idea of excluding other geometric resemblances or types.

I allude to the forms of the Pyramid and of the Vase. These are types which not only mould the masses and contours of compositions in the round, agreeably as sculpture *per se*, but by the same influence suit them for the purposes of architectural enhancement.

In regarding examples of these treatments, however, we must not, of course, expect perfect pyramids or perfect vase forms. The conditions of vital forms are not such as to be confined within limits so rigid, and we can only expect such coincidence as may evidence the plan of their geometric conception. In some works, also, we shall perceive the pyramid tall, like an isosceles triangle, in others flat, and spread out as in the Dying Gladiator, or the exquisite figure of Eve by Baily, a joy for ever as long as sculpture lasts. In one statue or group we may recognise the contours of a tall vase; in another, that of a broad wide one, as in a seated figure. The grand and expressive group of the Laocoon aims evidently at a pyramidal form, though this is somewhat blown aside by the gust of passion and of pain. The great group of Dirce and the Bull, of which there is a full-sized cast at the Crystal Palace at Sydenham, is on a similar principle, as it is, at some sacrifice, made more or less pyramidal on all four sides. The group of Niobe and her youngest daughter, among other works, evinces an intention towards this form, and in most of these there is a near coincidence with that of a flame of fire, which has ever a tendency towards the pyramid. Milton speaks of Satan, when touched by Ithuriel's spear, as springing up "like a pyramid of fire," and even the word pyramid is derived from this source. This form is also finely present in the general composition of the tombs of the Medici, as illustrated by the engravings before you; in which, although the parts are so boldly cast about, and so grandly diversified, yet this is effected without disturbing the general geometric arrangement which is here so finely preserved.

As I can only touch lightly on the details of my subject, I will now pass on to the second form I have indicated as frequent in fine statues and groups, that of the Vase; and to cite some examples which partake of the general form of a vase-like finial, of which a few familiar examples are before you. The outline and general contour of the far-famed Venus de' Medici affords, especially in the front view, the general balance of a vase-like finial. The Heracles of Glycon, commonly called the Farnese Hercules, although a figure as far removed as possible from this in character, has a similar quality of arrangement, only it is wider at the foot. Both these statues possess, to a great degree, in their principal view, an evenly-balanced vase-like contour. And this quality, no doubt, has had a very large part, along with their other merits, in obtaining for them that great popularity which they have ever enjoyed. They were more repeated in ancient art than any other statues; one great cause of this being, no doubt, that, in consequence of their geometric arrangement, they were found so very con-

venient as architectural decorations, and we sculptors may well keep this point in mind when we desire a widespread public for our efforts, and try to work for posterity. The cloaked figure of the Phocion, also before you, presents a similar character of contour, illustrating the application of a vase-like outline to a portrait statue. There is, however, another well-known treasure of ancient art that still more presents perfection as a vase-like finial, viz. the well-known classic group of Cupid and Psyche embracing. Turn it which way you will, in each view it preserves the just balance, elegant proportions, and general mass of a tall tapering vase. In this exquisite and graceful group we possess a charming example of geometric balance and contour applied to the human form, and of the perfect coincidence of the architectural, decorative, and sculptural elements. Again, accordingly, has ancient and modern repute followed this combination of merits, and in later times this group has been more frequently introduced into paintings than any other work of sculpture. I have before alluded to my disinclination to the pedantry of positive canons, and thus I would now again remark that although symmetry of form of this character endows a work of sculpture with a great charm, insomuch that its high value may be received as an axiom, yet occasionally divergence from this may be not only allowable, but even of great service in emphasising the action and expression of a statue; and that without injuring the effect of its architectural associations. Even in a niche which would seem, at first sight especially, to look for a symmetric treatment in the work occupying it, yet, premising that a general symmetric mass is obtained to occupy the general space of the niche, a hand and arm boldly coming forth straight out from the shoulder forwards, sideways, or upwards, and even cutting across the lines of the architecture, may have a fine, vigorous, and picturesque effect, and one still conducive to the general impression, although at first sight appearing to violate the compact of the arts. But these divergences and contrasts are only, I think, to be looked on as exceptions, and are in all cases to be guided by artistic taste alone, which is more subtle than rules.

Having used the tomb of Lorenzo de' Medici in its whole composition as an instance of the pyramid, I will now apply to the central seated figure which forms the apex of the composition for an example of the vase form, drawn together towards the base, swelling out on either side in the centre, and contracting again at the top, as is exemplified in the engraving and the small bronze copy of the Lorenzo on the table. Michael Angelo being a proficient in all the four arts, was the more open to their combination. In regarding this remarkable tomb, if the spectator will, in his mind's eye, substitute for the figure of Lorenzo a vase form of similar proportions and architectural festoons or some features of like character for the recumbent figures on either side, he will perceive how happy is the mere decorative combination as such, even apart from the nobleness of the figures; and indeed there are extant previous sketches by Michael Angelo of trials of the arrangement of these figures, in which is evidenced that their architectural arrangement in a geometric manner was his first thought. And this point may be best illustrated by viewing such works in the first place in the light of geometric decorative forms. In many situations it will be acknowledged that rather

broad, full, and luxuriantly shaped vases afford richer and more satisfactory decorations than high tapering ones. In the Crystal Palace gardens at Sydenham, for instance, I think it will be allowed that the broad vases look better than the tall ones; and I conceive that along the upper terrace, seated figures in bold attitudes, affording picturesque light and shade, but still subserving the general decorative proportions of wide vases, would have been preferable to the standing figures adopted, especially as they would have contrasted better with the numerous upright slender lines of the crystal edifice itself which forms their background. Seated attitudes were much adopted by the Greeks and Romans, and in later times by the Italians and French; and they have a most satisfactory effect on pedestals in the front of buildings, as would be the case in front of the Royal Exchange and the British Museum. If the authorities especially concerned in the erection of our public statues would first take an architectonic view of the subject, and consider what class of geometric decorative form would be most harmonious in a special site, before they determined for a standing or a seated figure, I think that seated figures would be more frequently executed than they are now as decorations of this city. The well-known group of the Rape of the Sabines, by John of Bologna, affords another instance of a vase-like form, round which spiral festoons of flowers may be imagined to be twisted, much as they are in those alabaster vases for flowers which we use as drawing-room decorations.

I will now pass on to busts. The ancients frequently made use of the terminal bust, and perhaps this is the most dignified way in which a work of this class can be based; but it does not so well subserve the purposes of decoration in our dwellings, and thus in modern practice has been replaced by the bust with the round pedestal. Nollekens introduced, and Chantrey continued, this mode of fitting for these works, by which means, especially when placed on the frustra of columns, they become finials of a vase-like form. Chantrey was very careful in so adjusting his busts that they should preserve a general symmetric form even at the back, fitting them well for decorations and finials, as may be, for instance, well remarked in the bust of William IV. by him, in the centre of the daïs at the end of the hall in Greenwich Hospital.

I will now proceed to offer a few remarks as to the treatment of sculpture in a tympanum. In this feature of art the general pyramidal form enforced by the space to be filled appears to be by no means the only consideration. It is unfortunate that we have no absolute record of the precise arrangement of any whole composition of Phidias filling these spaces in the Parthenon; although in such data as remain a sort of circular form in the centre, treated in a full manner, and lessening off in waving lines towards the extreme ends, may be imagined as the general geometrical treatment entertained. It has been conjectured that the figures of Niobe and her children occupied a tympanum of a temple of Apollo and Diana; but this is not certain, nor would it be safe to deduce from this series, which has been thus arbitrarily arranged, the mode of the Greeks in this feature of decoration. We have the arrangement of the Æginetan tympanum, but that is of a crude and archaic character. In illustration of my views of a fine geometric treatment for the sculpture of a tympanum, I am

happy to be able to allude to an English design, which, however, I only know through the medium of an engraving. I allude to the beautiful design by Professor Cockerell, for St. George's Hall.* Now, I have had no conversation with him on the subject, and I hope he will take in good part the venturesome character of my reference to his charming work; but it appears to me that this design affords a most just geometric treatment of a rich circular composition in the centre of the space occupied, tangent to the base line and to the two lines of the roof; that it thus, as it were, supports the apex of the roof, and thence runs off agreeably in diversified lines towards either end. Fancifully this treatment may be likened to the appearance of a vast mask in the centre of the tympanum, the hair of which flows off on either side to either end, like that of the Medusa; or, travestied by more common ornament, is like that of a coat of arms in the centre, and foliage branching or curling off to the extreme points of the space to be occupied. Another exceedingly picturesque example of the effective filling of a tympanum, and one very familiar, for you can hardly go up Ludgate Hill without seeing it, is on the tympanum of the west front of St. Paul's, in the relievo of the conversion of St. Paul, sculptured by Francis Bird. This appears also to have been arranged on the same principle of a circular form, opening out on all sides from the holy radiance in the centre. It is charming in effect,—and one is glad to be able to say for once something favourable for London smoke,—for the mode in which it has darkened certain parts of this relievo, and left others white, has subserved the scheme of the composition, and most vigorously enhanced its chiaroscuro. As regards the arrangement of sculpture in a tympanum, there is one mode which I think one may safely say should never be adopted, viz. that which would repeat the upright lines of the columns beneath. The masonry and structure of the pediment connects and ties together the substructure; and its sculptural decoration should surely not err from this character. It appears pointed out, therefore, that the lines of the sculpture with which it is endowed should not be loose, vertical, or disconnected; but, on the other hand, should possess an agreeably interlaced character, as one composition, spreading over and combining the space from end to end, and as it were protecting all beneath like a great bird with extended wings; and following in this track, I conceive no geometric treatment arising out of this consideration to be superior to that of a richly-devised circular supporting form in the centre, carried out towards either end in waving lines.

The metopes of the Parthenon evince a well-balanced covering of the surface, so as to obtain that amount of quality of light and shade that was just for the situations they occupied. But, further than this, any precise adoption of any common geometric line in them is not apparent to me. In the frieze of the same building, especially in the equestrian part of it, which will be allowed to be the finest example of the kind in existence, a horizontal ribbon-like character of geometric decoration has been adopted; the mass of the relievo, consisting of the bodies of horses and the lower portions of

* See a facsimile of the late Professor Cockerell's first sketch of this composition in TRANSACTIONS, 1863-64, page 27.

the riders, forms the centre of this band of decoration, which is shaded off above and below with smaller forms—above by the heads and upper portions of the riders, and below by their feet and the horses' legs. Although these details are charmingly varied, their continuity as ornament is not broken; nor, although probably the background was made slightly blue, do I believe that anything was done in the way of colouring that was calculated to break up this continuity. The guiding line of this frieze may be said, therefore, to be horizontal, affording an arrangement of men and horses in harmony with the principal architectural lines of the building.

I will now pass to the sculptural treatment of circular forms in relievo, and regard the geometric arrangement afforded by good examples. In the occupation of circular spaces, as regards shields and metal work, it will occur to you that a geometric treatment is prevalent, in which a bright light of vigorous design and workmanship is evident in the centre, raying off and shading away in intensity towards the edges. The shield of Francis I., said to be by Cellini, that of Achilles by Flaxman, and of Wellington by Stothard, also illustrate, more or less, this scheme of treatment, combined with a sort of circular movement around the outer portion, suggestive of an orrery. There appears, indeed, in art as well as in accordance with nature astronomically, an idea of movement ever connected with the occupation of circular areas of any extent.. In such works as coins and gems the spaces are often too small for this feeling to arise, and, therefore, in these a single head frequently fills the centre without any lines of an undulating character around, as may be well seen in consulting the fine collection of works of this class in the British Museum. In larger works of this form of area, no finer examples are to be found than that charming pair of relievi, equally exquisite in thought and execution—the Morning and Night of Thorwaldsen; and, in consequence, they have become standard features of architectural decoration. The same qualities, also, that fit these charming works for panels, also adapt them for gems and cameos (in which they have been worked in great numbers); that is, their decorative character, which in a large degree results from their geometric treatment.

Much more might be said on this subject as regards relievi, but I will now return for a short time to works in the round, directing my remarks, however, to some features of art which I have not yet touched. The very graceful little bronze of Sappho by Pradier, that Anacreon of French sculpture, is a fine example of pyramidal form attained in a single figure, fitting it, among other art-uses, for the crowning decoration for a clock; and this quality, in addition to its other excellences, has rendered it the figure most extensively adopted for those ornamental *pendules* which form so large a trade in France. The copyright of this figure was purchased from the artist by one house in Paris, of which I am told it has made the fortune. And it is, doubtless, in great degree, its general decorative arrangement that has made for it so great a reputation and so large a public. In other works of far larger scale, which, from their public situation, are more constantly before the eye, and which form part of the skyline of a city,—which, moreover, are liable to be regarded from a distance, whence their general outline is more recognised than their details,—a geometric and

well-balanced treatment is evidently still more essential. In Paris, on the Column in the Place Vendôme, stands a statue of the First Napoleon, dressed in his well-known grey surtout, which, although it is not remarkable for its art, subserves its architectural purpose in a satisfactory manner as a finial of a somewhat vase-like form. This cannot be said of the statues which form the finials of two of our columns in London, which are far from being geometric or well-balanced in their general contours, and evidence, in an unfortunate degree, how very much the effect of a column may be injured by an inadequate or lopsided finial; and this may be allowed to suggest another and an additional reason to those generally advanced against the placing of portrait statues on the top of columns, inasmuch as portrait statues, especially in accordance with the prosaic taste of the present day, may be held not to allow, so well as emblematic statues do, of that quality of adjustment as would fit them best for finials. So that even on this score, if on the top of a column there must be a statue, it would appear preferable that it should be a Victory, or a Peace, or some other emblematic figure well fitted for a finial, and of which there need be no desire to see the features near, and that the portrait statue of the individual honoured should be below, in front of the base.

I have often urged that it would be very beneficial were it a rule, that no public work of sculpture of any importance should be erected in bronze or marble in this city until the full-size plaster model had been previously set up on a pedestal, on the intended site, in order to try its effect architecturally as well as in other respects. I am convinced that, almost without exception, some advantage would accrue to the final effect of the work from this preliminary step having been taken. In the case of either bronze or marble works it is the practice always to make full-sized models in the first instance, so that but little time or delay would arise from this plan being followed. The plaster model having thus, *in situ*, received such modifications as the seeing it in its place would suggest, it could then be removed to be translated into either marble or bronze.

I will now proceed to the character of form suitable to crown a triumphal arch, for which it will be allowed probably that a flattened pyramid of decoration would be suitable, such as is supposed to have been obtained on the Arch of Constantine by a group in bronze of that Emperor in a car drawn by four horses abreast. Other elements of subject than these are, of course, open to be chosen; but as regards mass and outline, as a sculptural finial, perhaps none could be devised better to enhance an architectural structure of this class than those of a flattened pyramid composed of features on not too large a scale.

I am unwilling to close these few remarks without availing myself of the support of some of the highest works of painting, as well as sculpture, in the evidence they afford of the dignified and satisfactory results of geometric arrangement in a sister art. As these, however, are not strictly within my province, I will merely run over the names of a few that readily occur, which will call up at once the recollection of their geometric treatment. By Raphael: the School of Athens; the Death of Ananias;

the Madonna di San Sisto; and the Transfiguration. By Michael Angelo: the Last Judgment, and the ceiling of the Sistine Chapel. By Titian: the Assumption of the Virgin; and various works of Fra Bartolomeo and others. Many other works will occur to you, evincing in like manner with these the views of the greatest professors of the sister art, that just geometric treatment goes hand in hand with the loftiest and grandest flights of fancy. They also show the care taken by these masters towards the adjusting this in each case to the architectonic requirements of the situation.

In conclusion, as regards my own art, it will be evident to you that I have only touched on a portion of the subject of the geometric treatment of sculpture by reference chiefly to classic examples and classic architecture, and not to Gothic and other styles. Nevertheless, I fear I have already too much trespassed on the light my theme is calculated to receive from the remarks of others. Perhaps, however, I may add that apparently there is no subject that more illustrates the connection and union of the four arts, Architecture, Painting, Sculpture, and Decoration, than that to which the above remarks apply, insomuch that it may not be inappropriate to conclude them with the well-known observation of Michael Angelo, when questioned on a collateral subject, who replied, "I know but of one art."—JOHN BELL.

The late Professor Donaldson
ON THE SAME SUBJECT, AFTER HEARING MR. BELL'S PAPER.

In this country architects are forced to consider a building complete without sculpture; but in fact sculpture is necessary to give to every building its proper intensity of feeling. Among the ancients there never was a temple, however humble, without sculpture. This is found to be the case also in the choragic monuments and in the simplest tombs. Modern French architects carry out the same principle, and employ sculpture most lavishly, as may be seen in the new works at the Louvre. These sculptures are neither ordinary nor commonplace; the first artists of the country are engaged upon them. With regard to grouping sculpture in a vase-like form, Serlio imagined that the outlines of all vases were based upon the primary type of an oval, loftier and wider in different examples. A group of oval composition may incline one way or the other, because the inclination of the oval will not deprive it of its stability, but a vase must always be vertical because it cannot have stability when not vertical. One great law to be observed in all sculptural compositions for pediments is, that the figures shall be as large as possible, otherwise they will not play their part in the grand and entire whole, as in the pediments of the Parthenon. A great error may be noticed in the pediment of the Madeleine at Paris, viz. the presence of modillions above the tympanum, so that the light falling upon them gives them the appearance of so many more heads of figures in addition to the sculpture beneath, while the breadth of light upon the tympanum itself is greatly interfered with. The geometric treatment of sculpture has forcibly struck me when looking at Michael Angelo's works

at Florence, when it appeared to me that the figure might be confined within four lines—two vertical and two horizontal—these lines all touching the prominent parts of the figure and its pedestal. The same squareness of composition is found in the other works of Michael Angelo, such as the figures of the Prophets, in which the parallelogram seems to prevail over the vase form. Perhaps this great sculptor may have been guided by his feeling for geometry, and his knowledge of architecture. At all events, architects are greatly indebted to him for many grand and noble features, particularly his alteration of Bramante's design for St. Peter's; in which, despite the badness of the detail, the effect is very fine and grand—indeed, the style of Michael Angelo is as grand in architecture as it is in sculpture. Another painter who has treated decoration architecturally is Domenichino, whose skill is displayed in the four pendentives of S. Andrea della Valle at Rome, as well as in those of St. Peter's; and fortunate indeed was the architect in whose behalf his services were enlisted. In ancient times architecture and sculpture went hand in hand; but in modern practice it will be found that, whenever the architect makes provision for the works of the sculptor, the first thing the patron or the employer does is to wipe out the sculpture as a piece of extravagance. That the same laws which apply to architecture also apply to sculpture is especially evident in the works of the Mediæval architects, who introduced sculpture with such power and propriety of feeling that it combines with, and seems part of, the architecture itself.—THOS. L. DONALDSON.

The late Sir M. Digby Wyatt
ON THE SAME SUBJECT, AFTER HEARING MR. BELL'S PAPER.

Any architect seeking to carry his building to perfection can only succeed by the aid of painting and sculpture. Those arts are especially valuable, not alone from their extreme beauty, but because architecture is defective, since a building of perfect proportions may be erected, but without painting and sculpture the precise purpose and the thoughts connected with it cannot be expressed. To stamp them upon any structure, the "phonetic element," as Mr. Fergusson calls it, in his admirable *Essay on Beauty,* must be superadded. The sculpture of the Parthenon, the statues in St. Stephen's Hall, the mosaics of Orvieto, and the frescoes of the Campo Santo, express the purpose of the various buildings they adorn in a manner which abstract conventional forms alone can never do. In making use, however, of the resources available through the sister arts, the architect should draw the curb tightly, otherwise, poor Britons! in inviting these Saxons to help them, they may find their legitimate functions annulled, and wild discord suffered to reign where order, harmony, and beauty should be the presiding deities. The best way for architects to exercise this check is to deal with the works of the painter and sculptor as abstract decorative adjuncts, irrespective of their ideal characteristics, and as intended primarily to enhance the strictly conventional forms of the architecture. Sculpture may be made to subserve

these ends by three principal elements, viz. contour, mass, and light and shade. Upon a due subordination of these to each other, and to the structure they embellish, the good effect of architectural sculptures must depend. In very low relief, contour is the most important point, but the moment the artist adopts a higher degree of relief, the second element, or mass, becomes the most essential; because then not only the lines touching the ground, but the proportions of the masses rising to certain planes, must be harmonious; and each successive plane must obey the original laws of beauty which make the well-designed contour graceful in low relief. Not only should the masses balance in general quantity, but the amount of cutting up of each mass should be equivalent where they are responsive. Care must be taken to keep the balance even; thus in designing sculpture for a tympanum, for which very high relief may be preferable that the leading forms may be well illuminated, if the surface of the sculpture on one side the central axis only be cut into holes or notches (for diapers, draperies, &c.) a quantity of black spots upon the white will be introduced, giving to the work a greyish tone, and more dark than light will be given to one side. If the sculpture of the other half be left with a smooth surface, it will hold a much greater quantity of light, and will draw the eye towards it, whilst the darker half will not attract the eye at all; and thus, notwithstanding the general arrangement may be symmetrical and good, through a disregard of the laws of chiaroscuro, failure in effect may result. Hence it is essential that the artist should learn how to trace contours, how to distribute masses, and how to deal with the lights and shades of his composition. In looking at the symmetry of a beautifully designed piece of sculpture, whether in the round or in relief, the experienced eye cannot fail to recognise that balance and regularity, not too slavishly sustained, are all-important. A design may be vase-like or of any other form; it is only necessary that it shall be simple, well-balanced, and symmetrical; and whilst symmetry should be carefully preserved, it is at the same time necessary to veil it, and prevent its being left too apparent. The principle of the central group of Professor Cockerell's beautiful pediment at St. George's Hall, Liverpool, which is based on the circle, would be objectionable if the fundamental form had been too distinctly shown; but the moment the impression of regularity of form is obtained, combined with that variety which is incessant in nature, the effect is complete and satisfactory.—M. DIGBY WYATT.

The late Frederick P. Cockerell
ON THE SUBJECT OF PEDESTALS FOR SCULPTURE.*

The line to be drawn between architectural accessories of sculpture and sculpturesque accessories of architecture is in many instances so little defined, that to draw that line, and to sketch, even superficially, the leading features of the whole subject,

* Extracted from Transactions, 1860–61, pp. 239–250.

would be matter for a volume. All that can be done is to point to a few examples of the ancient schools, and, where the actual examples are wanting, to quote the authority of those who, from the obscure hints of ancient historians, have brought to light some of their principles of art. And if we compare with the few examples that remain the efforts of our modern schools (our own especially), we shall find that, obvious as these principles may appear, they have been sadly misunderstood, and too often utterly ignored, by our artists. Perhaps the fault will be found to exist, not so much in the want of talent in these times, as in the spirit of utilitarianism, which, by insisting on the union of the artist and the tradesman in the same person, limits the artist to a single branch of art, and practically ignores that union of the three sisters in which alone true strength in art can be found.

Taking as an axiom that the object of a pedestal is to give dignity and importance to the group or figure which it supports, rather than to act as an architectural feature having a primary importance and interest of its own, our first desire in studying the subject is to find some fixed principle of design and rule of proportion to guide us in our combinations, such as are found to exist more or less positively in the *architecture* of every school. But if in the study of the present subject we turn to architecture, it seems at first sight to offer but little assistance; for when once we have established that the object of a pedestal is to give importance to the feature which it supports, the analogy in the application of the pedestal in the two arts seems to stop; for the precise and geometrical lines, and the spirit of line and rule, which constitute the essence of architecture, have nothing in common with the flow of line—the ever varying and as it were accidental forms of sculpture. Yet though it may not be possible to establish a direct and palpable parallel, or to apply the rules which govern the proportion and form of architectural pedestals to those of sculpture, still the spirit which pervades one branch of art will be found to exist in the coeval works of the sister art, and a thorough acquaintance with the one cannot fail materially to assist us in our study of the other.

If we compare the few remaining examples of architectural and sculpturesque pedestals in the antique schools, there will be found a coincidence of principle in each school which will afford reasonable ground for adopting the architectural principle, where examples of the other are wanting. We cannot enough regret the scarcity of authentic information on the subject of Greek pedestals, but such hints as are afforded by written descriptions and the paintings upon vases &c. should be regarded as the Sibylline books and turned to account as best we may. It is no platitude to repeat that the Greek school is that from which all that is good in art is derived more or less directly; it is that which beyond all others evinces the deepest thought and the most unerring principle, and which is least subject to that caprice which so frequently bewilders us and throws us off the scent in modern schools. Horace, in the often-quoted passage—

Exemplaria Græca
Nocturnâ versate manu, versate diurnâ—

says only what scores of writers and artists of all times have said or implied, if not with the same eloquence, with equal insistence.

Of the earliest style of art but little need be said, for though the monumental sculpture of the primitive schools of Greece (commonly called the Dædalian school) and of Egypt has great and peculiar qualities of its own, they are not such as will materially tend to illustrate the subject under consideration. It is not unworthy of remark, however, that the coincidence between the works of architecture and sculpture which we shall find in other schools, exhibits itself also in the primitive works by the fewness of parts and the almost entire absence of those accessory features (as the pedestal) which are used in other schools to give scale and dignity to the leading features, and which the massiveness of the forms in the earlier schools seems to render less necessary. In the Egyptian and Assyrian architecture the columns generally stand upon the ground, or where they are raised upon a stylobate (as for example in the small temple at Philæ, commonly called the bed of Pharaoh) the latter is of a height which gives it rather the importance of a leading feature than an accessory. The pedestal, properly so called, belongs altogether to a later and more complete style of art, and seems a natural step in the development both of sculpturesque and architectural composition. Even with the Greeks this feature is but rudimentarily treated in the earlier works, the stylobate of three steps (*κρηπίδωμα*) being the only approach to the idea of a pedestal until the introduction of the Ionic order. The temple of the giants at Agrigentum is the only example that I am aware of in which a base is applied to the Doric order. This and a greater number of steps in the stylobate seem to show a marked progress in the development of the principle involved in the use of the pedestal. As in the earlier architecture, so in the sculpture, there is an entire absence of what may properly be called a pedestal. The sphinxes of the Sacred Way at Philæ have only a low square plinth, without architectural features of any kind. The colossi of the Plain of Thebes, of the rock-cut temple of Ibsamboul, and many other examples, are treated in the same way. It should be observed, however, that in none of these examples is the secret of scale, namely, the subordination of parts and gradation of dimension, entirely omitted, though it is not applied by means of *architectural* accessories. The colossi are surrounded by smaller figures of nymphs and divinities, and the sphinxes and caryatid figures have hieroglyphics and incised ornaments upon the square plinths, which assist materially in giving importance to the principal object.

Of Archaic Greek sculpture of monumental scale and character but very few examples exist. The sitting statues of the Sacred Way at Branchidæ, one of which is in the British Museum; those cut in the rock at Palazzuolo—the ancient Acræ in Sicily, and a colossal lion, also cut in the rock, at Naxos, are some of the examples that I can quote. Pausanias mentions and gives descriptions of several, which it would be foreign to our subject to refer to. These are very similar to the Egyptian sculpture and are evidently derived from it; and they always exhibit the same absence of architectural accessories. There are many small statuettes of the Dædalian school,

which were no doubt in many cases copies of colossal statues, and were used as votive offerings. Their pedestals (if any) have not been preserved. A volume of sculpture published by the Society of Dilettanti gives an example of a statuette of Minerva of this character, which has a pedestal. This is clearly a copy of a colossal statuette, but it is highly probable that the pedestal may have been added to the original statue in later times, as in the case of the Apollo of Amyclæ and in other instances.

Having thus briefly noticed the earlier practice, and the absence of the feature which forms the substance matter of our consideration, we now come at once to the great times of art when sculpture had reached its highest development, and when, as we may naturally suppose, the architectural accessories had reached the same pitch of perfection. It must be a matter of great regret that the sources of information upon this subject are so few, and that of the thousands of statues which adorned Athens and the other great cities of Greece, none of the pedestals remain; so that the scanty descriptions given by Pausanias, Pliny, and other writers, and the conventional representations on vases, are the only sources of information. We may, however, derive some assistance in developing these scanty hints from the architectural pedestals of the period.

The school from which our modern practice is chiefly derived, if indeed it can be said to be derived from any school at all, is the Roman—a mere vulgarised imitation of the Greek, in which the substance is copied but faintly and the spirit not at all.

In looking through the examples of Greek architecture in which the pedestal occurs, one is struck first with the relative importance of the dimension of the column to that of the pedestal, in which such a marked difference from the Roman appears. In the Greek the pedestal never exceeds the height of the entablature, and is more generally about one-sixth of the height of the column, while in the Roman the proportion is usually not less than one-fourth. There are some examples of Roman architecture in which the Greek system has been adopted, as in the temples at Assisi and at Pola, and in the building called the Incantada, at Salonica. In the latter the pedestal is less than one-eighth of the height of the column; but these are exceptions to the Roman rule. The loftiness of the Roman street architecture appears to have rendered it necessary to elevate the order in public buildings and temples upon a higher pedestal, so as to give it a proper importance in relation to the surrounding houses. This necessity would hardly be felt in the same degree by the Greeks in their less crowded spaces. A second and not less important characteristic of the Greek pedestal is, that the width of die is not much larger than the diameter of column itself (namely, about one-sixth of its height); while in the Roman the width is equal to that of the base of the column. Thirdly, the Greek die commonly diminishes upwards, thus preserving in the pedestal the character which the entasis gives to the column, as it were uniting the pedestal and column in one composition, and avoiding the apparent break in the line which is so observable in the Roman. Fourthly, the small dimension of the pedestal causes the cap and base mouldings to assume an importance which they have not in the Roman (without the actual size of the mouldings in reference to

the column being increased), thereby imparting a rich and composite character which, while adding to the mass, affords a valuable contrast by its horizontal lines to the vertical lines of the column.

In the Italian revival the Roman exaggeration of the pedestal was carried stil further, until it became necessary to give such a development to the capping that it assumed the importance of a complete cornice, with bed-mould, corona, and cymatium, instead of the simple moulding used by the Greeks. Thus the pedestal might almost be said to have ceased to be a part of the order incorporated with it and forming merely a base to it, and to have become a separate feature with an importance entirely its own. The Taylor and Randolph Institution, at Oxford, affords an example of the low pedestal used by the Greeks. Those who are acquainted with that building will hardly fail to recognise the beauty of this feature.

Of sculpturesque pedestals of the Roman school a sufficient number of examples remain to trace the presence of the same defects which characterise the architectural pedestal. It will, therefore, not be an unwarrantable assumption to suppose that the same affinity between architecture and sculpture existed in the Greek, and the very scanty information which we have seems to confirm this supposition.

Thus much for the elementary principle of form and proportion *per se*, independently of the very important subject of the application of it to the various conditions of small, life-size, and colossal statues, which the small space of this Paper will allow me to treat but superficially.

The next and most important principle which we have to consider, is the giving of scale to the principal object by the introduction of ornamental and sculpturesque detail in the pedestal. The principle involved in this practice is, as I have observed, not forgotten in the earlier works of sculpture, but it is applied to the sculpture itself and not to the pedestal (there being none to apply it to). The advantage of its application to the pedestal instead of the principal object is obvious. There seems to be an irrationality in grouping together giants and pigmies in one composition, as in the rock-cut temple of Ibsamboul, and many other examples, where a small figure stands by the legs of a large one. One accepts the expedient as one of necessity, and its grotesqueness is rendered less prominent by the conventional character of the whole work; but where the same thing occurs in later and more perfect works, as in the Toro Farnese at Naples, and the Nile God in the Vatican, one is at once struck with a sense of disproportion, and one is disposed to question whether a better means of giving scale might not have been used. There are not wanting those even who question the propriety of making the sons of Laocoon so much smaller than himself. When, however, the smaller figures are contained within the lines of an architectural form, and are subordinate to it, forming its enrichment only, they cease to come in competition with the statue and only act as a foil. They are then no longer of the same nature with the statue. The fact of their forming a part of the architecture conventionalises them and renders them inanimate things, stone or metal, while the statue represents a living creature. Quatremère de Quincy, in speaking of the Victory in the

hand of the Olympian Jupiter at Elis, says:—"There is no comparison to be esta-
"blished between the victories placed in the hands of statues and the statues them-
"selves. The figures of Victory in question, if one considers the usual conventions in
"this sort of composition, play the part only of images and not of living beings." The greatest examples of the importance of the principle which we are now considering, namely, that of gradation, are the works of Phidias, the chryselephantine statues of Jupiter of Elis, of Minerva at Athens, and many others, such as the Minerva of Pellene; Minerva Polias; Minerva of Lemnos, said to be his best work; the bronze Apollo, in the Acropolis of Athens; the Minerva of Platæa, in marble and gilt wood; the Venus Urania, in the temple of that name; The Mother of the Gods, in the Metroum of the Ceramicus; the Minerva Hygeia, in bronze, on a gilt throne; Venus Celestis, at Elis; Minerva Ergané, in the Citadel of Elis; and the Jupiter at Olympia. In these statues the smaller figures were not confined to the pedestal, but were introduced in every available space. The throne of the sitting figures, the shield of the Minerva, even her very sandals (on the edge) were covered with subjects; but these are mostly in basso-relievo, and in those parts where it is supposed that complete figures were introduced, they formed part of some conventional object, as griffins subduing Greeks, which supported the arms of the throne. I find in Quatremère de Quincy an observation upon the importance which Phidias must have attached to the pedestal. He says:—"We may conclude from
"a passage of the orator Themistecis, that the bassi-relievi of the pedestal occupied
"Phidias a long time. Although this artist says he had great ability in the art of
"representing in gold and ivory the figures of men and gods, nevertheless he required
"much time and leisure to finish these works. It is reported, indeed, that in the
"execution of Minerva he employed a considerable space of time in the works of the
"pedestal of the goddess." Pliny particularly dwells upon this fact. He says:—
"Among all nations which the fame of the Olympian Jupiter has reached, Phidias is
"looked upon, beyond doubt, as the most famous of artists. But to let those who have
"never seen his works know how deservedly he is esteemed, we will take this opportunity
"of adducing a few slight proofs of the genius which he displayed. In doing this, we
"shall not appeal to the beauty of his Olympian Jupiter, nor yet to the vast proportions
"of his Athenian Minerva, twenty-six cubits in height, and composed of ivory and gold;
"but it is to the shield of this vast statue that we shall direct attention, upon the convex
"face of which he has chased a combat of the Amazons, whilst upon the concave side
"of it he has represented the battle between the gods and the giants. Upon the
"sandals, again, we see the wars of the Lapithæ and Centaurs, so careful has he been
"to fill up every smallest part of his work with some proof or other of his artistic skill.
"To the story chased upon the pedestal of the statue the name of the birth of Pandora
"has been given; and the figures of the assisting gods to be seen upon it are no fewer
"than twenty in number."

These statues are briefly described by Pausanias and Pliny, and they have been further illustrated by the learned and intelligent researches of Quatremère de Quincy. It will be sufficient to quote what he says about the pedestal of the Minerva

of the Parthenon. He illustrates several others very fully, as the Jupiter of Elis, the Apollo at Amyclæ, &c. &c., but we shall more readily realise that of the Minerva, knowing, as everyone does, the copy of that statue in the Studii at Naples, and that at Deepdene. In describing the statue, he says :—" Her height, according to Pliny, was " 26 brachia, or 37 feet French [about 40 English], without including the base, of which " I shall speak in its place, and to which, as we shall see, it is not possible to give less " than 8 or 10 feet ; consequently the whole must have been about 45 feet [French], a " height perfectly in accordance with that of the Naos, which, as we shall see, could " not have been much more than 50 feet [French], if we suppose the ceiling to have been " horizontal." He says further on :—" The height results necessarily from the two " data which we possess, viz. the height of the temple, and that of the statue. Now, " we have shown that this height could not exceed 10 feet for the pedestal, a proportion " perfectly in accordance with the method followed by the ancients in the relation of " statues to their bases in the class of colossal sculpture in question," namely, that which is seen only from a limited distance. He again quotes Pliny, who says :—" On " the base is engraved what Phidias called the birth of Pandora ; one sees in it the " birth (generation) of twenty divinities." He then goes on to show that, taking 6 of the 10 feet for the figures, and appropriating the other 4 to the capping and base, there must have been two rows of figures, as there would not be room for the whole number if they were of a size to occupy the whole height of 6 feet. " As to the division " of the bas-reliefs into two rows, one over the other," says he, " I could, if necessary, " quote a great number of examples in the antique." Having thus determined the height, it is evident that the width of the pedestal could not have been less than 18 feet, considering the expanse that must have been given to the lower part of the figure by the shield, the griffin, and the serpent.

If we restore in imagination these and other examples of which Pausanias and Pliny give descriptions, we shall find in them an illustration of what we constantly hear of and never see, namely, perfect simplicity and unity, together with the greatest amount of richness and interest. In these the natural union of the arts of architecture and sculpture is most completely carried out, each preserving its own character, while, by the due relation of the one to the other, they combine in perfect harmony in one homogeneous composition. So soon as we turn from the Greek to subsequent schools, we find this quality of unity gradually disappearing ; the architectural element dwindling away, and giving place to an exuberance of sculpture and ornament. The first step in this direction is the general substitution of alto for basso-relievo in the Roman pedestals ; and for proof of the use of basso by the Greeks, see the quotation from Pliny, above. Of this there are abundant examples ; for instance, a pedestal in the Studii at Naples, with figures of cities, which I believe formed the base of a statue of Titus ; that in the Vatican Garden, and many other examples.

In the Gothic, I am not aware of any examples of monumental sculpture not forming part of an architectural composition (except Calvaries) ; but in general we find that the due relation between architecture and sculpture is almost entirely lost

sight of, as in the porches of cathedrals, &c., where it is difficult to say whether the sculpture is made for the architecture, or the architecture for the sculpture. Richness seems to be the object aimed at; the result obtained is profusion, not to say confusion. I would not, however, be understood to disparage Gothic sculpture, which I have studied and drawn most reverentially, and in which I find inestimable beauties which belong entirely to itself. I am only speaking, as my subject requires, of the scientific relation of one art to the other. In the Gothic Revival, the Greek principle is recognised, though not always carried out. There are no doubt abundant instances of pedestals in which the relation of the architecture to the sculpture is well preserved, but in general, where richness and effect are sought, it is at the expense of the architectural element, while the monument, instead of being a statue or group, becomes a complete family, in which the accessory figures are scarcely subordinate to the principal, and the architectural part is merely something for them to sit upon. In the composition of tombs this prodigality is carried still further. One constantly finds little figures, mere dolls, each with its little niche, and each as complete in all its parts as the principal figure. No doubt the object sought, of giving importance to the principal figure, is obtained, but it is at the expense of the small figures, which appear insignificant, instead of preserving their own dignity while adding to that of the whole.

One of the most practically important points to consider in this subject is the difference of relative scale between the pedestal and its statue in the different conditions of small statues or statuettes, colossal statues, and life-size statues. The expression "life-size" must be taken to mean something more than life-size, this varying according to condition of situation. The latter case, again, is subject to a great variety of conditions, as the public statue in an open space, the memorial statue of less dimensions in cathedral or hall, and the statue placed as an ornament in a gallery. Each of these conditions being so different from the other, and each again being subject to so many other conditions of its own, it would be impossible to attempt any rule which should be of general application. It is obvious that the smaller the statue the greater will be the necessary relative height of the pedestal, in order that it may be in some degree raised out of the way of harm and placed fairly in view. It is not necessary to speak of small statuettes for ornamental purposes, as in such objects which do not aspire to be monumental any caprice is more or less admissible. The subject of pedestals appropriate to a statue of a height of three or four feet is one which comes more daily under our notice; but where the statue is placed upon the level of the eye and the whole of the pedestal is below it, the detail is a matter of little importance, and the proportion is all we have to consider. In the paintings upon Greek vases there are two distinct classes of pedestals represented for small statues. Those of three or four feet high are generally placed upon a low square pedestal of about the same height as the statue. A subject frequently represented, and in which this occurs, is the Family of Priam taking refuge at the Altar at the Sack of Troy, and also Diomed carrying away a Statue from the Altar. It cannot be said that the proportion is a particularly agreeable one, and one must suppose that the comparatively large

surface of the top of the pedestal was intended for the convenience of placing votive offerings, and that it was rather an altar than a pedestal. The other class of pedestal is the Stylé, a small square column six or seven diameters high, and of about the height of the human figure (more or less). Sometimes it takes the form of a small Doric or Ionic column, and this, again, is sometimes placed upon a plinth or pedestal. This form of pedestal seems only to be applied to small images, a foot or eighteen inches high. This principle appears to be most suitable to its purpose, and is, indeed, that which in modern times is most frequently adopted for busts and small groups or statues. The form, however, which is often adopted, namely, a shaft, without moulding or finish of any sort, and not diminishing, is not a very happy application of the principle. The simple hints given by the Greek vases are well worthy of attention.

Of the pedestals of colossal statues for exterior positions I have not been able to find any very trustworthy examples. What little information I have been able to gather, however, seems to show that it was low in proportion to the height of the statue. A coin of Athens, given in Millin [" Galerie Mythologique "], and also in Professor Donaldson's recent learned work, *Architectura Numismatica*, representing the Acropolis of Athens, shows the statue of Minerva Polias. Of course, in a conventional representation on so small a scale, it is impossible to depend upon the exactness of the proportion; but it is sufficient to show that the pedestal is not only low but also very narrow in reference to the bulk of the figure. The restoration given in Quatremère de Quincy of the statue of Apollo at Amyclæ, the pedestal of which is of the time of Phidias or thereabouts, shows the same peculiarity. The remarkable coincidence between these examples and many examples in architecture, of the smallness of the pedestal, seems to confirm the supposition that the pedestal of colossal statues was generally small in bulk compared with the base or lower part of the statue, which must almost have appeared to overhang the die of the pedestal. In the best works of the revival we find the same character. Many examples in Italy are familiar to everyone: the colossal Angel on the top of Castel S. Angelo; the colossi of David, by Michael Angelo, and that of Hercules and Cacus; the statue of Marcus Aurelius at the Capitol, &c., are all examples of this in a greater or less degree. This principle is remarkably illustrated in the Perseus of Benvenuto Cellini, but the exuberance of ornament in the pedestal deprives it of the simplicity and unity which we find in the Greek. Nevertheless the importance which it gives to the statue must, I think, strike everyone. These, however, are but pigmies compared with the colossal statues of the ancients; the only things which approach them in modern times are the statues of Bavaria at Munich, and of S. Carlo Borromeo at the Lago Maggiore. With the latter I am not acquainted. That of Bavaria affords, by contrast, an excellent illustration of the merit of the Greek principle. The height of the pedestal is rather more than one-third of the statue, and the width equal to the height. Thus the bulk is so considerable that, when near the monument, one sees nothing but the pedestal, while at a distance, the statue, having no preponderating relation to it, does not as an object

of comparison serve to give scale. This defect is no doubt met by the contrast of the portico, consisting of a small Doric Order which surrounds three sides of the figure, and from most points of view forms a background to it. There are, however, necessarily points of view in which the eye does not embrace the monument and its background at once. In these aspects one cannot fail to be struck with the want of detail in the pedestal, which, having no features except the capping and base, and a moulded panel in the die, seems by its size to diminish rather than to give scale to the statue.

In the best examples of equestrian statues the pedestals are also generally small (relatively), though the proportion must naturally be influenced to a certain extent by the actual dimensions of the statue. The pedestal of Marcus Aurelius, in the Capitol, is not so high as the horse's shoulder; those of Castor and Pollux, at the top of the steps of the Capitol, are scarcely higher; that of the equestrian statue of the Grand Duke, in the Piazza del Gran' Duca, at Florence, is still smaller. Many other instances might be quoted; but, on the other hand, instances of the opposite system are not unfrequent. The statues of Bartolommeo Colleoni, in the Campo SS. Giovannie Paolo in Venice; that of Gatta Melata, in front of the Santo at Padua, and King Charles, at Charing Cross, all have pedestals of a very tall proportion. The necessity for reducing the bulk of the pedestals of equestrian statues seems to have been universally felt. This has been done, in most cases, by breaking the pedestal in its length and making the ends semicircular on plan: by this means preserving such a length as shall be in accordance with the impression of motion inseparable from a horse. In the crowded streets of modern cities, a statue placed upon a pedestal of so low a proportion as some of those quoted would be lost, unless the statue itself were of colossal size. This difficulty has been admirably met in several of the compositions of Rauch, in which the pedestal itself being small is raised upon a plinth, which is in some cases again subdivided or elevated upon a stylobate of steps; thus the barrenness of the long unbroken line so constantly adopted in our own statues is avoided. The moulded capping and base, and other enrichments, have a rich and full proportion in reference to the die of the pedestal, without the exaggeration of actual size which becomes necessary in the large pedestals so commonly in use. Thus the outline of the pedestal, rich in itself without crudely salient features, combines harmoniously with the statue, and with it engages the eye; so that the plinth or podium below, being of the most simple and severe form, may be raised or lowered without materially affecting the composition of the principal object. We must suppose that it is this difficulty of the unavoidable prominence of the capping in large pedestals which has offuscated the genius of some of our own sculptors, and driven them to the disastrous expedient of dispensing with all mouldings in their pedestals, and placing their statues upon the chopping-blocks which offend our eyes in too many of our public places. It is not so easy to find a reason for the prodigious bulk of some of them, which are large enough to admit of a house being built upon them over the statue's head. I have not been able to discover the authority for the rapid diminution of the block sometimes adopted, which gives to the pedestal the character of a truncated pyramid; neither is the

advantage of it at once patent. Much might be said upon the subject of London pedestals, but such has been the neglect of this accessory of monumental art that there would be but little room for favourable criticism. Our sculptors can scarcely be aware how much of the undiscriminating though deserved abuse levelled at many recent public monuments is due to the entire absence of design and proportion in the pedestals. We must suppose that they do not attach the same importance to the subjects as architects do. If they did, some knowledge of architectural detail, and a more careful attention to the examples exhibited by the Revival schools, and the more recent works of some other countries (Prussia in particular), would save our public monuments from many a deserved reproach. In these days of hero-worship, when so many statues are springing up, the subject is one of daily increasing importance, and calls for a unity between the sister branches of architecture and sculpture, through their professors, to avert the torrents of abuse which, rightly or wrongly, are poured upon each new monument.—FRED. P. COCKERELL.

Henry B. Garling, *Fellow*,

ON THE TREATMENT OF SCULPTURE APPLIED TO ARCHITECTURE.*

The first and most important point in the treatment of sculptural accessories is to make them in perfect accordance with the style and character of the building to which they are applied; so that they not only illustrate their object and purpose by intelligible and appropriate allegory, but also agree with the building in congruity of feeling and sentiment, even to the *minutiæ* of execution. But to produce that harmony and propriety which is the source of our most agreeable sensations in contemplating the productions of art, we must, in addition, distribute sculpture so judiciously through the composition, so nicely adjust it in proportion and position, that it shall appear an integral portion of the design; the work, as it were, of one hand, and so completely the expression of one idea, that a void would be created by its removal—that neither by disproportionate size nor by a too prominent position should it obtrude offensively on the eye, nor appear to retire too much and thus lose its proper effect in the composition. The regulation of these points cannot, however, be determined by rule, since every individual case will require a different treatment, but must be attained by that refinement and correctness of taste on the part of the artist, which can only result from a careful study of the best models.

It is of the utmost importance that the outline of the sculpture should be regulated by that of the architecture, and that it properly fill up those circumscribing lines, within which it is placed; that there be no protuberance, undue projection, or ungracefulness in the contour; and that it never interfere with or break off those main lines which indicate the constructive features of the building, or that continuity which

* Extracted from MS. Essay (in the Library) to which was awarded the Institute Silver Medal in 1848.

expresses the arrangement and proportions of the composition. The ill-effects of infringing these rules are apparent in innumerable instances. That these irregularities are occasionally found in works of the highest authority cannot be denied, yet the artist of refinement and taste will be cautious of allowing these instances so to warp his judgment as to prevent him from pronouncing them faults, even when associated with great names or existing in examples in other respects faultless. There is, perhaps, no quality so invariably associated with genius in an artist as a capacity for apprehending and applying the beauties of a style or model, and rejecting its eccentricities and irregularities; or so characteristic of poverty of taste and invention as the reproducing of deformity or caprice, without reference to the circumstances which suggested it, or rendered it appropriate in the original.

It will also be found of importance, in combining sculpture with architecture, to adopt a sober style of composition, particularly in the treatment of the draperies and accessories, not only in isolated figures and in crowning members, but also in the composition of friezes and pediments. The confusion produced by exaggerated action or intricate grouping will be immediately detected without affording relief to the lines of the architecture; although a meagre and straggling arrangement, or the stiff effect of perpendicular and horizontal lines, must generally be avoided. The value of sculpture as a decoration, independent of the sentiment it conveys, consists in filling up with varied and undulating lines and forms of exquisite beauty, what would otherwise be void and blank; while the success with which the artists of Greece adapted the loftiest conceptions of genius to these requirements, will prove that they neither tend to cramp the ideas nor to shackle the invention of the artist.

If it be necessary to observe these rules in the treatment of groups, it will be found equally so in the case of isolated figures. In the latter days of the Renaissance in Italy, distortion, exaggerated action and expression, were too frequently confounded with originality and vigour; and we are continually meeting, in work of that time, with striking instances of the infringement of these rules, and with the ungraceful effects resulting from it.

In placing sculpture in juxtaposition with architecture, it is obviously a point of no small importance to consider whether it affects the scale of the composition. It will hardly be necessary to demonstrate that with which every artist must be acquainted, viz. :—That magnitude is relative. That by skilfully proportioning details, or by placing in juxtaposition with the architecture, figures with whose size we are acquainted, an artist can impart a fictitious scale to his composition; or that by diminishing one feature and exaggerating another, he can produce an idea of magnitude which the actual size does not possess. Nevertheless in modern practice this has but too frequently been lost sight of, for in the works of the antique we observe not only its application of this rule, but the success with which it has been attended. The advantage to be gained by skilfully adjusting this scale must never be lost sight of. Undue exaggeration of the human figure beyond its natural proportions does not necessarily produce an effect of grandeur. A careful study of the best models and an

accurate observation of works already executed, will form the best and perhaps the only guide.

When we observe how necessary to the production of a pleasing and harmonious effect in isolated works, is the duly balancing the corresponding parts of the composition; the skilfully contrasting and combining of forms; the duly filling and adjusting of every part so as to give one outline to the mass: it is obvious that when sculpture is in combination with architecture, the slightest failing in this respect will be exaggerated by contrast with the regularity of the lines and masses with which it is associated, and to this point therefore the artist must direct his attention.

In designing groups and figures which crown a composition, it will be found of the greatest importance that the figures in every aspect appear in perfect equilibrium, and firmly planted on their pedestals, devoid of any protuberance or projection, either in limb or drapery, which may appear to throw the mass unduly on one side. It will, for this purpose, be found necessary to study the work from every possible point of sight, since we continually observe that certain works of sculpture, though perfect when viewed in some positions, are not so in others. Of the ill-effects resulting from the neglect of this important point, some of the works of the Renaissance artists afford instances, while the inimitable productions of the Grecian chisel afford striking examples of their consummate skill and science in meeting these requirements.

An important part of the application of sculpture to Architecture is the employment of Caryatides in supporting an entablature, and that perfect specimen, the Pandrosium at Athens, cannot be too deeply studied. Jean Goujon has left us some specimens of his taste and skill in those at the Louvre. We must not omit to notice the circular court of Caryatides, which would have constituted so beautiful a feature in the design for the Palace at Whitehall by Inigo Jones, although it was never executed. We cannot but observe with what judgment the architect has treated this feature of his design by applying it to an interior court, by which a unique effect is obtained, undisturbed by a comparison with a columnar arrangement. The effect of light and shade in this circular cortile would have been both striking and original.

It is obvious that the rules which govern the application of sculpture to architecture must regulate the treatment of Caryatides, viz.—a general sobriety of treatment; the avoiding all strained and unnatural positions of the limbs, or flutter or discomposure of the drapery; that each figure must appear from every position in perfect equilibrium; and that it convey the idea of naturally supporting the superincumbent weight, and also that the figures be so treated that the same outline and position do not recur too often. If engaged in the wall, as is frequently the case, a greater freedom of treatment may be adopted, since the outline of the figure will not vary so much at the different points from which it can be seen.

It might be supposed that the study and practice of two arts so intimately connected might have been united with advantage in the same artist. If, however, we look back to the era of the revival in Italy, when they were not uncommonly united in the same person, we cannot but observe that abuses and deformities are sometimes to

be met with in the works of architect-sculptors; and that they often fall short of those whose whole attention was directed to architecture alone, showing that to compass more than one art in its fullest perfection is generally beyond the grasp of the most powerful intellect, and that the attempt is mostly attended with failure in one of the arts or mediocrity in both, though a few brilliant exceptions may perhaps be quoted.

In conclusion, although the rules to be observed in applying sculpture to architecture are rigid, and may seem calculated to trammel the artist in the free exercise of his genius, in reality they scarcely fetter him at all. How little they are calculated to induce poverty and tameness of design, or impede the free exercise of the imagination, the example of the gifted artists of Greece will sufficiently prove. The rules of art are not arbitrary restrictions founded on the caprice of fashion, the authority of precedent, or the practice of approved masters, but those immutable laws upon the observance of which harmony, beauty, and grandeur in art depend, and which admit of no exception. They have been deduced from observation of the effects of certain combinations through a long series of ages, and are as inseparably connected with the productions of certain results as cause and effect in mechanical appliances. They are those unvarying principles of composition which it is the attribute and characteristic of true genius to know and to apply.—H. B. GARLING.

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Under subject-headings are arranged, each in alphabetical order:—1st, Titles of Papers in an abbreviated form; 2nd, Local names and references; 3rd, Sub-headings, with subordinate sub-heads run on.

Under name-headings are arranged, each in alphabetical order:—1st, Papers read or Remarks made by the individual; 2nd, Incidents and subjects connected with him.

*An asterisk * following an item denotes that there is an illustration connected with it.*

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