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# ARCHÆOLOGIA ÆLIANA.

## I.—THE THREE BRIDGES OVER THE TYNE AT NEWCASTLE.

READ BEFORE THE SOCIETY OF ANTIQUARIES OF NEWCASTLE, APRIL,  
1872, BY THE REV. J. C. BRUCE, LL.D., D.C.L., F.S.A.

DURING the spring tides at the end of March last, the foundations of the third pier of the recent bridge over the Tyne, reckoning from the Gateshead side, were removed. Being anxious to ascertain whether any traces of Roman work could be found, I obtained permission to be present at the operation. The result of these inquiries I propose presenting in this brief paper. From Mr. Ure, the engineer in chief, the officers acting under him, and the workmen, I have received much obliging assistance. To Mr. Campbell I am particularly indebted. He guided me in my little explorations, he has supplied me with copious extracts from his own note-book, and has given me tracings of such portions of the plans in the Tyne Commissioners' office as I required.

Towards the close of A.D. 119 the Emperor Titus Ælius Hadrianus visited Britain. He planned the wall which stretched across the Lower Isthmus of our island from sea to sea. This work entailed the construction of several bridges. The chief of these was that which spanned the Tyne at Newcastle. The erection of this structure, if we take into account the comparative barbarism which at that time pervaded the district, must be regarded as a bold and adventurous undertaking. The work, as we shall have occasion to show, was done in a most efficient and solid manner. The bridge was built as though it were to endure for ever. The native inhabitants must have viewed the operation with astonishment. For months together the stone which abounds on both the north and south banks of the river would be in course of extraction

from its bed, and the tall oaks which clothed the river's side, or grew upon the banks of Pandon Dene, the Lort Burn, the Skinner Burn, and contiguous places, would, one after another, be brought to the ground. Vast would be the efforts required to shape the various materials and drag them to the spot, and great the skill put forth by the military architects. No wonder that the fortified garrison which the emperor planted upon the platform overlooking the northern extremity of the bridge, and which formed one of the stations *per lineam Valli*, should take its name from the bridge, and that the bridge itself should be called after the family name of Hadrian, PONS ÆLII.

When the flood of 1771 rendered it necessary that a new bridge should be built in place of the structure which during the middle ages had carried the roadway across the river, traces of the bridge of Hadrian were observed. Brand says, "Many Roman coins were discovered in the ruins of the piers of this bridge, proving, it should seem, that some of the original Roman structure remained here till every part of the ancient building was cleared away on the erection of the new bridge." He quotes also the following observation from Pennant's Tour:—"I cannot help thinking that part of the Roman bridge remained here till very lately; for, from the observation of workmen upon the old piers, they seem originally to have been formed without any springs for arches." Amongst the coins which were found Brand specifies a coin of Trajan, one of Hadrian (which he engraves), and one of Antoninus Pius, which were found in removing the masonry. Pennant describes a beautiful coin of Faustina the Elder, after her deification, one of Antoninus Pius, and a third of Lucius Verus.

When I was preparing the first edition of my description of the Roman Wall, the late Mr. Rippon, of North Shields, lent me five silver coins which had come out of the foundations of the bridge. Four of them were coins of Hadrian, the other was a coin of Severus. He told me that he got them from a female relative of his with whom the clerk of the works lodged during the progress of the structure.

The works which are at present being carried on have yielded a few Roman coins. In removing the foundations of the third pier from the Newcastle side of the late bridge, a large brass coin of Faustina the Elder was found, and a small and much-worn brass coin of an emperor (whom I could not distinguish) bearing a radiated crown. In sinking

the iron cylinders on which to found the piers of the new swing-bridge, a small brass coin of Hadrian's reign was found, and two other Roman coins too much obliterated to be capable of recognition.

Several of these coins, it will be noticed, are of a date posterior to the time of Hadrian. Pennant justly observes that these later coins were probably deposited during some later repairs. These repairs would be of frequent occurrence, for, as has been already hinted at in the quotations from Pennant, the bridge of Hadrian was destitute of arches; the roadway being constructed of logs of timber laid horizontally. This seems to have been the usual mode of formation at that time.

The bridge which Trajan constructed over the Danube, near Belgrade, when upon his Dacian campaign (on which occasion he was accompanied by Hadrian), was of this construction. The stone piers exist to this day in the bed of the river; but Hadrian, after the death of Trajan, wishing to cut off communication with Dacia, set fire to the roadway and destroyed it.

There is a bridge over the Moselle, near Treves, which was built by Hadrian, and which is now spanned by stone arches. When I inspected this bridge I was convinced that the arches were not part of the original structure. In particular I noticed that on the sides of the piers was a stone string-course some feet below their summit, for the purpose, apparently, of giving hold to the struts which would be used in supporting the wooden roadway.

The bridge over the North Tyne at Chesters has undoubtedly been a bridge of this construction. Although extensive remains of it exist, not a single arch-stone has been found; but on the other hand stones, cut, as if for the reception of timber rails, have been met with.

As, from time to time, new timbers came to be required, either through decay or the ravages of war, coins of a date posterior to the original construction of the piers would find a lodgment.

The bridge of Hadrian, with such repairs as we have indicated, did good service to the community for many centuries. Over its roadway the Picts and Scots doubtless passed in their passage to the south. Over it King Athelstan rode on his way to the battle of Brunanburgh, and on his return. Over it Bede trudged when he came to visit his brethren at Monkchester, the present Newcastle. The Norman Conqueror and his sons crossed it at the head of their hosts. In the Life of St. Oswin, written by a monk of St. Albans, who came to reside at

Tynemouth Priory in the year 1111,<sup>1</sup> we have an interesting notice of this bridge. The monk writes in Latin; the following is a literal translation of the passage referred to:—"When that most victorious King William, who with a strong hand brought England under the sway of the Normans, was returning (A.D. 1072) from Scotland with a powerful army, near the place which is now called Newcastle, but was formerly called Monkchester, he encamped on the river Tyne. For it happened at the time that the river itself was so turned from its usual course by the overflowing of its banks that it could nowhere be crossed by fording, nor was there a passage over it by the bridge which is now seen there. But the Normans, accustomed to live by plunder, forced a contribution for themselves and their horses from the surrounding places."

It would appear that King William passed safely over the bridge on his way to Scotland, but the people of the place, who were ill affected to him, had during his absence in the North destroyed the roadway and perhaps also thrown down some courses of the masonry of the piers so as to intercept him on his return. A flood occurring at the same time effectually hindered him in his course homewards. These injuries were in due time repaired, for the monk speaks of the bridge as existing at the time he wrote.

At length in the troublous reign of Henry III. the Roman bridge was damaged beyond repair. Matthew of Paris, among the events of A.D. 1248, records the following catastrophe:—"In England, not to mention other cases, the greatest part of the borough of Newcastle-upon-Tyne, together with its bridge, was consumed by a raging fire." As Matthew of Paris was a monk of St. Albans, to which Abbey was attached the Priory of Tynemouth, he would be in the way of hearing North-country news.

Great efforts were made to retrieve the disaster. In Hadrian's day the army was set to work, and the natives were doubtless to a large extent impressed into the service. In the thirteenth century the Church of Rome was the great lever by which society was moved. In Bourne's History of Newcastle we have an enumeration of many of the briefs which were issued by various ecclesiastics granting indulgences to all who would assist either with money or labour in erecting the bridge. The Bishop of Durham, who was responsible for the building of one-third of the bridge, issued his letters patent. The Archbishop of York, in 1257, granted an indulgence of thirty days to every one that

<sup>1</sup> Published by the Surtees Society, 1838.

bestowed anything towards the building and repairing of Tyne Bridge. The Bishop of Rochester, in 1277, granted an indulgence of twenty days. Even in the north of Scotland the work of collection went on, the Bishop of Caithness granting liberty to collect alms throughout his whole diocese for the repairing of Tyne Bridge. Ireland, too, contributed, it may be supposed, its quota, for the Bishop of Waterford granted an indulgence for ten days, together with a promise of being prayed for in all the churches of his diocese to those who would assist in the repairing of the Tyne Bridge.

It would appear that the bridge, which was thus erected in the thirteenth century, required extensive repairs before the close of the fourteenth. According to Bourne, "An inquisition was made in the 43rd of Edward III. (1370) whereby it was found that the bridge was so decayed that £1,000 would not repair it."

Let us now turn to this mediæval bridge. Bourne says that "This bridge after it was repaired stood upon twelve bold arches, but now there are only nine, the rest being turned into cellaring at the building of the quays." Our Society is in possession of a rare print showing the bridge as it was when Bourne saw it. The engraving on the opposite page is a reduced copy of it. The print is dedicated to Cuthbert Fenwick, Esq., Mayor of Newcastle, who was mayor for the second and last time in 1739; the print, therefore, cannot be later than this year. It will be observed that on the Gateshead portion of the bridge the houses which are erected upon it are continuous; on the Newcastle portion the houses and towers are only erected over the piers. In this print all the arches are pointed.

Hutton in his Plan of Newcastle says, "The arches of this bridge are of different figures, some of them resembling Gothic ones, and others scheme arches;" and in the "View" which he gives of the ruins of the bridge, four of the arches, those next Newcastle, are represented as being circular. There can be no doubt that the arches were originally pointed; the alteration of form may have been effected by subsequent repairs.

Happily one of the original arches of the mediæval bridge still exists, the first at the northern end—one of two which Bourne tells us were turned into cellaring at the building of the quays. This arch is a pointed one, and as far as I can judge exhibits the architecture of the period when the second bridge was built. This arch is 44 feet through,

and has a span of 21 feet. It has been supported by eleven ashlar stone ribs, nine of which still remain. The ribs are bevelled at the angles, and are disengaged, that is, they are not built into the body of the arch. In the case of the two ribs which are removed nothing except the springers on which they rested remain. The voussoirs (arch stones) still exist on its west face; and they are bevelled inwards in two steps. The interior crown of the arch is seven feet below the present roadway. The second arch must have been destroyed when the abutment of the bridge which has recently been removed was built.

The third arch, which Bourne says was covered up by the formation of the quays, occurs at the Gateshead end; it is under Bridge Street, and has been partially, though only partially, explored.<sup>1</sup>

The mediæval bridge was, as is well known, destroyed by a flood in 1771. Hutton says, "This flood was the most dreadful inundation that ever happened in this part of the country, and was occasioned by the excessive rains which fell here, but more especially westward, about the head of the river, from Friday evening, the 15th of November last till the Sunday forenoon following. About midnight, between the Saturday and Sunday, the water rose so high at the bridge as to fill up the arches and cover the Close, Sandhill, Quayside, and other low parts of the town. The water rose about nine feet higher than the usual spring tides. Early on the Sunday morning the middle arch of the bridge fell, and, in the afternoon of the same day, a second and a third were so much shattered that two more fell a few days afterwards."

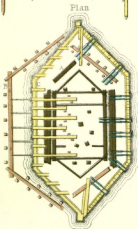
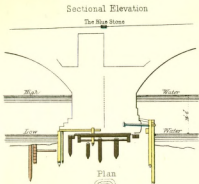
Hutton, speaking of the old bridge, says:—"This bridge had stood above 500 years, and might have stood much longer, if the lowness of the arches and too great thickness of the piers had not so much contracted the passage of the water."

In the Tyne Commissioners' office is a plan of the bridge taken two days after the fall of the arches, of which I have been furnished with a tracing. As will be observed, it shows how great must have been the obstruction which it presented to the passage of a large body of water.

I need not refer to the bridge which replaced the bridge so seriously damaged in 1771, further than to remind you that in laying the foundations of its piers traces of Roman work were discovered. I proceed at once to describe what I have myself recently witnessed.

<sup>1</sup> See a paper, "Old Tyne Bridge and its Cellars," by James Clephan, in the "Archæologia Eliana," Vol. IX., p. 237.

# DRAWINGS OF A PIER OF TYNE BRIDGE, Showing the Timber Framework of three periods.



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| (A) Roman work . . . . .     | A. D. 120 . . . . .  | <span style="display: inline-block; width: 15px; height: 10px; background-color: black; border: 1px solid black;"></span>  |
| (B) Mediaeval work . . . . . | A. D. 1250 . . . . . | <span style="display: inline-block; width: 15px; height: 10px; background-color: brown; border: 1px solid black;"></span>  |
| (C) Modern work . . . . .    | A. D. 1775 . . . . . | <span style="display: inline-block; width: 15px; height: 10px; background-color: yellow; border: 1px solid black;"></span> |

Scale of Feet







The removal of this bridge was rendered necessary by the deepening of the river, and by the design of allowing vessels of a large size to proceed above bridge.

Some time before my visit the two piers nearest the Gateshead side were removed. As these piers did not stand upon the same site as the corresponding piers of the mediæval bridge, no traces of previous foundations were found upon the immediate spot, but in the vicinity a few piles were noticed.

The third pier did stand upon the old site, and upon the roadway immediately above it was fixed the blue stone marking the division of the counties.

On removing the masonry of this pier the foundations of the Roman, the mediæval, and the more modern bridge were found.

And here I may remark (though it does not concern our more immediate object) that as half of this pier was in the county of Durham and half in the county of Newcastle, the cost of its construction was shared by the Bishop of Durham and the Newcastle Corporation. Instead of dividing the expense between them and employing one architect and one builder, the pier showed evident traces from the foundation to the roadway of having been built from two different designs and by two separate sets of workmen. Without staying to particularize the points of difference I come at once to the foundation.

In consequence of the improvements which have already been effected in the river, the low water mark is now one yard lower at Newcastle than it used to be; this circumstance enabled us to view the foundations to great advantage. Standing upon the framework of the pier, we stood, in a manner, "high and dry" upon what for ages had been the natural bed of the river, the stream still flowing past us on either side.

The accompanying Plan shows the piles of the framework of the three bridges after the stonework of the pier had been removed.

The first thing to be noticed is the piling of the modern bridge. Bay piles twelve inches square have been driven into the bed of the river, and immediately inside of them are sheeting piles six inches thick closely grooved into each other. On the space thus enclosed the foundation of the pier was laid. The space between the piles and the masonry was filled in with concrete.

Even before the work of removal began some timber framework might be noticed on the south side of this pier at low water, the precise object of which could only be conjectured. When the foundations were laid bare, timbers corresponding with those were observed under the body of the pier which proved that these timbers were part of the piling of the mediæval bridge. Though in all the three bridges the form of the piers has been the same, all having a cut-water up and down the stream, they are of different sizes. As is seen from the Plan on the opposite page the thickness of the mediæval pier has been much greater than the more modern one. We can readily conceive what resistance it would give to the river in flood.

The mode in which the dam of the mediæval bridge is formed differs from that of the last century. As we have already said, in the modern work, the sheeting piles are driven into the bed of the river vertically inside the bay piles; in the mediæval bridge the dam is formed by letting down balks of timber sideways one over the other betwixt two rows of bay piles which guide and hold them in position.

It is of importance to notice these differences of construction, as by doing so we are enabled to say, with decision, what is modern, what is mediæval, and what primeval.

In addition to the timbers which have been laid down to form the foundation of the bridge of last century, and of the thirteenth century, others were to be discerned within the area of the modern pier which must have been used for the foundations of an anterior structure, and this must have been the bridge of Hadrian. Piles have been driven into the ground and a framework of timber has been connected with them which have carried a smaller pier than either of those we have already noticed. This timber framework was resting on the natural bed of the river, and was for the most part below the foundations of the subsequent bridges. The dimensions of this ancient framing were 20 feet on each of the straight parallel sides, with 34 feet over the two pointed ends, with a breadth of 16 feet. These dimensions would allow of a roadway in the superstructure of about 18 feet. This is the usual width of the Roman roads in this neighbourhood. The timber constituting the framework of what we may fairly take to be the foundation of Hadrian's bridge was lying two balks deep, measuring twelve inches by six inches.

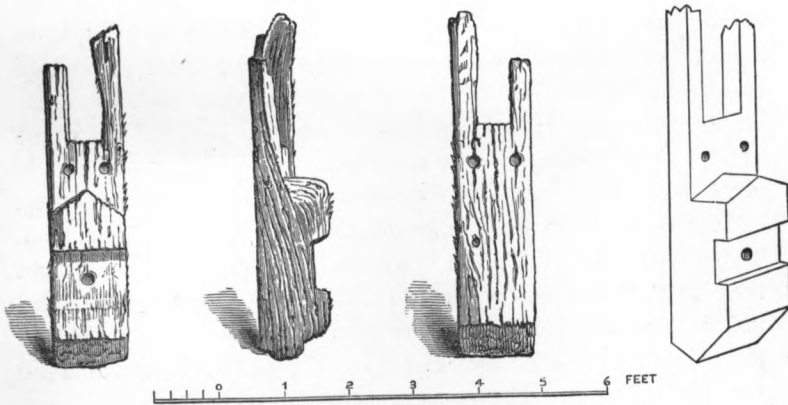
Mr. Campbell in his notes notices the difference in the appearance of the timber of the three periods. The Roman oak is smaller than the mediæval, or that of last century. The Roman oak is jet black, the outside of it is friable, and the heart is strong but fibrous.

The oak of the mediæval foundation is slimy, with a greenish tint of decay about one inch deep from the surface; the heart is solid and of a brown colour.

The timber of last century is quite fresh and new looking.

Mr. Campbell notices that the carpentry of the Roman framework is superior to that of the two others. He observes:—"We find mortise and tenon complete; and all the bars and transoms found bedded in the rubbish have half checks upon them."

The woodcuts here inserted illustrate this.



The tops of all the mediæval piles were flat. The tops of all the Roman piles were pointed. It would seem as if the mediæval, or perhaps the more modern builders, when they were preparing their own foundation, had found them in the way, and had, when knee-deep in the water, hacked them down with a hatchet as best they could reach them.

On drawing the piles of last century the iron shoe on their lower extremity was found to be in perfect preservation. The mediæval piles came up with the shoe on, but it was somewhat corroded. The Roman piles, with one exception, came up without the shoe, but the points were broken and torn, leading to the supposition that the shoe had be-

come a mass of oxydised iron which the partially decayed timber could not bring away with it. One short pile had an iron shoe on it; it is now in the Museum of Ushaw College, and is figured in the accompanying woodcut.



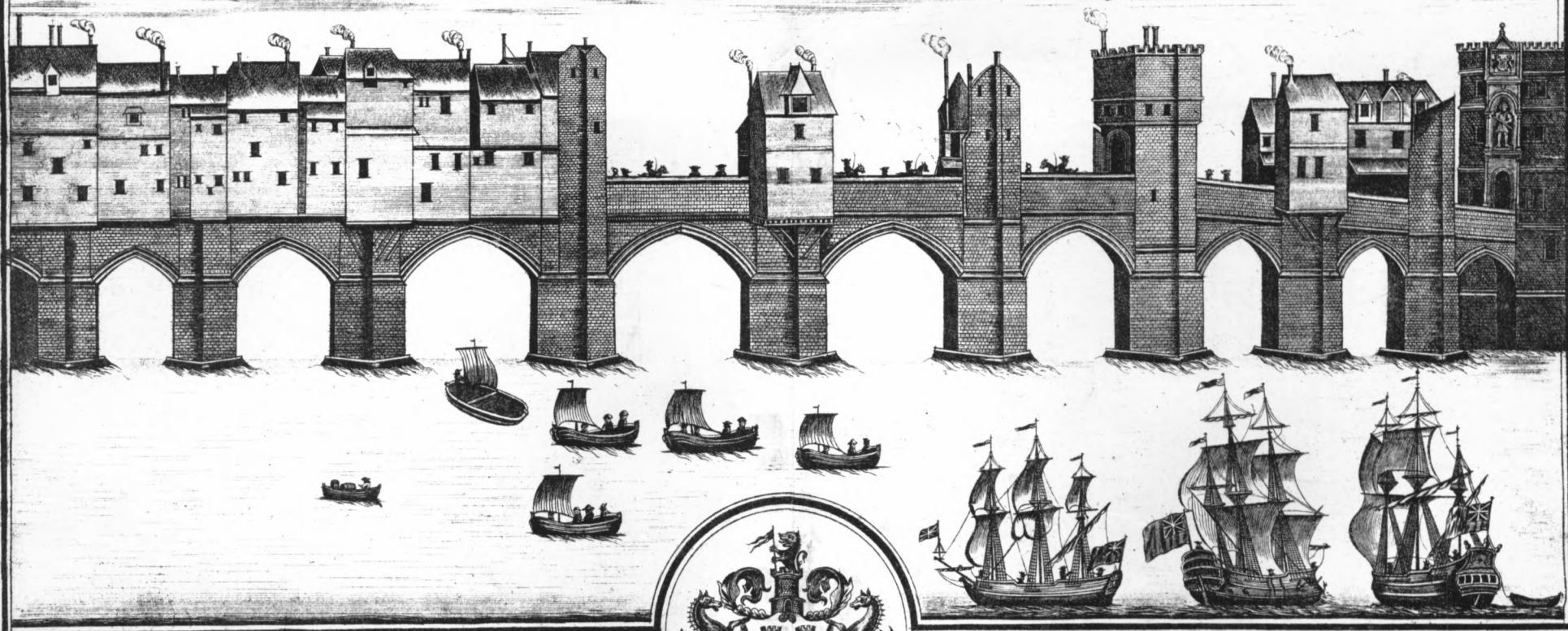
A few carved stones were lying within and about the Roman framework. They had been used in some structure but were not in their original places. Some of these, I thought, presented the appearance of Roman tooling. They had been fastened in their original bed by means of cramps; the holes remained, but the cramps were gone. The ends of the cramps had been bent down at right angles. In one of the holes a quantity of resinous matter was found—leading to the supposition that the cramp had been run in with resin instead of lead.

The third pier from the Newcastle side was removed some time ago. I refer to it here only to record one fact which is mentioned in Mr. Campbell's notes. The river here seems to have been very deep, and the Romans have had considerable difficulty in getting a foundation. They have, first of all, thrown in a quantity of quarried freestone and then laid upon it a mass of concrete nineteen feet in depth. Imbedded in this concrete were found some piles of black oak, on which was planted a horizontal framework of oak. The mediæval foundation had lain upon this mass. The recently removed bridge had also rested upon it, with the intervention only of a light timber frame below the outer margin of the foundation. It is curious to find such solid engineering works carried out in this neighbourhood seventeen centuries ago.

In concluding I may say a word in reference to the bridge of the future. In order to admit of the passage of large ships to the quays above Newcastle, the roadway on each side of the central pier must be capable of speedy removal and replacement. This is to be done, as is well known, by making it swing upon a pivot. When it is borne in mind that each arm of this roadway as it swings upon its pivot will be 140 feet long, and that the whole of it will weigh nearly 1,500 tons, the difficulties to be overcome in its construction and working will at once

NEWCASTLE

# NEWCASTLE BRIDGE



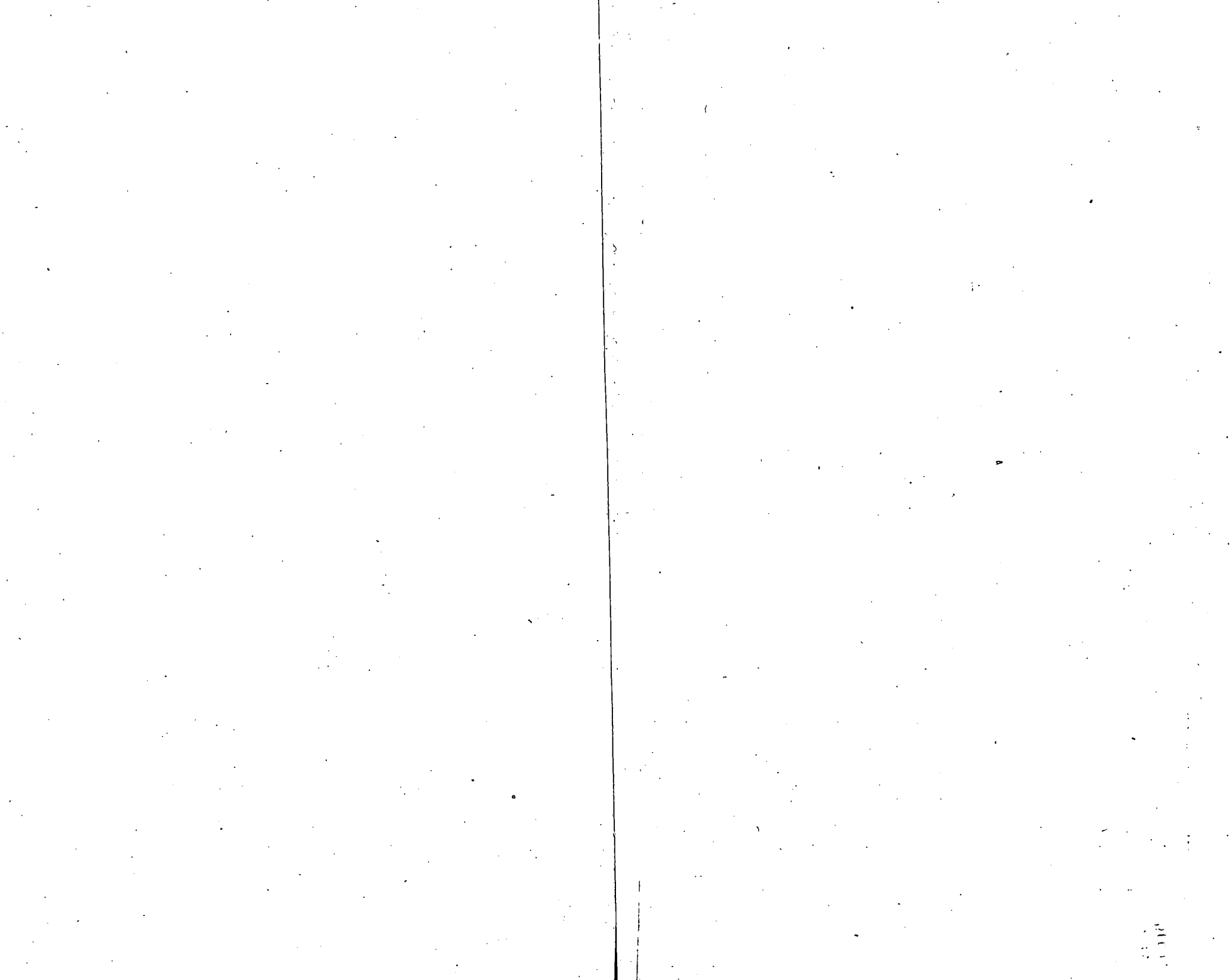
The Length of this Bridge is 237 Yards the Height 15 yards & Foot  
 And stands upon 12 bold Arches, but now there are only nine  
 The rest being turned into Cellaring at the Building of the Key

To Sir Robert Fenwick  
 Mayor of the Town  
 This Plate is humbly  
 presented to your  
 humble Servant

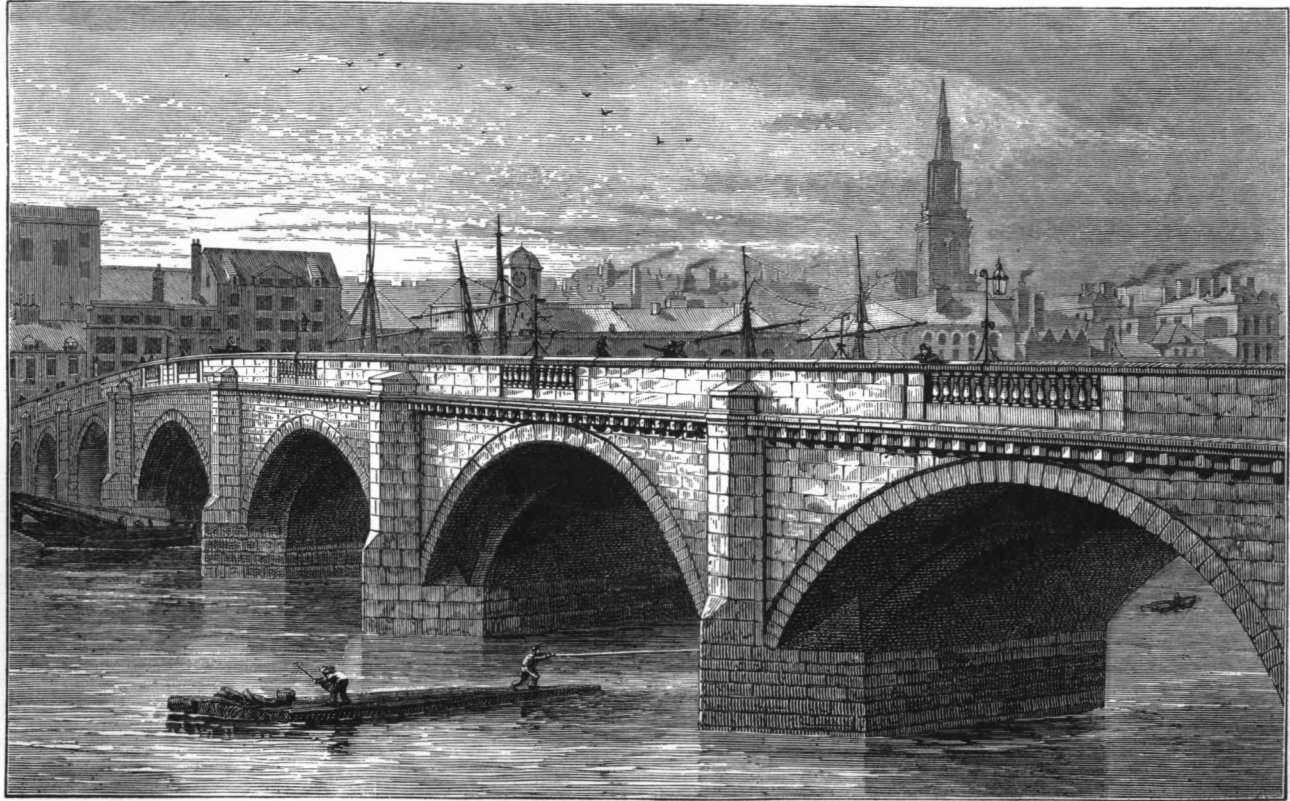


Esq. the Right Worshipful  
 of Newcastle upon Tyne  
 dedicated by his most  
 John Millerton

At the Entrance from the North stands the Chapel of St. Thom.  
 Built about y<sup>e</sup> year 1200 This Bridge is of great Antiquity  
 Being in the time of the Romans. Vid. Bourns Pa. 127.



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be seen to be very great. When it is constructed the inhabitants of Tyneside will have to boast of the grandest work of its kind in the world.

The builders of the last bridge<sup>1</sup> enclosed in the masonry of the pier which carried the "blue stone" a copper dish, carefully protected by a glass envelope, telling us of its history. Would it not be well to enclose in some important member of the new structure some memorial of its formation, and to deposit it with some state ceremonial? The Emperor of the world laid the foundation of the first bridge over the Tyne; to deposit the memorial of the latest bridge would be a task not unworthy of the Queen of the vast British Empire. Whatever other form this memorial might take, I would for one thing strongly recommend the striking of a medal representing the Queen of England on the obverse and the bridge itself on the reverse. If a medal be struck at all it ought to be one of the highest artistic excellence—such a medal as the Roman mint in its highest state of excellence would have produced. If I might venture to suggest a model for imitation I would mention the fine coin which was struck when Nero opened that magnificent specimen of Roman engineering, the port of Ostia—a port in which the large Alexandrian corn-ships could ride in perfect security.

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POSTSCRIPT, A.D. 1883.

The bridge was opened without ceremony for ordinary traffic on the 15th June, 1876. The swing portion of it was first used on the 17th July following, when the "Europa," of the Italian Navy, passed up to the Elswick Ordnance Works to take on board for the Government of Italy a gun of one hundred tons. In the second century Rome exhibited in Britain the triumphs of her engineering skill; seventeen centuries afterwards the chieftains of Tyneside showed Italy how largely she had profited by her early instructions.

<sup>1</sup> The woodcut here given is inserted by the kind permission of Mr. Andrew Reid, Printing Court Buildings, Newcastle.