THE ART OF BRONZE CASTING IN EUROPE.1--I.

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THE ART OF BRONZE CASTING IN EUROPE.[1]—I.

ABOUT ten years ago it was my privilege to deliver an address in this room on "Artistic Bronze Casting," and when I received the invitation of your Society to read another paper on the same subject, I confess that my first impulse was to avoid the task. I was afraid that I should, of necessity, go over much of the same ground that I had traversed on the former occasion, and only weary you by repetition. Besides this, I had fresh in my memory that admirable paper on "Japanese Bronze Casting," delivered some twelve months ago, when Mr. Gowland treated the whole practice and theory of bronze casting in so complete a manner that it seemed superfluous for any one to say more on the subject, unless he could show some entirely new process, or point out some hitherto unknown principle of the art.

Now, I confess, I have no such discovery to boast of, and yet I am here. I remembered that the historic side of the question had not been touched on in my former paper, which was almost, if not entirely, confined to the technical difficulties which this art presents. I propose, therefore, to treat the technical part as concisely as may be consistent with lucidity, and I do this with an easy conscience, as many of you are familiar with the process, and there are now several bronze foundries in England where excellent work is carried out on the waste-wax system.

When Mr. Alfred Gilbert, Mr. Onslow Ford and myself first began to agitate for the introduction of waste-wax bronze casting in this country, there was scarcely any one in England besides ourselves who had any knowledge of the subject; nor was there any foundry on this side of the Alps where waste-wax casting was practised or understood. For years we were unable to awaken any interest in the subject, but at last I was asked by the editor of the *English Illustrated Magazine* to write an article on bronze casting, which was published in 1883. This was followed, curiously enough, for there was no pre-arrangement, on the very next day by a most interesting lecture at the Royal Academy by the late Sir Edgar Boehm, assisted by Mr. Alfred Gilbert.

In 1884, further interest in the subject was aroused by the very able and interesting report of Sir Savile Lumley to Earl Granville on bronze casting in Belgium, where the waste-wax process had just been experimentally introduced by the Société Anonyme des Bronzes, at Brussels. In Paris also, M. Gonnon had produced more than one work by the wax process, although it was stated, I do not know with how much truth, that these were only partial successes, having need of very considerable repairs and chasing before leaving the foundry.

From that time to this the interest in this process has gone on increasing; and there is now no difficulty in getting bronzes cast by the wax process in England. This, and the advance in sculpture that has taken place in the public estimation during the last twenty years, must be my excuse for again addressing you on the same subject.

As to the antiquity of bronze casting in Europe, we only know that it dates from prehistoric times, and that it is impossible to say how or where it originated, or to give to any individual the credit of its invention. Sir J. Savile Lumley says that according to several Danish and German writers, the European bronze of prehistoric ages was probably an indigenous industry, not of Phœnician origin, but originally discovered in Britain. I am content to accept this theory as being quite as worthy of belief as the legend for which Pliny is responsible, that the art of bronze casting was invented by Scytes the Lydian, or Theophrastus the Phrygian.

The Palafites, or lake-dwellings of Savoy and Switzerland have yielded a very considerable harvest of early European bronzes, and also, in some instances, they have preserved some record of the manner in which these were produced. At Thonon, Switzerland, a mould for a spear-head was found which was composed of two slabs of stone, on each of which a spear-head was cut out to a proper depth. The two stones, being placed face to face, and bound together, would form a very simple but effective close mould from which many casts could be taken, without any injury to the mould itself. It is this mould of which Sir J. S. Lumley says that a modern lance-head was produced from a prehistoric mould. It was probably the earliest known example of piece-moulding amongst European bronze founders.

All their works, however, were not produced by piece-moulding, since another mould was found, made of clay over a wooden pattern, which seems to have been burned out, leaving a cavity to receive the molten bronze. In this, then, we find the first principle of the wax process, namely, the destruction or "wasting" of the pattern by fire.

This earliest process, which we may term a waste-wood process, would be only applicable to simple forms on account of the difficulty of completely destroying the wooden pattern, and afterwards getting rid of the ashes from the cavity of the mould; but it was a great discovery, and doubtless the genius who invented it would not be long in discovering that other substances more easily wasted by fire, such as wax, were capable of being fashioned into various shapes, and of being advantageously used as patterns for bronze casting; and there is every reason to suppose that the more important works found amongst the lake-dwellings of Lake Bourget were cast by the very waste-wax process which we have been trying to revive in England for the highest class of bronze statuary.

In the opinion of Count Casta de Beauregard, whose discoveries in Lake Bourget have so greatly enriched the museums of Aix and Chambéry, these settlements were destroyed by a race of men of the iron age, who carried fire and sword through the district long before the Roman era. Be this as it may, there can be no doubt as to the great antiquity and artistic value of the wax process, and moreover, as the ancient European nations do not seem to have been in the habit of making piece-moulds, except of the most simple description, namely, in two halves, it is not easy to see how else they could have executed large or complicated works. It is true that clay figures of the Tanagra type were got from moulds which were made, as I believe, in two halves, and some of these figures seem to be of a complicated character. Yet the heads and arms seem to have been moulded separately, and the undercutting in folds of drapery, etc., to have been omitted. Each of these figures, therefore, would consist of the following separate simple piece-moulds: — First, the body or trunk of the figure; second, the head; third and fourth, the arms; four moulds in all. After the soft clay had been squeezed into these moulds it was an easy matter to join heads and arms to the trunk of the figure and to retouch the whole, which was then allowed to dry, after which it was fired in a kiln and became terra-cotta. This principle of dividing the figure into several parts to be afterwards joined up to form a complete whole was a great discovery in the art of the moulder.

Of all the European nations of remote antiquity the Etruscans and Greeks stand forth pre-eminent as artists, and when we think of antique sculpture, whether in marble or bronze, it is Greek sculpture that is always in the foreground of our thoughts. And it would be strange if this were not the case, since we possess in our museums so large an amount of works, which although they are chiefly rather from Rome than from Greece, yet the Roman sculpture being greatly an echo of the earlier Greek art, was inspired by Greek legends and traditions, and executed, almost without exception, by the hands of Greek artists often brought as slaves from Greece to Rome, and employed by their conquerors to reproduce the originals they had brought to Rome as the spoils of war.

In ancient Greece the art of the statuary in bronze was held in high estimation; the desire of possessing bronze statues of divinities, heroes and statesmen seems to have been insatiable, and there were more bronze statues than we modern sculptors can conceive of.

It is then of Greek bronze casting that I propose to speak first. According to some old author — Pausanias, I believe — the art of modelling the figure, and of casting it in bronze, was first practised at Samos about 700 B. C. Many writers on art have put forward various theories as to how the old bronze statues were produced, and as many of these writers knew nothing about bronze casting, their ideas were often somewhat absurd.

Winckelmann, for instance, states that the horses of St. Mark's, at Venice — of which there are four — were all cast out of two moulds, not knowing that the mould is destroyed every time a bronze casting is made. Lemot, the French sculptor, who made some repairs to these horses, when they were taken to Paris by order of Napoleon the First, had ample opportunity of examining them, and

[1] A paper read before the Society of Arts by Mr. George Simonds and published in the *Journal* of the Society.

found that their heads and necks were cast separately, and that collars had been added afterwards to conceal the joints. This is not surprising. It is very doubtful if the Greeks or Romans ever attempted to make castings of the dimensions that we find to have been successfully carried out in later ages. It is pretty certain, I think, that they cut up their larger works, and cast them in parts, which were afterwards fitted together on much the same system as the terra-cotta figures were produced in clay. There is much to be said in favor of this system for large work, and little to be said against it. I will try briefly to tell you what, in my opinion, are the advantages and disadvantages.

A bronze casting, unless it be of very small size indeed, is always cast hollow, and, in order that it may be so cast, it is requisite that it should have a core inside as well as a mould outside it.

Now it is clear that if an object like a horse is to be cast, with a core inside, and if it is to be cast all in one piece, then that core will have to stay inside, since there will be no opening whereby it can be removed. Now the great weight of the core inside is a considerable disadvantage in erecting or moving a statue, and puts an unnecessary strain on the legs, which have quite enough to support without it. Moreover, the material of which cores are composed is excessively porous, taking up moisture greedily from the air, so that it is a source of danger to the thin bronze statue, which is certain not to be absolutely air and damp proof. There will be here and there some tiny fault, through which the core will absorb, and at last become so moist, that a severe frost might swell it almost to bursting. If the horse is cast without his head and neck, the core is easily removed and these dangers avoided.

There is, however, a more weighty reason for casting a horse without his neck and head. When the bronze is poured into a hollow mould it is at a temperature of, roughly speaking, 1,900°, consequently the air in the mould is expanded so suddenly that, unless escape were provided for it, an explosion would be the result; but although the main body of air escapes through the vents, there seems to be a film of air remaining, which, I imagine, prevents actual contact between the walls of the mould and the metal, so long as the latter is in motion and the mould is not yet full. When the mould is full, the outward pressure of the fluid metal forces this film of air out through the pores of the core and of the mould; those of the mould give a fairly free passage outwards, but the core cannot do so, however porous it may be, if it is enveloped on all sides by the bronze. In this case the gases that should have passed away through the core come boiling up through the fluid metal, forcing their way to the vents, which themselves full of metal, can no longer act. The gases become imprisoned in the bronze as it sets, and the result is a bad, unsound casting, "blown on the core," as we say, and full of holes like a sponge. To avoid this the ancients cut their large works to pieces. The only drawback to cutting is, that unless it is skilfully done, it is impossible to join it again without altering the movement or proportion to some extent.

There are various ways of making these joints in bronze, but at present I will merely say that the ancients used to cover the joints, if possible, with a bracelet or band of ornament of some kind, and join the parts together with rivets. They also made a species of box-joint by bending a strip of metal round the inside of an arm, and rivetting it in such a manner as to allow a couple of inches to project beyond the edge of the cast metal; this projection was then forced into the corresponding edge of the part to be joined, and secured in position by rivets. These joints were frequently further strengthened by dowel plates of a double dove-tail form, which were counter-sunk in the thickness of the bronze, so that one dove-tail was on each side of the joint. In principle this method is much the same as that now in use, though in practice we have somewhat improved upon it. The system of cutting was, I think, always practised by the ancients, except in the case of very small bronzes, such as the little "Victory" or "Fortune" whichever she may be, and the charming statuette of "Venus," both of which are in the Naples Museum, as are also those other highly interesting examples of bronze work, which I have now the pleasure of bringing to your recollection.

The ancients, as far as I can discover, did not understand the practice, now almost universal, of putting a "lantern" into the core, and of core-vents. I shall speak of these later on, merely observing at present that it is possible to get very small castings quite sound, even when the core is shut in, and gives no exit whatever to the gases. This is, however, a difficult matter, because it is essential that the metal should be poured at its lowest possible temperature — that is to say, it must still be quite fluid, and fill the mould easily and at once. It must also be a very thin casting, and solidify before the heat has penetrated the core to any distance, in which case little or no disturbance can take place.

It is a matter of great difficulty to pour these small castings at the proper temperature, and in many cases it will be found that they have blown on the core from being too hot and setting too slowly, or that the metal has not been fluid enough to fill the mould properly and ensure a sharp casting.

The works of vast dimensions which were so often executed by the ancients, of which the most generally known is the Colossus of Rhodes, were probably not cast in very large pieces, but in sections of very considerable thickness, with flanges on the inside by which they could be bolted or rivetted together. They could thus be built up from the ground without the elaborate internal framing which would have been needed had they been, as some writers have supposed, made of thin wrought plates and rivetted together. Indeed, the difficulty of executing large works in beaten plate is so much greater than that of casting, that it would only be used under very special circumstances. It was so used by Ernest Rietschel, of Dresden, for the statue of Brunonia in a quadriga with four horses all larger than life. The reason for its use in this case being that the gateway at Brunswick, on which it was to be placed, was not considered strong enough to support the weight of cast metal. That the colossal statue of "Apollo" at Rhodes was cast work, and not beaten, I think is fairly certain, since it would seem that it lay prone and in ruins for nearly 900 years, after which the metal was sold to a Jew, who it is said, loaded 900 camels with his purchase. The weight of metal is said to have been 720,000 pounds and it seems hardly likely that sheet-metal would have lasted so long, or that it should not have been stolen away long before, had it not been for the size and weight of the pieces of which it was built up. This is almost all that I can tell you of the methods of the Grecian bronze founders, and of the sort of work that they produced.

Of the Romans I can only say that, although they had a passion for sculpture, they do not seem to have cared to produce for themselves that which they could more easily acquire by conquest. We find accordingly that whenever they wanted sculpture for any purpose they stole it from other people, and where this was not possible, owing to the non-existence of anything suitable to their purpose, they employed foreign artists in the execution of the work. The fashion of collecting bronzes in this simple way was set, so we are told, by no less a personage than Romulus himself, who carried off from Carmerium a bronze quadriga, which he placed in the temple of Vulcan, after having had a statue of himself placed in the car. We do not know who made the statue of Romulus, but it could hardly have been by any save an Etruscan artist.

According to Plutarch, one of the Tarquins dedicated a quadriga to Jupiter Capitolinus, and we are told that artists were brought from Veii for its execution. This seems probable, since Veii is only some twelve or fifteen miles from Rome, and was an ancient and civilized city long before the days of Romulus and Remus.

As early as the days of Numa, laws were made concerning sculpture, and one of these forbade the representation of the gods. But it does not seem to have been observed, since Tarquinius Priscus employed the sculptor Vulcanius, of Veii, to make a sculpture of Jupiter, which he placed in his temple on the Capitol. Another curious law of Numa's restricted the height of statues to great men. These were not to be more than three feet in height, and were hence known as *tripedaneæ*. It is, therefore, to be presumed that "half life-size," as we should now call it, was the size of the statue of Horatius Cocles, which was erected in the *comitium* after his noble defence of the bridge.

For very many years, then, the Roman demand for sculpture, whether in bronze or in marble, was supplied by foreign lands and foreign hands. Indeed, we are told by Perkins that the first foreign sculptor of whom any record is found is one Manurius Vitturius, who seems to have made copies in bronze of the *ancile*, or little shield which the Romans believed to have fallen from heaven; and although after that period a few names are found, still they are merely exceptions that prove the rule.

Greek artists, however, had been brought to Rome, and with them the traditions and practice of their native art. That these rapidly deteriorated amongst their new surroundings is hardly to be wondered at, since their employers and their public lacked the appreciation and the cultivation of ancient Greece. The emperors changed the fashion in art according to their own whim or love of ostentation. Caligula, says Perkins, decapitated Greek statues, and placed upon them his own vile head, while Nero gilded the masterpieces of Lysippus, and employed Zenodorus to erect a colossal statue of himself, which is estimated to have cost a sum equal to about £3,600,000 of our money. Pliny remarked that it showed how much the art of casting in bronze had deteriorated. It is hard to understand how this vast sum could have been spent on this statue, and it is a pity that we do not know more about it. It lasted, however, but a short time, having been destroyed by the people of Rome to mark their hatred of the man it represented. We have another work, however, of that period, in the equestrian bronze statue of Nero, in the museum at Naples. I am, however, of the opinion that this statue is rather a Greek than a Roman work, although I can give no account of its history or authorship, save that it was found at Pompeii.

In strong contrast to this work is the well-known equestrian statue of Marcus Aurelius, remarkable above all else as being, I believe, the only statue of an emperor which, from the time of its erection to the present day, has always been respected and carefully preserved by the Roman people. There is, I believe, nothing known as to its authorship, and we can only guess, from a certain heaviness and from its general style, that it is probably the work of a Roman artist or, at least, of a very Romanized Greek. This, at least, is the opinion of Perkins, and I must say that it is also my own. I am quite unable to find any signs of Greek feeling in it, and although it is undoubtedly, in many respects, a noble and impressive work, yet I must certainly protest against its being considered, as it has been by some writers and many readers, to be the finest equestrian statue in the world. Winckelmann, who seems to have a natural gift for mistakes of this sort, supposes this monument to have been of beaten plate, and this story has often been repeated. It is, however,

nothing of the sort, but is a waste-wax bronze casting — not, however, cast at one pouring, but in separate pieces, as I have stated was usual among the ancients.

It would be too long, and indeed foreign, to our present purpose, to trace the decline of the art of the statuary in bronze through the various ages of the decline of the Roman power down to the final destruction of the last refuge of art by the siege and sack of Constantinople in the thirteenth century. There are, however, two bronze statues that I may mention as belonging to this period of decadence, one of which is supposed to represent either the Emperor Heraclius or Erico, King of Lombardy; it stands in the piazza of the town of Barletta. According to tradition, this statue was cast at Constantinople by a Byzantine artist named Polyphobus, about the middle of the seventh century. Perkins, however, considers it to be a genuine Italian work, and believes it to be of earlier date. I have never seen this statue myself, nor any photograph of it, but as Perkins was a most excellent judge of sculpture, he is probably correct in his estimate. The other is the well-known statue in bronze of St. Peter, in the basilica of St. Peter's at Rome. This statue is said to have been cast by order of Pope Leo I, as a thank-offering to the saint for his interposition and deliverance of the City of Rome from Attila. The date assigned to this statue is A. D. 153.

There is a legend that it is an antique, and was a statue of Jupiter, and that the head and hands only are of Christian origin. There is, however, no evidence of this, and, on the contrary, plenty of internal evidence that the work is of one period, and that not Classic. Possibly an antique Jupiter may have been melted down for the sake of the metal, and as a further honor to St. Peter by the destruction of a pagan divinity.

The period from the fifth to the ninth century gives us no record of any Roman artist, and we may easily understand that the iconoclastic war and wholesale destruction of statues, which was so vigorously prosecuted by Leo the Isaurian and his son in the eighth century, must have given the *coup de grâce* to the already dying art of the statue-founder; nevertheless, the persecution of artists, and the consequent emigration of numbers of them from Byzantium, was the means of spreading such tradition of the art as might have survived, into other and far distant lands, and the affiliation of numbers of these emigrants to the society or craft of the Comacine builders was the means of bringing a knowledge of the principles of the art into France, Germany and possibly into England also.

During the ninth and tenth centuries sculpture seems to have been at its lowest ebb. In the eleventh and twelfth centuries, however, the art began to receive some consideration, and artists, it is said, were sufficiently proud of their calling to begin once more to sign their works.

[To be continued.]