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Etruscan

Granulation

An Ancient Art of Goldsmithing

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Preface

Jewelrymaking was one of the first ways that humans used metal. One of the earliest methods has remained in use over the centuries and continues to exert its extraordinary charm today: that method is granulation.

Granulation, a sophisticated technique in which tiny granules are attached to a gold base, was practiced by ancient cultures for millennia. In these masterpieces of accomplishment, the number of granules can reach hundreds of thousands.

Ancient jewelry is now confined almost exclusively to museum cases and therefore cannot express its true beauty. Without the reflection of the sun in the natural movement of a wearer, without the skin, hair, and garments of a human being, these wonderful pieces have been transformed into stunning but static showpieces.

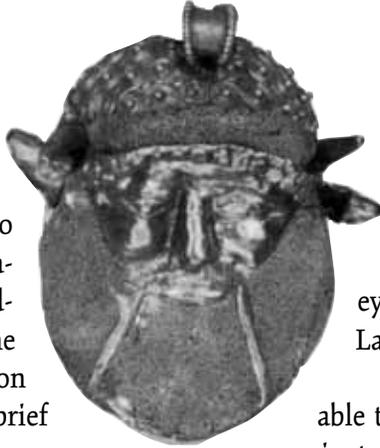
On the positive side, archeologists and museum curators made this jewelry the object of study—describing it, classifying it, giving it a chronologic location. With the advent of microscopic observation and sophisticated analytical tools, we have entered a new phase in the appreciation of granulated jewelry. Only recently have we begun studying these archeological finds as handmade creations with their own history and technical genealogy. We have begun empirically to reconstruct the phases of workmanship, recreating the surroundings, the tools, and the working methods in an attempt to bring together theory and practice, the mind and the most ancient tool of man, his hands.

Introduction

A treatise by Alessandro Castellani¹, a member of a famous family of Roman goldsmiths, was handed out to the visitors of the 1862 London World Exposition. Here is a brief excerpt:

“Kind gentlemen, thanks to your courteous benevolence, I was given the opportunity to explain in a few words the results of my research into the goldsmith’s art in the way it was practiced by ancient populations. [...] I will refer to the procedures used by the artists of those times. Unfortunately, these procedures have been lost, as well as many other mysteries of a civilization which was the mother of our own. [...] Among other things, the almost invisible granules that had such an important role as decorative elements in the work of ancient goldsmithing, presented us with almost insurmountable difficulties. We have made countless attempts [...] we studied the writings of Pliny, Theophilus and Benvenuto Cellini, without neglecting other sources [...]”²

The art which Castellani refers to is granulation, the art of attaching tiny spheres onto a metallic substructure at minute tangent points in such a way that



the point of contact is almost invisible to the human eye. The name comes from the Latin *granum*: grain or seed.

The Castellanis were never able to discover this “secret of the ancients,” but their many imitations of Etruscan gold work were of such high quality that only today are they recognized as forgeries. Meanwhile, they became museum and collectors items, at times more expensive than the originals.

The newly created “mystery” of the granulation technique in the 1800s began to stimulate the imagination of goldsmiths and others. It was a time of great discoveries and immense opportunities. English, French, German, and American diggers supplied the museums of their own countries with treasures of the ancients, often shamelessly plundering archaeological sites.

Findings were not only made in Asia Minor and Greece, but everywhere. Treasures such as the Regolini-Galassi tomb in Cerveteri were discovered in people’s backyards. These discoveries focused the attention of Europe on one people: the Etruscans.



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Large disc Fibula, from the Regolini Galassi Tomb, in Cerveteri, about 650 BC, 31.5 x 24 cm, Gregorian Etruscan Museum, Vatican. On the arc, of elliptical shape and with leaves motif, 55 geese are aligned. They are built in the round and using two half cylinders of foil 24 cm long, with a zig-zag pattern. All are made with very fine granulation. The oval bracket shows five lions embossed in bas-relief. All the outlines are realized with linear granulation, barely perceptible to the naked eye.

Ex Oriente Lux, The Light from the East



3

Details of the disc-fibula.

The most surprising findings unearthed at that time were works of Etruscan goldsmithing. They were not only expressions of dignity and wealth for the living, but religious relics for the dead. Through refined granulation techniques, Etruscan artisans achieved a level of technical and artistic mastery unsurpassed by other cultures. Remarkable is the complexity of the decorative pattern, but also the extreme refinement of the techniques. They seem to touch the limits of human possibility. In the 7th and 6th centuries BC, Etruscan goldsmiths were able to cover jewelry with a very fine granulation of 0.12 mm. At this scale it is

impossible to distinguish individual spheres with the naked eye; the result appears as an opaque surface resembling velvet. Some sources call this variation dust or powder granulation. On certain jewelry, tens of thousands of minute spheres of equal size were applied. An example of this is the large disc *Fibula of Cerveteri*, located in the Vatican (Gregorian Etruscan Museum). For this remarkable work, more than 120,000 minute spheres were prepared, individually applied to the gold surface and soldered in an almost imperceptible manner.

The goldsmiths who were able to achieve such mastery perfected their abilities through knowledge of their predecessors. Those who think the Etruscans first developed this refined decorative technique will be surprised to learn that when the Etruscans were using it, granulation was already an ancient technique with a tradition of more than two thousand years.

The most ancient objects with granular decoration that we know of are dated 2500 B.C. and were found in the royal tombs of Ur in Mesopotamia. It is from here that granulation spread, especially after the destruction of that city. It spread to Anatolia, to Syria, and to Troy (2100 BC). The “Treasure of Priam,” discovered by



4

Next to the Tutankhamon mummy, two daggers were placed for protection from the demons of the afterlife, one with a hardened gold blade, the other with a well preserved iron blade—a very rare metal for those times. The finely chiseled images on the case portray the victory of good against evil.

Both handles are adorned with geometric, lozenge, and triangular granulation. Egyptian Museum, Cairo, JE 61584.

*Sophia Engastomenos,
Schliemann's wife,
wearing the tiara of
"Priam's Treasure."*

Schliemann, attests, in the second period of Troy, to a high level of technical proficiency, with linear and triangular pattern granulation.

Starting in the second millennium B.C., Egyptian goldsmithing of the Middle Kingdom still shows clear elements of a Mesopotamian style. The most ancient findings with granulation come from the princely tombs of Dahour.³ Of course, we shouldn't forget the treasures of the New Kingdom, with the extraordinary belongings of Tutankhamun: daggers, rings, and bracelets carry decorative patterns with linear, triangular, and rhombic pattern granulation, in red gold and electrum (gold-silver alloy). Granulation with different gold alloys implied, for those times, a thorough knowledge of metallurgy.

Around 1600 BC, also in Palestinian Territory, in Cyprus, there were Sumerian and later, Palestinian influences. Here a remarkable granulated piece was created, a pendant with a triangular granulation of nine rows and more than 4000 granules.

The spread of this art in the Western world has been called *Ex Oriente Lux*, The Light Coming from the East. As early as 2000 BC, Minoan goldsmiths used this refined decorative technique for their

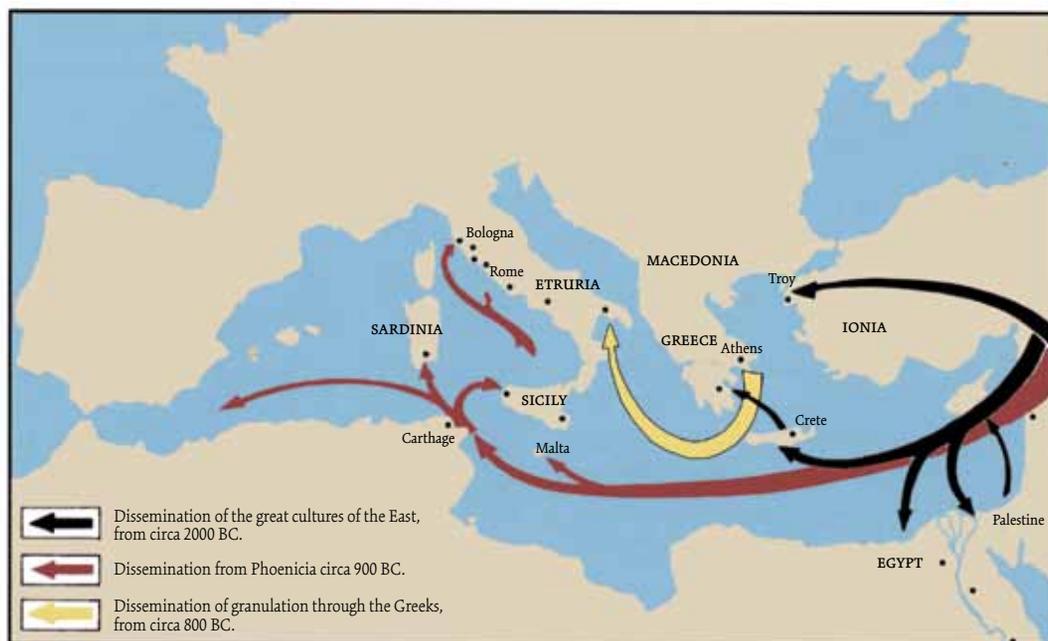


traditional naturalistic patterns, more inspired by Mesopotamia than by Troy. This was the first step toward Europe. Four more centuries went by before continental Greece acquired the "new" technique.

With the disappearance of Myceane in the 12th century BC, this artistic form died out for a few centuries, only to come back to life at the time of the Greek colonizations of the 9th century BC.

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The map shows the spread toward the West of the granulation technique through different ages: Starting with the Sumerians, in Southern Mesopotamia and continuing toward Troy, Egypt, Palestina, Crete and lastly the Greek inland (black arrows). Later, the technique was revived and new waves of dispersal occurred, this time through the Phoenician traders and artisans, starting from Syria, Carthage (red arrow), and Greece (yellow arrow).



While the Greeks were founding their first colonies in the West, Phoenician traders maintained business relations and settled in small communities in the Tyrrhenian area. This could explain the fact that the first Etruscan granulated jewelry was more influenced by Phoenician than by Greek art. It is probable that immigrant

Phoenician goldsmiths introduced new techniques in Etruria, including filigree and granulation.

An example of this can be found in the presence in Tarquinia of a leech-fibula, which represents one of the most ancient examples of Etruscan granulation. If the leech shape of Villanovan tradition,

is typically Etruscan, the Palmette motif, which also adorns it, originally belongs to the Phoenician tradition.⁴ This new style begins to appear in the 8th century BC and characterizes the following century, during the so-called “Orientalizing” phase.

In the Villanovan Age, golden objects were rare, being mostly limited to foils decorated with the punch technique (*repoussé*) along with the solar disk motif. The materials used for decorative objects were mostly bronze, amber, bone, and horn.

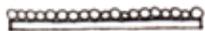
For the Etruscan artisans who were able to make refined bronze microfusions, it was probably not too complicated to master the new technologies. Particularly, the art of granulation seems to have immediately attracted both purchasers and artisans. The tombs of the noble families, rich in granulated jewelry, demonstrate this.

In the beginning we can only find a geometric ornamental typology, with a limited number of granules. In the Late-Orientalizing Phase though, we can find more mature shapes with a high number of granules adorning the objects with Greek fret designs and meanders, or outlining figurative motifs. The number of small spheres increases as the technique becomes more masterful. A leech-fibula from Tuscania in

the British Museum (dated to around 630 BC) has approximately 25,000 granules, some as small as 0.12 millimeter in diameter, attached to in the finest geometric style. In the second half of the 7th century, after the introduction of the silhouette technique in Vetulonia, or in Vulci, much jewelry is decorated using dust granulation to thickly cover the background. Smaller spheres and a wider variety of motifs characterize this extremely sophisticated age of Etruscan goldsmithing.

In the Archaic Age, the 6th century BC, the art of granulation loses a little of the importance it had in the previous century. At this time, spiral and twined threads of various shapes accompany the use of granules. They are elegantly placed to create fanciful compositions and complicated floral motifs. Dust granulation was now needed to create an opaque background to better emphasize the smooth and glowing areas of a gold leaf.

During the Classic period in the 5th and 4th century BC, granulation not only represents rich ornamentation, but it is also used to cover joints and as a bond to strengthen soldered joints. In these cases, the granules are almost thrown in bulk, without the creation of predisposed figures. Typical of this



a



b



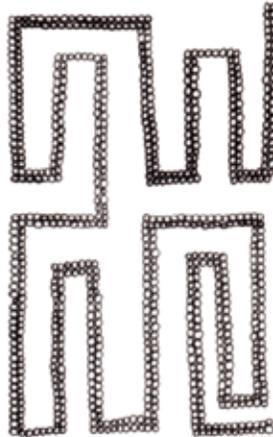
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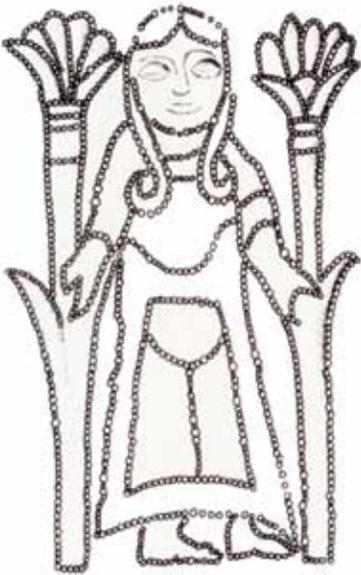
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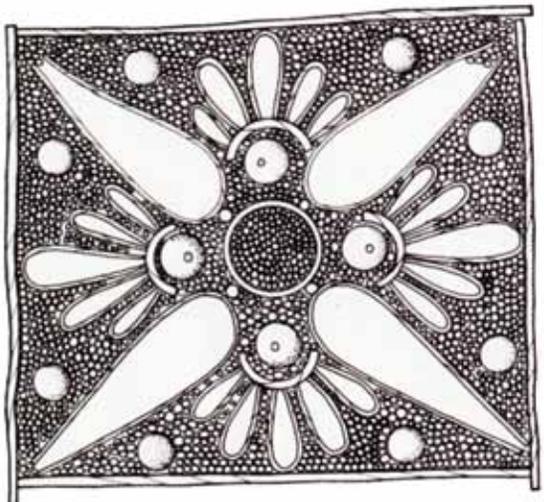
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i



h



j

type of granulation are the “Disk Earrings” of the second half of the 4th century BC.⁵

At times the surface is worked with stamping (*puntinatura*), made with a stump from the back. This is a sort of imitation of the original technique.⁶

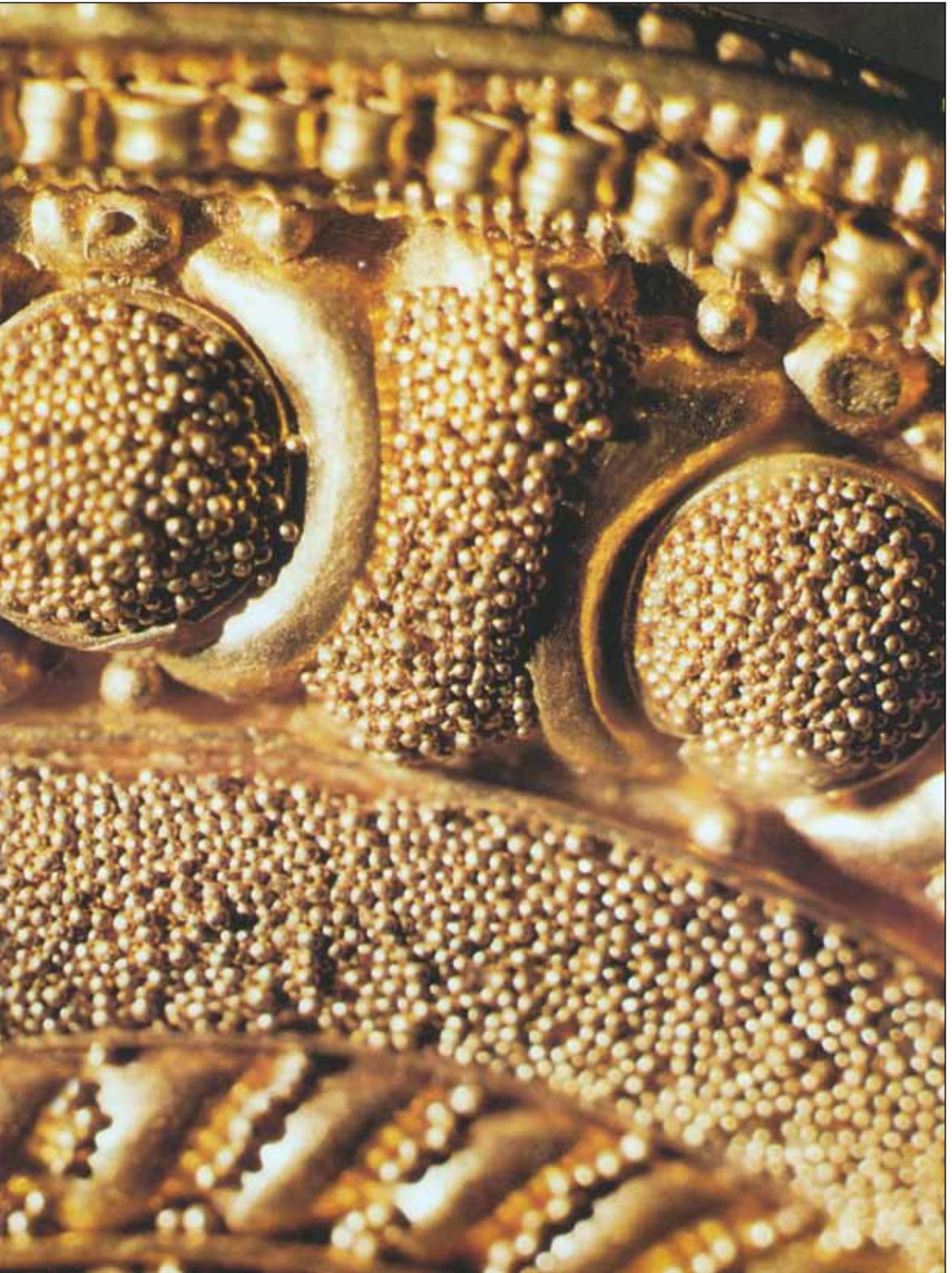
The pick of this sophisticated form of art rapidly became obsolete: it became the expression of a widespread Hellenistic style.

7

Types of Granulation:

- a) linear granulation with single and double rows, set apart or ajar;
- b) plane triangular granulation, starting from an initial triangle of three granules;
- c) granulation covering a hemispheric foil (usually with the base enclosed in round wire);
- d) linear granulation on spheric foil;
- e) complex geometric leitmotif with granulation, wires, and hemisphere;
- f) linear granulation with meanders;
- g, h) granulation of the outlines and of the details of raised figures in bas-relief;
- i) “silhouette” granulation, with covering of the background;
- j) field granulation of the background that leaves some of the foil smooth.





8

Previous double page: detail from a disk earring from Cetona, in Chiusi, with dust granulation on hemispheres and curved foils; 6th century BC, in Antikensammlung, Berlin.



9

Comb-Fibula from Palestrina, about 650 BC, with linear contour of embossed figures in bas-relief.

10

Detail. Museum of Villa Giulia, Rome.



The Mystery

During the Renaissance, the resurgence of interest in antiquity resulted in the formation of rich collections that were eventually opened to the public. Into the 18th and 19th century, museum goers admired in astonishment Etruscan jewelry covered with gold granules. It seemed impossible that the ancient artisans had achieved such perfection using their “simple” means.

The idea that contemporary culture was no longer able to do what the ancients did was gaining popularity and was nowhere better exemplified than in Etruscan granulation. Goldsmiths of the 19th century were forced to admit that in their attempts to duplicate the work of the ancients, modern techniques were falling short.

They had to find a solder to attach minute spheres of a tenth of a millimeter to the thin gold sheet without leaving visible traces. To achieve the clarity of the Etruscan work, the solder must not fill the spaces between the spheres, but should be so minimal that light could filter through the spaces between granules, giving them a suspended effect. The parts should be joined homogeneously to obtain an object that would remain free of corrosion for an entire millennium. Soldering a second time, the heat shouldn't melt the joints, but, on the

contrary, should make them even harder.

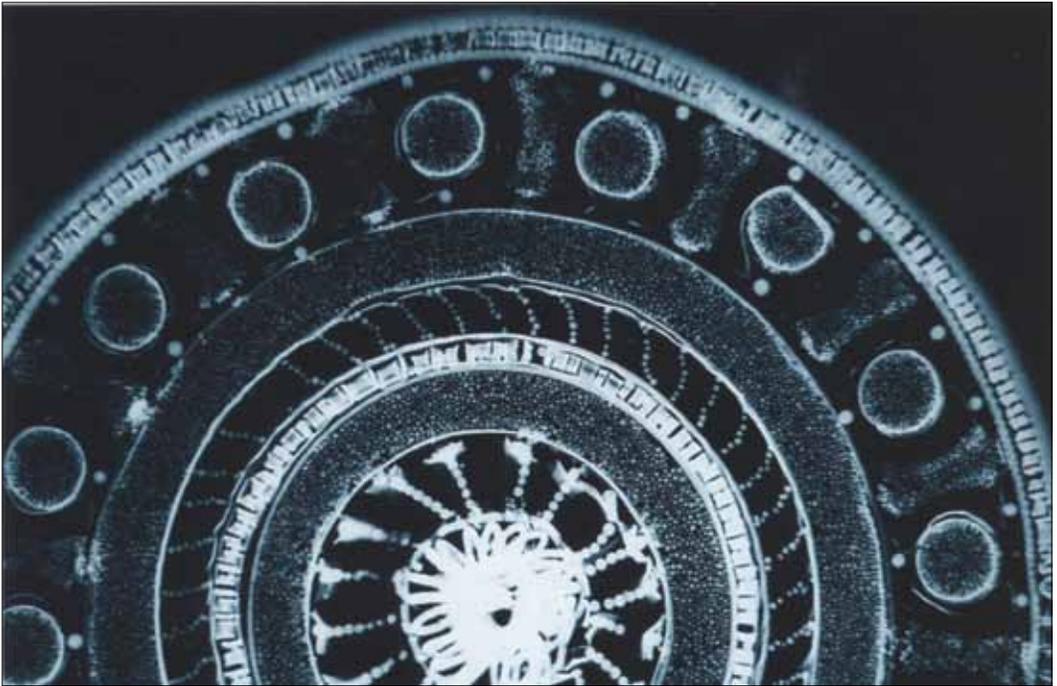
One of the people who took on the challenge was the Roman goldsmith Alessandro Castellani, collector, antiquarian, and researcher. Recall his words about the problem of ancient techniques:

“[We have] lost procedures, [and] many other mysteries of a civilization which was the mother of our own.”

How did it happen that a procedure so old, already in use for 4300 years, disappeared without leaving any trace and how was it entirely forgotten? The answer is trivial: Technology had changed. Starting in the 19th century, oil, gas and then electricity replaced the use of charcoal for soldering.

The new energy sources were better and more practical but their advent “put to sleep” the ancient procedure of colloidal soldering, a joining technique based on a chemical solder that requires the reducing action of charcoal.

An aura of mystery surrounded the granulation technique far into the 20th century. For far too long, archeologists and art historians were only concerned with the iconographic aspects and didn't pay much attention to the techniques used by the ancient goldsmiths. Professional forgers took advantage of this gap.

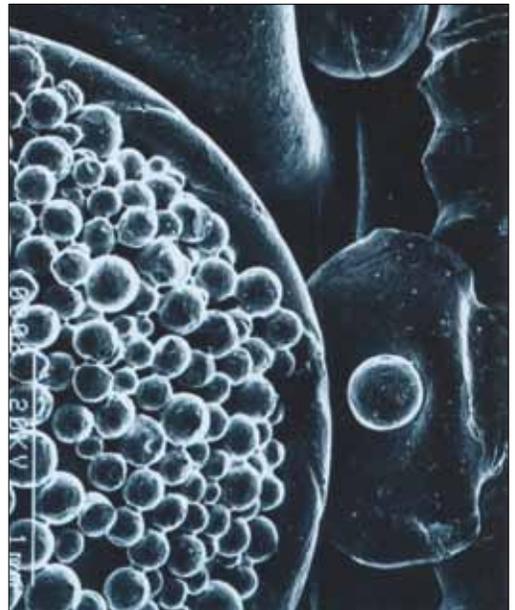
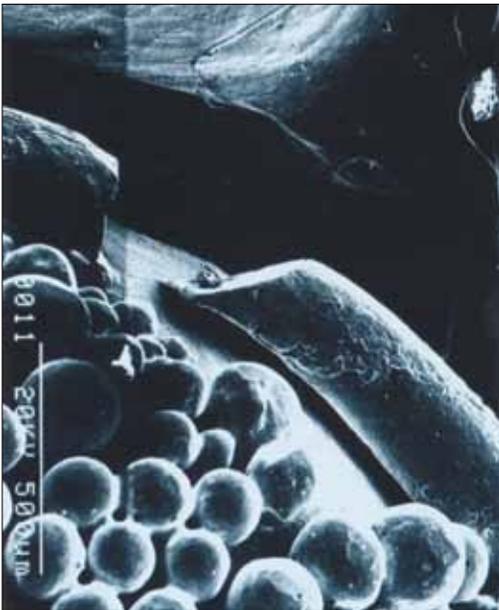


11

The radiography shows in lighter color the metallic parts, less transparent under X-ray, of the disk earring, in Creton.

12 & 13

Details photographed with the electron microscope. The granules can reach a thickness of 0.07 mm.



13-14

End of a strap with figurative leitmotifs in the round and in bas-relief. Linear granulation emphasizes details or follows the outlines of the figures (7th century BC). Antikensamm, Berlin.

