

The art of science: botany in contemporary medals

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Introduction

As is well known, drawing has been one of the most used methods to communicate and disseminate scientific knowledge. Medal art, however, has played a role no less important in this regard. The first association that arises between the artistic medal and the field of science is the portrait of scientists, through their formal representation in reliefs (medals or plaques), whose purpose was to honour these personalities in awards or commemorations. However, this research does not aim to address this type of manifestation. Its main objective is to analyse the medal's ability to present and display knowledge and scientific advancement. On the other hand, we will focus on the innovative techniques and procedures used to generate an image in the field of botany from the artistic medal, but also from works by contemporary artists who work from other disciplines based on relief.

Paraphrasing Miquel Baidal (2023), through scientific illustration 'art is put at the service of science' and, furthermore, it can do so using any technique. We start from this idea in order to establish clear analogies between the transmission of scientific knowledge and the creation processes typical of the field of the medal, which range from the use of relief as a vehicle of information, to the interpretation and poetics of art. The relief can show not only a faithful drawing, but also the volumes, thus providing an objective representation of the objects or natural elements studied to which is added the capacity of the materials, textures and finishes to transmit knowledge and reinforce the concepts. This makes the medal an ideal medium to express and communicate science, in the same way that illustration on paper does. We cannot forget the incorporation of new digital technologies or artificial intelligence, which have opened a world of graphic possibilities and have increased the capacity for precision and analysis.

Scientific illustration and artistic medal: first manifestations

Currency can move, travel, and reach places far from its origin. The first known examples represented elements



Fig 1. Lion of Lydia. Stater of Croesus, Lydia, 561–546 B.C.
Gold, 16 mm

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or symbols linked to the place to which they belonged, such as the native fauna or flora. What is considered the first coin in the world, called the Lydian Lion, 561 B.C. (fig. 1), represents this feline opening its jaws in front of a bull. The Sacred Owl of Athena, present in the Athenian coinage from late 6th century B.C. (fig. 2), is another of the most known motifs represented on ancient coins. In this case, we must highlight that it does not show references to Greek territory, but rather shows aspects of its way of life and culture. This ability to transport knowledge from one territory to another caused currencies to revalue. The power granted by this knowledge did not go unnoticed by the Roman Empire, which was a pioneer in incorporating the faces of celebrities or protagonists of war exploits on its coins.

Scientific illustration pursues the same goal: to disseminate and bring knowledge to the most remote



Fig 2. Sacred owl of
Athena. Tetradrachm,
Athens, 450–400 B.C.
Silver, 24 mm

Berlin, Altes Museum
Photo: ArchaiOptix,
CC Creative Commons
Attribution-Share Alike 4.0
International



Fig 3. Sheaf of **silphium**. ¼ stater, Cyrene, 308–277 B.C. Gold, 12 mm
Moscow, Museum of International Numismatic Club
Photo: Creative Commons CC BY-SA 4.0

places through drawing. Using line, stippling, stain, and colour, it recreates and analyses the object of study, providing valuable data. However, the medal goes one step further, providing volume and therefore giving relevance to the haptic. Starting from these early references, we can consider that the medal is, in its origin, one of the disciplines that put knowledge into circulation, making important contributions to the dissemination of science and the humanities. This need to communicate to sustain and promote the progress of civilizations, as well as the possibility of reaching distant places, is what makes this universal means of communication appear.

The main objective of scientific illustration is to show how things are to generate knowledge, but with precision: ‘in the word “scientific”, the word “precision” is implicit’ as Phyllis Wood says in her manual of *Scientific Illustration* (Wood, 1979). If we analyse the capacity of the medal to record, document, investigate and disseminate the world of botany, the relief itself provides a faithful record from the first fossils found. Through them, extensive knowledge of the history and evolution of life is obtained. Furthermore, these records reach us intact, without human intervention and therefore, as accurate information and not manipulated or interpreted. Taking this phenomenon as a reference we can affirm that the intentional use of relief will offer us a way of objective knowledge with many possibilities of application.

Returning to the coins, these are one of the first approaches to the botanical medal that could be considered. Thus, we cite as an example a Greek coin from the year 308 B.C. (fig. 3), where the representation of the *sylphium*, an extinct

plant, appears. Overexploited to the point of annihilation, this plant species had such relevance that from the end of the 6th century B.C. was immortalized in the economic and political tool par excellence of Greece: the coin. It is not a particularly precise relief, but it is enough to be able to identify the specimen. Without its existence, we would not know this specific plant. The currency documents a well-defined and recognizable species and fulfils an informative function.

Plant reliefs have been part of architectural surfaces in various manifestations and cultures. Some relevant cases are the Roman *Ara Pacis* (9 B.C.), the capitals of classical temples or the Egyptian reliefs from the Botanical Garden of Thutmose III (1450 B.C.). Also, in the artisanal mode they appear in mouldings on cornices and walls of private or institutional buildings. We highlight the importance of the contributions of Modernism in the use of plant motifs, both from an objective point of view and from interpretation with a figurative and realistic approach. In the same way, plant motifs are a fundamental representation in cultures such as the Arabic one.

Therefore, valuing this background and considering the technical possibilities of the medal, from the precision in the drawing of shapes, volumes, and textures of the objects of study, we can consider that the medal is a very useful means to be used in the field of science. As Mark Jones says ‘Medals unite painting and modelling in an essentially pictorial format which yet has the tactile qualities of sculpture’ (Jones, 1979, p. 177). This fact, inherent to the medal, allows us not only to show, but also to touch the elements studied with accuracy and scientific rigour. In addition to the possibilities within the rigorous parameters of science, it also provides great possibilities for expressive creation.

Techniques and materials in the botanical medal



Fig 4. *Passionflower Jardiniere* (fragment), late 19th century
Brown, Westfield & Moore
Majolica
Private Collection
Photo: Bonhams Skinner



Fig 5. *Gustav Mahler*, 1985
Consuelo de la Cuadra
Copper, struck, 80 mm
Madrid, Museo Casa de la Moneda
Photo: MCM



Fig 6. *Imprints of plant*
Kate Churchwell
Plaster

Personal web, UK

Photo: <https://uniquekr8ivity.com/botanical-art-gallery/>



Fig 7. *Imprints of plant*
Kate Churchwell
Plaster

Personal web, UK

Photo: <https://uniquekr8ivity.com/botanical-art-gallery/>

The plant representation in medals can constitute an excellent means of expressing precise characteristics of botanical species. When working with plant volumes, botanical or herbarium sheets do not transmit faithful information about the specimens. The plants, being pressed and dried, do not retain their original colour or their real morphology. Medals can provide this information through new technologies or the choice of materials. In this sense we can observe different methods that provide different finishes; on the one hand, the *Passionflower Jardiniere* piece (fig. 4) by Brown, Westfield & Moore (late 19th century), made of porcelain and enamel colour (majolica), in contrast to the modelling of a chestnut tree designed on the reverse of a medal commemorative of *Gustav Mahler* (fig. 5), made by the Spanish artist Consuelo de la Cuadra. Within the spectrum of scientific rigour, the medal has some advantages with respect to the exclusive use of drawing. The possibility of recording the surfaces and morphology of small elements through the press mould technique generates an exact appearance of the original element and provides a representation that focuses on the tactile. This system makes the relief a faithful sample of the registered element. Both through drawing and relief, the information that can be offered is very precise and exact. In the case of drawing, you can create your own archetype that functions as a general-use model, necessary to identify a single standard element. In the case of press mould relief, everything related to a single specimen is recorded, but with maximum fidelity and can be extended to the rest. A simple support of a leaf on a clay base offers a hollow registration faithful in shape and relief to its real model. It can be applied to all types of species in the botanical spectrum in order to consider this practice as a means of scientific dissemination. If we want to frame it in the field of medals, we only must consider a size that fits this discipline. Even so, it is not a condition because a lot of information fits into such a small space. In

this technique, also widely used in pottery and ceramics, both in the negative recording and in the positive copy, the materials play a very important role (figs. 6 and 7).

The use of new technologies, such as photogrammetry and 3D printing, still have a long way to go in the field of relief and, therefore, the medal. If the documentary and scientific aspect of botany is considered on the one hand, the possibility of faithful and rigorous records would allow the generation of illustrations and reproductions in light, transportable, attractive formats, with possibilities of use in teaching and in the transmission of knowledge. 3D printing suggests an analogy between the image

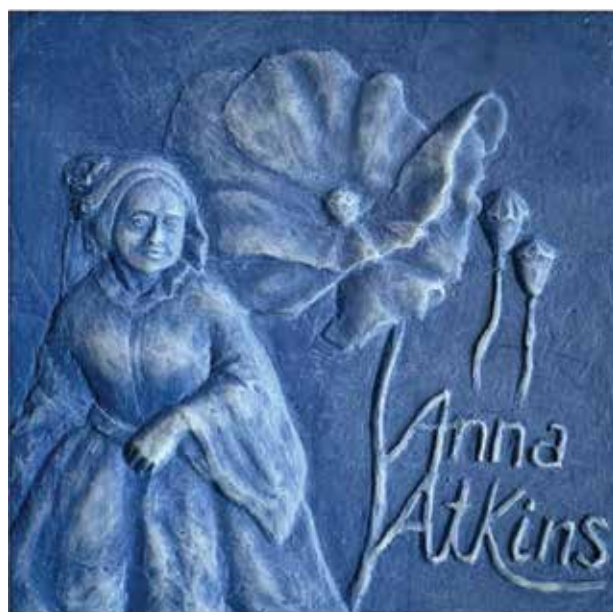


Fig 8. *Anna Atkins, Papaver Rhoea*, 2018
Raquel Sardá
Mixed technique, 150 x 150 mm
Photo: Raquel Sardá



Fig 9. *Dictyota dichotoma*.
Algae Cyanotype.
Photograph of British
Algae: Cyanotype
Impressions, 1843
Anna Atkins
Cyanotype, 270 mm
The New York Public
Library, b11861683
Photo: Creative Commons,
public domain



Fig 10. *New Zealand*.
Photograph of British
Algae: Cyanotype
Impressions, 1843
Anna Atkins
Cyanotype, 352 x 250 mm
Minneapolis Institute of Art
Photo: Creative Commons,
public domain

generated through a digital program and its unlimited reproduction and the source element of a coin minted and cast in an almost equally unlimited way in remote times. Photogrammetry brings the possibility of generating more volume records in species or botanical elements that are unreachable by the human eye, such as a grain of pollen or details of the pistils of a flower. With these new possibilities we can advance in the interpretive and artistic aspect, opening the possibility of generating multidisciplinary knowledge where art and science come together. Other materials and techniques that provide great results in faithfully recording plant specimens are synthetic resins, silicones, or direct casting systems.

The survival of the relationships between botany and artistic medal in contemporary creation

When studying artistic botany and its relationship with scientific illustration, it is essential to refer to the botanical scientist Anna Atkins (1799–1871) (fig. 8). A world reference for its botanical record through the cyanotype technique, it has left us an immeasurable artistic legacy (figs. 9 and 10) (Walther, 2023). Her cyanotypes appear to represent simple, flat shapes, with no greater registration than the clear and clean silhouette of the plant. However, through the transparencies and nuances offered by this

technique, we can perceive the volume of the plant specimens. The magical volume that the cyanotype reflects allows us to identify a species and its relief despite being an image made on paper.

This relationship between the two-dimensional and the three-dimensional is clearly seen in the engraving technique called embossing, where the different planes have the ability to be perceived as transparencies with a result similar to press mould relief. Going beyond the disciplines of relief modeling and combining this aspect of planes and embossing, we can observe the work *A occhi chiusi* (2018) by Giuseppe Penone (fig. 11). In this work drawing and modelling come together. The delicate representation of a closed eye with the appearance of a graphite drawing is, actually, a composition with acacia tree thorns, next to which there is an authentic relief on paper in the form of embossing. Being very far from the techniques of the artistic medal, this piece brings together multiple techniques of those previously exposed.

We want to show, as a comparison, the work of four great Spanish artists who have worked on relief from the artistic concept, participating in scientific and medal illustration at the same time. Artists such as Antoni Gaudí, with the



Fig 11. *A occhi chiusi*, 2018
Giuseppe Penone
Acrylic paint, glass microspheres,
acacia thorns on canvas;
white Carrara marble,
200 x 630 x 8 cm
Lausanne, Musée Cantonal des Beaux-Arts
Photo: <https://giuseppepenone.com>,
© Archivio Penone



Fig 12. *Charity Door*,
1883–1926
Antoni Gaudí
Bronze
Barcelona, Sagrada
Família
Photo: Creative
Commons
CC BY-SA 4.0



Fig 13. *The orchard*.
Relief for the doors
of the Burgos
Cathedral, 2019–
Antonio López
Plaster (in process),
bronze
Burgos, Cathedral
Photo: [https://
diariodeestilo.es](https://diariodeestilo.es)

vegetal ivy on the doors of Sagrada Família in Barcelona (fig. 12), and Antonio López with the reliefs of the Garden on the doors of the Burgos Cathedral (fig. 13), whose inauguration is scheduled – at the time we are writing this paper – for May 2024, have carried out works for churches or cathedrals in which the plant motif is omnipresent due to its symbolic meaning. Although they do not have the purpose of scientific dissemination, it is important to be able to recognize the typology of the plant modelled by the biblical references found in them (for example the fig tree, the lily, etc.).

In the first case, Gaudí generates a monumental sculptural presence and the perception of the whole is essential; however, the relief of the ivy allows us to extract a fragment in the form of a medal and not lose its vegetal, identifiable and sculptural essence. Something similar occurs with the work of the sculptor Cristina Iglesias (Blazwick and Smith, 2021) for the doors of the Prado Museum in Madrid (fig. 14) or in her wells located in places highly connoted of meaning, where the concept of life through water, with the idea of a journey to bring water from fountains, wells and springs. These plant

reliefs made according to the sculptural techniques of moulds, emptying, positive in cast bronze are works of grandiose sizes, but from which a fragment could be extracted without losing their sculptural essence, nor their artistic medal registration. Likewise, the reliefs by Miquel Barceló in the Cathedral of Palma de Mallorca reflect polychrome fruits and vegetables (fig. 15). The technique is more expressive and interpretive, eschewing faithful registration, seeming that the volume has been generated from the back, showing the reverse of the grip in a plastic way and combining it with direct modelling.

Returning to Gaudí's ivy and in front of Barceló's mural, the shapes of plants and fruits are identified and specified through colour. In the first, through a colour patina on the bronze and in the second, through the glaze of the ceramic. This will retain its properties as a vegetal sculptural relief even modifying its scale by converting it to the medal format itself.



Fig 14. *Portón-pasaje*. Monumental bronze doors of the Prado Museum extension ('Cubo de Moneo'), 2006–2007
Cristina Iglesias
Bronze, 8.40 x 6 m
Madrid, Museo Nacional del Prado
Photo: Creative Commons Genérica de Atribución/Compartir-Igual 2.0



Fig 15. Detail of mural *Multiplication of the Loaves and Fish*, Blessed Sacrament Chapel, 2001–2006
Miquel Barceló
Polychrome ceramics mural, 14 m height
Palma de Mallorca, Cathedral, Blessed Sacrament Chapel
Photo: Raquel Sardá

Conclusions

One of the main contributions of the artistic medal to scientific documentation consists in the promotion of research that encourages interdisciplinary collaboration between scientists and artists. The relief work using the techniques and procedures described allows us a faithful and rigorous record of the small details of the botanical world.

The medal provides relevant data and additional knowledge, which cannot be expressed through scientific illustration, such as the volume or texture of a specimen. Therefore, we can conclude that this discipline completes the information provided by drawing and generates a relevant method of knowledge in the world of botany. Furthermore, as we have seen, it is a starting point for plastic experimentation in a search for new languages and meanings in the relationships between art and nature.

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