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Horticulture of the Taj Mahal: Gardens of the Imagination

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The 17th century mausoleum in Agra, India, known as the Taj Mahal, has been long considered one of the most, if not the most, beautiful building, in the world. The structure is part of a large complex of buildings and gardens encompassing 1.7 hectares. Although usually considered in terms of its architecture, the building and grounds are rich in horticulture. The gardens in the Persian style, although considerably altered from the original, are justly famous. The external and internal walls are profusely ornamented with bas reliefs and stone inlays of flowers and plants that combine Persian, Indian, and Western influences. Ornamental geophytes are a prominent part of floral imagery. The architecture, garden, and decoration of the Taj Mahal are considered the pinnacle of Indo-Mughal art.

*Should guilty seek asylum here,
Like one pardoned, he becomes free from sin.
Should a sinner make his way to this mansion,
All his past sins are to be washed away.
The sight of this mansion creates sorrowing sighs;
And the sun and the moon shed tears from their eyes.
In this world this edifice has been made;
To display thereby the creator's glory.*

Shah Jahan

HISTORY

The Taj Mahal (Crown of the Palace) located in Agra, India, is a domed mausoleum of white marble (Fig. 1). Construction was begun about 1632 and completed about 1652 by the

Moghul emperor Shah Jahan (1592-1666), literally King of the World (Begley and Desai, 1989) who reigned from 1628 to 1658. Shah Jahan (Fig. 2A) was the great, great, grandson of Zahir-ud-din Muhammad known as Babur (the Tiger), invader of India from Central Asia, and descendant from both Timur (Tamerlaine) and Genghis Khan of Mongolia, hence the dynastic name Mughal. Jahan's mother was a Hindu princess of Jodhpur. Shah Jahan's empire at the time of his death comprised 90% of present day India. He became fabulously wealthy and is best known for the many buildings and monuments he created in Agra, Delhi, and Lahore. Soon after the Taj Mahal was completed Jahan became ill and was placed under house arrest by his son in the Agra fort. Subsequent division of the riches of his Kingdom led to the downfall of the Mughal dynasty.

Figure 1. The Taj Mahal. Photo by Jules Janick.



Figure 2. Shah Jahan (A) and his wife Mumtaz Mahal (B) (Pal et al., 1989).



The Taj Mahal was constructed as a mausoleum for his second wife, Arjumand Banu Begum, who was to be known as Mumtaz Mahal (Exalted One of the Palace) (Fig. 2B). Born 1593 and married 1612, she died in childbirth in 1631 after bearing her 14th child. The court historian commented on her death in the extravagant, florid, style of Persian poetry as follows:

*She brought from the groin of the exalted king
Fourteen royal issues into the world
Of these, seven now adorn Paradise
The remaining seven are the candles of government.
When she embellished the world with these children,
She waned like the moon after fourteen.
Where she brought out the last single pearl,
She then emptied her body like an oyster*
(Begley and Desai, 1989)

The extravagant building representing an earthly paradise honoring a lost love has captured the romantic imagination of poets and the public while the name Taj Mahal has entered popular culture epitomizing opulence, beauty, and devotion. Its architectural reputation continues to soar. Although pictures of the building are general knowledge, viewing it for the first time is an experience beyond all expectations.

The Taj Mahal represents the culmination of the Indo-Mughal style. However, while earlier Mughal buildings are usually red sandstone the Taj Mahal is white marble inlaid with colored

and semi-precious stones. The chief architect was the Persian Ustad Ahmad Lahouri. Its decoration makes extensive use of calligraphy and floral imagery and is greatly influenced by Persian paintings reflecting a special interest in gardens and plants.

HORTICULTURE

The Garden

The main complex is based on a 300 m² plot with 16 sunken flower beds (parterres) divided by walkways and flowing water that is typical in Persian gardens (Fig. 3). The main axis is divided by a long pool that wonderfully reflects the structure. The pool is lined on each side with about 80 columnar cypresses. Walkways are found on each side of the cypress strips. The charbagh garden (a garden based on four elements) was inspired by the Persian gardens introduced by Babur, symbolizing the four flowing rivers of mystical Islamic texts. In Persia, paradise is described as an ideal garden of abundance with four rivers flowing from a central spring or mountain. The river Yamuna behind the structure shows evidence of a Moonlight Garden (Mahtab Bagh) on the other side. Early accounts of the garden describe a profusion of vegetation including roses, daffodils, and fruit trees, but the plantings were altered during a reconstruction by Lord Curzon, British viceroy of India (1899-1905) and lawns became the main feature.

Decorations

The exterior and interior of the marble structure is ornamented with calligraphy, abstract forms, and plant motifs. Passages from the *Qur'an* are used as decorative elements. The calligraphy was created by the Persian calligrapher Abdul Haq from Shiraz, Persia in 1609 and the text is inlaid in jasper or black marble. Abstract geometric forms are used throughout, particularly herringbone inlays. Floors and walkways use contrasting tiles in tessellation patterns.

Floral imagery is presented in two forms: stone inlays (*pietra dura*) and bas relief sculpture (*dados*) carved in the marble. Both are a mixture of stylized and naturalistic depictions. These decorative forms are found on both the inside and outside walls and spandrels of the structure, the marble screen surrounding cenotaphs of Mumtaz Mahal and Shah Jahan, and the cenotaph itself. The analysis below bears heavily on the architectural historian Ebba Koch (2006). The plant identification is our best interpretation; we encourage comments.

Stone Inlays. The exterior decorations are made up of colored stone inset in the white marble of the structure, but the interior decorations include inlays of precious and semi-precious gemstones. The origin of the *pietra dura* appears to be derived from Florentine inlays of the Renaissance (Koch, 2001). There

Figure 3. Garden design of the Taj Mahal (Koch, 2006).

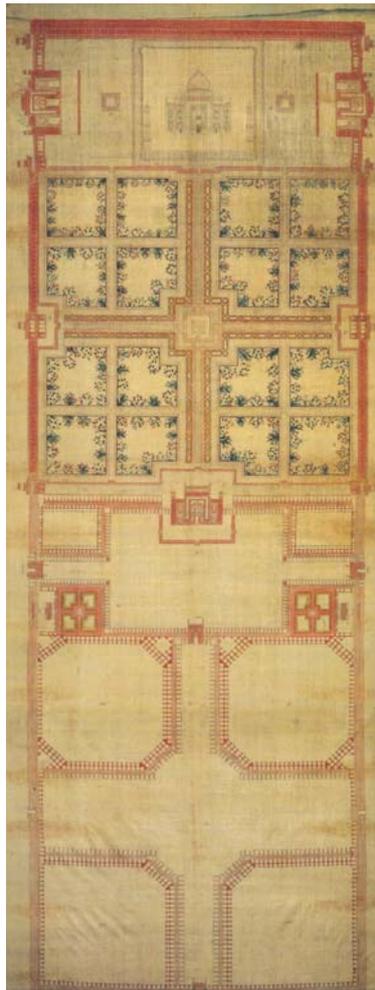
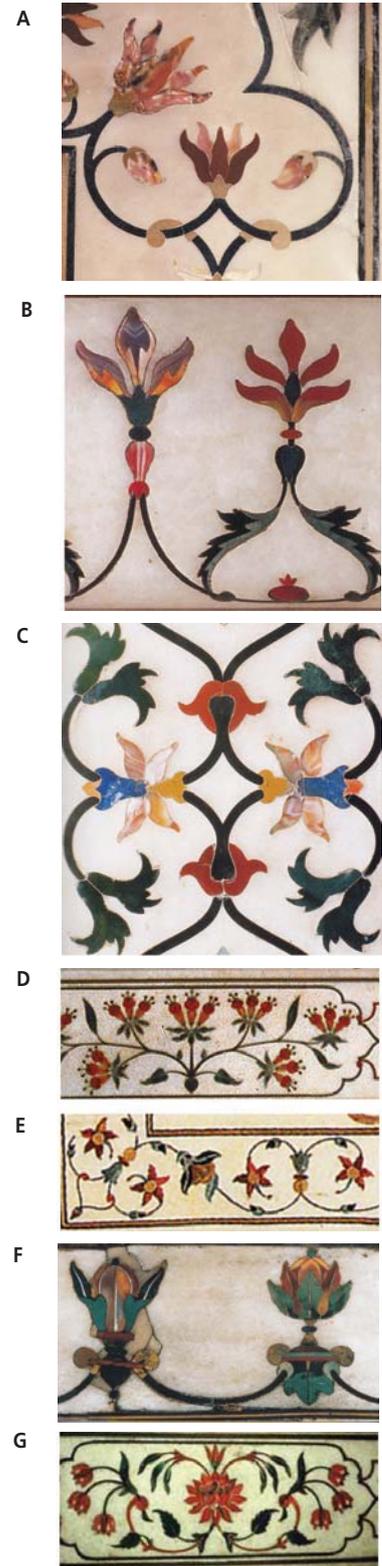


Figure 4. Floral inlays: (A) *Liliaceae*, tulip (*Tulipa* sp.) or lily (*Lilium* sp.); (B) *Ranunculaceae*, windflower (*Anemone* sp.) or buttercup (*Ranunculus* sp.), Note small fruit of pomegranate (*Punica granatum*); (C) columbine (*Aquilegia* sp.); (D) honeysuckle (*Lonicera* sp.); (E) bellflower (*Campanula* sp.) or windflower (*Anemone rivularia*); (F) left unknown, right lotus (*Nelumbo nucifera*); (G) central flower chrysanthemum (*Chrysanthemum*) plus Siroi lily (*Lilium mackliniae*).



are two types of floral inlays. One is based on complex repeating designs of highly stylized flowers, stems and leaves, often used as borders (Fig. 4). The other represents entire plants. Although they are stylized, some are naturalistic enough to permit botanical identification, but many are not and may be considered fantasy plants (e.g. Fig. 4F left, 5D,F). Muslim tradition forbids elaborate decoration on graves, so the crypts are plain but the bases and casket are elaborately decorated with *pietra dura*. The cenotaphs are enclosed by elaborately decorated marble screens. Although many floral inlays are difficult to identify with botanical precision, various species are suggested including bellflower, chrysanthemum, columbine, crown imperial, daffodil, gloriosa, honeysuckle, various lilies, lotus, pomegranate, poppy, primrose, tulip, and windflower.

Bas Reliefs. The dados typically show plants in flower growing in a mound of soil (Fig. 6) or as flowering stems in urns (Fig. 7A). The plants appear somewhat naturalistic with extraordinary detail in some flowers but closer examination indicates that the plants are stylized with mirror symmetry and executed with consider-

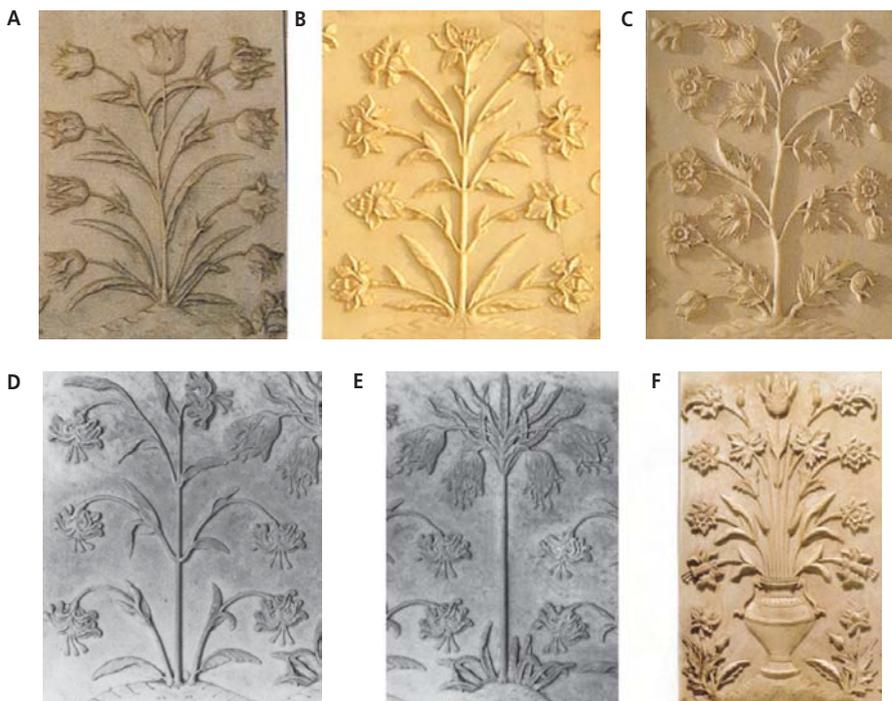
Figure 5. Flowering plant inlays: (A) turkscap lily (*Lilium martagon*); (B) milk and wine lily (*Crinum latifolium*); (C) toad lily (*Tricyrtis* spp.); (D) fantasy, based on toad lily (*Tricyrtis* sp.) or lily (*Lilium* sp.); (E) crown imperial (*Fritillaria imperialis*); (F) fantasy, based on chrysanthemum (*Chrysanthemum indicum*); (G) pomegranate (*Punica granatum*); (H) clematis (*Clematis* sp.); (I) unidentified; (J, K) poppy (*Papaver orientale*); (L) primrose (*Primula* sp.); (M) fantasy, based on erect bellflower (*Campanula* sp.).



able freedom resulting in depictions that are botanically imprecise. For example, the leaves and the flowers are often of different species (Fig. 8); and some plants have flowers of different kinds such as Fig. 6C, which has flowers of both windflower and tulip. Many of the dados are repeated in different locations and some strips show a series of alternating plants.

There is strong evidence that the dados were influenced by Western images as a result of Mughal contacts with Europeans (Skelton, 1972; Koch, 2001). There was a Portuguese delegation to the Mughal court as early as 1573, which resulted in the dispatch of an art delegation to Goa in 1575. Jesuit missionaries bought engravings by Flemish artists as early as 1580, which were exhibited, collected and copied. One engraving dated 1635 (Fig. 7B) by

Figure 6. Floral base reliefs or dados. (A) dzokou lily (*Lilium chitrangadae*), (B) spider lily (*Pancreatium* sp.); (C) windflower (*Anemone* sp.) with tulips (*Tulipa* sp.) at base; (D) glory lily (*Gloriosa* sp.); (E) crown imperial (*Fritillaria imperialis*); (F) tulip (*Tulipa* sp.) in the center and in descending order: unknown, leaf of grape (*Vitis* sp.), windflower (*Anemone* sp.), daffodil (*Narcissus* sp.), and sea lily (*Pancreatium* sp.) with plant of windflower at the base of the urn.



the Flemish artist Claes Jansz bears an inscription based on Isaiah 40:6, 8: *All flesh is grass, oh human being, it does not bring fame/And your beauty is like a flower.* The engraving is remarkably similar to the dado that appears in eight corners of the tomb chamber (Fig. 7A). However, the vanity theme of the engraving is transformed to a depiction of Paradise, symbolized in the *Qur'an* as a garden rich with flowering plants.

In the engraving, the predominant species in the center is a crown imperial with a tulip on the left side and an iris on the right. The dado includes two plants of daffodil growing on a mound of soil on each side of the urn containing flowering stems in mirror symmetry dominated by a lush iris (*Oncoclycus* group) in the center, quite similar to the one in the engraving, followed on either side in descending order by various flowers described in the figure caption of Fig. 7A.

BOTANY OF THE FLORAL IMAGERY

The floral decorations reflect the extent of floricultural knowledge in the Mughal period. Most

Figure 7. (A) Dados of cut stems in an urn: iris in the center, and in descending order on either side are columbine, daffodil, columbine, windflower, tulip, windflower, poppy capsule, delphinium. There are two daffodil plants on either side of the urn. **(B)** Engraved flowers in an urn of the Flemish artist Clades Jansz, 1635. Top three flowers from left to right are tulip, crown imperial, and iris. Others include columbine, bellflower, centaurea, various lilies, peony, rose, and poppy capsule.

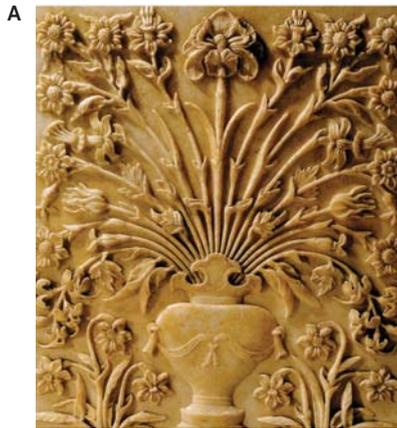
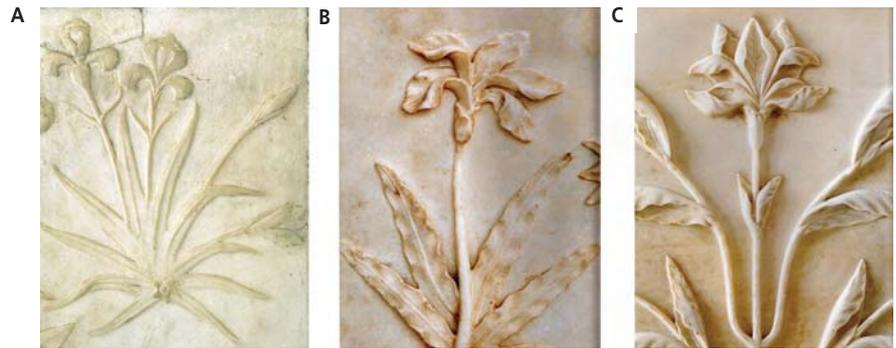


Figure 8. Iris dados: (A and B) flowers and leaves are naturalistic; **(C)** iris flower with leaves of dicotyledonous plant.



plants based on artist's imagination or composites influenced by Western florilegia. A quantitative and qualitative analysis of the floral

imagery of the Taj Mahal will require a complete detailed photographic survey of the internal and external structure.

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REFERENCES

- Begley, W.R. and Desai, Z.A. 1989. *Taj Mahal, the Illumined Tomb: An Anthology of Seventeenth Century Mughal and European Documentary Sources*. University of Washington Press, Seattle and London.
- Kennedy, T. 2007. The notion of hierarchy: The 'Parchin Kari' Programme at the Taj Mahal. *Archnet-Int. J. Arch. Res.* 1(1):105-121.
- Koch, E. 2001. *Shah Jahan and Orpheus: The pierre dure decoration and the programme of the throne in the Hall of Public audiences at the Red Fort of Delhi*. *Mughal Art and Imperial Ideology; Collected Essays*. Oxford University Press, New Delhi.
- Koch, E. 2006. *The Complete Taj Mahal: and the Riverfront Gardens of Agra*. Thames & Hudson, Ltd, London.
- Pal, P., Leoshko, J., Dye III, J.M. and Markel, S. 1989. *Romance of the Taj Mahal*. Time Books Intl., New Delhi.
- Plumier, C. 1703. *Nova plantarum americanarum genera*. Joannem Boudot, Parisiis. Plate 14, p.14-15.
- Skelton, R. 1972. A decorative motif in Mughal art. *Aspects of Indian Art. Papers presented in a Symposium at the Los Angeles County Museum of Art, Oct. 1970*, Brill, Leiden.

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of the plants that make up the floral imagery of the mausoleum are indigenous to India and the Mideast and represent plants frequently illustrated in Persian paintings and rugs. The main group of plants are ornamental geophytes including crown imperial, iris, various lilies, daffodil, and tulip, plants indigenous to and highly regarded in the Irano-Turanian floristic region. We were tempted to include fuchsia (Fig. 4C, Fig. 7A, third stem from the iris) based on previous suggestions (Kennedy, 2007). However, fuchsia is indigenous to the New World, and was unlikely to have been grown in Persia or India in the 17th century. It is possible that the images of fuchsia could have been derived from Western sources, but the earliest image of fuchsia we have located is by Charles Plumier in 1703, which rules it out. There are many plants we failed to identify and some may be fantasy