

WORKSHOP PRACTICES

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A sense of wonder is often the viewer's first response on encountering prayer nuts and miniature altarpieces, fulfilling, no doubt, part of the artist's original intent and the desire of the original owner. That fascination is followed by a desire to understand how these extraordinary and delightful objects were made and by whom. While the presence of carved coats of arms attaches ownership of some of them to specific individuals, and tantalizing blank escutcheons suggest their potential identification to a specific family, we have no documentary evidence about the artist or artists who created them except for the signature of 'Adam Theodrici' on a prayer nut in Copenhagen [FIGS. 8, 22].¹ So it is to the objects themselves we must turn to help us understand the structure and methodology of the workshop or workshops involved in their creation and to gain insights into the responsible artists [FIG. 222]. Microscopic examination, micro CT scanning and selective deconstruction of some of the prayer nuts have all been enlisted in our efforts to this end.²

The boxwood triptychs and diptychs closely resemble the large altarpieces being produced over the same period of time in the Netherlands both for the marketplace and on commission [FIGS. 74, 193]. Attributed to workshops in the Low Countries, over three hundred full-sized altarpieces survive from the second half of the fifteenth and the beginning of the sixteenth century. A variety of different artisans could



FIG. 222

be involved in the production of a retable – sculptors, carvers, turners, joiners, painters and carpenters. All were members of guilds established to protect their economic viability and that of their town, maintain the quality of the goods produced, and speed up and reduce the cost of production.³ The guild records often provide our best indication of the working practices of those who created the largescale, multi-component retables, and a possible model for the potential segregation of tasks associated with the fabrication of the boxwood objects. An altarpiece supplied to an individual or confraternity might contain a *caisse*, frieze, predella and multiple carved reliefs, much of which would be overlaid with paint and gilding and all of which could have been supplied by different shops.⁴ The entire project was governed by the somewhat idiosyncratic regulations promulgated by the guilds within each city. In Antwerp, they had the right to manufacture the *caisse*, hutch or corpus housing the reliefs, as well as the reliefs themselves while in Brussels, these functions were segregated.⁵ A further parsing of tasks occurred in Ghent. Here, carpenters were allowed only to peg disparate elements where joiners were allowed to use glue. Both trades, however, might work together to make hutches for altarpieces as long as they followed the prescribed restrictions.⁶ To assure the buyer that the regulations were being followed, individual work was often stamped at each stage of production with the discrete mark of the guild and town and, but only rarely, that of the maker. To date, no such identifying marks have been found on the

boxwood objects, but their absence does not preclude the fact that some segregation could have occurred in their fabrication, just as it would have in the case of the full-size retables.

The raw material required for these miniature works, boxwood, was imported into the Netherlands, probably cured, possibly sectioned, but not necessarily milled, giving the carver the opportunity to utilize the full dimensions of the variably sized pieces.⁷ Boxwood is a finely grained dense hardwood that exhibits little variation in its working properties either across or with the grain, making it ideal as a medium for finely detailed carving. The initial preparation of the stock material, the cutting of specific widths and lengths, would require rip and crosscut saws appropriately sized for the scale of the boxwood objects. Cutting in tenons would have been a second step, requiring a finer saw blade.⁸ Surfaces intended to be seen would have been finished with planes and scrapers to remove the coarser marks of the saw.

Artists had access to a variety of sources for their compositions and designs, including model books, prints, tapestries, paintings, altarpieces and their own creations.⁹ Whatever the inspiration, the desired image required considerable reduction in scale, giving the artist an opportunity to adjust or alter the narrative's arrangement.¹⁰ The sculpted reliefs for the prayer nuts, triptychs, altarpieces and monstrances were often segmented into distinct layers, representing the foreground, middle ground and background [FIG. 223]. The design would have been split into corresponding zones with each transferred onto



FIG. 223

its individual piece of wood by pouncing, tracing or sketching.¹¹ If a cartoon was used, the artist could transfer the image to the opposite face of their respective panel or disc as well as clarifying the registration of the overlapping positive and negative forms and allowing work to be done from both sides. The scale and detailing of the boxwood objects have always suggested the use of some form of magnification for their carving.¹² While we do not have any documentary evidence of the use of magnifying glasses by late medieval artists, contemporary goldsmiths were aware of the ability of plano-convex quartz cabochons to magnify objects, and had been exploiting that capability in their metalwork [FIG. 81].¹³

The specific sequence of work adopted in the production of the discrete elements comprising the prayer nuts, triptychs and monstrances varied with their complexity. A diptych from the Metropolitan Museum of Art is straightforward, with each wing a single piece of wood hinged to the other.¹⁴ By depicting the narrative in a predominantly horizontal plane and with generous access below the rounded arch, the diptych's artist was able to carve at a sufficiently oblique angle to reach and release the figures in the foreground from their background. This direct approach is shared with the single leaf from a diptych in the Thomson Collection in the Art Gallery of Ontario.¹⁵ This method was altered in the build-up of the triptychs, which is characteristically segregated into three principle components – sculptural reliefs, architectural housings and predellas or bases, with the prayer nuts typically being fashioned from two

distinct elements – exterior shells and inset reliefs. This segmentation gave the artist greater access to each element and freedom to develop the sculptural qualities of each section.

A triptych from Toronto is representative of the partial separation of the architectural framework from the sculpted relief.¹⁶ The artist started with a rectangular block spanning the entire width and depth of the central compartment, extending up to the central spire. A thin plank of wood, incorporating the central openwork screen, the molding around the central arch and the triangular base for the central finial, was set flush to the surface in a recess cut across the top and secured along its edges with beveled joints [FIG. 224].¹⁷ The same concept was adopted on a more lavish scale in the Wallace Collection's large triptych [FIGS. 42, 43, 153]. Here, three overlapping openwork screens, spanning each of the triptych's arches, were carved separately and set one into another.

The process is varied slightly in two triptychs from Detroit and New York.¹⁸ Here, full-sized architectural frames are shaped from single blocks of wood which include all the molding, trefoil arches, openwork screens and broken openwork moldings along the crest, and secured to the central corpus of each triptych with glue and internal pins.¹⁹ The square pinnacles and central finials on the crests of both triptychs are, like the Toronto object, composite elements joined to their supports with integral tenons [FIG. 225].²⁰ The broad concave moldings associated with the Detroit frame are deeper and wider than the Metropolitan's, allowing for the placement of standing prophets on



FIGS. 224, 225



FIG. 226

baluster colonnettes. Each is carved from a single piece of boxwood and is secured by two integral tenons set into the face of the molding. The openwork canopies above their heads are separate carvings as well, and similarly pinned. Comparable figures and architectural elements appear on other triptychs, such as that in the Wallace Collection, and those discrete carvings are presumably similarly pinned into their frames.²¹ The wings and central compartments of two triptychs from Copenhagen and Paris are deep apse-like spaces encircled either entirely or partially by spiraling openwork foliate patterns with entwined branches screening their arches.²² The borders on the Louvre triptych, like all of its elements, are in a more heightened style with entwined figures ornamenting the molding around the central corpus [FIG. 226]. In both objects, the architectural framework was carved out of the same rectangular block of wood defining their interior niches.

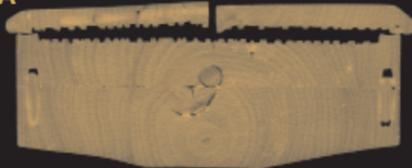
The desire to expand the narrative beyond the architectural frame suggested by the standing prophets in the Detroit and Wallace Collection triptychs is apparent in many of the boxwood objects, including the corpus of the New York triptych, where the ground carries over from the relief onto the frame and above the molding, in two triptychs from the Rijksmuseum and a private British collection,²³ where the kneeling angels on either side of the Virgin are part of the frame, and in the reliefs on the Wallace Collection's triptych, where the scenes are staged on semicircular plinths extending well out beyond their architectural frameworks.²⁴

The rough form of the concave, domed spaces housing the reliefs for the triptychs and altarpieces were initially carved out, or both drilled and carved, and then finished like most of the prayer nuts with Gothic windows, landscapes, cityscapes and ribbed vaulting. The profile of the niches varied, with the central compartment of the Toronto triptych being mushroom-shaped and with its form mirrored by the profile of its relief, which flares out slightly around the framing architecture [FIG. 227]. The join between the two is snug, necessitating the relief's insertion through an opening in the bottom of the niche. Generally, the profiles of the niches are not constrictive, allowing the reliefs to be set in directly from the front [FIG. 228]. These interior architectural spaces could also become quite elaborate, as in the case of the Louvre triptych, where it appears that the artist first roughed out the cavities for the wings and the corpus and then set in either one or two separately modeled pieces to articulate the niches with their mullioned windows and ribbed vaulting. A horizontal seam joining these elements is visible just above the capitals in the wings and across the back of the central compartment. Two pieces of thin wood are pinned over the backs of the central compartments of the upper and lower triptychs suggesting that the artist had access from that direction as well.²⁵

Where the triptychs, altarpieces and tabernacles might ostensibly share the same form and function as their larger models, the prayer nuts appear to be a novel construction. They are sometimes referred to as paternosters, or the terminal beads in rosaries,



A



B



C



FIGS. 227, 228A-C



FIGS. 229, 230

used as devotional aids in the early sixteenth century. The collections of the Duke of Devonshire, the Louvre, and the Musée de Cluny house the only three remaining boxwood paternoster nuts that are still attached to decade or Ave beads.²⁶ Whether or not most prayer nuts were configured as such is inferred – most are now stripped of any metal fittings that may have been used to tie them to other objects, but it does appear they were designed to be portable and to be opened with relative ease. A removable pin, now often lost, was used to fasten the clasp [FIGS. 229, 230].

When the prayer nuts are closed, their shape is most simply described as spherical with an expanded equator. Serving essentially the same function as the architectural frameworks for the triptychs and tabernacles, the vast majority of the prayer nuts' exterior shells were made from a solid piece of wood. Added, joined elements or piecemeal construction techniques were potential sources of weakness and avoided. Shaping of the prayer nuts' exterior shells required the skills of a turner. Mendel's illustration of a paternoster maker shows the craftsman using a horizontally mounted bow drill with a three-pronged, metal bit mounted at the tip to create his bead [FIG. 231]. In his left hand he is holding the wood stock selected for the beads braced against a stationary vertical post. The rotating shaft turned by the bow is mounted into a similar vertical post set into a track, allowing pressure from the worker's knee to slowly move the bit into the wood. For illustrative purposes, the three-pronged bit at the tip of the drill is exaggerated in size and simplified in shape. The central prong would

have been twice the length of the two others at the perimeter and would have created the channel for the nuts' stringing as well as providing a centering mark on the opposite face of the wood. The interior profile of the outer prongs would have been cut to replicate the size and form of one half of the desired nut. The craftsmen would create a series of cuts in one face of the block and then turn it over and, using the marks created by the central prong, align the bit and cut the opposite half.

The size of the prayer nuts and the need to define both their interior cavity and exterior profile obviated the use of a drill, requiring instead a pole lathe, a common means of turning and shaping wood and metal in the medieval period.²⁷ The lathe was activated by foot pressure on a treadle attached to a length of rope wrapped around the lathe's shaft and attached to the end of a sapling of sufficient strength and spring to pull the treadle back into position. The pole lathe provided more power than a bow drill, freed both hands for working, and allowed the turner to stand [FIG. 232]. As the wood rotated freely, the craftsman shaped and finished the work with gouges, skewed chisels, parting tools and scrapers similar to those illustrated.

The initial step in forming the nut's exterior shells required mounting a piece of rectangular stock into the lathe and cutting it down to a columnar form with the diameter equal to the largest required dimension of the nut and of sufficient length to accommodate each section of the prayer nut.²⁸ A parting tool was used to cut the column into two discs that could be



FIGS. 231, 232



FIGS. 233, 234

mounted to a faceplate secured to the spindle end of the lathe. With open access to the disc's front surface, the turner hollowed out the interior and shaped its lip to create the steps or shelves that allow the shells to be seated together. The step also provides space for inscriptions or decorative patterns adjacent to the hollowed-out cavity where the carved relief would ultimately be set in. Interestingly, this is the only place where turning marks remain visible in the interior [FIG. 233].

The opening into which the relief is set generally balloons out directly below the interior edge of the step, with the marks of scorpers, chisels and files visible to the naked eye [FIG. 234]. It appears that the initial, turned cavity was somewhat shallower, providing additional depth and strength to the shell wall during the subsequent shaping of its exterior and the eventual cutting in of the openwork pattern. The hollowed-out disc was next inverted and the open cavity secured against the lathe's faceplate. The solid end was supported by the pin in the lathe's adjustable post. The exterior profile of the hemisphere was then cut in, leaving sufficient depth of material at the broad end to integrate hinges, entwined vine tendrils, or other decorative elements.

Interlinking and perforated openwork tracery patterns have been carved into almost all of the exterior shells of the prayer nuts.²⁹ The forms vary, with some exuberant and delightful and others staid and obsessive, all reminiscent of the openwork tracery patterns used to support glazing and create screens in Gothic architecture. The removal of material from the shell

lightened the objects and provided sufficient grip to reduce the risk of slippage. Moreover, the delicate, ecclesiastical appearance and weightlessness of these objects in the hand were perhaps deliberate cues for their user to open and handle the prayer nuts with heightened attention.

All of the tracery patterns rely on the division of the prayer nuts' spherical domes, and in particular the discs at their tops, into six or eight segments with their further division into twelve or sixteen parts possible [FIG. 235]. Only two tools were used in this enterprise: the compass and straightedge. Division into six parts was accomplished by drawing three circles at the top of the spherical dome. One circle was placed at the center and the two other circles were centered at antipodes, or opposite poles, on the first circle's circumference. The three circles shared the same radius. A hexagon was created when a straightedge was used to connect the four intersections of the circles in addition to the outer circles' centers. Radii traveling from the center of the first circle's center to these six nodes divided the circle into six segments [FIG. 236]. Division of the disc into eight parts was simpler: a straightedge was used to bisect a circle, while another line bisected the first line at an angle of 90 degrees. Two additional lines, positioned at 45 degrees, were then drawn to divide the circle into eight equal segments.

The prayer nuts' exteriors exhibit two fundamentally different styles of tracery, and a third style that combines both. The first style begins with the superimposition of intersecting circles around the discs

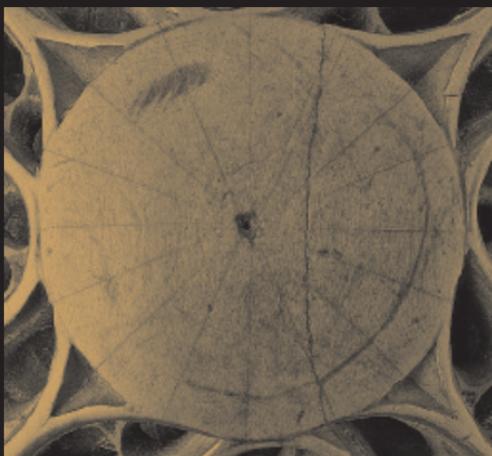


FIG. 235

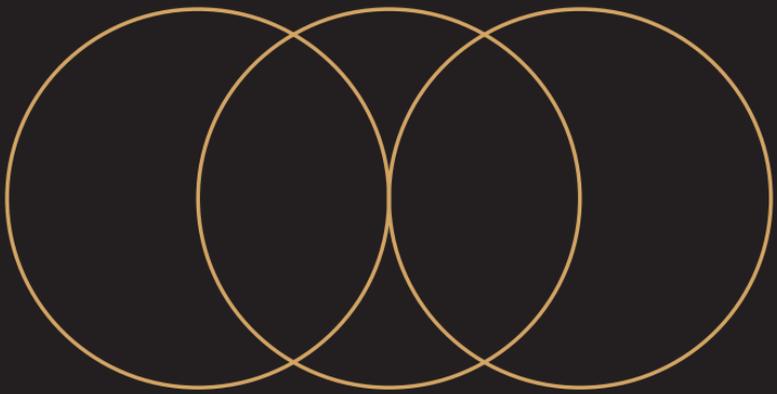
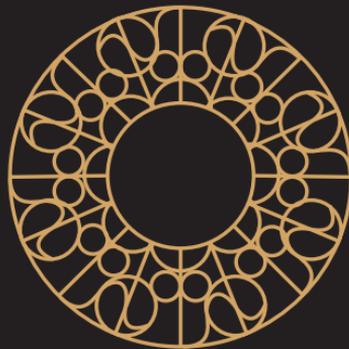


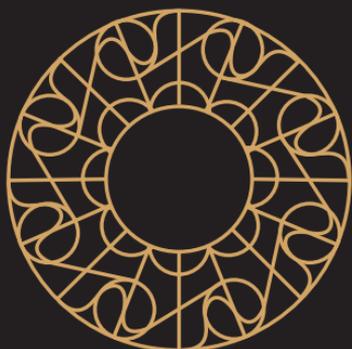
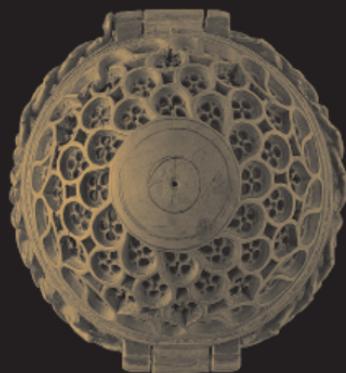
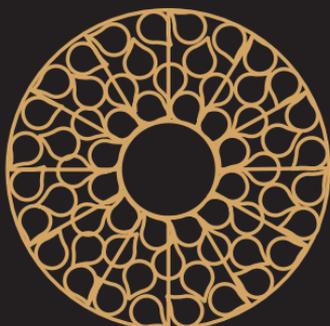
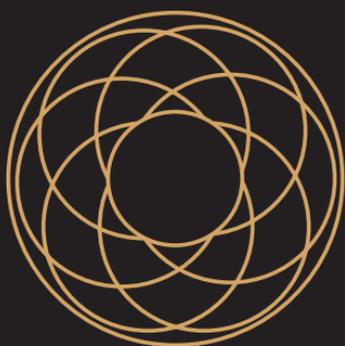
FIG. 236

of solid wood at the tops of the spherical domes. These additional circles rhythmically link nodes on the central circle's circumference where it is intersected by the six or eight radii at the edges of the segments [FIG. 237]. A second style of tracery was also executed largely with a compass but differs radically from the first style. Here a considerable number of small circles punctuate the surface of the spherical dome. Once the dome has been divided into segments, these small circles are laid out within the radii, or by using the radii as their centers. The circles are sometimes retained but more often are transformed into teardrop shapes by opening up a quarter of their circumference. The teardrop shapes are sometimes elongated by placement of their originating circles farther from the desired end position of their tails [FIG. 238]. A third style of tracery is the most complex. It uses partial circumferences or arcs of circles to link the first style's looping and intersecting circles with the second style's repeating patterns of small circles. The overall effect is that of a teeming, energetic surface, quite different from that expressed by the more staid second style of tracery [FIG. 239].

It appears that the tracery designs of the prayer nuts were most often rendered by starting at the top of the spherical domes. The designs tend to be well-ordered and logical around the central discs. As the tracery progresses toward the bottom of the dome, it can become slightly muddled, with circles not fitting as well and some repeating motifs truncated. In a few cases, however, it appears that the designs



FIGS. 237A-D, 238A-C, 239A-E

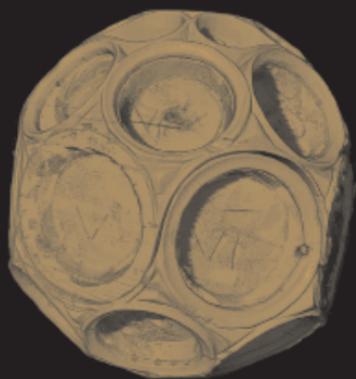


originate from the base of the spherical dome and proceed upward and inward. After the tracery designs were incised onto the spherical domes' surfaces, the wood in the negative spaces of the design would be cleared with braces and vertically and horizontally mounted spindles and bits like the pump and bow drills. For complex areas where control and visual access were uppermost, smaller gimlets substituted for the brace [FIG. 240]. The initial clearing of the design would be to the depth of the mullions, with chisels clarifying their form and edges. The openings for the 'windows' were then drilled through the remaining wall of the shell [FIG. 241]. In some cases, the openings echo the design of the dominant tracery, where others sport repeating patterns of trefoils, quatrefoils and rosettes. The openings are further refined by adding triangular notches between the openings and then working from the interior to reduce the depth of the shell's wall with gouges and files, and chamfering the inner edges of the opening.

The exterior shells of a conspicuous group of four prayer nuts differ from all the rest in that they have a faceted profile punctuated by the addition of roundels, some carved in relief and others pierced. Micro CT scans reveal that one of these, in the Duke of Devonshire Collection at Chatsworth House, has been carved from pieces of boxwood which were expertly glued together. Joins are partially hidden on the exterior through the use of roundels, of which there are 24 in total, all pinned to the exterior [FIG. 242]. The scans also revealed a numbering system used



FIGS. 240, 241



FIGS. 242, 243, 244

by the artist to link each roundel with its intended recess during the prayer nut's manufacture, not unlike the system of location marks used in large altarpieces and other sculptural ensembles [FIG. 243]. Although in many instances exquisite in their own right, the exterior shells and miniature altarpiece furniture described here also served to protect carvings nestled within, which range from simple and elegant low reliefs to the breathtakingly virtuosic. The sculpted reliefs were generally built up and carved from multiple shallow pieces overlaid onto one another with their dimensions cut down to fit within their niche in the altarpiece or prayer nut shell. Thin panels provided greater access to all of the interior elements, allowing the sculptor to model the figures and animals free-standing or in high relief.³⁰ The Nativity scene in the Toronto triptych is the most straightforward of the triptychs' reliefs, being carved in the main from a single piece of boxwood.³¹ Greater verisimilitude was provided by sliding a thin relief with details of the stable and the head of the ox into a mortise behind the Virgin in what would otherwise be an inaccessible area, and by inserting the column between the Virgin and the kneeling wise man through the bottom of the relief [FIG. 244].³²

The central reliefs in the Detroit and New York triptychs,³³ depicting the Nativity and the Crucifixion respectively, implement the multi-slab approach by overlaying plaques of wood of varying heights to create their narratives. The former's central scene utilizes two panels, while the Metropolitan Museum

of Art's much thinner corpus combines three slabs. Of its three plaques, the first portrays the three horsemen in the foreground; the second depicts the kneeling figures of Mary Magdalen and her attendants bracketed by another two horseman in the middle ground; and the last shows the figures of Christ and the thieves on their crosses, the triangular grouping of figures at the base of the central cross, two further horseman, and a standing figure holding a fork on the right side in the background. A joining mechanism was devised to allow the different plaques to be assembled and disassembled, giving the carver the ability to constantly evaluate his composition and assure its sculptural continuity. Two hidden pins served this purpose for the Detroit triptych while for the one in New York an interior system of blind interlocking mortise and tenon joins were cut into the bases of the slabs [FIG. 245].

Similar to the triptychs, the prayer nuts' interiors are articulated in a number of different ways. The least complex are simply boxwood discs carved in low relief with their backs rounded off. Remarkably, micro CT scanning confirms that the interior relief in a prayer nut in the Thomson Collection that illustrates the Queen of Sheba's visit to King Solomon is composed entirely of a single mass of boxwood carved exclusively from the front.³⁴ The only added element is a lamp on the side of the baldachin.

A prayer nut in Baltimore houses a deep relief depicting the Resurrection,³⁵ which is also carved predominantly from the front, but also through an opening at the top that was needed to access the



FIG. 245



FIGS. 246A–B

topmost and deepest part of the carving. The area of the aperture is considerable: it extends from the front to the back of the relief, and its arc is equal to about a sixth of the circumference of the relief's outer edge. The opening was subsequently filled with a thin, arced panel of boxwood secured along the sides by zigzag-shaped mortises and tenons.³⁶ A relief also depicting the Resurrection in the Hermitage shares an identical construction.³⁷ Its uppermost panel, however, is now lost, revealing not only the delicacy of the mortises, but also allowing the onlooker to imagine working within the constrictions imposed on the carver by such a small aperture.

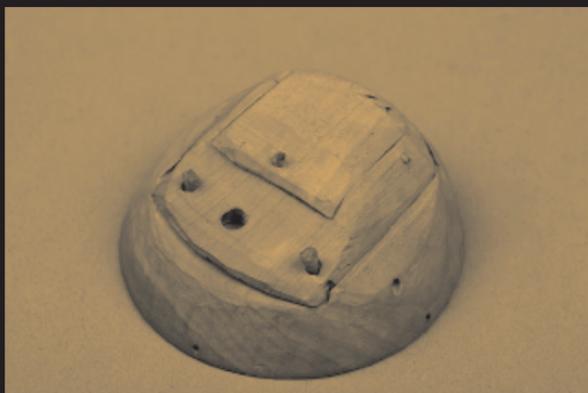
Comparison of a number of the more complex, multi-component prayer nut interiors reveals several different approaches that were executed using carved layers. Perhaps the most straightforward is exemplified in the relief depicting St Hubert in Toronto [FIG. 246]. Micro CT scans reveal that a solid disc was used in the background to depict a hunting scene involving dogs, horses and riders in low relief. Overlying this is another disc into which the scene of St Hubert's revelation was carved. Unlike the scene behind it, the carver here has worked from both sides of the disc, opening up the negative space surrounding the trees, deer and saint and exposing the hunting scene in the background. Inserted through the back panel, pins were used to join the discs together.

The method is varied in the Thomson Collection's nut with scenes from the life of St Jerome.³⁸ In this case, three discs comprise the relief with the deepest

solid and the other two carved from both sides allowing the designs to meld into one another. The back disc is set into a beveled mortise along the sides and front with the two joined with adhesive and secured along the back edge with pins cut flush to the surface. The front disc is butt joined and glued to the middle disc. This design reduced the surface area needed for joining the discs, and provided more space for the composition in the interior carving [FIG. 247].

There are a number of extremely intricate prayer nut interiors created with a succession of increasingly smaller, offset discs. This accommodates the depiction of a scene with a flattened foreground and a heightened vanishing point, the overall shape of which can be described as an oblique cone with its apex higher than its center. Illustrative are the interior reliefs in two of the New York prayer nuts – the scene depicting Pilate uses three discs while that for the Crucifixion integrates four. The intricate system of beveled mortise and tenon joins secured with pins and pegs is visible on the exterior of both reliefs [FIGS. 248, 249].

There does appear to be a correlation between the most intricate interior carvings, many of which include the additional opening for access at the top of the composition, and the exterior shells decorated in the second style of tracery described earlier.³⁹ The exterior shells in this group share a number of other features, including the use of a particularly tiny, well-spaced script found on the interior step of about two-thirds of the objects. Along with a prayer nut in the Thomson Collection and another object in the collection of the Musée de Cluny,⁴⁰ the great



FIGS. 247, 248, 249



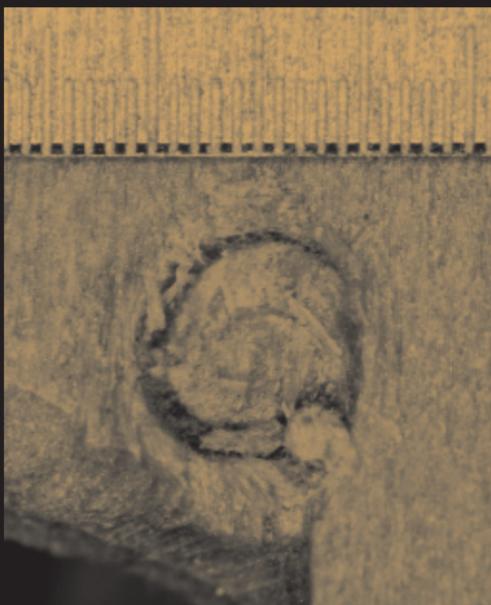
FIGS. 250, 251

majority of this groups' exterior shells are embellished with vines around their equators. Delicately carved and drilled openwork vines are unprotected on three objects: the modified prayer nut in the Musée de Cluny's collection along with nuts in Toronto and New York.⁴¹ The rendering of the vine in the latter two objects is the most naturalistic but vulnerable, with both objects showing significant losses and areas of damage [FIG. 250]. In the other instances within the group, the vines appear stylized and are embedded within a narrow and deep profile, presumably for their protection. Four prayer nuts in the group, along with three others, contain another shared feature: tabs visible at the bottoms and in some cases the tops of the interior reliefs to key the latter into the exterior shells [FIG. 251].⁴²

Given the size of the discs and plaques comprising the reliefs, it would have been difficult to hold them securely during shaping and cutting. Micro CT scans and visual examination reveal holes in the thickest part of each side of the plaques comprising the reliefs in the triptychs from Toronto, Detroit and New York [FIG. 228B], as well as holes on the sides and around the top of sections of the nuts' reliefs.⁴³ They serve no current function, but could have helped to secure the wooden panels within a larger frame or against a support. The process is not unlike that used by the sculptors working on large-scale altar-pieces, who would mount a block of wood for a figure on a bench between two posts on a rotatable vice, freeing their hands and allowing the wood to be rotated 360 degrees.⁴⁴ Whether the boxwood

pieces were intended to be rotated is unclear, but in either case each plank of wood could be more securely braced and manipulated, allowing the sculptor to work with greater assurance.

Unlike the large-scale altarpieces, for which painters and gilders provided the preponderance of surface detailing on both sculptures and architectural elements, the almost complete absence of polychromy on the carvings challenged the sculptor to impart sufficient detail and authenticity to the narrative to enliven it for the viewer.⁴⁵ The specialized tools made by the micro-carver mirrored in shape and function the saws, braces, augers, gimlets, files, flat chisels, U-shaped gouges and V-shaped gravers found in any contemporary woodcarver's studio, excepting only their size.⁴⁶ Microscopic examination of complex, undercut areas not visible to the viewer often retain the marks of fine gimlets. Their diameters range from 1.0 to 0.3 millimeters, with a shell-like profile with a spiral taper and a perimeter cutting edge [FIG. 252]. The carver also used gimlets to add details like the shape of a horse's hock or the open-work pattern of a king's crown. He also had a variety of knives with skewed blades with straight and curved cutting profiles, as well as hooked tools with assorted cutting edges that could reach around tightly compressed forms. The set of tools belonging to the seventeenth-century Italian miniature carver Ottaviano Jannella is representative of the types of instrument used to carve the boxwood objects [FIG. 253]. Many of the carved surfaces preserve the evidence of the tools' shapes, with cuts from



FIGS. 252, 253



FIGS. 254, 255

a V-shaped graver and U-shaped gouge apparent in details of clothing, the spiral form of a soldier's helmet, or a horse's trappings, and the stippled patterns of punches across reserved areas [FIG. 254]. Less easily segregated are the successive cuts made by knives to model complex forms such as a horse's neck or rump, or a figure's physiognomy. The skill with which the carver could manipulate his tools is particularly evident in the anguished countenance of the tortured souls only partially visible within the mouth of Hell in the Damnation scene of the Toronto prayer nut.⁴⁷

To populate the narratives successively within such constrained proportions, the carver often added fully detailed elements that were part of the original design or were added during carving. The two figures standing behind and to either side of Christ's Cross in the Metropolitan Museum of Art's Crucifixion scene are each a distinct carving partially set into a carved-out recess within the cityscape at the back of the niche [FIG. 255]. The outstretched hand of the figure on the right is separately modeled as well and inserted into his sleeve. The triptych from Detroit, like that from Toronto,⁴⁸ benefits from two rectangular panels set in behind the Virgin in the depths of the stable to incorporate an ox and other interior features. A different strategy was adopted for the central compartment of the Louvre triptych,⁴⁹ where a series of shallow reliefs was first secured within interior niches across the back of the apse-like space before the principal relief of the Crucifixion was positioned in front.⁵⁰ In the Louvre triptych and

that in the Statens Museum for Kunst,⁵¹ large canopies were added into the centers of their screens at the top of the central corpi.

More subtle are the embellishments that recur on many of the boxwood objects, and are often visible only under the microscope. Thin rectangular openings cut into the wall of the relief illustrating the Carrying of the Cross in a New York prayer nut, and the Toronto Life of St Jerome, that allowed an additional building profile [FIG. 256] and a tiny deer respectively to be set into the composition [FIG. 257]. The elaborate costumes have frequently benefited from the addition of discrete elements with flourishes like the tufts on the top of a hat, a soldier's shield, the buttons down the back of a jacket, or the finial on top of a soldier's spiral helmet set into drilled holes [FIGS. 258, 259].⁵² In addition, a soldier's lance or flag, a shepherd's staff, a candle attached to a column or wall, and the lost ring in a stone pier were all set into or through drilled holes.

The wings for the prayer nuts, triptychs, altarpieces and tabernacles would have been cut and sized at the start of the design phase. The wings for the triptychs are of two types – those that were fabricated from a single piece of boxwood and those with a box-like construction similar in their detailing to the central compartments. Shallow reliefs were carved into the former's interiors and occasionally their exterior surfaces as well.⁵³ A molding similar to that on the central compartment would articulate the perimeter, with integral broken openwork tendrils along the crest. Space was reserved across the bottom for an inscription or a frieze that often continued along the base of



FIG. 260

the architectural framework under the central relief. It is unclear at which stage the inscriptions were added. In the case of the Musée de Cluny triptych,⁵⁴ the spaces set aside on its wings are blank, which suggests that the object was not a commissioned piece but may have been made as a model for potential clients or for the market.⁵⁵ The absence of a reserved space for an inscription associated with the central compartments of the Art Gallery of Ontario, Musée de Cluny and Victoria and Albert Museum triptychs might be explained if the triptychs are no longer associated with their original predellas.⁵⁶ The CT scans of the base of the Toronto relief reveal a notch or rabbet cut out of the bottom front edge just below the top of the current predella, possibly eliminating what was part of an area reserved for an inscription [FIG. 260]. Given the precision with which the relief and niche were created, it appears anomalous that the cut would be accidental, suggesting an earlier mounting. The inscribed panels along the bottom of the Metropolitan Museum of Art's triptych are each separate pieces of wood, which suggests that it too has been repurposed.⁵⁷

The sculptural program of eleven prayer nuts was similarly augmented with the use of wings and discs, covered with low relief on both sides.⁵⁸ The additions are all fabricated largely from a single piece of wood: some have strips added to their borders. The wings are hinged to the left and right sides of the upper relief and the discs covered the lower interior. Small hook-shaped elements partially recessed in the male portion of the hinge and clasp at the top and bottom

of the upper shell could be pivoted to hold the wings once in place.⁵⁹ Nine of this group of works retain their wings *in situ*:⁶⁰ hinge pins and openings cut into the prayer nuts' shells to receive the male portion of the wings hinge indicate that works in the Smith College Museum of Art and Thomson Collection once had wings as well.⁶¹ The extremely thin, delicate discs have a relatively complex hinging mechanism that attaches to the lower, female hinge of the prayer nuts' shells. From the eleven prayer nuts originally equipped with the discs, only four survive [FIGS. 261, 262].⁶²

To house the two reliefs of the prayer nuts, most of the extant works retain their original vertical presentation, with the male part of the clasp at the top of the work when opened.⁶³ The upper relief is always slightly smaller than the lower one, allowing it to fit into the larger circumference of the lower shell when the nut is closed [FIG. 230]. The mechanics of the clasp support this assertion, since it is considerably easier to open the prayer nuts by pushing the male portion of the clasp upward while holding the female element stationary.

The interior reliefs of the prayer nuts are held in place with pegs, typically left projecting, sometimes hidden in the composition and, at other times, conspicuously implanted at the quadrants of the relief. Such a minimal approach allowed the relief to be secure while accommodating the variable expansion and contraction of the shell and its relief. It has been suggested as well that the pegs allowed the prayer nuts to function as pomanders, whereby the interior shell could be removed and a fragrant material



FIG. 261



FIG. 262

inserted between the interior relief and exterior shell.⁶⁴ Residues of perfumed media have not been found in any of the vacant spaces inside the prayer nuts. More relevant, however, is the fact that removing the pegs and then reinserting them while aligning the relief within its shell is an extremely exacting and difficult process that could not have been undertaken by anyone other than a skilled artisan without significant damage to the relief. One such person might have been a goldsmith who would have needed to remove the pegs to insert metal fittings. Additionally, the pegs may be a deliberate gesture used to emphasize that these incredible works are indeed, the work of the human hand. A more robust system was required for securing the reliefs within their niches for the triptychs, altarpieces and tabernacles. In the Detroit triptych, a pin projecting through the base held the relief while in the New York triptych a similar pin, now lost, was set in through the back.⁶⁵

A base or predella was required for the triptychs, altarpieces, tabernacles and monstrances. Two triptychs in Copenhagen and a private collection present an elegant and minimal approach, with the bottom of the niche and its associated frame for both the upper and lower triptychs cut back slightly to form a large tenon to seat into the supporting plinth and be secured with pins in a form of attachment that seems common to all.⁶⁶ The bases become more detailed and might include a reliquary compartment, an elaborate architectural construct, or crouching and seated lions. What is striking about all of these examples is that they give the appearance of having been made

by an apprentice or assistant who was given a box of remaindered pieces of wood and a rough design and then left to his own devices. Odd-sized bits of wood are discovered inserted in unusual places with very basic forms often assembled from multiple pieces. The surfaces and details are often roughly carved and bear a preponderance of incised lines from a marking gauge or compass due to overexuberance or the mismarking of pieces. Identical adjoining elements are often fabricated in a different manner, with one having an integral tenon for attachment and the other a dowel, the mortise for which required multiple drillings to align correctly [FIG. 263]. Even when the assemblages are detailed with small reliefs or sculptural elements, as in the Wallace triptych, there is an absence of the finesse in the building up of the architectural surrounds that is not apparent in the working of the triptych's reliefs, their compartments and architectural overlays [FIG. 42].⁶⁷ It is also very evident that the triptychs are often skewed at odd angles from the lack of symmetry in their predellas or bases. This disparity in quality suggests a segregation of functions within a single workshop or across associated shops.⁶⁸ By contrast, the monstres in the Residenz in Munich and in the Waddesdon Bequest,⁶⁹ with their openwork tapered stems and supporting lions, are beautifully worked and sympathetic in their design to the whole, which may have been necessitated by the requirements of the commission.

The recognition through the ages of the exceptionally delicate nature of these boxwood objects is



FIG. 263



FIG. 264

attested to by a number of protective storage cases.⁷⁰ Remarkably, many of the extant, unprotected pieces are extremely well preserved, apart from some of the shells of the prayer nuts that absorbed the force of inadvertent blows. The exception is the coatings that were applied more recently to the outer surfaces of the bases for the triptychs, their architectural surrounds, and the prayer nut's boxwood shells, that has given them a saturated appearance.⁷¹ Under magnification the coatings appear to have been rapidly brushed or padded over the surface, collecting along the top edges of the openwork designs and flowing into cracks and over losses, which is indicative of their more recent application [FIG. 264]. The boxwood would have absorbed oils from a devotee or admirer's hands, and the coatings may represent an attempt to visually unify the selectively stained surface. Conversely, the reliefs, apart from a few subjected to or affected by restoration efforts, exhibit raw, slightly oxidized surfaces.

CONCLUSION

In cataloguing the technical vocabulary embedded in a range of the surviving corpus of boxwood objects under consideration, our intent has been to create a deconstructive methodology and a visual language to better discriminate and describe those objects yet to be studied. It is clear that the artists working in boxwood adopted an additive approach to the building up of their reliefs, joining together multiple layers, setting in discrete panels, adding minimally detailed flourishes, and carving everything

with uncommon virtuosity. A similar approach had been adopted for the production of large-scale altarpieces over a much longer period than the thirty-year timeframe suggested for the fabrication of the boxwood objects, the equivalent of the lifetime of a single artist. Our carvers may have emerged from the more established tradition, easily applying that oeuvre's technical sensibility on a more delicate scale. The objects are very finely worked in the main, with those of lesser quality possibly being early efforts or the product of a lesser hand. While some of the material may have been fabricated for the market and the casual visitor, those works may have served to elicit the greater challenge of commissioned work, the true masterpieces.

We have highlighted those objects that share a technical approach within and across object type and that suggest an attribution to the same artist. What is more difficult to understand are the subtle variations in style, technique and quality. Are they the natural evolution of a maturing artist responding to stylistic changes, another carver entirely, or variations within a workshop? Illustrative of this conundrum are the triptychs from the Rijksmuseum and a private collection, and the prayer nuts from Chatsworth House and Smith College Museum of Art [FIG. 167].⁷² All illustrate the Virgin standing on a crescent moon gently cradling the Christ Child, surrounded by an aureole ringed with flowers and set within a niche or cavity decorated with stars.⁷³ In each instance, the artist has chosen to segregate sections of the narrative to enhance the sense of relief. In the case





of the triptychs, the kneeling angels are carved out of the overlying architectural frames. On the privately owned piece, the images of the Virgin and Child and the aureoles with their flowers and the crowning angels are sculpted from two separate pieces and set over one another. The Smith College Museum of Art prayer nut articulates all of these sculptural elements from a single piece of boxwood, while the Chatsworth House example uses two, the outer layer pierced to reveal the stars beneath. The only technical variation in all of the reliefs is in the treatment of the stars. In the Rijksmuseum triptych the stars are separately carved and glued on to the surface of the niche while in the other three objects a circle has been scribed with a compass into the surface of the niche or cavity describing the perimeter of the star, and the surround for the rays carved out. Stars are a recurrent motif on many of the prayer nuts and their treatment may provide a possible discriminant. However, there is a cautionary example in the Last Judgment scene in the Toronto nut,⁷⁴ where the inset panel across the apex is scattered with incised stars, but applied stars accent the rest of the firmament.

- 1 Various authors have associated groups of the boxwood objects with a specific workshop. See for instance, Leeuwenberg 1968, pp. 618–22; Wixom 1983, p. 43, note 35; Romanelli 1992, pp. 56–73; Williamson 2002, pp. 140–49; Scholten 2011a, pp. 339–40; Scholten 2011b, p. 447. The customer had the option having an escutcheon painted or incised, and the absence of paint might indicate its removal or loss. Romanelli 1992, p. 37, suggests the blank escutcheons are an indication of fabrication for the market.
- 2 Inspired by the synchrotron-based computer X-ray tomography carried out on a Rijksmuseum prayer nut, cat. no. 15 (Reischig *et al.* 2009), micro CT scanning was used to investigate multiple objects: the Thomson Collection's boxwoods in the Art Gallery of Ontario were imaged by Andrew Nelson at Sustainable Archaeology, Western University, Ontario, Canada – see Ellis *et al.* 2016; six of the Metropolitan Museum of Art's boxwood objects were scanned at Chesapeake Testing in Belcamp, Maryland (Chris Peitsch); the Cleveland Museum of Art's prayer nut, cat. no. 34, was imaged at NASA Glenn Research Center, Ohio, USA (Richard Rauser); the rosary in the Devonshire Collection at Chatsworth, cat. no. 35, along with two objects from the Wernher Collection at the Ranger's House, cat. nos. 19, 57, were scanned at the Imaging and Analysis Centre, Natural History Museum, London (Dan Sykes). The Detroit Institute of Arts shared the scan of their triptych, cat. no. 42, with us, and we would like to express our thanks to Yao-Fen You and John Steele for their generosity in facilitating that process.
- 3 For a discussion of guild regulations see Jacobs 1998, pp. 210–17; Williamson 2002, pp. 13–18; Verougstraete 2015, pp. 2–6.
- 4 For references see Jacobs 1998, p. 216.
- 5 Jacobs 1998, p. 217.
- 6 Verougstraete 2015, pp. 2–6.
- 7 There are sections of sapwood on some of the triptychs' larger sections. See for instance, the back of the hutch for the Art Gallery of Ontario's triptych, cat. no. 43, where the edges have been chamfered to reduce the sapwood. Dendrochronological studies have suggested that fifteenth-century oak for the large-scale altarpieces was aged for ten years; Verougstraete 2015, p. 21.
- 8 For a full discussion of the wood-working tools available to the late medieval cabinetmakers and carvers see Goodman 1964. The space between the tines of medieval combs, which were often made of boxwood, can serve as an indicator of the fineness of medieval saw blades.
- 9 See Marks 1977, p. 141; Wixom 1983, p. 41; Jacobs 1998, pp. 219–22; Scholten 2011a, p. 330; Scholten 2011b, p. 449.
- 10 The first pantograph capable of copying and reducing existing drawings mechanically was invented by Christopher Scheiner in 1603. By copying the lines of an existing drawing with a stylus connected to a series of hinged rods, each line would be replicated by another pen at the opposite end of the instrument at a reduced or enlarged scale. See the Galileo Project at <http://galileo.rice.edu/sci/scheiner.html>.
- 11 Serck-Dewaide 1998, pp. 83–89, discusses the increasing complexity of large-scale altarpieces at the end of the fifteenth century, with sculptors integrating numerous individual figures carved from multiple pieces of wood composed to disguise their assembly.
- 12 See the chapter by Scholten, pp 171–210.
- 13 Scholten & Falkenburg 1999, p. 25.
- 14 Cat. no. 46.
- 15 Inv. no. AGOID 29369. A single hole in the base of each leaf of the Metropolitan Museum of Art's diptych, cat. no. 46, served to mount it at some point in its history, possibly when the red paint on its exterior surfaces and the present hinges were added. A plaque in the British Museum, inv. no. WB.239, carved on both sides, is a single block of wood as well. See Thornton 2015, pp. 172–75.
- 16 Cat. no. 43.
- 17 An identical approach was taken in the articulation of the central arch and

- screening in the Victoria and Albert Museum's triptych, inv. no. 264-1874. See Williamson 2002, no. 49.
- 18 Cat. nos. 42, 45.
- 19 The Hermitage triptych, inv. no. ϕ 1641, with the Adoration in the central niche, has a similar overlaying frame more consistent in form with the triptych from Toronto, cat. no. 43, but carved from a single piece of wood like the New York and Detroit examples.
- 20 Jacobs 1998, p. 228, discusses the prefabrication of elements within large-scale altarpieces. The spires on the top of many of the boxwood triptychs, altarpieces and tabernacles might well have been prefabricated or made by an assistant or apprentice.
- 21 The triptych from the Waddesdon Collection in the British Museum, inv. no. WB.232, utilizes similar elements across its corpus.
- 22 Cat. nos. 44, 47.
- 23 Cat. nos. 48, 49.
- 24 The horsemen in the Victoria and Albert Museum's triptych, inv. no. 264-1874, are well outside the frame. See Williamson 2002, no. 49.
- 25 The Toronto altarpiece, cat. no. 41, has a similar sheet across its back allowing the scene of Christ Carrying the Cross to be set in from the rear.
- 26 Cat. nos. 35, 36, and Paris, Musée de Cluny, inv. no. OA 381. A fourth example, recently rediscovered by Ingmar Reesing, is a string of five beads attached to a carved ring in Hartford, in the collection of the Wadsworth Athenaeum, inv. no. 1953.259. See also Heberle 1898, no. 217. Cf. cat. no. 37.
- 27 Reischig *et al.* 2009, p. 312, suggest that the prayer nuts were drilled into a spherical form like the paternosters and then cut in two to create the two hemispheres; however, if the outer profile of the shell were cut in first, it would have been difficult to then mount the turned end to the face plate for cutting out the interior cavity.
- 28 CT scans confirm the matching grain of the shells. The shell for the Metropolitan nut, cat. no. 27, was cut down from a block made up from two pieces.
- 29 Both exterior shells of a prayer nut in the British Museum, inv. no. WB.235, are solid, as are both exterior shells of the prayer nut in a private collection in Toronto, cat. no. 23, except for four quatrefoil piercings in one of its shells. One of the exterior shells in the Victoria and Albert Museum's prayer nut, inv. no. 265-1874 (Williamson 2002, no. 45), is solid. All solid shells are decorated in low relief.
- 30 In the latter half of the fifteenth century, the narrative scenes of large-scale altarpieces became more complex, necessitating individual figures to be carved from single blocks of wood and then assembled together, allowing the carver greater freedom and access to create fully three-dimensional forms. See Serck-Dewaide 1998, p. 83.
- 31 Cat. no. 43.
- 32 The stable in the Adoration scene in the Hermitage triptych, inv. no. ϕ 1641, and the Musée de Cluny triptych, inv. no. 13,532, appear to have a similar insert.
- 33 Cat. nos. 42, 45.
- 34 Cat. no. 13.
- 35 The Walters Art Museum, inv. no. 61,132.
- 36 The use of an aperture at the top of the composition permitting greater access to one or both of the interior reliefs is found in approximately a quarter of the prayer nuts, with all utilizing the same mortise and tenon system to secure the inset panel.
- 37 Inv. no. ϕ 240.
- 38 Cat. no. 24.
- 39 Examples include cat. nos. 14–17, 20, 22, 26, 27, 29, 38, as well as Vienna, Kunsthistorisches Museum, inv. no. KK 4206; Dresden, Grünes Gewölbe, inv. no. GG-VII 32 hh; London, The British Museum, inv. no. WB.235; Baltimore, The Walters Art Museum, inv. nos. 61.131, 61.132. All except cat. no. 17 have the additional opening at the top of the composition.
- 40 Cat. no. 13 and Paris, Musée de Cluny, inv. no. 21,325 respectively. The latter has two additional reliefs instead of spherical domes on its exterior. There is a similar object in the British Museum, inv. no. WB.239 (see Thornton 2015,

- pp. 172–74). Cat. no. 27 and Vienna, Kunsthistorisches Museum, inv. no. KK 4206, do not have vines encircling their exteriors.
- 41 Cat. nos. 20, 26.
- 42 Two tabs are used for each of the reliefs in the prayer nut in the Museum voor Religieuze Kunst in Uden, cat. no. 11. Other examples have a single tab per relief, i.e. cat. nos. 13–16, and Baltimore, The Walters Art Museum, inv. no. 61.132. The latter is unusual in that the tabs, which are part of the reliefs, key into the exterior shells, but the housing is upside down. Cat. no. 29 has a single tab on the bottom relief, and a single relief of the Resurrection in the Hermitage, inv. no. ϕ 240, survives but without shell or associated relief, and has a single tab at its lower edge. It is possible that other reliefs had tabs which have been removed.
- 43 All the holes have a rounded profile characteristic of a spoon bit.
- 44 A good depiction can be found in Georg Pencz's engraving *The Life of the Children of Mercury* from his planet series of 1533.
- 45 Suda & Ellis 2013 note the extremely subtle use of polychromy in the interior of the mouth of Hell in cat. no. 20. The pigments are identified in Moffat & Poulin 2012 as red lake (probably containing kermes or cochineal) mixed with a wool protein as well as a carbon-based black pigment. This discrete use of pigment is mirrored in the central prayer nut in the Waddesdon tabernacle in the British Museum, inv. no. WB.233; see Thornton 2015, pp. 186–94.
- 46 The fretsaw is thought to have been invented in the middle of the sixteenth century; see Goodman 1964, p. 153.
- 47 See Ellis *et al.* 2016 (forthcoming).
- 48 Cat. nos. 42, 43.
- 49 Cat. no. 47.
- 50 Without the advantage of CT scans, it is difficult to deconstruct the triptychs to the degree possible for the New York, Detroit and Toronto objects, with the suggested details of fabrication based on imaging and *in situ* visual examination.
- 51 Cat. no. 44.
- 52 For further examples, see the soldier on the right side of the New York triptych, cat. no. 45, with his spiral helmet, and the horseman on the right side of the corpus of the Waddesdon Bequest triptych in the British Museum, inv. no. WB.232 (Thornton 2015, pp. 178–85), with inset buttons down the back of his jacket and an attached finial on his helmet. A vertically channeled shield is another popular prop in the Crucifixion scenes in the prayer nuts in the Metropolitan Museum of Art, cat. no. 17, and the British Museum, inv. no. WB.236 (Thornton 2015, pp. 162–66), with their mounted soldiers carrying a shield and wearing spiral helmets, and a prayer nut at the Abegg Stiftung in Riggisberg, inv. no. 7.14.67, where the shields are mounted on the wall.
- 53 The kneeling angels and figures of Joseph on the Detroit, cat. no. 42, and the Musée de Cluny (inv. no. 13,532) triptychs are identical in their physiognomy.
- 54 Paris, Musée de Cluny, inv. no. 13,532.
- 55 Romanelli believed it likely that the Victoria and Albert Museum triptych, inv. no. 264-1874 (Williamson 2002, no. 49) was made for the market; see Romanelli 1992, p. 235. Some of the prayer nuts retain blank bands on their exteriors, possibly to take inscriptions, and may indicate they were market goods as well. See cat. no. 1.
- 56 Cat. no. 43; Paris, Musée de Cluny, inv. no. 13,532; London, Victoria and Albert Museum triptych, inv. no. 264-1874. Williamson notes that the current base for the London triptych is later, and that the central relief can be raised to accommodate a different mounting and an inscription; see Williamson 2002, p. 148.
- 57 Cat. no. 45.
- 58 The group includes cat. nos. 26–30, 32, as well as The British Museum, inv. no. WB.236; Vienna, Kunsthistorisches Museum, inv. no. KK 4206.
- 59 This supports the notion that the prayer nuts were intended to be opened vertically and that the male portion of the hinge pointed upwards when the object was open. As this was the case,

- the disc did not need to be secured as it would remain in place while the prayer nut was being opened.
- 60 Including cat. nos. 26–28, and 30.
- 61 Cat. nos. 20, 22. Baker suggests that the wings for one of these objects are probably now attached to an unusual nut in Graz, Austria; see Baker 1998, p. 417.
- 62 Three prayer nuts have discs that are still attached: cat. nos. 28, 30, and The British Museum, inv. no. WB.236. The disc for a prayer nut in the Metropolitan Museum of Art, cat. no. 27, survives but has become detached.
- 63 The following prayer nuts have reliefs arranged horizontally: cat. nos. 5, 17, as well as Ecoeu, Musée national de la Renaissance, inv. nos. ECL 15018, 15019, 20504; Paris, Musée de Cluny, inv. no. 21,325; Baltimore, The Walters Art Museum, inv. no. 61.131; Dresden, Grünes Gewölbe, inv. no. GG-VII 32 hh; Hamburg, Museum für Kunst und Gewerbe, inv. no. 1878.134; Romanelli 1992, no. 85. Many of these have obvious restorations. Prayer nuts with interior reliefs now inverted, i.e. with the male part of the clasp at bottom when opened, include cat. nos. 9, 11, and Toronto, Art Gallery of Ontario, inv. nos. 29263, 29365; Baltimore, The Walters Art Museum, inv. no. 61.132; London, The British Museum, inv. no. WB.235; Seattle Art Museum, inv. no. 67,4; Romanelli 1992, no. 89; Mannheim 1893, no. 2140.
- 64 Scholten 2011b, p. 451.
- 65 Cat. nos. 42, 45. The series of pegs in the New York triptych may be part of a later restoration.
- 66 Cat. nos. 44, 49. The Copenhagen triptych is also straightforward, with its upper plinth appearing consistent with its fabrication, but the lower base is a more recent addition. A similarly cut-back tenon was created for the mounting of the Hermitage triptych, inv. no. ϕ 1461.
- 67 This discontinuity is also apparent on the Waddesdon triptych in the British Museum, inv. no. WB.232.
- 68 Jacobs 1998, p. 107, discusses the variation in the quality of the carving of the wings in large-scale altarpieces relative to their corpi, and *ibid.*, pp. 230–31, the practice of the predellas being made either by a separate workshop or at a later point by the owner. The wings carved from a single piece of wood in shallow relief often have elements of the design that carry over into the molding, making it unlikely there was any segregation in the carving of the relief and the molding.
- 69 Cat. no. 38; British Museum, inv. no. WB.233.
- 70 There is not room to address the cases' age and origins here, but their existence is not unexpected for material of this type and age. A silver case survives for cat. nos. 16, 55. Victoria and Albert Museum, inv. no. A.535-1910 (see Williamson 2002, no. 47) had a copper case; and cat. no. 15 has a copper case with a velvet pouch. Two prayer nuts, cat. nos. 7, 22, are housed in custom leather cases, as is the Chatsworth rosary, cat. no. 35. The Waddesdon tabernacle in the British Museum, inv. no. WB.233 (Thornton 2015, p. 194, figs. 11, 12) and the Louvre triptych, cat. no. 47, are both associated with leather cases. The exterior shells for cat. nos. 5, 8, 12, 21 are made of silver with repoussé or engraved patterns.
- 71 Moffatt & Poulin 2012 identify prayer nut coatings in the Thomson Collection at the Art Gallery of Ontario, using FTIR, SEM-EDS, TD-GC-MS and Raman spectroscopy, as shellac and pinaceae resins (including pine resin), beeswax, a collagen-type protein and a carbohydrate glue. FTIR micro spectroscopy analyses of some of the coatings were undertaken by Adriana Rizzo, Associate Research Scientist in the Department of Scientific Research at the Metropolitan Museum of Art, and were indicated as animal glue, beeswax and gum.
- 72 Cat. nos. 48, 49, 35, 9.
- 73 Ecoeu, Musée national de la Renaissance, inv. no. ECL 20504, is a very similar version that lacks the encircling stars and has the seated Virgin nestled within the field.
- 74 Cat. no. 20.

