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MERTZ, MECHTILD

FRENCH NATIONAL CENTER FOR SCIENTIFIC RESEARCH : RESEARCHER, EAST ASIAN CIVILIZATIONS RESEARCH CENTER

TAZURU, SUYAKO

KYOTO UNIVERSITY : ASSOCIATE PROFESSOR OF WOOD ANATOMY AND CULTURAL PROPERTY SCIENCE

ITŌ, SHIRŌ

WAKAYAMA PREFECTURAL MUSEUM OF ART : DIRECTOR

BOGEL, CYNTHIA J.

KYUSHU UNIVERSITY : PROFESSOR : JAPANESE ART HISTORY AND BUDDHIST VISUAL CULTURE OF ASIA

<https://doi.org/10.5109/4843145>

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出版情報 : Journal of Asian Humanities at Kyushu University. 7, pp.127-158, 2022-03. 九州大学文学部大学院人文科学府大学院人文科学研究院

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# A Group of Twelfth-Century Japanese *Kami* Statues and Considerations of Material Intentionality: Collaborative Research Among Wood Scientists and Art Historians

MECHTILD MERTZ, SUYAKO TAZURU, SHIRŌ ITŌ,  
AND CYNTHIA J. BOGEL

## Abstract

**A** COLLABORATION between wood anatomists and art historians, this report investigates Japanese statues dating to the tenth to twelfth century now preserved in American, British, Canadian, and Japanese museums and private collections. This is the first article in any language concerning a “group” that at present comprises eighteen wooden icons we place in the genre of *shinzō* (statues of *kami*, i.e., divinities). They are related in terms of style, physical features including size and carving technique, and—the impetus for this study—rare wood choices. Some, perhaps all, are related in terms of provenance. A 1930 illustrated catalogue for an exhibition of Shinto statues and objects, the *Shinzō shinki zuroku*, describes two of the statues as the *kami* embodiments (*shintai*) of the historical figures posthumously known as Shōtoku Taishi and his consort. The *Catalogue* also notes that they are said to have come from a [Shinto] shrine in Izumo (northern Honshu) and are made of Japanese bigleaf magnolia (*hōnoki* / *Magnolia obovata*) or possibly ancient *kusunoki* (camphor wood). Over several years, working closely with institutions and owners—three right up until the month this report was written—wood samples of twelve of the eighteen statues were microscopically tested with the permission of the

owners (all but two were tested by authors); four have been carbon-14 dated. The combined results of the tests are astounding. Ten of the twelve are made of magnolia (*mokuren-zoku* / *Magnolia* sp.), one of (*sumomo-zoku* / *Prunus* sp.), and one of Japanese chestnut (*kuri* / *Castanea crenata*). These woods are not as yet recorded for use in *shinzō* and as such represent a topic worthy of serious study. Carbon-14 dating confirms the dates as circa tenth to eleventh century (for three) and eleventh to twelfth century (for one). In addition to details about the choice of woods this study discusses the *shinzō* in terms of categorization, iconography, historical definitions and viewpoints, acquisition and provenance, and suggests avenues for further research among scholars and the institutions and individuals who care for the icons today. The authors hope that this article will facilitate further understanding of scientific research such as wood identification and dendrochronology, and its applications to the religious, historical, economic, ecological, and stylistic study of icons.

## On *Shinzō*: Repositories for the Divinity

The two characters 神 and 像, meaning “god” and “image or statue” respectively, form the term for “deity icons,” in Japanese, *shinzō*, and in Chinese, *shenxiang*.

Japanese 神 is also pronounced “*kami*,” a term applied to a vast range of divinities, spirits, and natural phenomena. In premodern China, Korea, and Japan, 神像 was a sweeping term that referred to a wide range of images of local gods and divinities from many religious and ritual traditions but is not typically applied to images of Buddhist divinities. In Japanese, *shinzō* refers to statues of the *kami*, and the term *butsuzō* 仏像 to Buddhist statues. Each has their own distinct nomenclature and appearance and yet next to some *kami* representations statues of lesser Buddhist divinities such as female or male *deva*<sup>1</sup> (henceforth “*deva*”) or guardian figures,

even to a trained eye, the two can be difficult to differentiate—a point to which the statues featured in the present research will attest.

A history of *shinzō* can be supported by remains and records, but also bedeviled at every turn, since the relationships between Buddhist divinities and the powerful *kami* changed over time and were very localized and complex. A history of *shinzō* might include figures or symbols of *kami* in nature or at sacred sites, such as in stone niches or forests or within open air structures, but we can only hypothesize about these. There remain numerous archaeological finds of assorted anthropomorphic imagery on pottery or flat wooden shapes, usually painted, from the late seventh and eighth century that are not Buddhist per se, many of which were used for benevolent means (such as healing) but also for malevolent purposes. The relationship to contemporaneous notions of such talismans, effigies, or loci or conduits to *kami*, however, is unclear. Art historian Kageyama Haruki 影山春樹, writing in the 1960s and 1970s, understood them as prototypes of *kami* representations.<sup>2</sup> Regardless, it is important to keep in mind that although today seen as gentle gods, *kami* were once seen not only as very powerful, but also potentially violent and dangerous divinities that inhabited unseen places deep in the mountaintops, requiring ardent propitiation to keep safe the land and its inhabitants.<sup>3</sup> Some of the most feared and respected, even ostracized, *kami* are found at the borders of territories controlled by different clans, or at the extreme edges of power centers, areas of influence that compete with notions about the Japanese imperial line, or areas influenced by “foreign” or competing gods—such as Izumo (a possible provenance for some of these statues) and the large island of Kyushu. Therefore, it should not be surprising that there exists a fluidity in the interpretation of the nature of *kami* over time and place, or at the same moment, and their diverse *shintai* 神体 forms. The term *shintai* or *goshintai* 御神体 refers to something in which a *kami* inheres, a temporary vessel for its nature. It is also thought that objects or places that attract *kami* are selected by humans or the *kami* themselves as *shintai*.

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We are grateful to Sugiyama Junji, Itoh Takao, and Sorimachi Hajime of Kyoto University for their wood identification expertise in evaluating the Shinto statues at the Philadelphia Museum of Art, Cleveland Museum of Art, and Princeton University Art Museum. We are also indebted to the conservators and curators at the following museums and collections in North America and Europe who collaborated with us—at times over several years: Asian Art Museum of San Francisco, Cleveland Museum of Art, Philadelphia Museum of Art, Honolulu Museum of Art, The Metropolitan Museum of Art (loan), Princeton University Art Museum, Gitter-Yelen Collection, Royal Ontario Museum, Sainsbury Centre, and The Art Institute of Chicago. We are especially grateful to conservator Daniel Hausdorf and curator John Carpenter of The Metropolitan Museum of Art, curator Stephen Salel and registrar Cynthia Lowe of the Honolulu Museum of Art, and dendrochronologists Catherine Lavier, Centre de recherche et de restauration des musées de France (C2RMF), and Mitsutani Takumi, formerly of the Nara National Research Institute for Cultural Properties (Nara Bunkazai Kenkyūjo 奈良文化財研究所). Wood identifications were supported by the Collaborative Program, “Databases for the Humanosphere,” issued by the Xylarium (Zaikan Chōsha Shitsu 材鑑調査室) of the Research Institute for Sustainable Humanosphere (RISH), Kyoto University. The synchrotron radiation experiments were performed using the beamline 20XU at SPring-8. SPring-8 is an acronym for Super Photon Ring-8 GeV (<http://www.spring8.or.jp/en>) located in Sayō-gun, Hyōgo Prefecture, with the approval of the Japan Synchrotron Radiation Research Institute (JASRI, Proposal No. 2017B1761, 2018B1747, and 2021A1123). This study was further supported by a JSPS Kakenhi Grant, Number 16K18730 and 19K01124 (Tazuru Suyako, primary investigator) and RISH Mission-linked Research Funding, Numbers #2018-5-4-1, #2019-5-4-1, #2020-5-4-1, and #2021-5-4 (all Tazuru). Paleo Labo Co., Ltd. in Toda City, Saitama Prefecture conducted the carbon-14 dating of statues held by the Honolulu Museum of Art and the Royal Ontario Museum with the support of a scientific research grant and RISH Mission-linked Research Funding #2021-5-4 (Tazuru). Collaboration was supported by a JSPS Kakenhi (Kiban B) Grant, Number 18H00630 (Cynthia J. Bogel, primary investigator) and the Metropolitan Center for the Study of Far Eastern Art, Advanced Research and Publication by Individual Scholars Grant (Bogel).

1 The Sanskrit word *deva* (Jp. *ten* 天) denotes Indian gods of non-Buddhist origin. When referring to such deities in Japanese the character *bu* 部 is added, rendering the designation *tenbu* 天部.

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Japanese artworks often depict *deva* as figures wearing Chinese garments.

2 See Kageyama, *Shintō bijutsu no kenkyū*, p. 492, cited by Guth Kanda, *Shinzō*, p. 10, and Kaneko, “Nihon ni okeru hitogata no kigen.”

3 Satō, “Wrathful Deities and Saving Deities.”

This is a key concept in understanding the unusual choice of woods for the statues under discussion. Trees have long been associated with *kami* and are the primary medium for *shinzō*. *Shintai* can be a tree, stone, or a waterfall, for example, and it is also a respectful way to refer to the statues in which the divinity inheres. In premodern times, *shinzō* were less accessible for viewing relative to *butsuzō*—themselves not very accessible, but the hidden were venerated in myriad ways.

Many scholars note that representations of Japan's divine *kami* were unnecessary or unthinkable until Buddhist icons became ubiquitous, which in turn stimulated a desire to create a material focus for worship of the *kami*, a “competition” model that can create unnecessary binaries. It is clear, however, from surviving late eighth-century and later records that *kami* were viewed by some as sentient beings who are suffering in their current form and who desire to take refuge in Buddhism. This suggests an emerging Buddhist-centric viewpoint of *kami*<sup>4</sup> and a concurrent emerging and irresistible urge to “represent” in an environment brimming with representations of Buddhist divinities as well as *kami*, both in proximity to temples in the Chinese style in new Chinese-style capitals and beyond. In ancient Nara 奈良 (Nara period, 711–784) shrine-temple complexes (*jingūji* 神宮寺, also *jinganji* 神願寺) came later than in other parts of the realm, among them the eighth-century shrine-temple Usa Hachimangū Mirokuji 宇佐八幡宮弥勒寺 in Kyushu, Kehi Jingūji 氣比神宮寺, Wakasahiko Jinganji 若狭比古神願寺, and Tado Jingūji 多度神宮寺.<sup>5</sup> The first records attesting to the creation of *shinzō* include Tado Jingūji. One reason for the representation of *kami* is a desire to see what one venerates, and as noted, it is strongly connected to the abundance of Buddhist icons by the eighth century in Japan, and the ritual needs of shrine-temple and temple-shrine complexes.

Strictly speaking, *shinzō* are best seen as temporary physical embodiments of *kami* and “representing” the maker, patron, or god's intention—a form of “material intentionality”—a term contributed by Bogel. But the real thrust of this term comes with the knowledge we

have gained through wood testing to understand the possible origins and meaning of *shinzō* made of magnolia and other uncommon *kami* statue woods. Although representation in paintings or sculpture often represents state/political and spiritual (if the two can be separated) intentions, material intentionality is central to this report. From human hair to fragrant woods and ephemeral materials such as paper to luxurious significations such as lacquer, materials are also spiritual. The data garnered by co-authors Tazuru Suyako 田鶴寿弥子 and Mechtild Mertz on the woods used for every statue in the group of eighteen discussed herein that was able to undergo testing is astounding and will, we hope, add to our understanding of not only this compelling body of work (whether it is a “group” or not remains to be proven) and to the material intentionality of *butsuzō* as well.<sup>6</sup>

As we move through the details about a unique group of icons, including points ranging from the scientific and artistic to the situational and historical, or from the material to the numinous, it would serve us well to be cognizant of the truly limitless types of divinities or spirits in Japan—and neighboring influences, namely the Chinese continent, the Korean Peninsula, and Southeast Asia—and their myriad origins and functions. There has been resistance in Japan to recognizing non-Japanese influences on the representation of what have long been venerated as the “indigenous” *kami*, in large part due to the associations between the imperial family and *kami*, and yet, *kami* veneration is dependent on external sources for both ritual content and appearance (as is the imperial family). The term 神 in China and Korea in premodern times was used for the spirits of the earth and many local gods. As is well known, these non-Buddhist divinities entered Buddhism—with the Hindu gods a major import source. In Japan, we see a return of many local gods from foreign lands that entered Buddhism, including Kishōten 吉祥天, guardian kings (*shitenno* 四天王), and dragon kings (*ryūō* 龍王), who also appear in the form of *shinzō*. Art historian Nagasaka Ichirō 長坂一郎 has shown that even the seated posture with one knee

4 Itō Shirō briefly notes this, as does most of the literature on *shinzō*. Itō, *Heian jidai chōkokushi*, pp. 61–63.

5 Uejima, “State, Temples and Shrines in Medieval Japan,” pp. 14–19; Hardacre, *Shinto*, pp. 97–99; and Kochinski, “Negotiations Between the Kami and Buddha Realms.” Kochinski's article takes up these four shrine-temple complexes.

6 Important studies that have presented new evidence for the woods used for Buddhist statues include Kaneko et al., “Nihon kodai ni okeru mokuchōzō no jushu to yōzaikan I” and “Nihon kodai ni okeru mokuchōzō no jushu to yōzaikan II”; and Tazuru et al., “Wood identification of Japanese Shinto Deity Statues in Matsunoo-taisha Shrine.”

up and one down, typical of one type of *shinzō* statue from the Heian 平安 (794–1185) period derives from a similar representation of non-Buddhist gods (神) at Chinese Buddhist cave sites, for example. By extension, the impetus for making statues of the *kami* is not the iconic tradition of Buddhism in Japan, as has long been asserted, but the iconic traditions of making local divinities in Korea and China and their impact on Japan.<sup>7</sup> This fluidity need not be universalized or posited as something that negates the meaning of different ritual systems and beliefs, nor should the conflicts between “the gods that came first” and those that followed, but neither should the Japanese *kami* be essentialized or essentializing; nor binaries such as Buddhist and non-Buddhist or the state of the *kami* as numinous in a way that relates only to “Shinto” and not Buddhist concepts or the intentions of the viewer.

Such fluidity and concomitant complexity bear directly on representations of *kami* made from the latter half of the Heian period, when the statues featured in this study were made. By then *shinzō* were crafted to resemble courtiers, monks, men, women, animals, demons, bodhisattva, deva, guardians, beggars, old men, old women, foreign persons from far-away lands, and children. The earliest surviving *shinzō* are male and female, in court dress, old and young, or don simple robes and have shaven pates like monks. Examples include the triad at the temple Tōji 東寺 (Kyōōgokokuji 教王護国寺) featuring Hachiman 八幡, a god from Kyushu, and anonymous male and female forms held at the shrine Matsuno’o (Matsuo) Taisha 松尾大社 and the temple Kōryūji 広隆寺, all in Kyoto.<sup>8</sup> The latter two temples were patronized by the Hata clan 秦氏, who came to Kyushu from Silla 新羅 (Korea) by the late fifth century.

From the late eighth and ninth century, temples had structures or halls on site dedicated to the propitiation of the temple’s tutelary *kami* with *shinzō* enshrined, and some shrines had a Buddhist statue enshrined. The tutelary *kami* statues are difficult to distinguish at times from *butsuzō* of lesser divinities, such as deva or bodhisattva. In the medieval period they are referred to as *shugojin* 守護神 or *gohōjin* 護法神, “protecting gods” and “protectors of the Buddhist dharma.” At that time

the term Shinto was not used as it is today to define a specific body of cultural practices juxtaposed with the Buddhist “religion” and other concepts that formed in Japan due to Western influence in the second half of the nineteenth century. Noting how difficult it must have been to create the appearance of *kami*, Itō Shirō 伊東史朗 writes about the strong Buddhist influence surrounding the production of the earliest *shinzō*. He refers to the earliest written record to a *shinzō*, a passage dating to 761 and found within the 801 *Tado Jingūji garan engi shizaichō* 多度神宮寺伽藍縁起資財帳 (Inventory and Account of the Sacred Origins of Tado Jingūji 多度神宮寺), a work about Ise Province that tells of “Tado daibosatsu” 多度大菩薩. “Great Bodhisattva” from this early usage referred not to the compassionate Buddhist divinity but to a “great *kami* awakened to the Way of the Bodhisattva.”<sup>9</sup> Although we do not know what Tado Daibosatsu looked like, the title “Great Bodhisattva” also appears circa 781, when the *kami* Hachiman was honored with the title Gokoku Reigen Iriki Jintsū Daibosatsu 護国靈験威力神通大自在王菩薩 (“Great Bodhisattva of National Protection and Marvelous Spirit Power”).

Wood is the most common material by far for religious icons in Japan (others include bronze and lacquer) but for *shinzō* wood is used almost exclusively. Whereas the artisans of Buddhist statues made during the time when the statues discussed here were carved, i.e., the late Heian period (ca. 1068–1185), are frequently known, those for the *kami* were rarely named. Wood anatomists and art historians specializing in Japanese and Chinese materials and iconography and history have come together in these pages to narrate the story of how scientific analysis of the wood itself is probably the only thing that we can be sure about for most of the statues—and to explore where this secure standpoint can take us in an historical or religious study of the works. This research furthers our knowledge of how wood statue-making evolved in Japan and contributes significantly to our understanding of wood types used for Shinto icons. It reiterates the importance of wood identification for proper study of statuary and other objects for the fields of wood science, art history, Japanese religions, and regional studies.<sup>10</sup>

7 Nagasaka, *Shinbutsu shūgōzo no kenkyū*, p. 268.

8 See Itō, *Matsuo Taisha no shinkage*; and Keyworth, “On the ‘Shinto’ Statues of Matsuo Shrine.” The latter has an extensive biography.

9 In English, see Guth Kanda, *Shinzō*, pp. 11–13. Bocking, *A Popular Dictionary of Shinto*, p. 33.

10 For an overview of the history of wood research in Japan, and wood nomenclature, structure, grain, and more, see Mertz, *Wood*.



Even more so than the study of Japanese Buddhist statues, the fact that *shinzō* are usually kept out of the public eye at Shinto shrines contributes to the understudied state of their materials. It is even possible to argue that more than Buddhist icons, due to their lesser exposure to tourism and museum exhibitions, *shinzō* impart a thick aura of distance from worldly matters. Furthermore, testing their wood is not welcomed by shrines and owners. Material analysis through scientific means helps to answer questions about how long ago and for whom, and about why these icons were made as well as of what and where, all questions that might otherwise be unresolvable. Important studies of *shinzō* to date are listed in the note here.<sup>11</sup> We turn now to the wood discovery that stimulated this co-authored report.

## “The Philadelphia Moment”: Piecing Together the Group of Eighteen Statues

The existence of a group of related *shinzō* statues—most of which were held in collections overseas—had been known among curators and other scholars, collectors, and dealers from the early twentieth century. (It should be noted that, until recently, collectors and dealers were occupations that overlapped considerably.) Clues indicating a group of sixteen statues first emerged at the Philadelphia Museum of Art in 2017. That year, two of the present report’s authors, Mertz and Tazuru, visited the museum to collect wood samples for microscopic examination within the context of a project on Chinese Buddhist sculptures.<sup>12</sup> Samples

extracted at that time from a Japanese statue known as “Crowned Male Deity in a Japanese Robe” (*Hōkanwasō danshinzō* 宝冠和装男神像, figure 10) yielded very surprising results. Scientific testing demonstrated that the statue was not cypress (*Chamaecyparis obtusa*, Jp. *hinoki* 檜), the principal material for religious icons in Japan from the Heian period.<sup>13</sup> Nor was the icon sculpted from Japanese nutmeg (*Torreya nucifera*, Jp. *kaya* 榿), the next most common wood used in statuary. Scientific analysis revealed that the statue at the Philadelphia Museum of Art was crafted from a species of magnolia wood (*Magnolia* sp., Jp. *mokuren-zoku* 木蓮属, モクレン属). The size of the statue suggests a high probability of *Magnolia obovata* (*hōnoki* 朴木 or ホオノキ), but other species such as *Magnolia praecocissima* (*kobushi* 辛夷) or *Magnolia salicifolia* (*tamushiba* 田虫葉) cannot be discounted.<sup>14</sup>

The use of magnolia wood for statuary is exceedingly rare, hence the excitement. Of the 1,062 religious sculptures included within a 2012 database of published wood identification reports which span all regions and eras, only seven Buddhist statues are carved from magnolia wood.<sup>15</sup> And of those seven magnolia statues, only two can be firmly dated to the Heian period, both of which were made in the Kanto region using assembled-wood construction (*yosegi-zukuri* 寄木造) rather than being carved from a single bole (bole meaning tree trunk), a technique known in Japanese as *ichiboku-zukuri* 一木造 and the method used for the eighteen statues under discussion.

and *Traditional Woodworking Japan*, pp. 7–40 in English and in Japanese, Mertz, *Nihon no ki to dentō mokkōgei*, and Itoh and Yamada, *Ki no kōkōgaku*.

- 11 Guth Kanda, *Shinzō*; Kanagawa Kenritsu Rekishi Hakubutsukan, *Kamigami to deau*; Kyōto Kokuritsu Hakubutsukan, *Kamigami no bi no sekai*; Itō and Akagawa, *Shinzō chōkoku jūyō shiryō shūsei* 3; Itō and Yahiro, *Shinzō chōkoku jūyō shiryō shūsei* 4; Nara Kokuritsu Hakubutsukan, *Shinbutsu shūgō tokubetsuten*; Oka, *Shinzō chōkoku no kenkyū*; Ōsaka Shiritsu Bijutsukan and Mainichi Shinbunsha, *Yamano Kamihotoke Yoshino*, Kumano, Kōya; Shimane Kenritsu Kodai Izumo Rekishi Hakubutsukan, *Dai Izumo ten*; Tōkyō Kokuritsu Hakubutsukan and Kyushu Kokuritsu Hakubutsukan, *Kokuho daijinyaten*; Vilbar and Carr, *Shinto*; and Yuhara, *Bessatsu taiyō shinzō no bi*.
- 12 Mertz and Itoh, “The Study of Buddhist Sculptures from Japan and China Based on Wood Identification”; Mertz and Itoh, “Analysis of Wood Species in the Collection”; and Tazuru et al., “*Firaderufia* bijutsukan ni okeru Chūgoku butsumō no jushu shikibetsu chōsa.”

- 13 Findings on the “Crowned Male Deity in a Japanese Robe” may be found in Tazuru et al., “Wood Identification of a Japanese Deity Statue of the Philadelphia Museum of Art.” *Hinoki* cypress, with its woody aroma and pure white color, is frequently used for religious architecture, most famously the Ise 伊勢 Shrine complex.
- 14 *Magnolia obovata* can grow up to thirty meters tall and reach a diameter exceeding one meter. The species can be found in mountainous areas to the north, including the South Kurile Islands, and south as far as the upper levels of Kyushu. See Satake et al., *Nihon no yasei shokubutsu: Mokuho* (Vol. 1), p. 106. Fresh magnolia wood can sometimes be recognized by its greenish-grey color. Easy to split and carve, magnolia is often used in woodturning to create lacquered objects. In English see Mertz, *Wood and Traditional Woodworking in Japan*, pp. 59, 63, and 202.
- 15 Wood anatomist Itoh Takao 伊東隆夫 and archaeologist Yamada Masahisa 山田昌久 created the database. Itoh and Yamada, *Ki no kōkōgaku*. The magnolia findings are reported in a 1963 article by wood architecture specialist Kohara Jirō 小原二郎. See Kohara, “*Nihon chōkoku yōzai chōsa shiryō*.” On tenth-century Heian period statuary see also Itō, “Heian jidai kōki no chōkoku shinkō to bi no chōwa,” and Itō, “Jūseiki no chōkoku.”

Tazuru and Mertz informed art historian Itō of the extraordinary results, well aware of his interest and expertise in *shinzō* and previously in consultation with him. Itō, in turn, shared a list of sixteen works that he had thought about previously as a group of statues that were similar in date and style and therefore likely provenance. The contours of the group came into clearer relief still, and expanded, when Mertz identified a similar wooden statue in the private Gitter-Yelen Collection (figure 18), which had been offered at Bonhams international auction house in 2017.<sup>16</sup>

Available evidence led Itō to conclude that a group of sixteen related statues existed, now preserved in various museums or collections. Many of these had been documented in a series of surveys published in 1979 and 1980 in *Ars Buddhica* (*Bukkyō geijutsu*) by art historian Shimizu Zenzō 清水善三 of Japanese religious icons in North America.<sup>17</sup> Itō expanded on Shimizu's survey. With the addition of the Gitter-Yelen Collection statue (figure 18) and another statue purchased by the Sainsbury Center in Norwich, UK (figure 8), the total of known works we believe are from the same group, based on wood testing and style, now stands at eighteen.

In summary there are eleven statues dispersed across North America: ten in museums (Ontario, Philadelphia, Cleveland, Honolulu [3], Chicago [2], New York, San Francisco, Princeton) and one in a private collection (Gitter-Yelen); five in Japanese museums and private collections (Tokyo National Museum, Tokyo University of the Arts Museum; and one statue in the UK (Sainsbury Centre). There may be others, but our research has not brought any to light. The table at the end of this essay simplifies the material known for each of these statues and has columns for their names, home institution, provenance, sources, and other known and speculated information. Contrary to standard practice, the illustrations (figures) cited will not appear within the main body of text and not necessarily in order of mention. Rather, due to the large number of statues in the group, the authors wish to present them together in a specific order that corresponds to the useful table placed immediately before the eighteen statue illustrations and wood-related figures (19–23).

## Privacy, Provenance, and Science

The website of Bonhams describes “a group of unusually large Shinto deities that appear to have reached the United States in the 1950s through the Mayuyama Company [Mayuyama & Co.] and are thought to be associated with religious cults active in the region southwest of present-day Tokyo, centered on the Izu Peninsula.” Bonhams includes the statue tested in 2017 at the Philadelphia Museum of Art within this group.

The statement that the works originated from Izu Peninsula near Tokyo is, however, an unfortunate error. Rather, the provenance is possibly the Izumo 出雲 area, located on northern Honshu island, in Shimane 島根 Prefecture, facing Ulsan and Gyeongju on the Korean Peninsula across the East Sea (the latter a great capital of Silla kingdom for over a thousand years, beginning in 57 BCE until the early tenth century) and home to the vast shrine grounds of Izumo Taisha 出雲大社, more properly known as Izumo Ōyashiro. The 1950s noted on the Bonhams page is a decade we have not confirmed, but acquisition dates for statues, most of which—if handled by Mayuyama—went through dealers both in Japan and in the U.S. before being sold to U.S. collectors or museums, indicate movement to the U.S. and within Japan during the 1950s and 1960s; neither can it be confirmed by us that the group was sold by Mayuyama (this is not to suggest that these two statements are in error, only that a source is not provided).

A 1966 publication edited by Mayuyama Junkichi 繭山順吉, *Japanese Art in the West*, was a key source to the ongoing interest in an expanding group of *shinzō* that appeared to be connected to the seven illustrated in his book by those within and outside of Japan, as the two provenance columns in our table suggest.<sup>18</sup> Mayuyama writes that the works illustrated are among his favorites and the photos are from his collection. In his 1988 book, *Bijutsushō no yorokobi* 美術商のよろこび (in English, *The Joys of Art*), Mayuyama writes that “2,123 pieces of Asian arts and crafts, most of them ceramics, had been handled by members of our staff during seventy years since the company was founded in 1905... I am proud to be an art dealer.”<sup>19</sup>

16 Bonhams, “Lot 6150: A Large Standing Figure of a Shinto Deity,” <https://www.bonhams.com/auctions/23784/lot/6150/>.

17 Shimizu, “Amerika, Kanada ni aru Nihon chōkoku” (parts 1–3).

18 On the founder of the company (Junkichi's father) and the history of the business, see Mayuyama, *Kobijutsushō Mayuyama Matsu-tarō to kanshō tōki no sekai*.

19 Mayuyama, *Bijutsushō no yorokobi*, foreword, n.p.

The euphemisms of the previous volume are gone, and it is reasonable to assume that he sold at least the seven *shinzō* statues that appear in *Japanese Art in the West*, and quite possibly many more in the group of eighteen.

The Art Institute of Chicago holds in its collections two of the eighteen statues under discussion (figures 4 and 13). The museum explains on their homepage they represent the Dragon King and the monk Hyeja, respectively, and that the two “originally belonged to a group of 12 Shinto deities (*kami*) believed to have come from the Izumo district on the north coast of the island of Honshū.”<sup>20</sup> “The group is believed to represent Shōtoku Taishi 聖徳太子 (574–622), his family, and his advisors,” the text continues. The Art Institute of Chicago does not specify which sources they consulted to posit a link with Shōtoku Taishi. Perhaps, like Itō, the research team was aware of two sculptures pictured in a 1930 publication, *Shinzō shinki zuroku* 神像神器図録 (Illustrated Catalogue of Shinto Statues and Sacred Implements, henceforth *Catalogue*), said to represent Shōtoku Taishi and his consort (figures 1 and 2).<sup>21</sup> The description in the 1930 *Catalogue* is as follows:

1, Statue of Prince Shōtoku (*Shōtoku taishi zō*), magnolia wood carving, height 3 *shaku* 3 *sun*, collection of Mr. Maeyama Hisakichi.

It is a statue<sup>22</sup> from a shrine in Izumo,<sup>23</sup> and is said to be the work of the prince (Taishi) himself. Also, it is known as an incarnation of Kannon Bosatsu. The wood used is conjectured to be magnolia (*hō*), but some propose that it is ancient camphorwood (*kodai kusunoki* 古代楠).

1, Statue of Lady Shōtoku Taishi (*Shōtoku Taishi kohizō*) magnolia wood carving, height 3 *shaku* 1 *sun*, collection same person as above.

一、聖徳太子像 木彫朴材 丈三尺三寸  
前山久吉氏出品

出雲某神社の御神體にして、太子の御自作なりと稱し又觀音菩薩化身の像と傳う、用材は朴と推定するも、或は古代楠ならんかの説もあり

一、聖徳太子妃像 木彫朴材 丈三尺一寸  
同氏出品<sup>24</sup>

The *Catalogue* was created for exhibitions held by the Nihon Bijutsu Kyōkai 日本美術協会 (its English name was Japan Arts Association), an organization formed in 1879 and which became a foundation in 1925. The association held biannual exhibitions of sculpture, crafts, and calligraphy, one in spring and one in autumn. It also mentions that both statues formerly were found in a certain shrine in Izumo Province (*Izumo bō jinja no goshinzō* 出雲某神社の御神像). We cannot know the basis for the attribution of Shōtoku Taishi and his consort; early statues representing Shōtoku Taishi as the reincarnation of Kannon were, just like images of Kannon, worshipped by myriad people seeking salvation and protection from disease and disaster.<sup>25</sup> As for the important provenance mention, it is possible that if the statues were removed from the shrine by authorities during the destructive and violent actions upon shrines and also temples during the Meiji 明治 period (1868–1912), or sold by a shrine due to economic constraints, or other reasons, or that such provenance might be contrived, but Bogel suggests that this is unlikely. Whichever the case, it is all we have to go on at this time.

Note that the first two figures are unusual in that the primary source of information for them is the 1930 *Shinzō shinki zuroku* and poor quality photos in the Tokyo National Research Institute for Cultural Properties (Tōkyō Bunkazai Kenkyūjo 東京文化財研究所). Even though we know that they are owned by an individual in Japan, photographs and information have not been circulated by the dealer or new owner, nor is the provenance since the 1930 notation that they were in the collection of Maeyama Hisakichi 前山久吉 (1872–1937). Note that Maeyama also owned the statue of the old woman (figure 16) now in the Tokyo National Mu-

20 The Art Institute of Chicago, <https://www.artic.edu/art-works/5821/dragon-king>.

21 Although the more common reading for 神器 is *jingi*, it is usually used to refer to the imperial “three treasures” of a mirror, sword, and jewel. As the exhibition was broader than a focus on the three we use an alternate reading for the characters, *shinki*.

22 The term *goshintai* 御神體 is used, which as noted, refers to something in which a *kami* inheres.

23 The characters 出雲 are used as phonetic equivalents for Izumo rather than 出雲.

24 Nihon Bijutsu Kyōkai, *Shinzō shinki zuroku*, unpaginated, text section p. 2, plates 8 and 9. Note: alternative renderings of Ōiratsume include 橘大娘皇女 and 橘大郎.

25 JAANUS, entry for Shōtoku Taishi, <http://www.aist.or.jp/~jaanus/>.



seum. As he died in 1937 it is possible that the first two went to Mayuyama, but there is no evidence for this in circulation. The date that Maeyama gave the statue to the museum is not public to our knowledge.

These and other observations beg the question of whether eighteen is the likely final number for the group and whether there is a known iconographic precedent for eighteen related figures including Shōtoku Taishi and his consort, or whether it is likely a larger group based on established iconography. There is no easy reply, but based on Bogel's assessment of the existing statues, the types of icons in this group, and certainly the number eighteen, do not correspond to a known iconography. Based on the well-known narratives of the prince's life on folded screen paintings, handscrolls, or sets of paintings usually entitled something along the lines of *Shōtoku Taishi eden* (聖徳太子絵伝, *Illustrated Biography of Prince Shōtoku*) found in museums around the world, any number of "groups" could be extrapolated but there appears to be no set iconography for the choice of these eighteen or including these eighteen in Heian period sources or surviving art works. The sole basis for the Shōtoku designation is the source described above, the 1930 *Catalogue*.

It has been noted and will be further explained in the section "Eighteen *Shinzō* in Three Categories" below that there are prominent sculpture specialists who have designated figure 16, an icon of an Old Woman Deity from the Twenty-Eight Legion (Nijūhachi bushū 二十八部衆), a Buddhist assembly of a variety of divinity types that in Japan are associated with the Thousand-Armed Kannon (e.g., at Rengeōin 蓮華王院, today's Sanjūsangendō 三十三間堂). This would imply that there were more statues in the group. There are divinities in the group of eighteen that find parallel in the Twenty-Eight Legion, but the authors remain unpersuaded by this iconographic designation, as well as to the idea that the eighteen under discussion here are Buddhist divinity representations, not *shintai*. We look forward to further discussion.

## Wood in Ancient Japanese Statuary

Important studies of hinoki cypress and *kaya* woods include groundbreaking cooperative research projects between wood scientists and art historians specializing in religious sculpture. For example, two art history Buddhist sculpture specialists, Kaneko Hiroaki 金子

啓明 and Iwasa Mitsuharu 岩佐光晴, worked with wood anatomists Noshiro Shuichi 能城修一 and Fujii Tomoyuki 藤井智之 and presented the results of their examination of the wood species of early Buddhist sculptures in three *Museum* publications (1998, 2003, and 2010).<sup>26</sup>

In the earlier article the authors discuss the results of wood tests on sixteen Buddhist sculptures representative of the Nara period and two representative icons from the early Heian period, each made from a single bole. The team concluded that each statue was made of made of Japanese nutmeg (*kaya*),<sup>27</sup> correcting previous identifications as hinoki cypress.<sup>28</sup> The work of the Kaneko group stimulated a reevaluation of scholarly assessments of the woods used for ancient Japanese Buddhist wooden icons, which then affected scholarly assessments of wooden *shinzō*.

As explained in the first report (*Museum* 1998), camphorwood (*Cinnamomum camphora*, Jp. *kusu* 樟) was the primary wood used for Buddhist statuary in the seventh century, but during the eighth century, statues were mostly made of Japanese nutmeg or hinoki cypress. The team studied tiny wooden fragments from seven single-bole icons at Tōshōdaiji 唐招提寺 and nine at Daianji 大安寺 as representative works of the Nara period, and for the early Heian period tested the main Yakushi Nyorai 薬師如来 icon at Jingoji 神護寺 in Kyoto and the same divinity from Gangōji 元興寺 in Nara. Each statue, microscopically analyzed, turned out to be Japanese nutmeg. Japanese nutmeg and cypress both served as substitutes for Indian sandalwood (*Santalum album*, Jp. *byakudan* 白檀), a wood highly valued in India (and beyond) and referenced in Buddhist scriptures as ideal for creating Buddhist images.<sup>29</sup>

26 Kaneko et al., "Nihon kodai ni okeru mokuchōzō no jushu to yōzaikan I" and "Nihon kodai ni okeru mokuchōzō no jushu to yōzaikan II." See also Mertz, *Wood and Traditional Woodworking in Japan*, pp. 17–18.

27 On *Torreya nucifera* see <https://conifersociety.org/conifers/torreya-nucifera/>

28 See for example Kohara, "Nihon chōkoku yōzai chōsa shiryō." The science of microscopic wood identification has advanced considerably since Kohara's pioneering work. Sampling method and location, for example, are now meticulously documented.

29 Most frequently cited is the legend of King Udayana. "When Sākyamuni left the world to teach his mother in the Heaven of the Thirty-Three Gods, King Udayana of Kausambi missed him so much that he had a true likeness of the Buddha made out of the best sandalwood (*Santalum* sp., Ch. *tanmu* 檀木) available. Rösch, *Chinese Wood Sculptures of the 11th to 13th Centuries*, p. 172. An important new compendium of essays by Arunkumar

In most regions of China sandalwood is not indigenous and cannot be easily cultivated. Instead, cypress (*Cupressus* sp., Ch. *baimu*, Jp. *haku* or *hakuboku* 柏木) was burned as incense to purify, drive out evil, and communicate with the gods from at least the Tang 唐朝 (618–907) period. Ritual use in Japan of cypress as a substitute for Indian sandalwood is typically traced to the Chinese monk Jianzhen 鑑真 (Jp. Ganjin; 688–963).

Kaneko et al.'s second report (*Museum* 2003) considered single-bole statues from more northern regions of the archipelago where Japanese nutmeg does not grow. The team also extended their study to include not only single-bole sculptures but also statuary crafted from other techniques and materials such as dry lacquer and clay works with internal wooden frames (armatures) or a wooden core. The selected samples were microscopically identified as hinoki cypress, Japanese zelkova (*Zelkova serrata*, Jp. *keyaki* 欏), and foxglove (*Paulownia tomentosa*, Jp. *kiri* 桐). The study further concluded that Japanese nutmeg was used for single-bole sculptures in the Kinki region as well as in adjacent regions where the tree grows naturally. In areas where Japanese nutmeg trees do not grow (e.g., the Tohoku region of northern Japan), local species such as Japanese zelkova were used.<sup>30</sup> Significantly, these findings also cast doubt on the previously accepted chronology that single-bole sculptures from the Nara and Heian periods evolved from wood-core dry-lacquer sculptures whose thick outer layers of lacquer as a technique receded over time.

## Wood Identification and Dating

Scientific wood identification entails analyzing the characteristics of wood cells under a microscope. High levels of magnification reveal anatomical features specific to each genus, and in rare cases species, as assessed by a trained wood anatomist. In the present case, the authors or museum conservators took miniscule wood

samples of less than 0.5 x 0.5 x 1 cm from the underside of nine sculptures (figures 3, 5, 6, 9, 10, 11, 12, 14, 18), typically from a hollowing or a crack. The samples were then sent to one of three wood anatomy laboratories: the Research Institute for Sustainable Humanosphere (RISH) of Kyoto University, Japan; the Forest Products Laboratory (FPL) of the Center for Wood Anatomy Research, USDA Forest Service, Madison, WI, USA; and the Jodrell Laboratory (JL) of the Royal Botanic Gardens, Kew, in London. Each lab possesses a large wood collection, or xylaria, and an extensive body of reference material.<sup>31</sup>

After soaking the samples in water to soften them, researchers at each lab prepared the microscope slides. First, they extracted thin sections by applying single- or double-edged razor blades in cross, radial, and tangential directions (approximately twenty  $\mu\text{m}$  thick). The sections were then heated on a hot plate with a mixture of glycerin and ethanol in a ratio of 1:1 to remove air bubbles and mounted on slides with the slide mounting medium gum chloral (a mixture of Arabic gum, and chloral hydrate). The slides examined in Japan at RISH were studied under an optical microscope (Olympus BX51) and photographed with a digital camera (Olympus DP70) (figure 19).

For extremely tiny samples of about 0.8 to 1 mm in diameter and 8 mm in length maximum, as seen on figure 20, author Tazuru performed the wood identification using synchrotron X-ray microtomographic imaging at the synchrotron SPring-8 in Hyogo Prefecture (figure 20). This extraordinarily advanced and rare method provides a high-resolution (0.472  $\mu\text{m}/\text{pixel}$ ) 3D image of the wood's anatomical micro-structure from which the species can be determined (figure 21).

Microscopic wood identification does not yield information about the age of the wood. Dating wood can be accomplished by two methods: dendrochronology, which examines growth and measures tree rings; or radiocarbon or carbon-14 dating. The former method requires a surface large enough to permit scientists to observe a sufficient number of growth rings. *Dendrochronology* also involves reference work, that is, situat-

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et al., *Indian Sandalwood*, contains a wealth of information on that precious wood. See also Cottrell, "Indian Sandalwood's Heartwood of History," and Boehm, *The Concept of Danzō*.

30 The distribution of *kaya* extends from south of Miyagi Prefecture on the island of Honshu through Shikoku and Kyushu as far south as Yakushima. Satake et al., *Nihon no yasei shokubutsu: Mokuhon* (Vol. 1), p. 25. On the use of *kaya* wood see also Tōkyō Kokuritsu Hakubutsukan, *Butsuzō*; and Kohara, "Nihon chōkoku yōzai chōsa shiryō." For *kaya* in Buddhist sculptures, see Bogel, "Canonizing Kannon," p. 46, and *With a Single Glance*, pp. 93–95, 264–69.

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31 For reference material the sample size is about 1–2 cm x 1–2 cm x 1–2 cm. The sectioning is done by a microtome. Such samples are mounted on glass slides and covered. The wooden cubes allow the three sections to be cut into transverse, radial, and tangential sections. Reference material samples are drawn from trees that have been botanically identified by its leaves, flowers, and fruits.

ing a sample within a master chronology composed of, for example, old living trees, extant building material, and excavated wooden remains that are specific to each wood species grown in a given geographic region. *Dendrochronology in Japan* is limited to three tree species: hinoki cypress; Japanese cedar or cryptomeria (*Cryptomeria japonica*, Jp. *sugi* 杉), *hiba arborvitae* (*Thujopsis dolabrata*, Jp. *hiba* 檜葉 or *asunaro* 翌檜); and umbrella pine (*Sciadopitys verticillata*, Jp. *kōyamaki* 高野槇).<sup>32</sup>

Radiocarbon or carbon-14 dating, the second method, was applied to three statues of the group of eighteen discussed in this report (figures 3, 8, and 18).<sup>33</sup> A wood's radiocarbon age refers to the date when the tree was felled, not when the material from that organism was used. To account for seasoning (i.e., drying), processing, and carving, it is standard to add a period of fifty to one hundred years to a wood's felling date.

## Discussion of the Wood Identifications of the Shinzō

Recalling that the 1930 *Catalogue* states that statue figures 1 and 2 came from a shrine in Izumo, and also that the wood for making the male and female deities is thought to be magnolia or camphorwood, we turn to a consideration of shrines and trees and *kami*. The Great Shrine of Izumo (Izumo Taisha), one of the two most venerable Shinto shrines in Japan, furnishes a good sampling of the kinds of trees to be found in a Shinto shrine's precincts. The species include evergreen broadleaved trees such as *Quercus acuta* (*akagashi*), *Quercus myrsinaefolia* (*shirakashi*), *Lithocarpus edulis* (*matebashii*), *Michelia compressa* (*ogatamanoki*), *Cinnamomum camphora* (*kusunoki*), *Machilus thunbergii* (*tabunoki*), *Ternstroemia gymnanthera* (*mokkoku*), *Cleyera japonica* (*sakaki*), and also conifers such as *Pinus thunbergii* (*kuromatsu*), *Cryptomeria japonica* (*sugi*), *Sciadopitys verticillata* (*kōyamaki*), *Juniperus chinensis* (*byakushin*), *Chamaecyparis obtusa* (*hinoki*), *Podocarpus macrophylla* (*inumaki*), *Podocarpus nagi*

(*nagi*), and *Torreya nucifera* (*kaya*).<sup>34</sup> The significance of forests surrounding shrines has been taken up by scholars recently in new and important ways in terms of the environment and the shrines' presentation of these holdings.<sup>35</sup>

Our study is concerned with the specific trees chosen for the *shinzō* that were tested. Microscopic wood analysis allows us to ascertain that the group of statues in question includes (at least) three wood species: *Magnolia* sp., *Prunus* sp., and Japanese chestnut (*Castanea crenata*). Mertz summarizes the trees' usage as follows.

Ten statues have been identified by microscope as magnolia (*Magnolia* sp., Jp. *mokuren-zoku* 木蓮属). *Magnolia* sp. (*mokuren-zoku*) comprises other important magnolia species, such as *Magnolia praecocissima* (*kobushi* 辛夷), 15 m tall, or *Magnolia salicifolia* (*tamushiba* 田虫葉) with a height of 10 m, that are candidates for a *Magnolia* sp. wood identification. A very probable candidate is the Japanese bigleaf magnolia (*Magnolia obovata*, Jp. *hōnoki* 朴木), attaining a height up to 30 m. This is also the tree mentioned in the *Shinzō shinki zuroku*, under the name of *hō* 朴. Our wood identifications were limited to a level of genus (*zoku* 属), as the wood samples, that were collected by the museums and sent to our laboratory at Kyoto University, the Research Institute for Sustainable Humanosphere (RISH) in Kyoto, had to be as small as possible, in order not to harm the integrity of the statues. In two instances the samples were so tiny that co-author Tazuru applied the synchrotron X-ray microtomography technique (figures 21 and 22); this was for the Male Shinto deity statue of the Honolulu Museum of Art (figure 9), and the "Crowned Male Deity Statue in a Japanese Robe" of the Philadelphia Museum of Art (figure 10).

The Sainsbury statue, the deva-like female deity statue, was also identified to genus level, *Prunus* sp. (*sumomo-zoku*). Four tree species belong to this genus, cherry (*sakura* 桜), plum (*sumomo* 季), apricot (*ume* 梅), and peach (*momo* 桃). All these tree species flower in spring on naked branches, before the leaves open, the same as magnolia. The wood of *Magnolia* sp. and *Prunus* sp. are diffuse-porous, that is to say they show a very smooth surface. The wood is easy to carve. The growth rings are inconspicuous. Magnolia blooms

32 Important Japanese dendrochronologists include Mitsutani Takumi 光谷拓実 and Ōkōchi Takayuki 大河内隆之 in the Kinki area and Ōyama Motonari 大山幹成 in the Tohoku area. These scholars established the master chronologies over two millennia through which ancient wooden relics can be dated. See Mitsutani, "Nenrinnendaihō to bunkazai"; and Mitsutani and Ōkōchi, "Nenrinnendaihō to saishin gazō kiki."

33 <https://www.radiocarbon.com/old-wood-effect.htm>.

34 Mertz, *Wood and Traditional Woodworking in Japan*, p.13, n. 37, personal observation, 19 July 2000.

35 Rambelli, *Buddhist Materiality*, pp. 129-71. Rots, *Shinto, Nature and Ideology*; Rots, "Sacred Forests, Sacred Nation."

before the famous cherry (*sakura*) but at the same time or after the three.

The third species, the Japanese chestnut (*Castanea crenata*, Jp. *kuri* 栗) has quite conspicuous growth rings. While the wood of magnolia and *Prunus* sp. is diffuse-porous, or smooth, chestnut, however, is ring-porous and shows a distinct grain. That means on a cellular level, that in spring, when the growing season starts, the early pores have a larger diameter than during the rest of the growing season, when the pores become narrow. This leads to very conspicuous trees rings, visible on the statue's surface. It is also to note that a conversion (*seizai* 製材) was practiced already in the Jōmon 縄文 period (10,000 BCE—800-400 BCE) by wedge-assisted longitudinal splitting, when the longitudinal saw was not yet introduced. The *ōga* 大鋸 (two-man frame saw), used for rift-sawing or longitudinal sawing, was only introduced to Japan from the fifteenth century on.

All three tree species, that were microscopically identified in this essay like *Magnolia* sp., *Prunus* sp., and *Castanea crenata* were likely grown on a temple or shrine precinct (*keidai* 境内), where the statues were "enshrined," or nearby. It could be imagined that all ten magnolia statues come from one huge tree (figure 19). That tree was perhaps struck by lightning, and thus was provided by divine power. Therefore, it was highly suitable for carving into *shinzō*. The two other tree species, *Prunus* sp. and the Japanese chestnut, could have been entrained by the fall of the huge tree. These are of course hypotheses. What else do the three wood species have in common? They have an expressive flowering period in spring, and are useful timber trees. Magnolia shows conspicuous, beautiful flowers in spring (figure 23). Its big leaves were used for wrapping food, and its wood is suitable for turning and carving. The *Prunus* sp. group consisting of cherry, plum, apricot and peach, is also highly appreciated for their flowers in spring. The Japanese chestnut is highly appreciated for its edible sweet chestnuts, harvested in fall.

Bogel notes that last, but not least, there is an intriguing association between magnolia flowers and scent and the *kami* in the magnolia species that grows in warmer climes. A magnolia species named *Magnolia compressa* (*Magnoliaceae*, *Magnolia* genus), scientific name *Michelia compressa* (Maxim) Sarg, is a fragrant evergreen type magnolia; unlike broadleaf magnolia and others it is green all year round. The flowers appear against the green leaves. In Japanese it is called *Ōga-*

*tama-no-ki* 大賀玉木, literally, "tree inviting the *kami*" and it can be referenced as early as in the collected songs (poems) of the *Kokinshū* 古今集, early tenth century.<sup>36</sup> The flowers and tree were treasured and considered to be *shintai* for the gods. Its flowers are smaller than those of the broadleaf magnolia; the shape of the Ōgatama tree flowers is the model for the bells used in shrines by the *miko* priestesses. (The flower branch is also depicted on one of the Japanese currencies, a 1-yen coin.)

• Magnolia (*Magnolia* sp., Jp. *mokuren-zoku*)

Figures/statues 3, 4, 5, 6, 9 10, 12, 13 14, 18

The IAWA List of Microscopic Features for Hardwood Identification notes the following anatomical features for the genus *Magnolia* sp.:

Growth ring boundaries distinct. Wood diffuse-porous. Solitary vessel outline angular. Perforation plates simple and scalariform. Scalariform perforation plates with 10-20 bars. Intervessel pits opposite and scalariform. Ray width 1 to 3 cells. Fibres thin- to thick-walled. Axial parenchyma in marginal or in seemingly marginal bands.<sup>37</sup>

• Prunus (*Prunus* sp., Jp. *sumomo-zoku* 李属)

Figure 8

The anatomical features of *Prunus* sp. are as follows:

Growth ring boundaries distinct. Wood diffuse-porous to slightly semi-ring-porous. Simple perforation plates. Intervessel pits alternate, shape of alternate pits polygonal. Vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell. Helical thickenings in vessel elements and throughout body of vessel element present. Gums and other deposits in heartwood vessels. Ray width 1 to 4 cells. Axial parenchyma diffuse to scanty paratracheal. Crystals in enlarged cells.<sup>38</sup>

36 Ōtsuki, *Shinpen Daigenkai*, entry pp. 315-16.

37 See Wheeler et al., "IAWA List of Microscopic Features for Hardwood Identification"; and Wheeler, "InsideWood."

38 See Wheeler et al., "IAWA List of Microscopic Features for Hardwood Identification"; and Wheeler, "InsideWood."



As with magnolia, *Prunus* sp. is a revered wood species in Japan as is demonstrated by the selection of wood species of the statues of the Matsuno'o Taisha 松尾大社, a sprawling historic shrine in the Western part of Kyoto. Eight of the eleven *shinzō* at Matsuno'o Taisha scientifically identified by Tazuru and Sugiyama 杉山 (of Kyoto University) tested as *Prunus* sp.<sup>39</sup> The figure 8 statue from the Sainsbury Centre mentioned above microscopically identified as *Prunus* sp. could be made of cherry, plum, apricot, or peach.<sup>40</sup>

▪ Japanese chestnut (*Castanea crenata*, Jp. *kuri*)

Figure 11.

The anatomical cell structure of Japanese chestnut, the wood used to craft the sculpture of the Youthful male Shinto deity statue held by the Princeton University Art Museum (figure 11), displays the following characteristics:

Growth ring boundaries distinct. Wood ring-porous, with vessels in dendric pattern.  
Perforation plates simple and scalariform with up to ten bars.  
Intervessel pits alternate, size medium or large.  
Vascular or vasicentric tracheids present.  
Axial parenchyma diffuse, diffuse—in—aggregates, or scanty paratracheal.  
Rays exclusively uniseriate. All ray cells procumbent.<sup>41</sup>

## Eighteen *Shinzō* in Three Categories

Itō has proposed a division of the eighteen *shinzō* into three categories: (1) eight major deities (*shusaijin* 主祭人); (2) three minor deities (*haishin* 配神); and (3) seven

attendants or followers (*jūsha* 従者). It is of course that future finding may expand or contract this number. These are listed on the table immediately after the figure number and accession number, with the deity name preferred by Itō below the main classification names. To the right, in the third column, we list the name used by the museum or private owner for the work.

▪ Eight Major Deities, the *Shusaijin*

The subgroup of Major Deities is made up of eight sculptures. Three male and five female deities wear long robes to the ground, so that the tip of the feet or shoes can be seen. The female deities are dressed in a long-sleeved garment reminiscent of robes worn by female Buddhist deities in depictions of the heavenly realm and widely seen in *kami* statues, too. The male deities show their attributes, such as a beard or *kesa* while the female show hair knots. Female figures 2, 3, 6, 7, and 8 are similar in design. The 1930s *Shinzō shinki zuroku* catalogue assigned the designation of “Shōtoku Taishi’s consort” (*hizō* 妃像) to figure 2, which would have referred to Princess Tachibana no Ōratsume. Again, it is possible that the pair were venerated sometime before 1930 as such since the cult of Shōtoku Taishi was very widespread in the medieval period, but we cannot assign any further meaning to the Shōtoku Taishi and consort descriptions in the *Catalogue* than this.

Figure 3 is illustrated in Mayuyama’s *Japanese Art in the West*, which describes it as the figure of a female Shinto deity (the table gives all references). Radiocarbon dating in December 2021 determined that figure 3’s date ranges between 1079 and 1155, to which an additional fifty to one hundred years must be added. The institutions that house figures 6 and 7 put them in the same range based on style. Bogel notes that the style of figure 8 (made of *Prunus* species) differs in some distinct ways from others, based on photographs comparing the five. Final assessments depend on many factors, including close examination of the actual statue. All five female deity figures are between 93.9 (figure 2, 1930 using *shaku* and *sun*) and 97.8 cm (figure 6), which supports a common production site and time period and display.

Figure 6 (see also figure 19) is on loan to The Metropolitan Museum of Art in New York. Microscopic identification of the tangential section by RISH, plus the macroscopic photos by conservator Daniel Hausdorf of

39 See Tazuru, Sugiyama, Wood identification of Japanese Shinto deity statues in Matsunoo-taisha Shrine in Kyoto by synchrotron X-ray microtomography and conventional microscopy methods (2019). <https://jwoodscience.springeropen.com/articles/10.1186/s10086-019-1840-2>.

40 With the exception of another species of *Prunus* sp., almond (*Prunus amygdalus*) a tree native to Iran and surrounding countries, this species does not naturally grow in Japan.

41 See Wheeler et al., “IAWA List of Microscopic Features for Hardwood Identification”; and Wheeler, “InsideWood.”



the Met, both in 2022, confirmed the 97.8 cm statue was carved from magnolia. Remarkably, this dendrometric information allowed the repositioning of the statue in the original quartered log, in longitudinal and transverse planes, as shown in figure 19.

The male deity statues are three (more may have originally existed). Figure 1 is described in the 1930 *Catalogue* as having been called an incarnation (*keshin* 化身) of the bodhisattva Kannon, an entirely feasible designation given its iconography; Itō of this research group prefers a simpler designation as “Male deity statue.” Both figures 1 and 2 are described in that text as being made of *hō* 朴, the Japanese bigleaf magnolia (*Magnolia obovata*, Jp. *hōnoki* 朴木, ホオノキ) or in the case of the male, magnolia or ancient camphor wood (*kusunoki* 楠). It is unclear to what the prefix “ancient” (*kodai* 古代) refers in this case. Given the results showing that of twelve statues tested ten are magnolia, the 1930s “guess”—or inherited knowledge from those who knew the mysterious provenance of the statues—is likely to be correct. The statues’ current owner is not known to us and permission to conduct microscopic wood identification is not possible. Figure 4 is currently held at the Art Institute of Chicago under the name “Shinto deity in the guise of the monk Hyeja.” Itō’s title of “Deity statue with the attributes of a Buddhist monk,” one of the most common “guises” for *kami* of *shinzō*, does not reference the monk Hyeja (Hyeja (?–623, Eji 慧慈 in Japanese). Likely added by owners prior to its entering the Art Institute of Chicago and based on the 1930 description for figure 1, Hyeja was one of two Korean monks who instructed Shōtoku Taishi from the Kingdom of Kōkuri 高句麗 (Kr. Goguryeo) arriving in Japan in 595. Figure 5 is a male divinity in a genre of what many scholars have referred to as the “foreign type” of *shinzō*; the Cleveland Museum of Art curator designates it simply as a “Deity,” aware of opinions that place it in the Twenty-Eight Legion divinity group alongside its typical *shinzō* carving and relationship to others in this group. It is illustrated in Mayuyama and is one of the ten certified as magnolia.

Wood testing could not be conducted at this time on the Asian Art Museum of San Francisco’s statue (figure 7), which we can only imagine will be magnolia. Figure 8, also a deva-like female deity statue, is preserved at the Sainsbury Centre in Norwich, UK, and bears a resemblance to figure 2. Both may be missing a topknot or double loop (Bogel); they are both ca. 94cm. In 1998, Peter Gasson of the Jodrell Laboratory

at Royal Botanic Gardens, Kew, microscopically identified the statue’s wood as *Prunus* sp. (Jp. *sumomo-zoku* 李属). Radiocarbon dating by accelerator mass spectrometry conducted in 1999 by the Oxford University’s Research Laboratory of Archeology and History of Art determined that the age ranges between 960 and 1040. In this case, too, fifty to one hundred years should be added to the result for a correct date calculation.

### ▪ Three Minor Deities, the Haishin

The subgroup of minor deities consists of three deities. All three are male. Two have the distinctly defined tummy area seen in male figure 5. Their garments differ, with trouser-like lower portions, and show more of the lower leg. Figure 9, Male deity statue in a Japanese robe, is held at the Honolulu Museum of Art. Like the other two figures at that museum (figures 12 and 14), it was a gift of Robert Allerton in the early 1960s. The wood identification of magnolia was made in 2021 by synchrotron X-ray microtomography imaging and it has a height of 113.0 cm, the tallest, but due to the tall hat. The hat is striking, as is the protruding belly and left arm raised—an iconography that we have not studied. We refer to figure 10, held at the Philadelphia Museum of Art, as the “Crowned Male Deity Statue in a Japanese Robe.” As noted, the results of its wood testing result of magnolia in 2021, also by synchrotron X-ray microtomography imaging, served as the impetus for the present research. The 99.1 cm statue wears a crown and a tunic that falls below the knees. Both figures 9 and 10 are illustrated in Mayuyama (pp. 23 and 24, see Table notes). Figure 11, the “Youthful male deity statue” (*dōji-gyō shinzō* 童子形像), rises 95.0 cm in height. His black painted hair is parted in the middle and extends in two thick ponytails nearly to his waist. The statue has been discussed in the superlative Cleveland exhibition catalogue on Shinto art by Vilbar and Carr as Wakamiya 若宮, the Young Prince—either the child of the principal *kami* of a shrine, or a representation of that deity’s renewed spirit, although they note in conclusion that although “Hachiman Wakamiya is the most likely candidate for the identity of this sculpture, its precise identity remains unclear”.<sup>42</sup> As with many of the eighteen statues discussed here, Vilbar and Carr also note that the traces of the carving tools are not smoothed away,

<sup>42</sup> Vilbar and Carr, *Shinto*, 169, photo on 169.

one of the hallmarks of *shinzō*. The sculpture is made of Japanese chestnut (*Castanea crenata*, Jp. *kuri* 栗), updating the visual assignment of zelkova in the Cleveland exhibition catalogue to the work before testing.

#### ▪ Seven Attendants or Followers, the Jūsha

All but two (figures 15 and 16) of the group of seven attendants or followers who protect the major and minor deities (figures 12 through 18) wear knee-length garments held by a belt around the waist. Otherwise, figure 15 is a guardian type figure and 16 a female deity with attributes of an old woman.

Figure 12, the second of three held by the Honolulu Museum of Art and gifted by Robert Allerton, stands 99.7 cm tall and features the priest Hōshi statue (*Hōshi oshō zō* 宝誌和尚像). Contrasting Mayuyama's notation of hinoki cypress, our microscopic wood identification of 2021 indicates magnolia.<sup>43</sup> The depiction of multiple faces is striking and also typical for portrayals of this priest—here in *kami* form. Figure 13, found in The Art Institute of Chicago, the “Dragon King” is represented as a youthful figure looking upward with the dragon attribute on his head, making it 102.2 cm tall. It is illustrated in Mayuyama and therein called the “Dragon Woman” (*Zen'nyo ryūō* 善女竜王). The Art Institute explains on its website that “the Dragon King, originally an Indian Hindu god, was gradually incorporated into the Buddhist pantheon. Veneration of this deity, who rules the seas, spread with Buddhism from India to China and, via Korea, to Japan; there the Dragon King was transformed into a Shinto god.” This statue was microscopically identified by the Forest Products Laboratory (Center for Wood Anatomy Research, USDA Forest Service) in Madison, Wisconsin as being made of magnolia. We identify figure 14 as a deity statue with demonic (*yasha*) attributes, *Yasha-gyō shinzō* 夜叉形神像, as does Mayuyama, where it is illustrated. Preserved at the Honolulu Museum of Art, it was also gifted to them by Robert Allerton. The museum provided us with a museum record notation stating that figure 12 was purchased from “Maruyama & Co., Tokyo;” Bogel notes this may be an error for “Mayuyama”; with all three statues gifted by Allerton, one can surmise that all three were purchased from Ma-

yuyama, who illustrates all three in *Japanese Art in the West*. Figure 14 measures 99.7 cm tall and microscopic analysis conducted in 2021 determined it to be magnolia. The statue has been radiocarbon dated to 988–1026.

The authors have less information for the next three *jūsha* statues, all of which are in Japanese museums. Figure 15 is a deva-like male deity statue, which could represent Bishamonten 毘沙門天, but this is not certain. It is privately owned but on loan to the Tokyo National Museum and is dated by the museum based on style to the twelfth century. We do not have its exact height size. Wood testing is rarely carried out on religious statues in the Japanese museums and that is so far the case for figures 15, 16, and 17. Figure 16 is female deity statue with the attributes of an old woman (*rōjōzō* 老女像). This genre is part of various Buddhist deity groups such as the Twenty-Eight Legion noted earlier. They are not unknown in *shinzō* examples. Preserved at Tokyo National Museum, the statue rises 97.4 cm high.

Figure 17 is a deva-like male deity statue, a standing icon with monk attributes (*Sōgyō ryūzō* 僧形立像), preserved in the University Art Museum at the Tokyo University of the Arts. It dates from the twelfth century, and its size is 97.0 cm. On their homepage the statue is described as maybe being made from birch (*Betula* sp., Jp. *kaba* 樺). This observation was probably done by naked-eye observation, and cannot be confirmed. Figure 18 of the group is a deva-like male deity statue held today in the Gitter-Yelen collection. The statue's height is 101.0 cm, due in part to its wild standing hair. It was offered for sale by Bonhams auction house on March 15, 2017 without a sale. The webpage notes that the figure's naked torso is “simply carved with a slightly protruding belly, the suggestion of a cloak-like garment around the shoulders, and the skirt indicated by three folds in relief and augmented by a few simple lines extending to just above the knees. The back is almost smooth except for lines below the collar and above the skirt, and the feet bear traces of dark pigment indicating shoes.”<sup>44</sup> The face conveys ferocity with arched brows. It was identified by RISH in 2022 as being made of magnolia. The similarity with the flaming hair to that of priest Hōshi (figure 11) suggests that this statue also belongs to the category of attendants.

43 Mayuyama, *Japanese Art in the West*, 22–23, 342.

44 <https://www.bonhams.com/auctions/23784/lot/6150/?category=list>

## Conclusions: Material Intentionality

The eighteen Shinto statues form a group unified by physical attributes including style, size, construction by a single bole of wood (*ichiboku-zukuri*), remaining marks of the carving tools and—our most robust research effort—the use of distinctive types of wood. The reasons for the use of magnolia, *Prunus sp.*, or chestnut are unclear, but we have offered suggestions to the extent possible. All of this combines to point to the ways in which religious arts may convey their “intention” through materiality. The statues date to the Heian period as far as we can test, judge, or receive information, and we have a tantalizing lead that they may come from a shrine in the Izumo region.

As for the iconography, we have omitted a discussion of shinbutsu shūgō 神仏習合 in direct terms because this so-called (and unfortunately so) “synthesis” of Buddhist and kami veneration is well considered in the literature.<sup>45</sup> Itō has proposed that the group of eighteen *shinzō* statues may represent a *suijaku mandara* (*mandala*) 垂迹曼荼羅, one type of multi-deity representation of which there are many examples in painting<sup>46</sup> but none in sculpture. According to this “philosophy” regarding kami—one that came into formal expression during the Heian period—like the Dai-bosatsu designation noted in this report, *honji-suijaku* thesis puts forth that various Buddhas, the source or origin figures of deities, are called “*honjibutsu*” 本地仏 and deities originating from them are “*suijakushin*” 垂迹神 or *suijaku kami*. Kami were understood as the local Japanese manifestations (*suijaku*) of eternal Buddhist figures (*honjibutsu*).

Most of the provenance records for these statues, now scattered across various museums in the United States, Japan, Canada, and the United Kingdom most of the provenance records have been considered (less so for those in Japan) and it is likely that research in the Mayuyama Co., Tokyo archives or further discussions with dealers and museums in Japan will provide further provenance information. If so, it will tell us more

about their acquisition history, but not their iconography, alas. At the same time, discussions about icons that were moved, sold, stolen, or traded after the forced separation of shrine and temple and the destruction of their “goods” and prohibition of certain “rituals” is a very sensitive topic, especially when it comes to the current trustees for these materials.

The group may well have included more deity statues. In the present study we have been concerned primarily with the material used to make the *shinzō* under discussion—namely, wood—and with sharing the results of scientific study and its possible implications for *shinzō* scholarship. It would be exciting to be able to prove that this group was created for a particular donor or for a specific purpose—or even that the group is complete at eighteen. For the time being, we look forward to further collaborations among ourselves and others.

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Fig. # Access. #	Deity group Statue description / name (created by Itô Shirô)	Statue name used by museum or owner	Country, owner, & object provenance information	Medium, Source (if not owner)	Dimensions	Date (source)	Notes, additional provenance information, and sources
1	Major deity ( <i>shusaijin</i> 主祭人)  Male deity statue ( <i>Danshinzô</i> 男神像)	Current designation by owner unknown  <i>Shinzô shinki zuroku</i> : "Shôtoku Taishi, incarnation of Kannon" ( <i>Shôtoku Taishi Kannon keshin shinzô</i> 聖徳 太子観音化身神像).	Japan. Private collection. Former owner: Maeyama Hisakichi 前山久吉 (1872–1937)  Sold within Japan to a private party in recent years	"Possibly Japanese bigleaf magnolia ( <i>hō</i> 朴) ancient camphor wood ( <i>kodai kusunoki</i> 古代楠)" ( <i>Shinzô shinki zuroku</i> )  Not tested	H ca. 99.9 cm 3 <i>shaku</i> 3 <i>sun</i> * ( <i>Shinzô shinki zuroku</i> )	12th c. (?) ( <i>Shinzô shinki zuroku</i> )	<i>Shinzô shinki zuroku</i> 1930, pl. 8
2	Major deity ( <i>shusaijin</i> 主祭人)  Deva-like female deity statue ( <i>Joshinzô</i> 女神像)	as above  <i>Shinzô shinki zuroku</i> 1930, pl. 9 states: "Consort of Shôtoku Taishi statue ( <i>Shôtoku Taishi hizô</i> 聖徳太子妃像)	as above	as above	H ca. 93.9 cm 3 <i>shaku</i> 1 <i>sun</i> * ( <i>Shinzô shinki zuroku</i> )	12th c. (?) ( <i>Shinzô shinki zuroku</i> )	
3  957.228	Major deity ( <i>shusaijin</i> 主祭人)  Deva-like female deity statue ( <i>Tenbugyô joshinzô</i> 天部形女神像)	Figure of female Shinto deity, Goddess (museum designation)	Canada (Toronto). Royal Ontario Museum. Purchased with the generous support of a Grant from the Government of Ontario	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISH)	H 97.3 cm W 25 cm D 13 cm	ca. 1079–1155 (Carbon-14 dating, +/- 50–100 years) (11th–12th c.)	Mayuyama 1966, p. 22, pl. 25. Shimizu, 1979 (3), p. 113 notes "said to be from a shrine in the Izumo region."  <a href="https://collections.rom.on.ca/objects/299062/figure-of-female-shinto-deity?ctx=2cafb44e-1ecd-4a8d-834b-ebf4768712cb&amp;id=x=0">https://collections.rom.on.ca/objects/299062/figure -of-female-shinto-deity?ctx=2cafb44e-1ecd-4a8d -834b-ebf4768712cb&amp;id=x=0</a>
4  2002.22	Major deity ( <i>shusaijin</i> 主祭人)  Deity statue with the attributes of a Buddhist monk ( <i>Sôgyô shinzô</i> 僧形神像)	Shinto deity in the guise of the Monk Hyeja	USA. Art Institute of Chicago. Kate S. Buckingham Endowment	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (FPL)	H 97 cm	11th–early 12th c. (museum)	<a href="https://www.artic.edu/artworks/159534/shinto-deity-in-the-guise-of-the-monk-hyeja">https://www.artic.edu/artworks/159534/shinto-deity -in-the-guise-of-the-monk-hyeja</a>  Shimizu 1979 (2), p. 107 notes collection Cynthia Hannah Moore
5  1954.373	Major deity ( <i>shusaijin</i> 主祭人)  Deva-like male deity statue ( <i>Tenbugyô danshinzô</i> 天部形男神像)	Deity  Acquired in 1954 from Hollis & Company, New York, NY. Formerly collection of Umebara Ryûzaburo 梅原 龍三郎 (1888–1986)	USA. Cleveland Museum of Art. John L. Severance Fund	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISH) with traces of polychromy	H 100 cm	1100s, Heian period (museum)	Mayuyama 1966, p. 24, pl. 28.  Provenance and other information: <a href="https://www.clevelandart.org/art/1954.373">https://www.clevelandart.org/art/1954.373</a>
6  L.2012.3.3	Major deity ( <i>shusaijin</i> 主祭人)  Deva-like female deity statue ( <i>Tenbugyô joshinzô</i> 天部形女神像)	Female Shinto deity	USA. On loan to The Metropolitan Museum of Art, New York	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISH)	H 97.8 cm W 24.8 cm D 12.7 cm	1000–1200 (museum)	<a href="https://www.metmuseum.org/art/collection/search/76086">https://www.metmuseum.org/art/collection /search/76086</a>

Fig. # Access. #	Deity group Statue description / name (created by Itô Shirô)	Statue name used by museum or owner	Country, owner, & object provenance information	Medium, Source (if not owner)	Dimensions	Date (source)	Notes, additional provenance information, and sources
7 B69S36	Major deity ( <i>shusaijin</i> 主祭人)  Deva-like female deity statue ( <i>Tenbugyô joshinzô</i> 天部形女神像)	Female Shinto spirit	USA. Asian Art Museum of San Francisco. Gift of Mrs. Herbert Fleishhacker. Statue transferred to this Museum from the Fine Arts Museums of San Francisco in 1969. Donated to the latter in 1948. History prior to 1948 unknown.	Wood with traces of pigment	H 97 cm W 21.6 cm D 12.1 cm	1100–1200 (museum)	<a href="http://searchcollection.asianart.org/view/objects/asitem/19409/0?tstate:flow=737b23c4-3ffd-46cc-a45a-a49778bodfeo">http://searchcollection.asianart.org/view/objects/asitem/19409/0?tstate:flow=737b23c4-3ffd-46cc-a45a-a49778bodfeo</a>
8 1146	Major deity ( <i>shusaijin</i> 主祭人)  Deva-like female deity statue ( <i>Tenbugyô joshinzô</i> 天部形女神像)	Shinto deity  Purchased by the Sainsbury Centre, UEA, from Leighton R. Longhi, Inc. in 1997 on advice of Robert Sainsbury (museum records)	UK. Sainsbury Centre, Norwich. Gift of Howard Hollis (1899–1985). Funds provided by the Robert and Lisa Sainsbury Charitable Trust	<i>Prunus</i> sp. (Jp. <i>sumomo-zoku</i> 李属 スモモ属) (JL) with white plaster and faint traces of polychromy	H 94 cm	960–1040 (Carbon-14 dating, +/- 50–100 years) (JL) 1185–1332 (museum) (10th–11th c.)	<a href="https://www.sainsburycentre.ac.uk/art-and-objects/shinto-deity/">https://www.sainsburycentre.ac.uk/art-and-objects/shinto-deity/</a>  <a href="https://adlib.uea.ac.uk/Details/collect/2257">https://adlib.uea.ac.uk/Details/collect/2257</a>
9 1964– 3311.1a-b	Minor deity ( <i>haishin</i> 配神)  Male deity statue in a Japanese robe ( <i>Wasô danshinzô</i> 和装男神像)	Male Shinto deity ( <i>danshinzô</i> 男神像)  Izu gongen 伊豆権現 Shimizu, 1979 (2), 110	USA. Honolulu Museum of Art. Gift of Robert Allerton, 1964	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISHI)	H 113 cm	12th c. Heian period (museum)	Mayuyama 1966, p. 23, pl. 26. Shimizu 1979 (2), p. 110 gives gift dates as 1944 NB: Museum website under reconstruction at this time (also applies to figs. 12 and 14)
10 1965–25–1a,b	Minor deity ( <i>haishin</i> 配神)  Crowned male deity statue in a Japanese robe ( <i>Hôkanwasô danshinzô</i> 宝冠和装男神像)	Shinto deity Purchased in 1965 from Kochukyo Co., Tokyo. Originally in Izumo Shrine and "ten years ago" in Ryoichi Hosomi's collection with information given by R. Hosomi, 20 June 1965 (museum records)	USA. Philadelphia Museum of Art. Purchased with the J. Stogdell Stokes Fund, 1965	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISHI) with traces of white plaster and polychromy	H 99.1 cm W 24.1 cm	11th–12th c. (museum)	Mayuyama 1966, p. 24, pl. 29; Shimizu 1979 (3), p. 100
11 2006.84	Minor deity ( <i>haishin</i> 配神)  Youthful male deity statue ( <i>Dôshigyôzô</i> 童子形像)	Youthful male deity statue ( <i>Dôshigyôzô</i> 童子形像)	USA. Princeton University Art Museum. Museum purchase, Fowler McCormick, Class of 1921, Fund.	Japanese chestnut ( <i>Castanea crenata</i> , Jp. <i>kuri</i> 栗) (RISHI) with traces of polychromy	H 95 cm W 27 cm D 17.2 cm	12th c., Heian period (museum)	<a href="https://artmuseum.princeton.edu/collections/objects/42936">https://artmuseum.princeton.edu/collections/objects/42936</a>  Vilbar and Carr 2019, p. 168, fig. 69
12 1960–2788.1	Attendant/follower ( <i>jûsha</i> 従者)  Priest Hôshi statue ( <i>Hôshi oshô zô</i> 宝誌和尚像)	Priest Hôshi statue ( <i>Hôshi oshô zô</i> 宝誌和尚像)  Museum provenance: Maruyama & Co., Tokyo. Said to be from a Shinto shrine in Izumo Prefecture. ["Maruyama" may be an error for "Mayuyama"]	USA. Honolulu Museum of Art. Gift of Mr. Robert Allerton, 1960	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISHI)	H 99.7 cm	12th c. Heian period (museum)	Mayuyama 1966, p. 22, pl. 24. Shimizu 1979 (1), p. 110

Fig. # Access. #	Deity group Statue description / name (created by Itō Shirō)	Statue name used by museum or owner	Country, owner, & object provenance information	Medium, Source (if not owner)	Dimensions	Date (source)	Notes, additional provenance information, and sources
13 1957.242	Attendant/ follower ( <i>jūsha</i> 従者)  Dragon King deity ( <i>Ryūōzō</i> 竜王像)	Dragon King (a Shinto deity statue)	USA. Art Institute of Chicago. Gift of Robert Allerton	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (FPL)	H 102.2 cm	11th–early 12th c. (museum)	Mayuyama 1966, p. 23, pl. 27.  <a href="https://www.artic.edu/artworks/5821/dragon-king">https://www.artic.edu/artworks/5821/dragon-king</a>
14 1964–3210.1	Attendant/ follower ( <i>jūsha</i> 従者)  Deity statue with demonic attributes ( <i>Yashuyōshinzō</i> 夜叉形神像)	Male Shinto deity	USA. Honolulu Museum of Art. Gift of Mr. Robert Allerton, in honor of the fiftieth Wedding Anniversary of Mr. & Mrs. Theodore A. Cooke	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISH)	H 99.7 cm	988–1026 (Carbon-14 dating, +/- 50–100 years) 10th–11th c.  12th c. (museum)	Mayuyama 1966, p. 25, pl. 30. Provenance: museum has only the credit line  Shimizu 1979 (1), p. 111
15	Attendant/ follower ( <i>jūsha</i> 従者)  Deva-like male deity statue, possibly Bishamonten ( <i>Tenbugyōdanshinzō</i> or <i>Bishamonten</i> 天部形男神像または毘沙門天)	Unknown	Japan. Tokyo National Museum 東京 国立博物館, on loan from a private collection.	Wood	unknown	12th c. (?)	
16 Coll. No. C-1113	Attendant/ follower ( <i>jūsha</i> 従者)  Female deity statue with the attributes of an old woman ( <i>Jōshinzō</i> [Rōjo] 女神像 [老女])	<i>Rōjogyōzōryūzō</i> ( <i>Nijūhachibushūzō</i> ) 老女 形立像 (二十八部衆像)  Standing statue, Old Woman Deity from the Twenty-Eight Legion statues	Japan. Tokyo National Museum 東京 国立博物館. Gift of Mr. Maeyama Hisakichi 前山久吉 (1872–1937)	Wood with polychromy	H 100 cm	12th c., Heian period (museum)	<a href="https://colbase.nich.go.jp/collection_items/tnm/C-1113?locale=ja">https://colbase.nich.go.jp/collection_items/tnm/C-1113?locale=ja</a>  Image no: C0055106
17 TUA000242# 338	Attendant/ follower ( <i>jūsha</i> 従者)  Deva-like male deity statue ( <i>Tenbugyō danshinzō</i> 天部形男神像)	Standing statue with monk attributes ( <i>Sōgyō ryūzō</i> 僧形立像)  <a href="https://images.dnpartcom.jp/ia/search?filterText=TUA000242">https://images .dnpartcom.jp/ia /search?filterText =TUA000242</a>	Japan. The University Art Museum, Tokyo University of the Arts, 東京 藝術大学美術館	Wood. Single block construction ( <i>ichibokuzukuri</i> 一木造)  Birch wood (museum) No scientific testing has been done. Birch unlikely (authors)	H 97 cm	12th c. (museum)	<a href="https://images.dnpartcom.jp/ia/search?filterText=TUA000242">https://images.dnpartcom.jp/ia /search?filterText=TUA000242</a>
18 NA	Attendant/ follower ( <i>jūsha</i> 従者)  Deva-like male deity statue ( <i>Tenbugyō danshinzō</i> 天部形男神像)	A large standing figure of a Shinto deity	USA (New Orleans). Gitter-Yelen Collection.  Formerly Howard Hollis collection.	Magnolia ( <i>Magnolia</i> sp., Jp. <i>mokuren-zoku</i> 木蓮属 モクレン属) (RISH)  with traces of pigment	H 101 cm	Late 10th c., Carbon-14 (not by Paleo Labo) 10th–11th c.	<a href="https://www.bonhams.com/auctions/23784/lot/6150/?category=list">https://www.bonhams.com/auctions/23784 /lot/6150/?category=list</a>  Bonhams listing (the listing remains posted; the statue did not sell at the time).

KEY: RISH: Research Institute for Sustainable Humanosphere, Kyoto University, Japan

PG: Peter Gasson, Jodrell Laboratory, Royal Botanic Gardens, Kew, UK

\*Modern equivalents for the traditional measurements of *shaku* 尺 and *sun* 寸 are 30.30 cm and 3.03 cm respectively.

The precise equivalents in 1930 (date of source) were not researched.

\*Carbon-14 dating was performed by Paleo Labo Co., Ltd., Toda City, Saitama Prefecture, Japan, unless otherwise indicated



**Figure 1.** Private collection. 12th c., *Magnolia obovata* (unconfirmed).



**Figure 2.** Private collection. 12th c., *Magnolia obovata* (unconfirmed).



**Figure 3.** Royal Ontario Museum, 957.228. Ca. 1079-1155, *Magnolia* sp.



**Figure 4.** Art Institute of Chicago, 2002.22. 11th-early 12th c., *Magnolia* sp.





**Figure 5.** Cleveland Museum of Art, 1954.373. 1100s, *Magnolia* sp.



**Figure 6.** The Metropolitan Museum of Art, L.2012.3.3. 1000-1200, *Magnolia* sp.



**Figure 7.** Asian Art Museum of San Francisco, B69S36. 1100-1200, *Magnolia* sp.



**Figure 8.** Sainsbury Centre, 1146. Ca. 960-1040, *Prunus* sp.



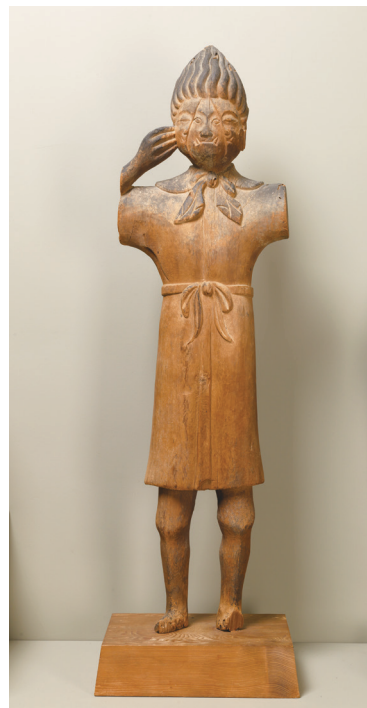
**Figure 9.** Honolulu Museum of Art, 1964-3311.1a-b. 12th c., *Magnolia* sp.



**Figure 10.** Philadelphia Museum of Art, 1965-25-1a, b. 11-12th c., *Magnolia* sp.



**Figure 11.** Princeton University Art Museum, 2006.84. 12th c., *Castanea crenata*.



**Figure 12.** Honolulu Museum of Art, 1960-2788.1. 12th c., *Magnolia* sp.



**Figure 13.** Art Institute of Chicago, 1957.242. 11th-early 12th c., *Magnolia* sp.



**Figure 14.** Honolulu Museum of Art, 1964-3210.1. Ca. 988-1026, *Magnolia* sp.



**Figure 15.** Tokyo National Museum, 12th c. (?), wood.



**Figure 16.** Tokyo National Museum, Coll. No.C-1113. 12th c., wood.

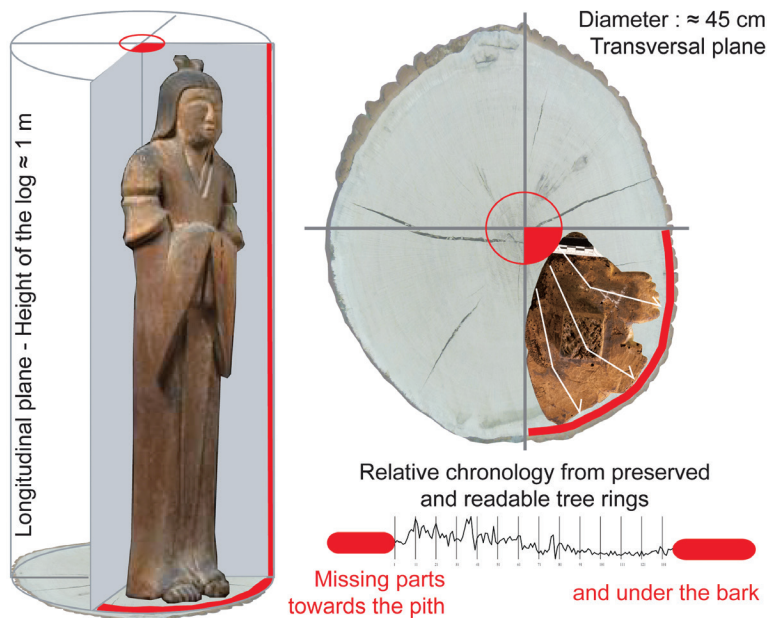




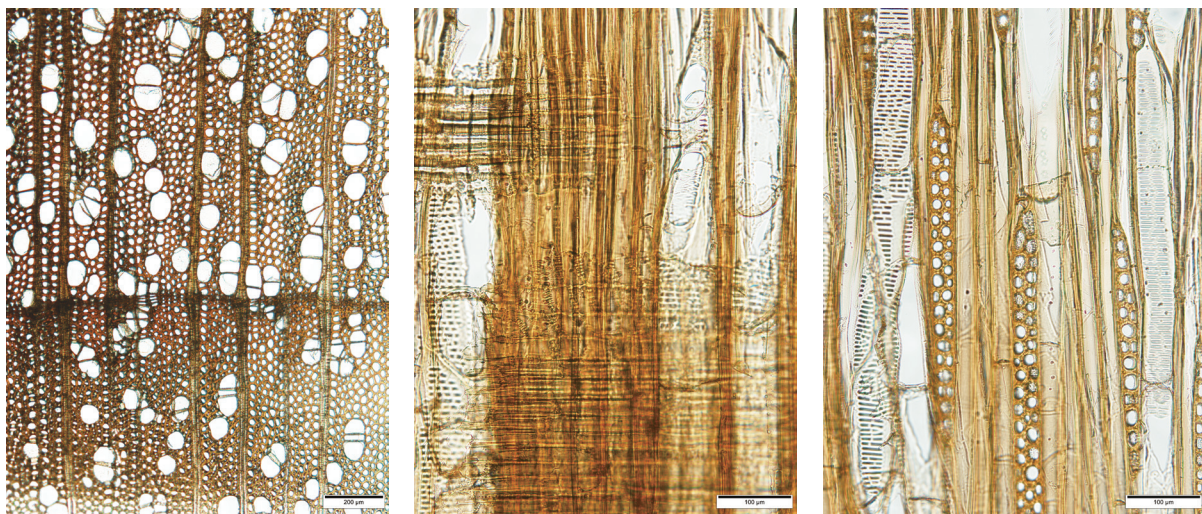
**Figure 17.** Tokyo University of the Arts, Coll. TUA000242 # 338. 12th c., wood.



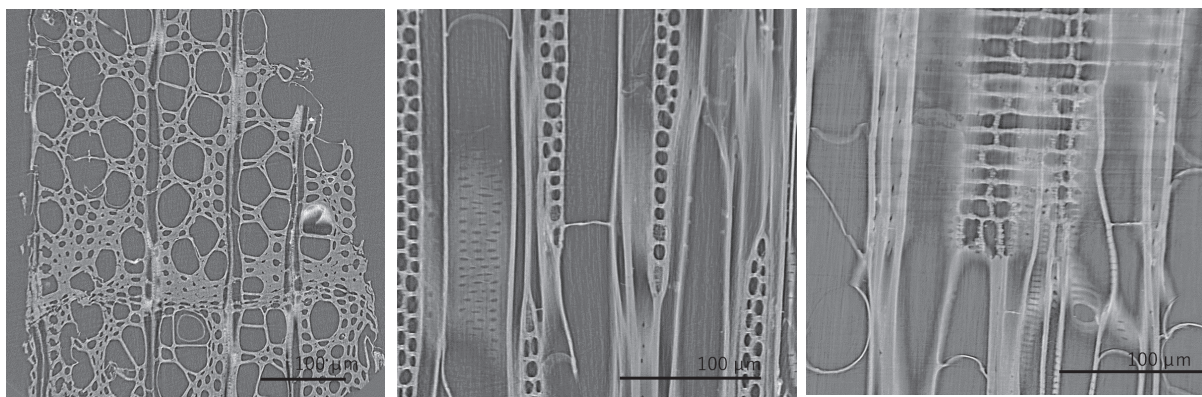
**Figure 18.** Gitter-Yelen Collection. Late 10th c., *Magnolia* sp.



**Figure 19.** Image created using current dendrometric information for statue designated as fig. 6, allowing the repositioning of the statue in the original quartered log in longitudinal and transverse planes. CAD image by C. Lavier, Centre de recherche et de restauration des musées de France (C2RMF). The underside of the statue (photo right) shows that it must have come from a quarter of a log of about 45 cm diameter and (photo left) one meter high. Photographs by C. Lavier, with permission. Statue: Private collection, on loan to The Metropolitan Museum of Art, New York (L.2012.3.3), with permission.

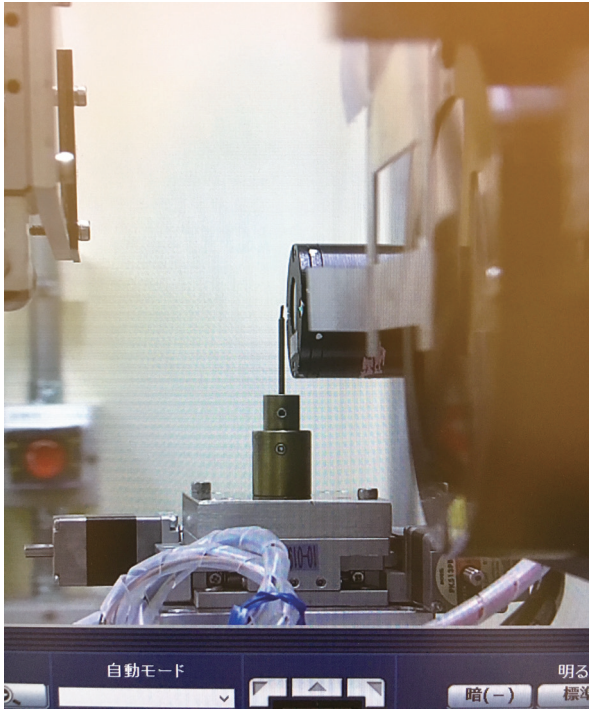


**Figure 20.** Microstructure of *Magnolia* sp. or *mokuren-zoku*, by observation under the microscope (Olympus BX51, Japan). Left, transverse section; center, radial section; right, tangential section. Test on sample from fig. 12. Photograph by Tazuru Suyako.



**Figure 21.** Pseudo-sections constructed from the datasets obtained through the synchrotron X-ray (SRX-ray) experiment at SPring-8 (Harima, Hyogo Prefecture) of *Magnolia* sp. or *mokuren-zoku*. Left, transverse section; center, tangential section; right, radial section. Test on sample from fig. 9. Photograph by Tazuru Suyako. Note: Micrographs of the deity statues will be available in the future in the RISH database.





**Figure 22.** Scene of the experiment at Beamline20XU, SPring-8. A tiny wood sample (0.5 mm x 0.5 mm x 7 mm) was fixed on the sample holder and a total of 1,800 transmitted images were recorded on a high resolution camera. Photograph by Tazuru Suyako.



**Figure 23.** Magnolia tree in bloom in the Kyoto Imperial Palace (Kyōto Gosho 京都御所 ). Kyoto, March 25, 2022. Photo by Judith Clancy, with permission.