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The *Vesicular* or Egyptian Rectangle as an Analytical Tool: Demonstrating the Persistence of Yuman Ceramic Production Through the Increasing Proportional Height of Vessels

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There are few existing studies of contemporary Yuman ceramics in Baja California, and past research has primarily focused on how the craft has been "westernized" since the Spanish mission period. Although innumerable ceramic traditions were practiced in Mexico prior to the arrival of the Spanish, it is not usually possible to trace the persistence of this craft through the transition from a semi-nomadic subsistence pattern to a more sedentary lifestyle; it is possible with Yuman ceramics. The author has developed a new method employing the vesicular *or Egyptian rectangle to measure vessels and demonstrate diachronic and synchronic changes in the relative height and variety of forms. The associated theory holds that these changes correspond to the decreasing mobility, or increased sedentism, of Yuman peoples. Independent of the undeniable western influences on Yuman ceramics, this method shows that the proportional height of vessels increased with the persistence of this craft through time.*

Investigating the persistence of the Yuman ceramic tradition from precolonial times into the present day is certainly not a new endeavor. In the early twentieth century, Malcolm Rogers (1936) carried out ethnographic research with the few Kumeyaay potters still present in southern California and northern Baja California. His objective was to gain some insight into and obtain a better understanding of the ceramic materials he was encountering at Yuman archaeological sites. Nonetheless, he concluded that it was not entirely possible to do this because of the substantial differences he observed between precolonial and ethnographic objects, many of which he considered to be non-native in origin (see Panich and Wilken-Robertson 2013a:112). Subsequent research aimed at characterizing the nature of the persistence between colonial and contemporary Yuman ceramics has indicated that at Spanish missions located in areas where the tradition had originally been present, ceramics continued to be produced using the ancestral paddle and anvil technique, although some modifications were made to decorative finishes and in the type of fuel used in firing. Also, the introduction of European dietary and food preparation customs produced a need for different and diversified vessel forms in addition to those customarily used. As a result, substantial changes are evident in mission-era ceramics when they are compared to earlier archaeological examples (Griset 1990:196–197).

In related research, Sue Anne Wade (2004) explored two specific problems in her study of Kumeyaay and Paipai ceramics through time: first, the evidence for cultural adaptations resulting from the arrival of the Spanish in Alta and Baja California, and second, the influence of Americans and Mexicans on the craft. She concluded that the persistence of the tradition from the precolonial period into the present day could be credited to the intercultural exchange network that indigenous potters developed as an adaptive strategy. According to Wade, the industry fostered political reciprocity and cultural sharing that was needed to survive in a constantly changing world; this adaptive strategy was said to be observable in Yuman ceramic forms produced for these ethnically distinct populations at different times in history. Similarly, Suzanne Griset and Alan Ferg analyzed a ceramic collection in 2010 that had been

acquired in the Paipai community of Santa Catarina, Baja California, by Norton and Ethel Allen in the 1950s. Using historical records and photographs, they demonstrated that this settlement was a useful site for investigating and tracing the familial lineages of potters as well as for exploring the changes occurring to their vessels in response to the commercialization of these goods, a process that began about 1950.

The question of persistence in the Yuman ceramic tradition in Baja California was not addressed by Mexican archaeologists until quite recently (Porcayo 2015, 2016a, 2016b). This is primarily due to the limited number of researchers and of archaeological or ethnographic projects dedicated to the topic; however, it is also important to note that the neglect of this type of research reflects a trend in the study of all the nomadic or semi-nomadic peoples who once inhabited the country. Although many precolonial ceramic traditions existed, there is currently no specific research exploring whether or not they were developed by nomadic and semi-nomadic groups. If some of these traditions did, in fact, persist through the transition to a sedentary subsistence pattern, it is currently unknown which basic characteristics of manufacturing techniques, decorative finishes, uses, and forms are correlated with either nomadic or semi-nomadic production. The question as to whether certain changes were triggered by colonists with different cultural and economic practices, or by the resulting commercial market for utilitarian and decorative wares, is even less understood.

The aforementioned trend in Mexico is owing to the fact that contemporary studies of precolonial ceramics focus exclusively on sedentary groups, primarily from Mesoamerica. Furthermore, researchers generally agree that during the pre-classic period in Mesoamerica (ca. 2,500 B.C.), the practices of sedentary agriculture and ceramic production were introduced simultaneously (López Austin et. al. 2002:11; Lorenzo 1967:34). This entirely ignores the possibility that the craft was practiced by other (non-sedentary) groups, including those in Baja California. The primary objective of Mexican archaeologists has been to determine the earliest ceramic tradition(s) in Mesoamerica, associated with the first sedentary agriculturalists. Ceramic technology is thought to have been introduced by migrants from northern South America, where it had been practiced longer, though it may also have developed independently in the region or been reinvented locally through imported knowledge of the craft approximately 4,000 years ago (Brush 1965; García y Merino 2005:73, 77, 80; McNeish et. al. 1970).

Perhaps as a result of the studies described above, Mexican researchers in the past who observed the presence of ceramics at archaeological sites once inhabited by nomadic or semi-nomadic groups in the north of Mexico assumed *a priori* that this material had been imported or traded into the area, precisely because the inhabitants had not practiced sedentary agriculture (Aveleyra 1956:101, 102). In a departure from this historical discourse in Mexican archaeology, I consider attention to the persistence of Yuman ceramic production from precolonial times into the present to be of fundamental importance. As mentioned above, previous studies in this region have been limited to identifying cultural changes provoked by contact with Euro-Americans (Griset 1990) or finding evidence for adaptive strategies developed to survive in a "constantly changing world" (Wade 2004), perspectives with which I do not entirely agree. A more encompassing study of persistence, particularly among contemporary potters in Santa Catarina (Fig. 1), is relevant not only to the archaeology of California and Baja California, but also to all of Mexico, since it involves the only known example of a ceramic tradition that was initiated by semi-nomadic peoples who subsequently transitioned into a sedentary subsistence pattern.

While conducting a literature review of historical documents dating from the sixteenth to the eighteenth centuries, Agustín Ortega Esquina characterized the cultural groups inhabiting the lower Colorado and Gila rivers during the colonial period as being immersed in a complex process of social change. He identified three types of tribal communities present in the area at the time of contact with Spanish missionaries: incipient, "developing," and hierarchical (Ortega 2002, 2004). His study was based upon an Ibero-American theoretical framework that emphasized a tendency toward more sedentary living that intensified after the arrival of the Spanish.

Incipient tribal communities consisted of seasonally-nomadic hunter-gatherers such as the Kumeyaay, Paipai, and Kiliwa (Ortega 2004:355). Contemporaneous "developing" groups, such as the Cocopah, were semi-nomadic or partially sedentary and practiced agriculture,

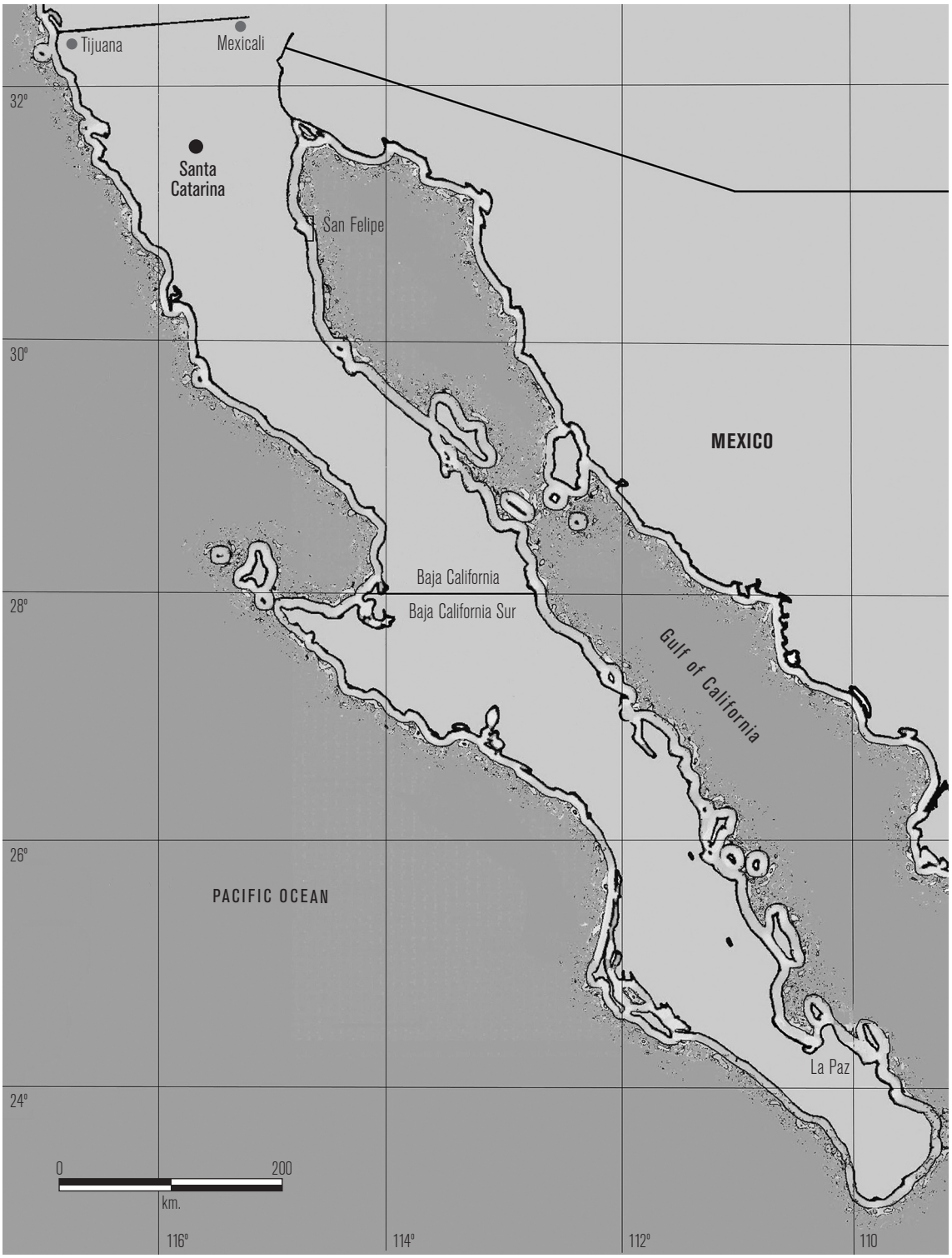

Figure 1. Location of the Paipai community of Santa Catarina, Baja California.

supplementing their diet through fishing, hunting, and the gathering of plant resources. The third subsistence pattern Ortega (2004) identified, hierarchical communities, involving such groups as the Yuma or Quechan tribes, had adopted relatively complex social and political systems that were said to be further consolidated by Spanish

colonialism. These latter groups lived in permanent villages and practiced a mixed economy, with a marked division of labor between agriculturalists, fishers, and collectors.

Utilizing this classification, Ortega demonstrated that by the eighteenth century, when Europeans arrived, Yuman tribes inhabiting the lower delta included seasonal hunter-gatherers, dispersed semi-nomadic groups, and permanent, or "nuclear" village settlements that shared a diverse array of subsistence practices (Ortega 2002:268). Missionary explorers Eusebio Francisco Kino (of the Jesuit order) and Francisco Hermenegildo Tomás Garcés (of the Franciscan order) referred to the dispersed "*rancherías*" they encountered along the river deltas in the eighteenth century, and indicated that it may have been intertribal hostility that forced these groups to join together in greater numbers (Ortega 2002, 2004).

Since 2004, I have overseen numerous archaeological projects within Yuman territory in Baja California. At sites where ceramics are present, the diversity of forms and quantity of vessels vary across what are thought to have been territories specific to particular ethnolinguistic groups. For example, sites in the vicinity of Algodones or Valle de Mexicali contain relatively more forms and numbers of vessels than sites near San Felipe or the Gulf of California. In addition, after having recorded a variety of Yuman sites and analyzed the ceramics with associated radiocarbon dates, it became apparent that those sites containing more diverse and abundant assemblages were usually occupied at later, post A.D. 1700 dates. Many of these sites were found to be contemporaneous with Kiliwa sites in the San Felipe region that yielded smaller and less diversified ceramic collections. In general, a study of earlier sites indicates that such a diversity of forms and quantity of vessels did not exist initially—only very basic forms such as bowls and small *ollas* were present.

While studying a prehistoric Yuman vessel in 2015, I began applying geometric criteria in an attempt to understand the fundamental differences between what Rogers (1945) and Waters (1982) had classified as bowls and *ollas*. It was impossible to make an identification based solely on the forms represented by their typological tables. An application of the Egyptian rectangle method described herein solved this interpretive problem. It also helped to verify observations I had made in the field regarding the paucity of ceramic forms at early Yuman sites. These findings challenge Rogers' (1945) assignment of more varied forms to his Yuman I category; in Baja California the archaeological record appears to reflect a different reality.

Vessels analyzed throughout the development of this method included intact archaeological vessels and sherds, specimens from museum and private collections, and past and present ethnographic vessels produced by potters in Santa Catarina, Baja California. Comparative analyses made using the Egyptian rectangle diagram revealed a clear pattern involving an increase in relative vessel height over time. I attribute this observed phenomenon to increasingly sedentary living and such associated social changes as (among others) a need for storage vessels for food and water and for different methods of preparing food, changes that began prior to the arrival of the Spanish and that subsequently intensified (Ortega 2002, 2004). It is also possible that as groups became more sedentary, potters had more time to specialize and produce relatively taller vessels; more nomadic groups had less need for such vessels and less time to dedicate to the task.

This is the first proposed methodology to be advanced for comparing and contrasting Yuman archaeological and ethnographic ceramics in relationship to the degree of mobility practiced by their makers. This is certainly a complex topic; however, the Egyptian rectangle method seems to permit both synchronic and diachronic analyses of these materials, analyses that reflect the diversity of these tribal communities and their respective subsistence patterns.

PROPORTIONAL VESSEL HEIGHT AND THE EGYPTIAN RECTANGLE

The concept of *altura vesicular* was developed in northern Baja California by archaeologist Antonio Porcayo Michelini (Porcayo 2016a, 2016b, 2016c), and it will be referred to herein as proportional vessel height. In order to understand its significance for the study of diachronic and synchronic change and observed cultural persistence in Yuman ceramic production, it must be emphasized that the concept is not based on an *a priori* assumption that increases in vessel height and variety are correlated with decreasing mobility in these tribes. On the contrary, the concept of proportional vessel height resulted from

testing the hypothesis that the Egyptian rectangle could be applied to ceramic studies, using the method developed by myself and described below (Porcayo 2015, 2016a, 2016b, 2016c). The associated hypothesis linking changes in the ceramics to changes in subsistence patterns is but one possible explanation for the observed pattern of increasing proportional vessel height through time. This hypothesis holds that the more highly nomadic groups tended to be, the less time and need they had to create tall vessels displaying variable forms; the more sedentary groups became, the more time and need they had to create a greater variety of proportionally taller vessels. For this progressive increase in relative height to be observed, ceramic production must be traced from its inception in nomadic or semi-nomadic groups through their transition to a sedentary lifestyle.

The Egyptian rectangle is a geometric tool for measuring the relative proportions of virtually any physical object by dividing it symmetrically and comparing its parts. Historically, it was used to divide space in a harmonious manner for Egyptian architectural designs, such as the mortuary shrines in pyramids (Rendón Gómez 2013). It was also used by Jewish people to design symbols such as the Ark of the Covenant, the first rectangular tabernacle, and the mythical Temple of Solomon in Jerusalem; it was subsequently used by Christians in the construction of churches and cathedrals (Rendón Gómez 2018). At present, there is no indication in the archaeological literature that the Egyptian rectangle has been used previously to analyze or categorize ceramic forms. It has been used, and is principally known, as a tool for studying architectural plans from a variety of time periods and cultures around the world (Rendón Gómez 2013). The only existing studies in which this method has been applied to ceramics are those published previously by the author in Mexico (Porcayo 2015, 2016a), California (Porcayo 2016b), and La Habana, Cuba (2016c); it must be reiterated that there are no antecedents for the application of this method to this class of cultural material.

One previous archaeological study of precolonial Mesoamerican vessels made brief reference to proportional vessel height. However, in this particular case, Eduardo Noguera (1965) did not use the Egyptian rectangle to measure or interpret the vessels, nor was attention given to diachronic and synchronic change, or to the persistence of the ceramic tradition through time. Proportional vessel height was only analyzed to demonstrate the inspiration that gourds provided in the development of vessel forms. Noguera observed that these vegetables could be cut into particular shapes to obtain the array of vessel forms represented within each Mesoamerican ceramic tradition (1965:38, Fig. 15; Fig. 2).

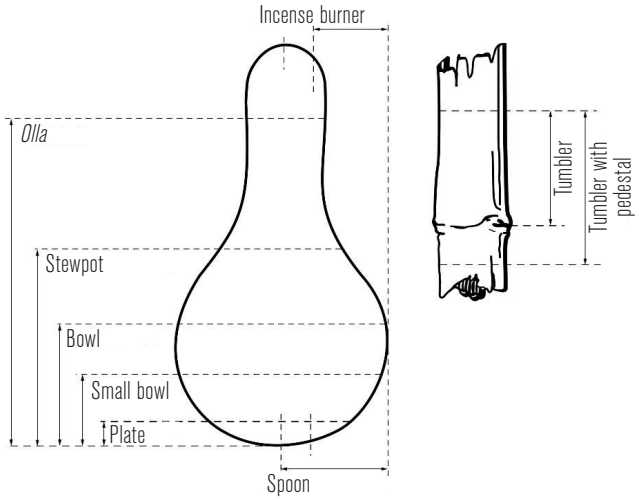

Figure 2. Mesoamerican Gourd-Shaped Ceramic Forms (after Noguera 1965).

The need to develop a new analytical method for classifying Yuman ceramic vessel forms became apparent in 2015 when I sat sketching an intact archaeological vessel and was unable to identify its form. It was impossible to determine whether the vessel was a bowl or an *olla* using previously suggested criteria for Yuman archaeological ceramics (Rogers 1945: Fig. 8; Waters 1982: Fig. 7.2). While I was applying basic geometric principles and dividing the vessel into sections (using vertical and horizontal lines), it became evident that relative comparisons could be achieved using the Egyptian rectangle diagram. Consulting old sketchbooks and digital files containing earlier experiments on this topic, I superimposed circles traversed by multiple lines on vessels in search of patterns. The diagram was adapted slightly in order to fully accommodate the array of Yuman ceramic forms, and vessel after vessel was tested, with unexpected and very satisfying results (Porcayo 2015).

The Egyptian rectangle diagram consists of the intersection of two equipollent circles with identical radii; their centers are joined by a vertical line segment of the same length as their radii. This middle portion of the diagram also contains a mandorla, or *vesica piscis*,

formed by segments of each circumference, like the almond shaped center of a Venn diagram (Fig. 3).

As predicted, the configuration of the Egyptian rectangle diagram permitted the symmetrical partition of rectangular and circular spaces, providing a practical tool for comparing the attributes of Yuman vessel forms, and consequently for observing diachronic and synchronic issues tied to the persistence of the ceramic tradition through time. This method can be applied to assemblages found in the field, or to laboratory and museum collections.

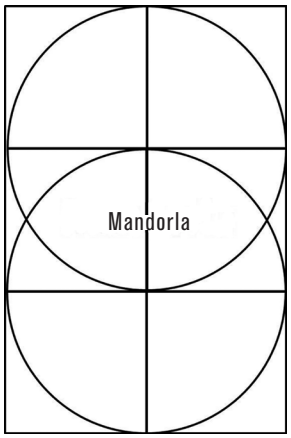

Figure 3. The *vesicular* or Egyptian rectangle diagram and its mandorla (*vesica piscis*).

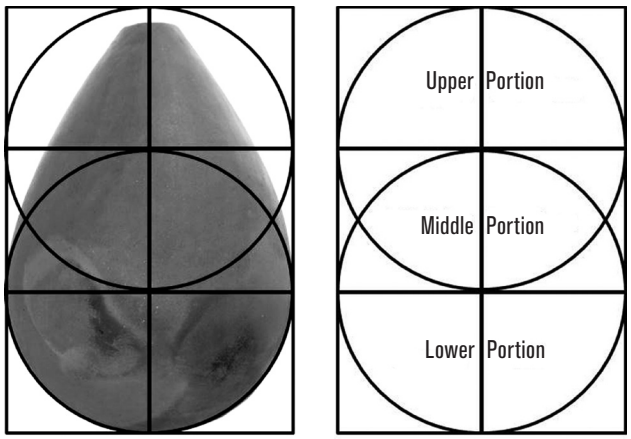

Figure 4. Lower, middle, and upper portions of the Egyptian rectangle diagram. (Photo by Isidro Madueño González and Antonio Porcayo Michelini–CINAH BC.)

METHODOLOGY

The method described here can be used on either intact vessels or vessel fragments as long as the sherds provide enough information for the entire vessel profile to be reconstructed through an archaeological sketch. In order to identify and classify the form of a vessel, it is necessary to use a sketch or photograph that avoids angular distortion. The image should be digitized for use in a software program such as PowerPoint. A digital rendering of the Egyptian rectangle diagram is then superimposed on the image (Fig. 4). The digital process described here was first developed by experimenting with physical sketches using a ruler and compass. Therefore, if researchers prefer, the same results can be achieved by following the steps illustrated in Figures 5a through 5e.

Once the image files have been inserted into the PowerPoint slide, the vessel image and diagram must be positioned in such a way that the maximum width of the vessel rests along the entire lower horizontal axis within the diagram (e.g., Fig. 5a). This simply entails dragging the image into place and shrinking or expanding the diagram *from its corner*, adjusting each as needed. Once the image is in place, the diameter of the encompassing circle should be equal to the maximum width of the vessel (e.g., Fig. 5b). The circle is further divided into four

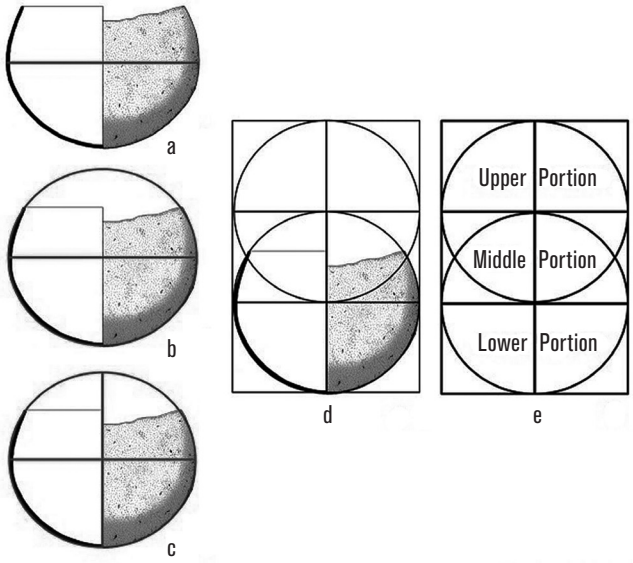

Figure 5. Method and portion groups.

equal parts by the vertical line running down the center of the diagram (e.g., Fig. 5c). The horizontal lines within the diagram cross the center of each circle, forming lower, middle, and upper rectangular portions (e.g., Fig. 5d). The proportional height of all vessels is ascertained based upon whether their maximum height is contained within the lower, the middle, or the upper-portion group (Fig. 5e).

Lower-Portion Group

Vessels filling the lower portion of the diagram include plates, scoops, and bowls, as well as vessels that have now been identified as transitional bowls (Fig. 6a–c).

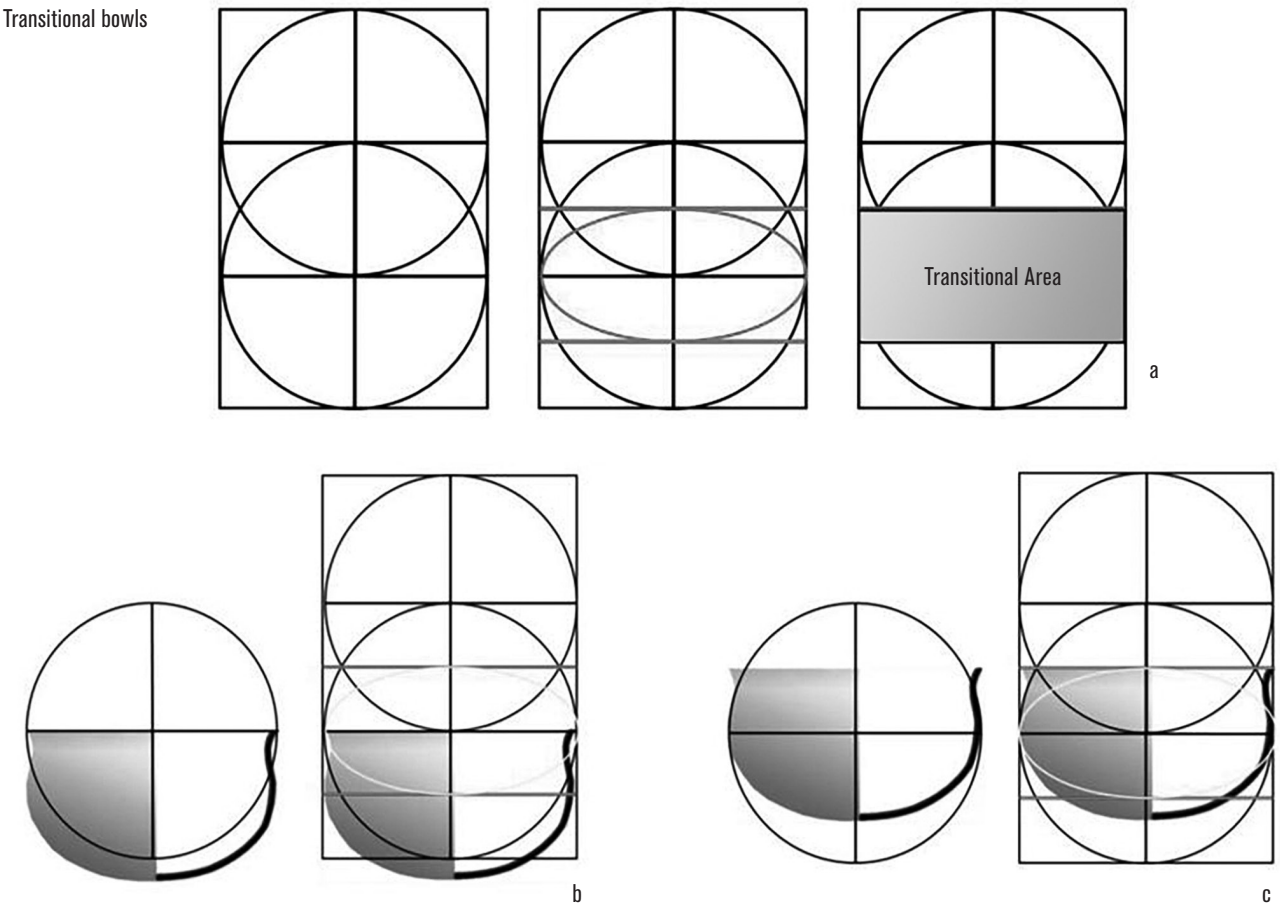

Figure 6. Transitional bowls. (Photo by Antonio Porcayo Michelini–CINAH BC, and Don Laylander.)

These were easily confused with *ollas* in the past, since they slightly invade the middle portion of the diagram where *ollas* are now grouped. The rim or upper wall of transitional bowls reaches into the lower half of the middle portion of the diagram and the walls and rim sometimes share the same diameter (Fig. 6b). Consequently, although this was not its intended purpose, the Egyptian rectangle diagram has proven useful in solving the problem of establishing parameters to distinguish between bowls and *ollas*. If a bowl does not extend beyond the transitional area occupying the lower half of the middle portion *once the maximum width of the walls (not the rim) is resting along the horizontal axis*, it is considered to belong to the lower-portion group along with bowls, plates, and scoops (Fig. 6c). However, similar vessels that extend beyond this transitional area are considered *ollas* because it is evident that the intention of the potter was to deliberately increase the height and volume of the vessel to utilize it for a different purpose (Porcayo 2015, 2016a, 2016b, 2016c).

Middle-Portion Group
(filling the lower and middle portions of the diagram)

The Yuman vessels belonging to the middle-portion group are semi globular or semi spherical and globular or spherical *ollas*, transitional *ollas* (similar to transitional bowls but proportionately higher), globular *ollas* with spouts, jars with Colorado shoulders[1] and spouts, and horizontal oval canteens, as well as those that are semi-triangular, and globular or spherical (Porcayo 2015, 2016a, 2016b, 2016c).

Upper-Portion Group (filling the lower, middle, and upper portions of the diagram)

The upper-portion group generally contains two vessel types: jars and canteens. The jars that fall within this group are globular or spherical with spouts, or globular with cylindrical spouts. The canteens are globular or spherical, vertical oval, semi-triangular with spouts, or biconical (Porcayo 2015, 2016a, 2016b, 2016c).

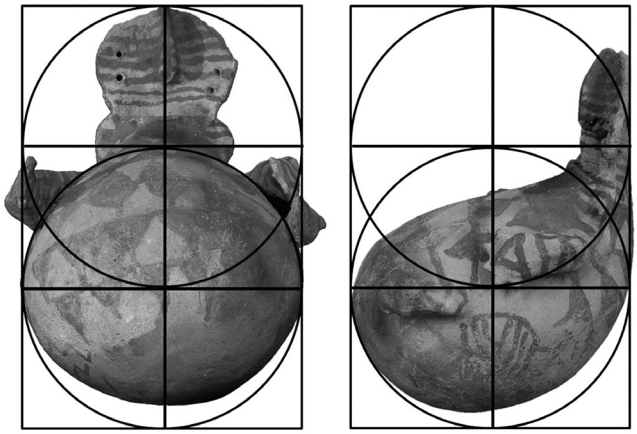

Figure 7. Compound vessel forms. (Photo by Isidro Madueño González and Antonio Porcayo Michelini–CINAH BC.)

Compound Forms

Some vessels, which I have characterized as compound forms, do not appear at first glance to be geometrically proportional. However, as can be seen in the case of the archaeological specimen depicted in Figure 7, once they have been placed within the Egyptian rectangle diagram, it becomes evident that they can, in fact, be categorized by this method. These compound forms are chronologically significant because their proportional height invades the upper portion of the diagram, suggesting that they correspond to a later period of ceramic production during which users were transitioning from semi-nomadic to sedentary subsistence practices.

A PROPOSED CHRONOLOGY

The results of this study suggest two general periods in the production of Yuman ceramics: an initial, archetypical production phase, and a later phase I refer to here as one of persistent production. Note that the persistent phase was referred to previously as intentional or deliberate (Porcayo 2015, 2016a, 2016b, 2016c). The concept of proportional vessel height can only be understood in terms of the premise that archetypal vessels represent the first expressions at the beginning of a ceramic tradition. This model assumes that if a ceramic tradition continues uninterrupted, potters will eventually either consciously or subconsciously achieve a certain proportional vessel height. These concepts enable us to chronologically order Yuman archaeological sites in Baja California containing ceramics and to establish whether the site occupants were semi-nomadic or sedentary at the time the archaeological deposits were created.

As seen in Figure 8, archetypical forms are concentrated in the lower-portion group of the diagram, corresponding to the formative period (A.D. 700 to 1050). The vessel forms falling into the middle-portion group correspond to Transitional periods I and II (A.D. 1000 to 1850), while the vessels belonging to the upper-portion group are associated with the newly proposed Transitional III period (A.D. 1850 to present). The first four objects depicted in the upper-portion group column of the typological table are ethnographic vessels produced by potters in Santa Catarina, while the remaining vessels are either intact archaeological specimens or reconstructions from archaeological sherds.

Archetypical Ceramic Production

The three basic archetypical vessel forms were trays, bowls, and semi globular *ollas*. All subsequent shape variations were derived from these rudimentary forms, reflecting the formative stage of the tradition during which potters were relatively unskilled. Archetypical ceramic production was a response to an immediate practical need that was met through the manufacture of a few basic utensils. At this stage, more complex forms and greater technical skills were unnecessary. The simplicity of these archetypical forms is associated with the semi-nomadic subsistence pattern characteristic of early Yuman groups (Rogers 1945; Van Camp 1979). Archetypical ceramic assemblages will never contain more than the three basic forms (trays, bowls, and semi-globular *ollas*), with perhaps the addition of a few transitional ones. These forms will fall only into the lower- and middle-portion groups of the Egyptian rectangle diagram and none will fall into the upper-portion group (Porcayo 2015, 2016b).

Persistent Ceramic Production

The persistent stage of ceramic production is no longer formative and it reflects a tradition that has persisted without interruption, changing slowly in response to a gradual shift from semi-nomadic to sedentary subsistence during the late precolonial era and later periods (Transitional I to III). The vessel forms produced by these potters tend to be proportionately taller and extend into the upper-portion group of the ceramic classification system, based on the

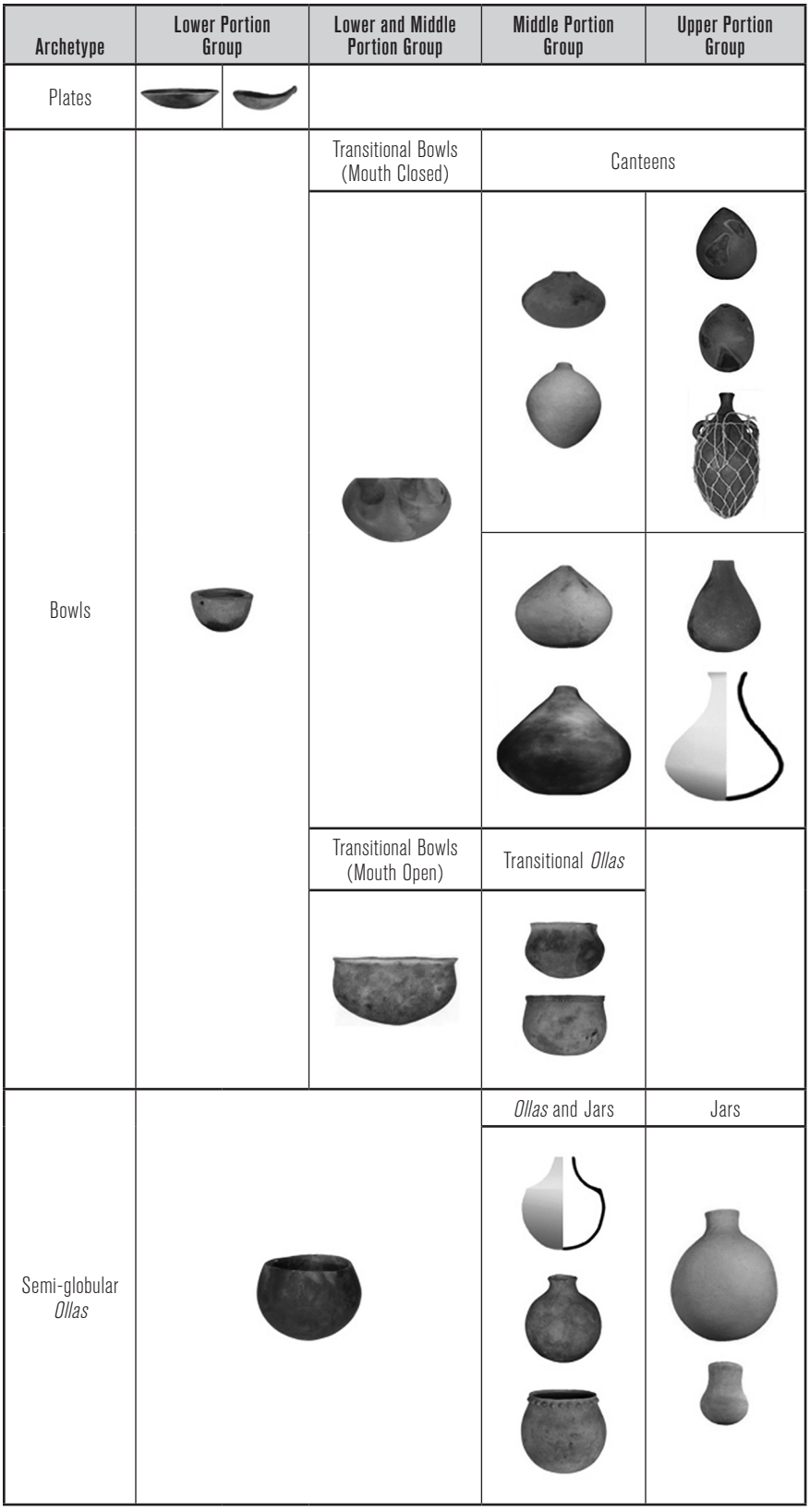

Figure 8. The three basic archetypical vessel forms and all subsequent shape variations.

Egyptian rectangle diagram. Producing vessels of these proportions requires a full-time commitment. The potters are able to achieve greater relative height and more varied forms by elaborating upon a base of existing knowledge and transforming the archetypes they have already mastered into more complex pieces.

The proportional vessel height and variety of forms produced by a given community correlate with the age of its ceramic tradition. Over time, the increasing complexity of subsistence activities creates a need for more specialized forms and potters capable of producing them. In other words, specialists begin to dedicate themselves to this task as the community becomes more sedentary. The longer the period of occupation at a site, the more varied the forms, the greater the relative vessel height, and (very importantly) the greater the overall volume of the vessels produced. Archaeological sites extending through the archetypical and transitional stages should contain ceramics of both types, either stratigraphically or in mixed surface deposits. These data provide evidence as to the history and occupational longevity of a site and whether or not it eventually became a permanent settlement (Porcayo 2016b).

Since this research began in 2014, I have observed these two archaeological concepts manifesting themselves in the contemporary vessels created by potters in Santa Catarina. The same concepts were also applicable to the results of a ceramic work-

shop taught by archaeological ceramicist Juan José Cardoza Rojero of Mexicali to Cocopah children at El Mayor Cucapá in the fall of 2013. The Cocopah children created archetypical vessel forms in their attempts to reproduce their ancestral ceramic tradition, manufacturing basic forms lacking proportional height. In contrast, the potters in Santa Catarina, who are direct descendants of potters belonging to an unbroken and persistent ceramic tradition that is centuries old, deliberately manufacture more complex and greatly varied forms. Their work reflects the efforts of generations of potters who either consciously or subconsciously strived to achieve greater proportional height in their vessels (Porcayo 2015, 2016b).

Although the research presented here is partially derived from observations made by Malcolm Rogers (1945) regarding Yuman cultural chronology, recent radiocarbon studies suggest that his proposed timeline was not entirely accurate. Michelle Graham (2017) recently analyzed ceramic sherds recovered from sites within and around the El Vallecito archaeological zone in La Rumorosa, Baja California. She classified reconstructed vessels using the Egyptian rectangle diagram, and interpreted the results in relationship to previously established dates from archaeological sites. The empirical data generated by Graham's research provide further support for the observed gradual increase in the proportional height of Yuman ceramic vessels. Archaeologists have collected a variety of other data that suggest that there was also an increase over time in the overall quantity of cultural materials associated with Yuman groups in Baja California (Porcayo 2018). I have attributed this phenomenon to the increased sedentism of Yuman tribes that began even before the arrival of the Spanish. The primary factors contributing to this change in subsistence activities were a reduction in tribal territories due to population growth, and increased precipitation, which provided greater access to stored water.

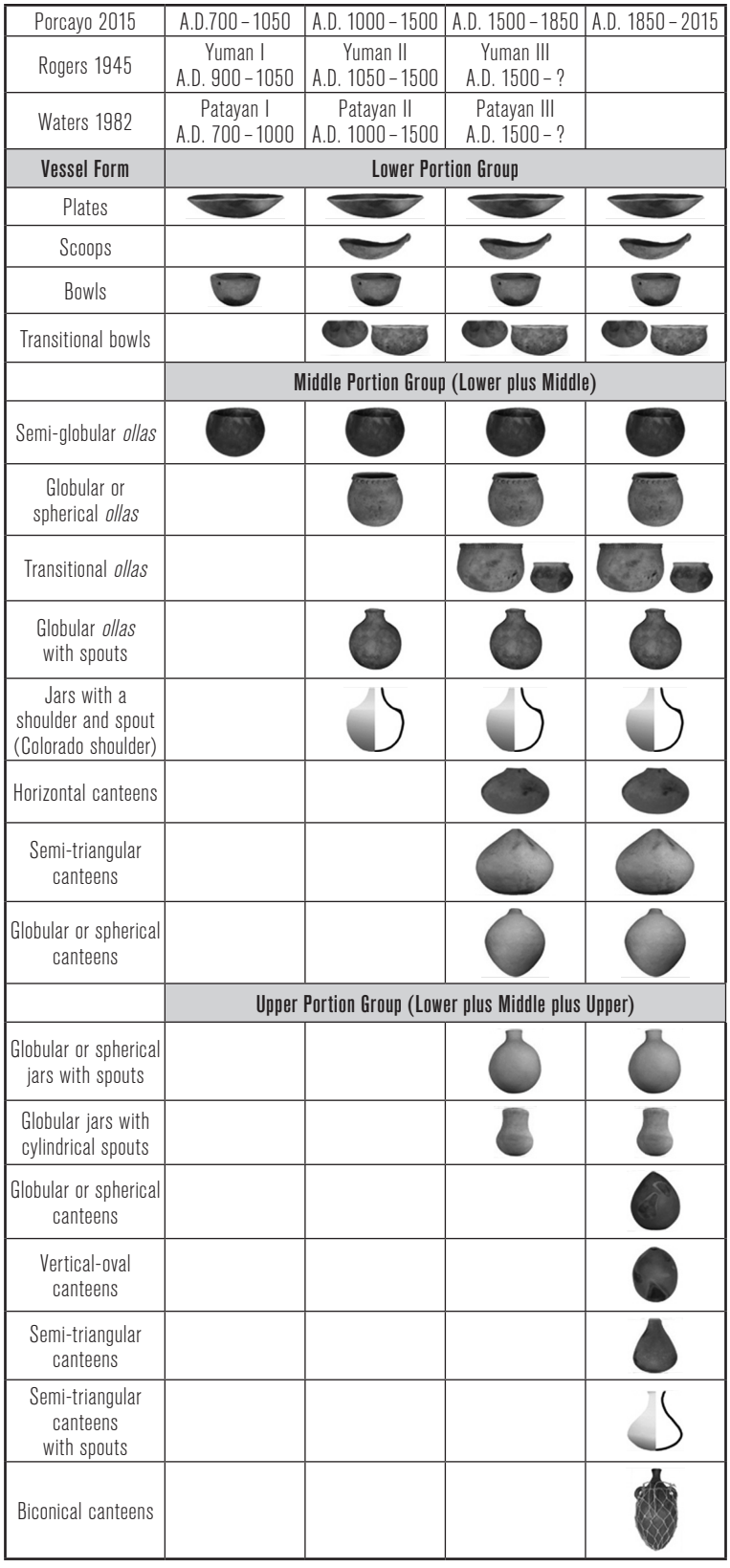

Figure 9. Yuman time periods according to the Egyptian rectangle technique.

PROPOSED TIME PERIODS

Each proposed time period is briefly described below (Fig. 9).

Formative Period (A.D. 700–1050)

This time period is characterized by the presence of only archetypical ceramic forms: trays, bowls, and semi-globular *ollas*. The artifact assemblage from the site called El Gran Abrigo in Sierra de las Pintas contains radiocarbon-dated charcoal (cal A.D. 895–925: cal A.D. 940–1020) and ceramic forms associated with this period (Graham 2017; Porcayo 2018).

Transitional Period I (A.D. 1000–1500)

During the Transitional I period, the first transitional bowls appear with both open and closed mouths, as well as scoops, globular or spherical *ollas*, globular *ollas* with spouts, and jars with Colorado shoulders and spouts. All of these forms are directly derived from the archetypes. The sites containing radiocarbon-dated charcoal and ceramic forms assigned to this period are La Biznaga in Sierra de Juárez (cal A.D. 1415–1455: cal A.D. 1405–1445), and La Explanada in El Vallecito (cal A.D. 1474) (Graham 2017; Porcayo 2018).

Transitional Period II (A.D. 1500–1850)

The manufacture of transitional ollas began during this period, along with such canteen forms as horizontal oval, semi-triangular, and globular or spherical. More importantly, globular or spherical jars with spouts and cylindrical spouts were introduced at this stage and extend into the upper-portion group of the Egyptian rectangle diagram. The observation that a variety of new forms appeared during this period has since been reinforced by the diversity and quantity of artifacts recovered from radiocarbon-dated sites (Porcayo 2018). The sites from which radiocarbon-dated charcoal and ceramic forms assigned to this period have been recovered include El Mayor 2 in Sierra del Mayor Cucapá (cal A.D. 1670–1680); Kilometer 57 in La Rumorosa (cal A.D. 1660; cal A.D. 1683; cal A.D 1735; cal A.D. 1805); La Explanada and El Corral in El Vallecito (cal A.D. 1665; cal A.D. 1738; cal A.D. 1754; cal A.D. 1785: cal A.D. 1793), and El Murillo in Sierra de Juárez (cal A.D. 1800; Bendímez 2012). The latter three sites also contain La Rumorosa-style rock paintings chronologically associated with an intensification of Yuman settlements in Baja California (Graham 2017; Porcayo 2018).

Newly Proposed Transitional Period III A.D. 1850–present)

This period actually began in 1848 when Alta and Baja California were politically split and the population was divided between two different countries by the redefined international border. Nonetheless, for the purposes of this system of classification, 1850 is considered the beginning point; it may, in fact, have taken that long for the Yuman groups to feel the repercussions from the division of their land and people. After 1848, quotidian Yuman ceramic wares were gradually replaced by non-native goods; as a consequence, some tribes abandoned ceramic production entirely (Griset 1990; Wade 2004). The beginning of the Transitional III period is also marked by a drought that began around A.D. 1850 and lasted roughly 30 years (Cook et al. 2007).

Many of the vessels produced during Transitional periods II and III extend into the upper portion of the diagram, exhibiting proportional vessel height. This is particularly true of numerous canteen types, including globular or spherical, vertical oval, semi-triangular, semi-triangular with spouts, or biconical. There is a notable increase in relative vessel height during this stage, and of equal importance, an overall increase in vessel volume. These changes were prompted not only by increasingly sedentary living, but also by population growth. Larger vessels were needed to store water and food at campsites that became permanent villages for some, though not all, of the Yuman tribes in Baja California (Porcayo 2016b).

The present study places the work of contemporary potters in Transitional period III. Lee Panich and Michael Wilken-Robertson (2013b), in apparent agreement, have identified two historical turning points that altered traditional ceramic production in Santa Catarina and created distinct phases (2013b:75). The first phase runs from 1797, when the Dominican Order built and settled the Santa Catarina Mission, to the time it was destroyed and abandoned in 1840. The second phase runs from 1840 to the present. The phase preceding the destruction of the mission in 1840 corresponds to the Transitional II or Rogers' Yuman III period in the dating scheme proposed here, and the second phase corresponds to the newly proposed Transitional III or Yuman IV period.

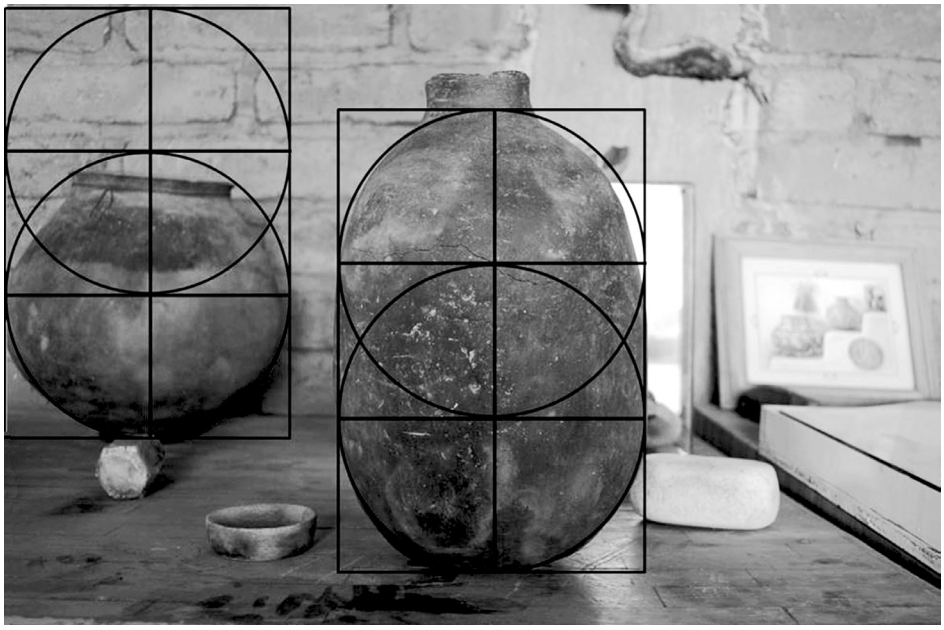

Figure 10. Two archaeological vessels exhibiting proportional height using the Egyptian rectangle.

Either chronology supports the proposal that Yuman ceramic vessels began to exhibit proportional height around the same time that tribes became more sedentary at mission sites. The Paipai community had permanently settled at Santa Catarina by the time the church was abandoned in 1840.

Based upon the proportional height of recovered vessels and upon radiocarbon dates, the known archaeological sites assigned to the Transitional Period III include Los Algodones (cal A.D. 1870–1920; cal A.D. 1900; cal A.D. 1881; cal A.D. 1900); PAVT2-14-MH1-El Vallecito (A.D. 1869 based on the presence of a silver dollar); Rancho Jacuín (ca. A.D. 1851–1870 based upon the presence of a button from an American Army uniform; Porcayo 2018).

ARCHAEOLOGICAL YUMAN CERAMICS EXHIBITING PROPORTIONAL VESSEL HEIGHT

With regard to archaeological specimens exhibiting proportional height, I have found two intact vessels that faithfully meet the criteria (Fig. 10). They are currently on display in Daria Mariscal's private ceramic museum in Santa Catarina, Baja California. These two vessels were found on the outskirts of the village of Santa Catarina, and it is clear that they exhibit proportional vessel height. Their exact age is unknown because they were removed from their archaeological context long ago and there are no associated materials that could be used to date them. Daria estimates that they were produced at least three generations ago, stating that the pieces definitely predate those made during her mother's and grandmother's time. If these vessels were approximately 150 years old at the time of our interview in 2016, they were produced around 1866 and correspond perfectly to Transitional Period III, which is the time period during which objects characteristically exhibit proportional vessel height.

Unfortunately, very little research of this nature has been carried out in Santa Catarina, and archaeological evidence regarding intact or fragmented vessels exhibiting proportional height is limited. Panich and Wilken-Robertson (2013b:79) studied the general form and function of sherds recovered from excavations at the Santa Catarina Mission, and found they were primarily from bowls and jars. The relative height of the jars confirms the occurrence of proportional height during the mission period, when the Paipai people were transitioning from a semi-nomadic to a sedentary lifestyle.

CONTEMPORARY YUMAN CERAMICS

Only the potters in Santa Catarina, of all the descendants of Yuman-speaking tribes, have continued the craft into the present. These potters are currently manufacturing vessels that display proportional height, reaching into the upper-portion group of the Egyptian rectangle diagram. This places the work of contemporary artisans in what I have proposed as the Transitional III period (Porcayo 2015, 2016b). Aside from the obvious influences Europeans and their descendants have had upon these ceramics, a comparison of the relative height of archetypical vessel

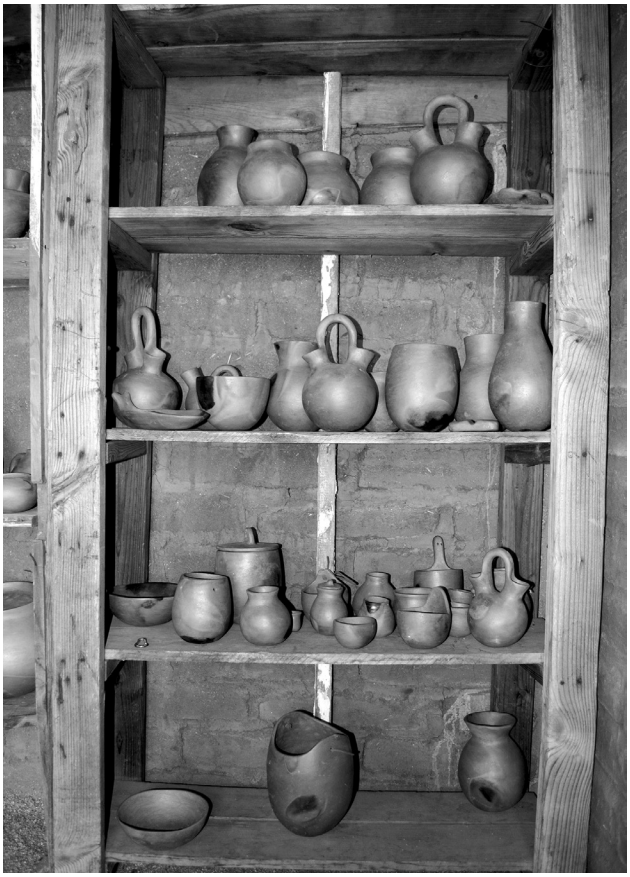

Figure 11. Contemporary Yuman vessels displaying proportional height, made by Daria Mariscal in Santa Catarina. (Photo by Isidro Madueño González and Antonio Porcayo Michelini–CINAH BC.)

forms with the objects subsequent artists were able to produce—reaching into the middle and upper portions of the Egyptian rectangle diagram—demonstrates that this skill has been honed over time and across generations.

Other researchers have attributed changes in vessel form to external cultural influences and associated adaptations or innovations (Griset 1990; Wade 2004; Wilken-Robertson, personal communication 2018), whereas I suggest that the increase observed in proportional vessel height is independent of external factors. As demonstrated by the historical photographs published by Griset and Ferg (2010:Figs. 3, 4, 9, 11), this proportional height was achieved prior to the commercialization of Yuman ceramics, which is thought to have intensified around 1970 (Wade 2004:48). Today, it is widely known that the Paipai community in Santa Catarina continues to produce traditional ceramics. Many of these vessels are deliberately manufactured to exhibit the proportional

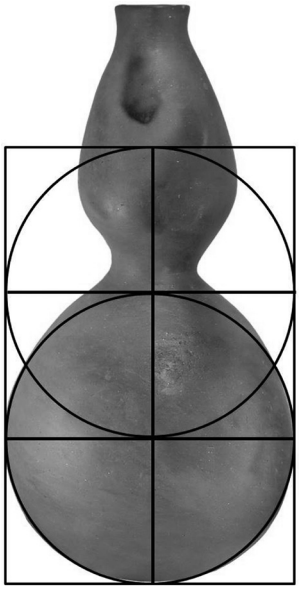

Figure 12. The Egyptian rectangle diagram superimposed on a vessel created by Daria Mariscal to demonstrate its notable relative height. (Photo by Isidro Madueño González and Antonio Porcayo Michelini–CINAH BC.)

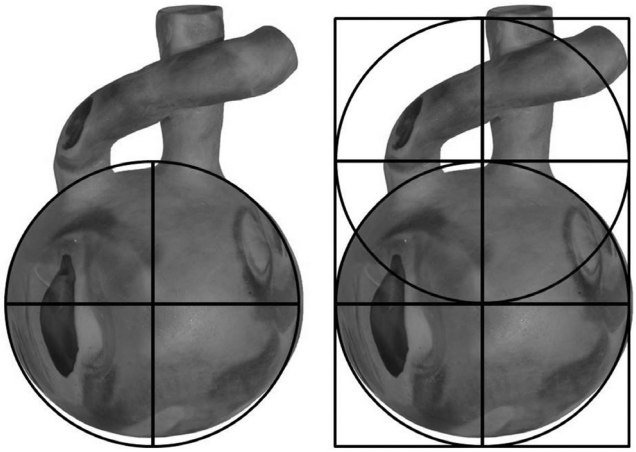

Figure 13. Tirsa Flores' eccentric vessel form. (Photo by Isidro Madueño González and Antonio Porcayo Michelini–CINAH BC.)

height described in this research, placing them in the Transitional III period (Fig. 11).

Some of the vessels created by ceramicist Daria Mariscal are shown below, superimposed on the Egyptian rectangle diagram to demonstrate their substantial relative height (Fig. 12). However, contemporary potters are also enhancing their ceramic creations, breaking entirely with the traditional parameters for vessel forms. The unique work of Tirsa Flores is an example of this (Fig. 13).

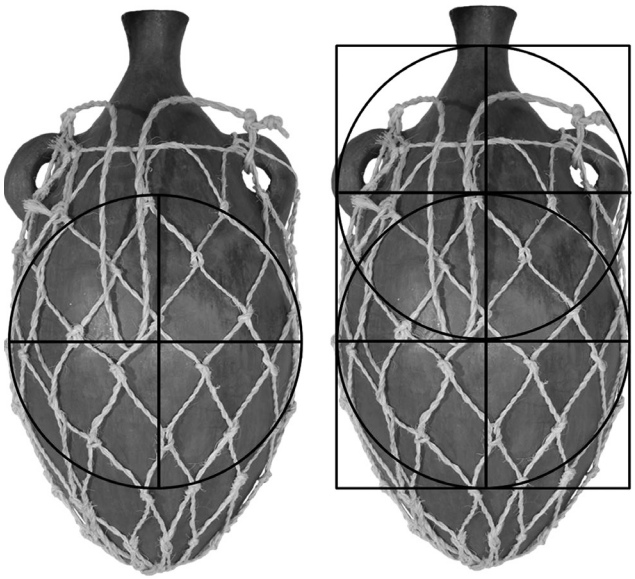

Figure 14. Biconical amphora made by Teresa Castro. (Photo by Isidro Madueño González and Antonio Porcayo Michelini–CINAH BC.)

CONCLUSIONS AND PREDICTIONS

It remains to be seen where this ceramic tradition is headed today in the hands of the potters in Santa Catarina. Perhaps the Egyptian rectangle technique and the concept of proportional vessel height can be used to make predictions. The new concepts and the proposed analytical method presented here are unknown to the Paipai potters. Therefore, any observations involving their ceramic tradition should have no influence on their future efforts. The predictions set forth here regarding the future direction of the Paipai ceramic industry can be tested by means of further ethnographic study.

Two biconical canteens with handles produced by potter Teresa Castro have induced me to reflect on the future of her craft. These pieces are reportedly a product of her imagination, but they resemble Greek olive amphorae typical of Mediterranean Europe. These vessels exceed both the lower and upper portions of the Egyptian rectangle diagram, yet at the same time are surprisingly stout (Fig. 14).

During the Pre-classic or Formative period in Mesoamerica (2,500 B.C. to A.D. 100), when agriculture developed and people adopted a sedentary village lifestyle, amphorae and jars similar to those produced by Teresa Castro were being widely manufactured. Once

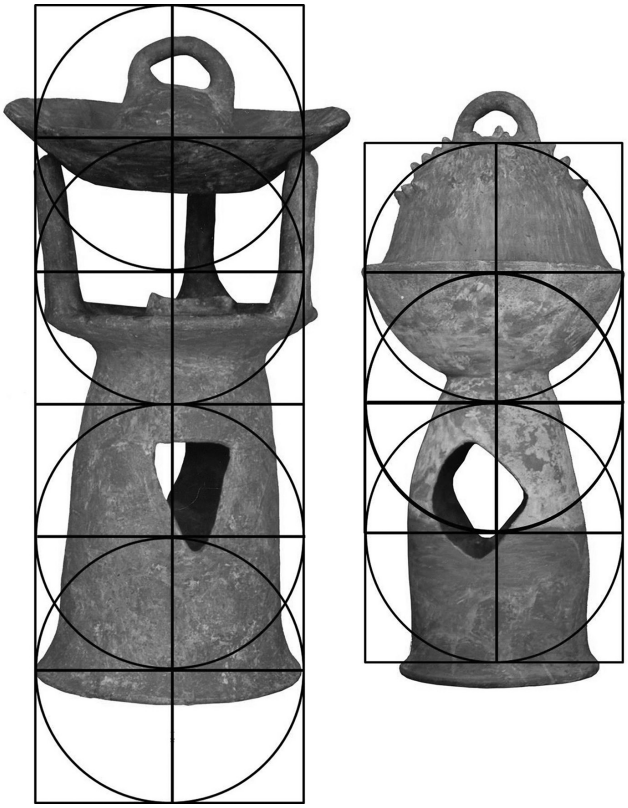

Figure 15. Archaeological vessels from a pre-classic site in the state of Guerrero that extend beyond the upper portion of the Egyptian rectangle diagram.

the proportions of such vessels exceeded the lower and upper portions of the diagram, structural elements were attached to the outer surface to provide needed support. This was the case with some of the vessels encountered during excavations undertaken at a pre-classic site in the state of Guerrero in 2001, and there are innumerable other examples throughout Mesoamerica (Porcayo 2004; Fig. 15).

I suspect that Paipai ceramics will continue to follow this trend and move beyond the four stages represented by the Egyptian rectangle technique. The Paipai ceramic tradition seems to be on a trajectory similar to the one followed by sedentary Mesoamerican villagers and farmers who began over time to manufacture enormous jars with external structural supports resembling those made by Teresa Castro and people in the ancient civilizations of the Mediterranean and in other regions of the Old World. As demonstrated with the examples of recent Paipai vessels shown in this study, this phenomenon is already occurring, and it should be noted

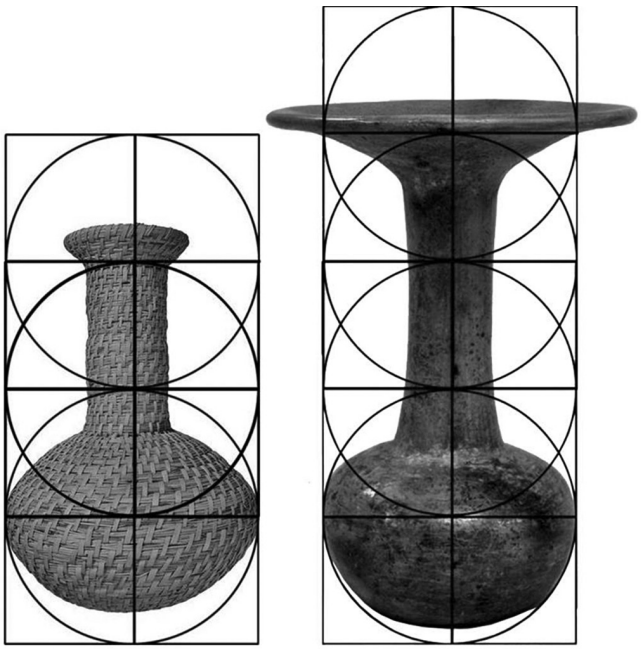

Figure 16. (a) Example of basket by María Griselda Mariscal Regino from Santa Catarina with proportional height (photo by Isidro Madueño González and Antonio Porcayo Michelini – CINAH–BC), (b) Teotihuacan ceramic vase (source: http://www.latinamericanstudies.org/teotihuacan/florero-1.jpg).

as the beginning of yet another stage in Yuman ceramic production, the Transitional IV period. This proposal should be tested and documented in the field as much as possible. It would also be interesting to apply this method of analysis to Yuman basketry production, in which the same diachronic and synchronic pattern seems to be visible (Fig. 16). The new phase can be considered to be such as long as potters do not abandon the traditional tools—the paddle and anvil—that make Yuman ceramics extraordinary and unique. The current Paipai ceramic tradition, inherited from semi-nomadic ancestors of centuries past and still persisting, constitutes a virtual goldmine of information.

As demonstrated by the proportional height of Transitional III period vessels—an objectively verifiable attribute—these objects are more than just vessels that are "…anomalously tall…[and] created in northern Baja California for the tourist or collector trade" (Laylander 2017:4). We need to move beyond cursory explanations that minimize the efforts and persistence of the Paipai indigenous people in maintaining their ceramic tradition over hundreds of years. Future archaeological and ethnographic studies will lead to a more complete understanding of the true complexity of these extraordinarily interesting vessels and their proportional height. The latter attribute is essential to interpreting, documenting, and explaining the stages that potters pass through as their communities move from a semi-nomadic to a sedentary way of life, as have the Paipai people and countless others throughout the world.

NOTES

[1]A Colorado shoulder is a relatively abrupt change of slope where the vessel neck meets the vessel body.

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