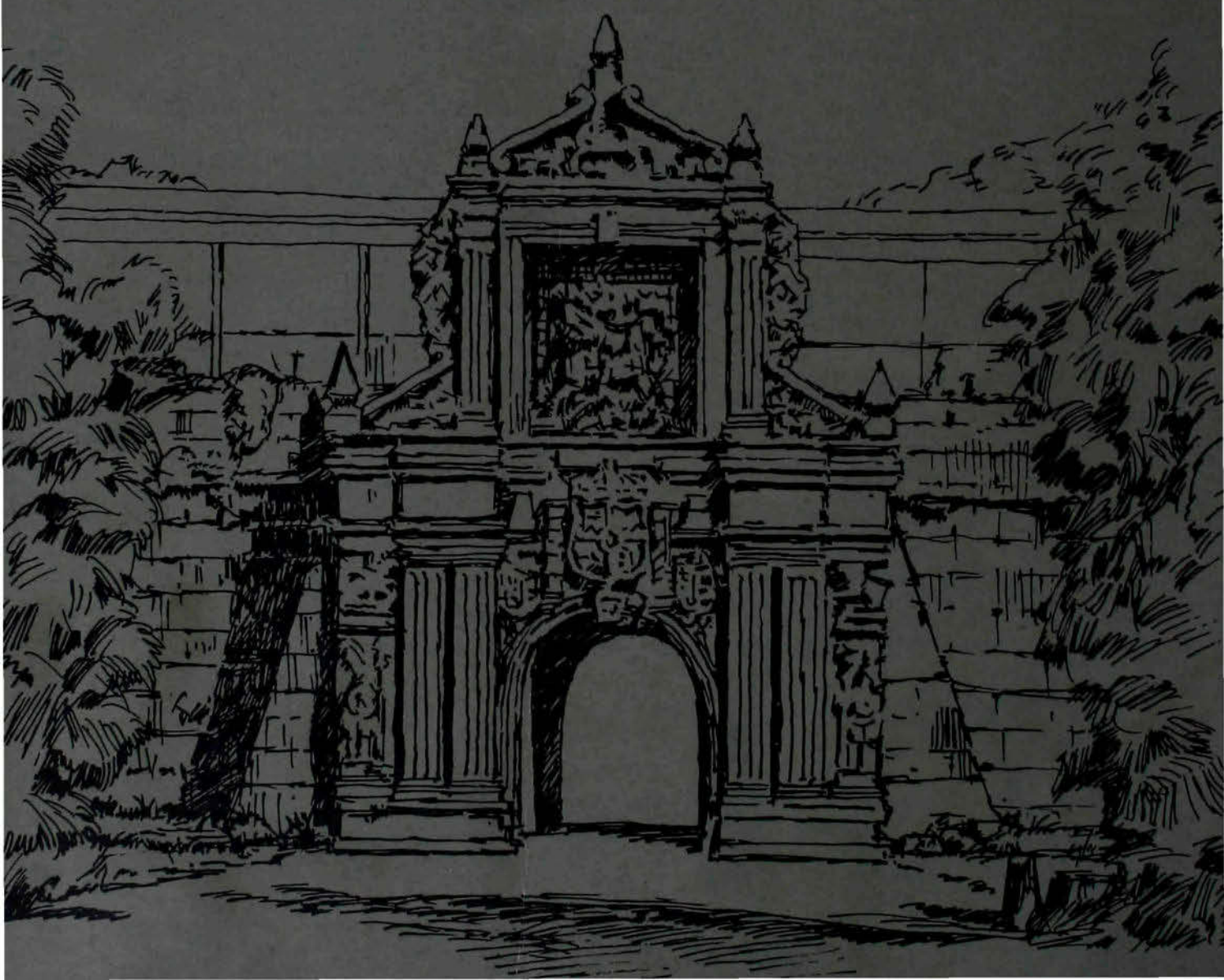
SPAFA DIGEST

Journal of SEAMEO Project in
Archaeology and Fine Arts (SPAFA).
Published by SPAFA Co-ordinating Unit.

Vol. III No. 1 1982



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SPAFA Objectives

The objectives of SPAFA are:

– To promote awareness and appreciation of the cultural heritage of the Southeast Asian countries through the preservation of archaeological and historical artifacts as well as the traditional arts;

– To help enrich cultural activities in the region;

– To strengthen professional competence in the fields of archaeology and fine arts through sharing of resources and experiences on a regional basis;

– To promote better understanding among the countries of Southeast Asia through joint programmes in archaeology and fine arts.

The Cover

Intramuros, or the walled city, was the seat of government during the Philippine Spanish era. Reduced to ruins and disrepair, it has been undergoing restoration since September 1979. The effort documents how archaeology is used to rebuild a place that approximates the original and evokes the aura of the past.

The choice of the Fort Santiago gate in the walled city as cover makes explicit the theme of this issue – the conservation of building materials and ornamentation used in the past.

SPAFA Digest is published bi-annually by the SEAMEO Project in Archaeology and Fine Arts Coordinating Unit, Darakarn Building, 920 Sukhumvit Road, Bangkok 11, Thailand. This issue is edited by Felicitas C. Rixhon and printed by the Professional Publishing Co. Ltd. 2/2-3 Soi Kluaynam-Thai, Sukhumvit Road, Bangkok, Thailand. Tel. 392-9673.

EVIDENCES OF CULTURAL PATTERNING AS SEEN THROUGH POTTERY : THE PHILIPPINE SITUATION

by Rosa C.P. Tenazas

Philippine archaeological researches are undergoing two major shifts in orientation from the traditional approach of mere recording of artifacts. These changes are seen in the incorporation of archaeology in palaeoanthropological studies and a shift in focus from the artifact to include ecology, i.e., the environment as part of the ancient setting. In other words, archaeological studies are no longer confined to just a giving of description of recovered artifacts but rather are increasingly utilizing sophisticated means of analyses. They include a reconstruction of ancient lifeways of a people, specifically their subsistence strategies and their socio-religious life expressed in the rituals connected with burials and in the type and quality of funerary goods that accompany these burials.

The present paper attempts to show examples of cultural patterning in archaeological context utilizing data from excavations with particular emphasis on an important category of artifact – pottery. Data have primarily been derived from excavations and subsequent comparative studies by this writer of two Iron Age sites in the Philippines. These sites are the early Iron Age jar-burial culture of Magsuhot in the municipality of Bacong, Negros Oriental[1] and the lakeside Iron Age Settlements of Pila, Laguna, island of Luzon.[2]

The Magsuhot Site

A jar-burial site that was excavated by this writer in the island of Negros in 1974-75 is located in the barrio of Magsuhot, approximately 8 kilometers in the upland interior of the coastal town of Bacong, the first municipality south of Dumaguete City, the

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MAP OF PHILIPPINE ISLANDS

The excavation sites

capital of the province of the Negros Oriental. This province is characterized by low, rugged and serrated chain of mountains which in most parts are close to the shoreline. The location of this prehistoric jar-burial settlement may be seen against this topographical setting. The dating is derived from analogies of similar sites already investigated, ca. 400 B.C. – 200 A.D., or earlier.

Pottery as Determinant of Settlement Location of the Magsuhot Culture

The establishment of a particular type of settlement generally depends upon a number of factors: the most important being closeness to sources of food, accessibility to good drinking water and, to a certain degree, considerations of safety of location. Settlement sites normally reflect the adaptation of a society and its technology to its environment. In the case of Magsuhot we rest on the assumption of causative priority.

One is struck by the relative richness of the prehistoric culture that had at one time flourished there in marked contrast to the poor conditions that presently prevail. Only about twenty families now inhabit the relatively barren region. The determinant of settlement choice by this prehistoric jar-burial practicing people obviously had lain elsewhere than the important consideration of, say, a productive land base. The possibility of exploitation through some form of agriculture had, however, not been ruled out for while today the area is virtually denuded of even a secondary forest, in the past a different situation could have obtained. In any case, while the relative productivity of the land in the past is not readily manifest, it is apparent that this early Iron Age community was able to live out its annual subsistence cycle within its own settlement site.

The answer to why the site of Magsuhot was chosen for settlement was sought in the artifacts, for it is possible to draw information from the material culture that has been preserved. Settlements have been known to spring up in relative wastelands where rare and valuable resources are discovered. In Magsuhot, one of the important resources was clay. The most striking thing about Magsuhot burials is the quantity of the pottery that accompanied them. In two particularly rich burials, the recovered grave furniture constituting almost exclusively of pottery averaged 85 pieces per burial!

Other possible valuable resources that had been considered were forest products that were becoming important in the maritime commerce in Southeast Asia prior to the 10th century, A.D. As early as the turn of the Christian era, patterns of maritime trade had been established in the Philippine Archipelago. The evidence comes in the form not only of trade ceramics from China, but also of luxury products for adornments, glass beads and bracelets, traceable to Middle Eastern origins.

The maritime trade in Southeast Asia is traced back to the Southern Chinese dynasties' needs for Western luxury goods that had been blocked off from their traditional land routes. Rather than send out for what they needed, the Chinese were apparently content to just sit and attract shipping to their shores. As a consequence, entrepots along the main trade routes, like Oc-Eo in Funan and a few trade routes along the Isthmian routes in the Malay Peninsula, proliferated. It is not the intention of this paper to go into the details of the dynamics of this maritime trade. It is sufficient to mention here that one of the important products in the Western markets that attracted the Chinese were jungle aromatics (frankincense, myrrh, camphor, etc.) which were believed to have found competition in Southeast Asian substitutes.[3] This suggested that the trade in forest products spawned the establishment in the Philippines of settlements in upland areas which are regarded today as low in exploitative potentials.

A jar burial assemblage in situ uncovered in Bacong.

Thus apart from the local trade in pottery, the Magsuhot jar-burial people appear to have also been engaged in indirect maritime trade with more enterprising middlemen.

In Magsuhot, the accessibility to a seemingly inexhaustible source of clay in addition to other enterprises that were indirectly connected with maritime commerce may be said to determine the settlement choice, offsetting as it were the absence of inherently more ideal conditions in the area.

Once the complex surrounding pottery manufacture is understood and other commercial activities defined, it is not too difficult to see how this jar-burial culture developed progressively in a way comparable to groups whose stability depended solely on agricultural economies.

Pottery has been used as a standard basis of exchange for commodities not readily available in the community. The virtual lack of evidence for, say, iron working in the form of slag and other residue of smelting activities and the negative evidence for weaving (e.g. spindle whorls) point to iron products and woven fabrics as items that were bartered for the locally manufactured earthen ware. Luxury items in the form of exotic beads and bracelets made from

Magsuhot Pottery Coffin

glass were traded in exchange for other categories of staples within their reach of exploitation (viz: forest aromatics). The exchange of foodstuffs is seldom in evidence and it is through the discovery of extraneous raw materials or artifacts, such as iron implements and ornaments of glass, that the existence of external trade is established.

In his detailed discussion of the economics of Buhid pottery, Conklin had demonstrated the negotiability of pottery among an ethnic minority group called Mangyan on the island of Mindoro.[4] For instance, the smallest variety of cooking pot takes a value equivalent to one string of beads. The value of any other kind of pot is thereafter determined by using this standard as basis.

In Magsuhot, as far as determinants of settlement were concerned, it can be said that accessibility to a rich source of clay and consequent trade in pottery, as well as external commercial contacts in the form of exchange of certain staple products for manufactured foreign goods, may have provided the wherewithals for subsistence for this early Iron Age people.

Insofar as local pottery trade is concerned, one specialist in Southeast Asian pottery states: "Pottery may . . . be the only item through which there is a constant cyclical source of money or goods from outside (a) community."[5] Today pottery manufacture is a home industry from which a sizable number of people near Dumaguete City eke out their livelihood. The best clay material for pottery in the whole province is found in the area that is now Dumaguete City. Magsuhot is located just a few kilometers south of this source of clay in addition to other sources in the immediate vicinity. The availability of a good source of clay for the craftsmen has maintained the pottery industry in Dumaguete City just as this writer has hypothesized for the Magsuhot community in the prehistoric past.

Craft Specialization in the Pottery Industry of Magsuhot

Pottery making is usually a hereditary craft passed down through either the mother's or the father's side. In the case of the Iron Age Culture of Magsuhot, pottery craftsmanship appears to have been handed down generationally from both lines. Women have been traditionally associated with pottery manufacture but no rigid rule exists which prevents men from participating in a predominantly female activity. Solheim has shown that among the Ibanag of Isabela in northeastern Luzon, men involved themselves in pottery manufacture by taking on the harder task of making the heavier stoves.[6] The Magsuhot situation could have started as a cooperative endeavor between the women and their menfolk, especially in the manufacture of the heavy burial jars and pottery coffins. It appears that two factors operated towards bringing about male involvement in the pottery industry leading, as it were, to an actual craft specialization. These are the factors of size and sheer weight. One burial jar alone weighed more than 50 kilos. In primary burial in jars, size was not the only factor considered by the Magsuhot potters but thickness as well.

This theory of craft specialization finds support in certain elements of design and mode of manufacture:

a) the heavy burial jars and pottery coffins together with the ritual vessels and figurines that were manufactured under special conditions are attributed to the male potter, while
b) utilitarian forms with simple incised designs, such as the cooking pot forms and their derivatives, bowls with stands, angle pots, perforated

Magsuhot Burial Jar

pots, etc., that appear to be manufactured under different conditions than the above category of vessels, are believed to be made by the female potter.

Analysis has shown (the details of which will not be discussed here) that differential distribution of the Magsuhot pottery complex outside its centre is partly the result of trade and partly a reflection of change in the design vocabulary of this pottery complex.It resulted from the occasional marriage of women (as potters of the utilitarian forms) outside the group. As a pottery complex, the pottery assemblage of Magsuhot is identified with the Bagupantao Pottery Complex after Solheim.[7]

The burial jars and pottery coffins are invariably decorated with lenticular cut-out designs on appliqued flanges, usually located under the lip rims and covers. This design dominates the total pottery assemblage although it is not commonly met within the more utilitarian group of vessels like simple cooking pots, angle pots, footed dishes and so on that is believed to be the products of women potters. The jars, coffins, and certain categories of ceremonial vessels including the figurines that were the exclusive manufactures of the menfolk appear to have been fired under conditions different from that obtained in the rest of the pottery assemblage.

The very exclusiveness in the manufacture of ritual vessels by the male members of the community appears to have some religious significance. The shapes of some of the pottery that fall under the category of ceremonial vessels indicate non-utilitarian function. Examples are the double-rim or open-ended pots which are especially reminiscent of fertility symbols as are the elongated gourd-like forms. In one particular example of the double-rim type, the truncated rim produced an effect resembling the male organ. This phallic/fertility concept is exemplified in the discovery of a ritual vessel which shows two female figures sitting astride it, their limbs intertwined. The

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interesting point is that one of the female figures is unmistakably pregnant. This is one of two instances of pregnant figures recovered from the burials. The other bigger figurine, measuring about a foot high, has its hands supporting its distended stomach.

Reconstruction of some Socio-Religious Patterning in the Magsuhot Culture

The clearest evidence of status differentiation in a society comes from graves. Burials have also been a source of information on certain aspects of the socio-religious lives of people. In Magsuhot, three sources of evidence for social stratification may be mentioned:

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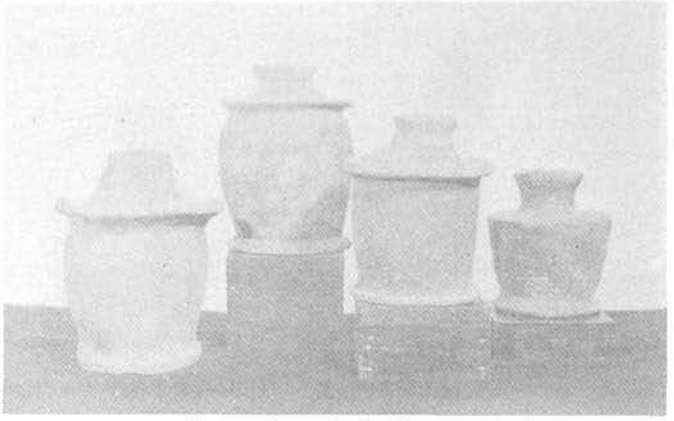
1. A phallic pot with female figures, one unmistakably pregnant, sitting astride the liprim.
2.&3. The front and side views of a figurine of a pregnant woman



Examples of phallic pottery

A carabao ceramic piece

a) the existence of rich complex burials vis-a-vis simple burials,
b) the presence of figurines and certain pottery objects identified as status or power symbols, and
c) a carved megalith weighing approximately 500 kilos that this writer interprets as a ceremonial seat.

Two types of burials were distinguished in Magsuhot on the basis of disposition: a) the complex burial, and b) the simple burial. Exemplified by two examples, one of the complex burials excavated in Magsuhot was a multiple burial of three jars in one grave pit measuring 2x1 meters and, the other, a combined burial of a very big burial jar measuring about 80 cm. in diameter and a pottery coffin in a grave of similar proportions. The evidence obtained disclosed the phenomenal association of funerary pottery goods numbering at least 70 and 100 pieces to each grave. These figures are remarkable by any early Iron Age standard; no other Iron Age jar burial culture has yet been discovered in the Philippines that approximates the richness and sophistication of the culture that existed in Magsuhot in the prehistoric past.

These complex burials were, moreover, disposed in what this writer calls "two-level graves." In other words, additional goods were laid after the initial cover up of the main burial. Simple burials are found in only one level and accompanied with relatively few (averaging 30 pieces) pottery goods.

Due to the extensive erosion of the topsoil – the cemeteries being located on top and along hillsides, the topmost layer of funerary pottery in complex burials is usually found just a few centimeters from the surface. In one of the complex burials found, the main burial located 77 cm. below the surface was connected to the top assemblage by a carefully placed series of nested pots in mouth – bottom arrangement that started directly from the main burial jar.

The motif seen on burial jars and pottery coffins is a stylized representation of a cock's head, usually in sets of two, on top of their covers. The significance of this motif was not immediately apparent until the recovery of one complex burial where the decoration of bird heads on the burial jar was graphically represented.

A staff-like pottery object with the stylized representation of a cock's head on one end has been identified, on the basis of analogy to Western-type mace heads, as some symbol of prestige or power. As such, this must have been associated with an important personnage. The attribution of status by itself is an indication of considerable influence and power of the individual to whom this is identified.

In an analysis of the tripartite view of the world by certain indigenous groups in Asia, it was shown that the underworld is represented by the fish (alternately lizard,, snake, or crocodile), the present world by the beast of sacrifice (eg. cow, buffalo, etc.), and the skyworld by the bird (alternately the rainbow).[8] The meaning of the bird motif on the burial and pottery coffins should perhaps be interpreted in this context. The idea must have carried with it the belief that entry into the skyworld would be greatly facilitated by its observance.

In shamanism and related phenomena, the cosmic axis takes many forms: rainbow (alternating with the boat among riverine and maritime groups), tree, ladder, mountain, etc. From as far west as India to China, the "heavenly ladder" usually has a cock on the top rung. Thus, in parts of China, the shaman candidate climbs knife ladders on top of which the celestial cock roosts. The heavenly ladder of the Indian Savara tribe, on top of which a cock is also perched, is believed to have identical significance.[9]

The existence of a stratified society within the Magsuhot jar-burial culture is inferred from the presence of certain pottery objects, the figurines, and differential treatment of burials. An important addition is the megalith which has tentatively been identified as a ceremonial seat. On one end of this stone are carvings of two heads and the beginnings of a third. Symbols or ancient forms of writing are incised just above the carved heads.

Some Logistics Involved in a Jar Burial Ceremony in Magsuhot

It is of interest to include a discussion on the probable logistics involved in a burial ceremony ir

the context of the early Iron Age community of Magsuhot.

Given the weight of one jar alone, and the quantity of associated grave goods that were interred with the deceased, the burial entourage must have involved the participation of a good number of related families in conducting just one burial ceremony. An experiment was made by this writer using one medium-sized burial jar, approximately just 1/3 the size and weight of the 52-kilo jar from one of the complex burials. From a point in the center of the jar-burial site to only just about a kilometer down to base camp, it had taken an average farmer carrying the small jar at least three stops to go downhill! Assuming that the habitation areas were located on the surrounding valleys, burial entourages would be climbing up the hills to get to the burial site, not the other way around.

Ingenious ways were probably employed in conducting an elaborate burial like the complex burial of, say, three jars and an accompanying grave furniture of 100 pieces of pottery, or even of a less elaborate or simple burial of only 30 associated pieces of grave pottery, considering that one pot averages about a kilo in weight. And this does not yet include the rituals attached to the preparation of the corpse for burial, the preparation and setting up of the funerary offerings, arrangement of the entire assemblage of grave goods in the burial pit, plus ceremonies attending the exhumation of older burials for inclusion into the new one in some cases.

The Magsuhot jar burial practice was a primary mode of interment in jars with occasional inclusion of older bones of relatives. In one of the complex burials in Magsuhot that had lent itself to analysis, the primary burial of young female adult and two children inside one jar (the biggest jar in a complex of three jars in one grave) included older bones and teeth belonging to at least one other individual. Other interesting features of this particular burial were the deliberate breaking of a number of pots to line the grave pit, and the lining of the middle jar with powdered haematite. An adult body was cut up to accommodate the corpse inside the jar.

The following is a detailed description of the adult corpse and the other remains as these were carefully recovered from the jar:

A preliminary analysis of the contents of the burial jar disclosed a multiple primary burial of an adult female and two children. One of the children was approximately 6-9 years of age. The evidences used for age determination were the newly erupted first permanent molars and lost deciduous incisors on the mandible. The other was an infant. The limiting age of 20-25 years for the adult female was determined by the degree of union and non-union of the proximal and distal epiphyses, respectively, of the femoral bones. The portions of both maxilla and mandible that carry the second and third molars were missing, so it has not been possible to observe eruption or non-eruption of the third molar to substantiate evidence for aging. In any case, suture closure on the skull had not yet commenced.

The thigh and long bones of the adult female were articulated in flexed position when found. The majority of the vertebrae, especially the cervical set (all six in articulation, except the atlas bone) were intact.

In order to fit no less than three bodies into a jar measuring 54 cm. at its widest diameter and 79 cm. high to the top of its cover, the bodies had to be dismembered prior to placement. At the time it was excavated, the adult skull lay on its right side with the maxilla pressed against the northern section of the jar (later its mandible would be recovered from the opposite wall near the children's remains). It lay directly on top of the thigh bones. That the skull was no longer articulated to the rest of the body was shown by its unnatural position with the top of the skull oriented towards the pelvic region

1. Cock's head motif on a burial jar

2. A mace made of ceramic

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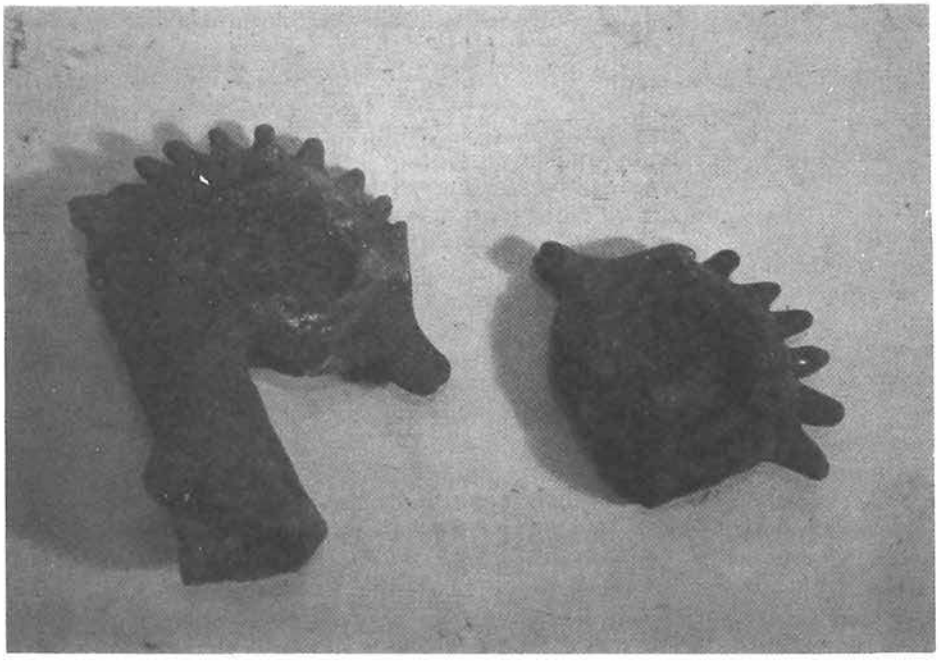

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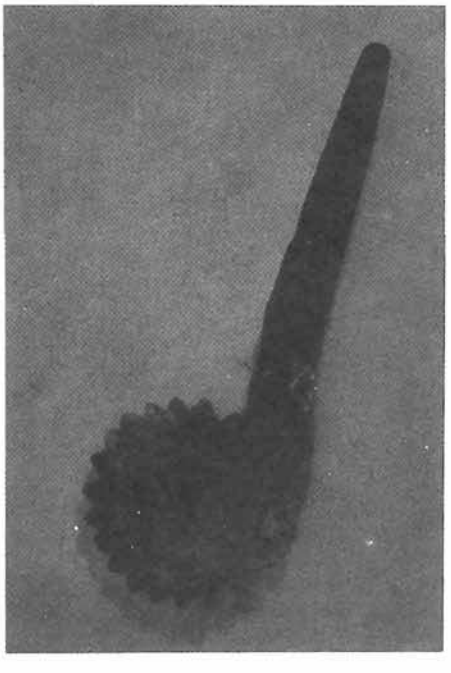

rather than the other way around, as would have been the case, if the body had been merely doubled up. Directly underneath the limb bones and enmeshed in a matting of rotted rib bones were the thoracic and cervical vertebrae. From this evidence it appears that the torso was laid first near the bottom of the jar, the flexed lower limbs on top of this, and the head deposited also on top of the thigh bones.

It has not been posible to reconstruct the exact placement of the children's remains. When found, only the outline of the skull of the older child could be seen. Its mandible, still more or less intact, lay beside it. Of the infant remains, only a few long and rib bones identified it in addition to the few teeth. The children's remains were located opposite the adult remains.

Hundreds of paste beads, predominantly orange in color, and some iron implements were likewise recovered from the main burial jar. Included in the heap of human bones and grave goods were fragments of animal bones. Funerary provision must have included offerings of food. Evidence of meat offerings came in the form of remains of chicken and pig. In addition to the multi-colored paste beads, a thick bevelled, orange paste bracelet was found at the bottom of the jar directly under the adult remains.[10]

The Magsuhot Jar Burial Complex uncovered.

This practice of dismemberment prior to burial in a jar finds ethnographic parallel among the Sagada of the Mountain Province of northern Luzon.[11]

A closer examination of some of the remains of the animal offerings showed that these were ceremonially cooked over fire before being put inside the jar as some of the skeletal remains had shown signs of burning. These offerings of animal meat were laid at the bottom of the jar before actual interment of the bodies.

It is suggested that the pottery industry of Magsuhot was a collective effort by a good number of families in the community. The phenomenon of high quantity in pottery association that characterized many burials can be explained in part by the status of the deceased and the practice of each related family of offering an alloted number of funerary gifts of pottery in each burial.

As far as means of transport is concerned, the travois or bamboo sled would already have been in existence and used in transporting entire burial assemblages. One pottery figurine of a young calf or carabao recovered from a burial showed that species of domesticate had perhaps played an important role, then as now, as beast of burden and as beast of sacrifice.

The Pila Site

The excavation site in the barrio of Pinagbayanan, municipality of Pila in the province of Laguna, referred to as the Pila site, was one of several archaeological sites bordering the southeastern margin of Laguna de Bay, the largest lake in the Philippines. The total area excavated by this writer in 1967-68 involved three adjacent sites in all covering an area of 6000 sq. meters. Within this relatively small area, close to 400 burials comprising two main cultural periods were recovered. Period I is early Iron Age in date corresponding to the Magsuhot settlement. Period II, already protohistoric in date, is subdivided into three phases.[12]

Period II abounds in evidence of a more direct and intensified maritime trade contacts with China which was only suggested in Period I. This maritime trade contacts during Period II was not only confined to China but also showed relations with Siam and Annam, especially in the late 13th to the 15th centuries, A.D.

Determinants of Settlement Location in Pila

The Pila site was used both for habitation and burial over a much longer period of time than the Magsuhot settlement. The determinants of settlement choice do not appear to be too difficult to reconstruct. The Pila settlement is described as a fishing-oriented economy with an agricultural base, a classic example of an adaptation by a society to its environment. Reconstruction of the patterns of exploitation has not presented a real problem due to the strong indication of continuity of the same patterns into the present. Recovery of net sinkers and, in one instance, of a bronze fish hook indicate intensive fishing activities, a situation presently prevailing in many shore areas. The site's location along a stretch of irrigated agricultural land suggested similar utilization in the past. Just as maritime trade as supplementing the economic base is suggested for Period I, this activity appears to be intensified especially in Phases 1 and 2 of Period II.

In contrast to the Magsuhot situation, there is abundant evidence of iron working. Iron slag were items of artifacts commonly encountered in Phases 1 and 2 of Period II. Similarly, the recovery of spindle whorls indicates the existence of the weaving industry. Native cloth material was among the items mentioned as staple products of the indigenous peoples of the Philippines in the maritime trade with China.

Local earthenware in Periods I and II do not compare in quantity to those recovered from the Magsuhot burials. One of the reasons perhaps is that we are here witnessing the beginning of the deterioration of the local pottery industry in the face of stiff competion with the better-fired, better-shaped ceramics from China, especially in Period II. This is not a phenomenon unique only to Pila, however. It appears that devolution in local earthenware manufacture was a universal feature associated with the appearance of highly fired products from kilns in China and mainland Southeast Asia. In a subsequent discussion, it will be shown how the differential

treatment of local pottery vis-a-vis their imported counterparts established status differentiation in Pila society.

Evidence of Socio-Cultural Patterning in the Cremation Burial Practice of Pila

The Pila site yielded four cultural levels which were clearly delineated by a difference in associated assemblages and, in the case of the later phases, association of Chinese trade wares bearing diagnostic decoration of potteries manufactured under the Chinese Sung, Yuan, and Ming dynasties.

The appearance of a new burial tradition in Laguna heralded a new phase characterized by a religious outlook that included ritual burning of the exhumed bones before reburial in jars. Additional evidence of multiple reburial was also present, the jars becoming progressively smaller with each reburial.

Diggings in Pinagbayanan, Pila, Laguna

Cremation burial characterized Phase 2 of Period II. The cremation burials were of two types: 1) burial directly in a pit and, 2) burial in a jar or vessel. A further classification is based upon the presence or absence of associated grave goods. By the end of the project which lasted about one year, ninety one or roughly 25 per cent of the total number of burials recovered from the Pila site were cremation burials. Included in these assemblages were a number of doubtful cremation burials which were invariably found in larger stoneware jars. The regularity with which these were discovered in smashed condition initially provided a very challenging problem. Their subsequent inclusion within the cremation burial complex was based upon the following factors:

1) the presence in a number of these seemingly deliberately broken jars of traces of charcoal and charred skeletal remains believed to be human,
2) the regularity in which these were found in close proximity to definite cremations, whether directly in pits or in vessels; and
3) the presence of grave goods, whole or broken, inside these jars which provides a striking parallel to excavated cremations in vessels which also contained grave goods.

The hypothesis that the cremation in Pila was secondary is based upon several factors, foremost among which is the occurrence of large fragments of skeletal materials which is rarely found in primary cremation.[12] The cremation in Pila not only included recognizable parts such as long bones and large fragments of skull bones, but sometimes whole jaw bones with a few teeth still intact as well as finger and feet bones.

In this cremation burial in jars, we also see a parallel practice of multiple burial (burial of more than one individual inside one jar) that had been demonstrated in the Magsuhot jar burial culture.[14]

Ethnography has not shown an example of secondary cremation burial practice among existing groups in the Philippines. The closest parallel has been drawn from a tribe in Borneo called the Sihouggo. In their practice of secondary cremation, such ritual is considered an absolute necessity for purposes of purification. All unatoned sins are wiped away and then "the spirit is as clean as though washed in gold."[15]

Another and more important evidence in support for secondary cremation was the discovery of a crematory complex comprised of a structure made principally from ferric oxide with three chambers, none of which is large enough to contain an average-sized adult corpse. A number of smaller, basin-shaped structures made from the same material having an average dimension of 40-50 centimeters in diameter were also discovered. These smaller structures may also have been used for burning the disarticulated skeletal remains. Their discovery initially presented another problem until the recovery of a cremation burial in a brown spherical jar in situ sitting on top of one of these red ochre structures.

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1. *The crematorium*
2. *Secondary cremation burial in a Chinese export vessel*
3. *An Iron Age burial in Pila*

The Problem of Multiple Reburial

Secondary burial has been defined as an "indirect kind of burial practice in which the body is to be buried at least twice though often washed three or four times." A number of primitive groups practicing secondary burial today regard the ancestral bones as the abode of the ancestral spirit. Consequently, special care is taken in the cleaning of the bones before reburial as the belief prevails that the fortune of the entire family is dependent to a great extent upon the manner in which the ritual is observed. A calamity or serious illness befalling a member of the family is usually attributed to the displeasure of these spirits. In which case, the bones have to be exhumed, cleaned and subsequently reburied. The number of times that this is done appeared to be dictated by the exigency of the situation.

The smashed large jars were almost invariably found in close proximity to cremations whether in pits or in containers, and the inference is that the findings in Pila are parallels of the above situation in archaeological context.

Evidence of External Influence in the Cremation Burial of Pila

The cremation burial practice found in Pila had an impact so strong and compelling to the indigenous population as to spread rapidly around the lake region despite its relatively short duration. At this point, it is possible to present the conditions which facilitated the introduction of this cultural trait into this part of the Philippines.

The Chinese had, for centuries, been in contact with the early Filipinos through maritime trade. In fact, it would appear that the only intensive outside contacts the early Laguna settlers had during this particular period was with the Chinese traders. Evi-

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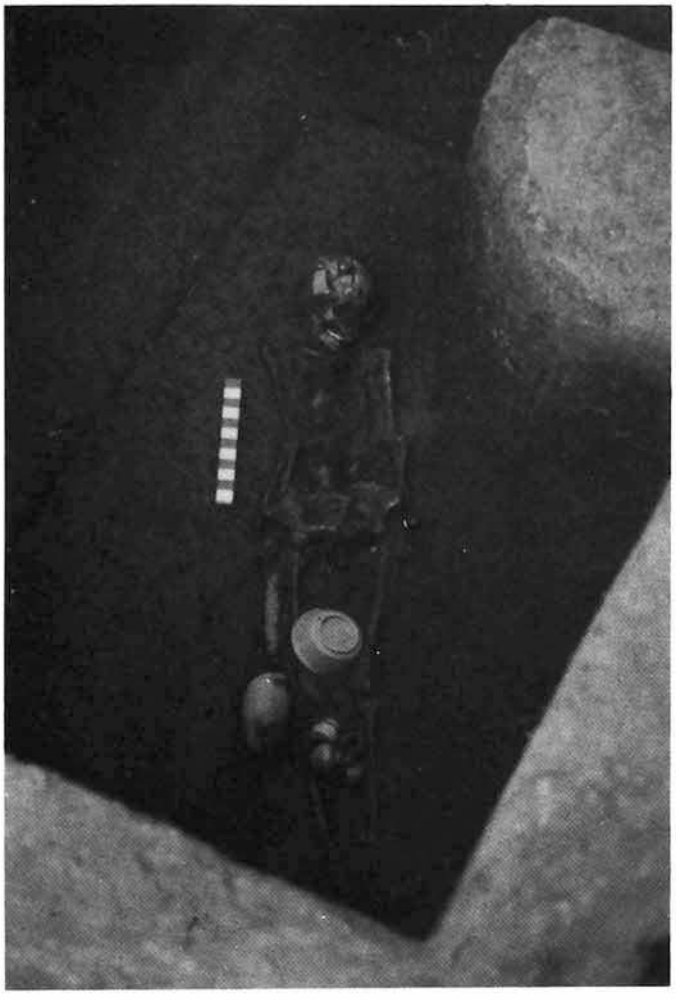


Assemblage of ceramic wares as found in burials in Pila in Period II.

Example of placement of export of ceramics vis- a-vis earthenware in Pila Burials in Period II.

dence points strongly to an actual settlement by these foreigners and, most likely, marriage to local women in the Laguna area.

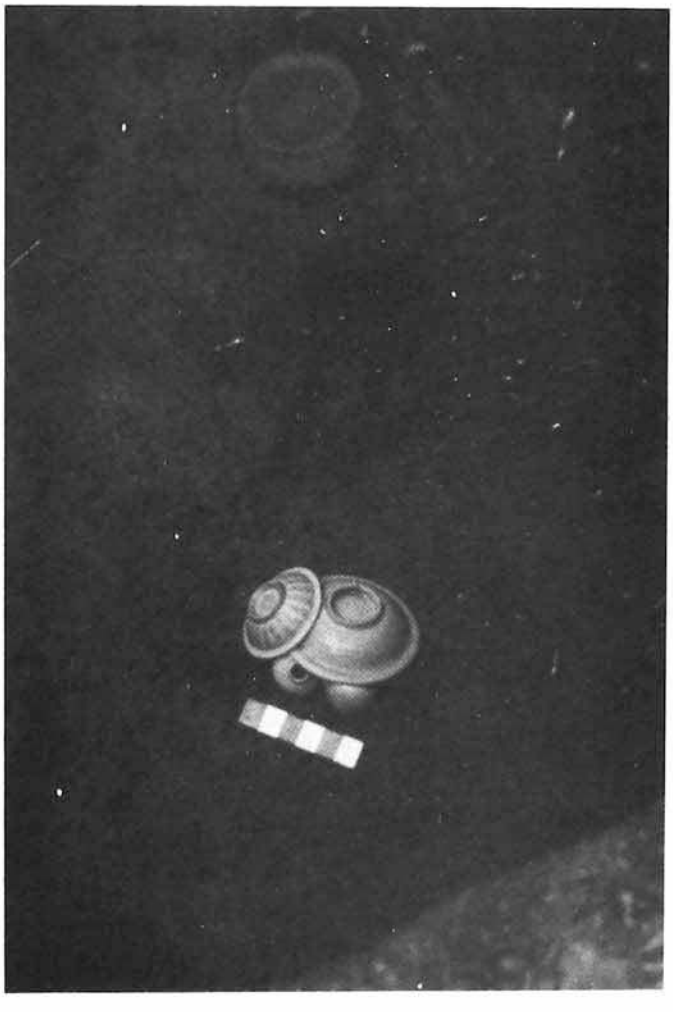
In this connection, it will be useful to introduce a category of ceramic item – the so-called "water droppers" – which was intimately linked to the problem and has constituted an additional argument for an actual foreign intervention at this time. These water droppers were tiny spouted vessels that were used to wet the ink used for writing or calligraphy. Outside of pure chance or unless actually carried and introduced into the indigenous culture by actual settlers who came from a tradition where writing was known to a literate few, there was no logical reason for these tiny vessels to be brought into the Philippines as items of trade. It is probable that they came to be introduced into the recipient Laguna culture, not necessarily in their original cultural context, but initially and it would seem thereafter, as highly valued knick-knacks with the added function of establishing status symbol to their new owners. Like the cremation burial practice, nowhere but in this part of the Philippines have water droppers been recovered, and in phenomenal quantity and shapes.

This could mean that foreign agents – most likely the Chinese – actually established settlements in the area and introduced certain artifacts specific only to their culture, such as the water droppers that were used in caligraphy or writing. At the same time, they introduced a new religious concept resulting in the sudden and widespread appearance of an entirely new burial tradition, that of cremation. Whether these practices were introduced in toto or were the result of indigenous innovation of the same concept are questions that will not now be possible to answer.

Stratification of Pila Society as Seen Through Pottery

It was previously mentioned that a mode of burying in two levels characterized the complex burial in Magsuhot. This practice of adding grave goods after the partial cover-up of the burial pit also finds a parallel in the Pila site of Laguna.

In the case of Pila, it was the local earthenware that were placed on top, perhaps an indication of the high value the Pila people had attached to the imported ceramics which formed the main burial assemblage, in opposition to the seeming low esteem of their own local products that were separated from the rest of the assemblage. Another illustration of this apparent pottery discrimination is connected with the practice of wrapping of the dead in a shroud or matting

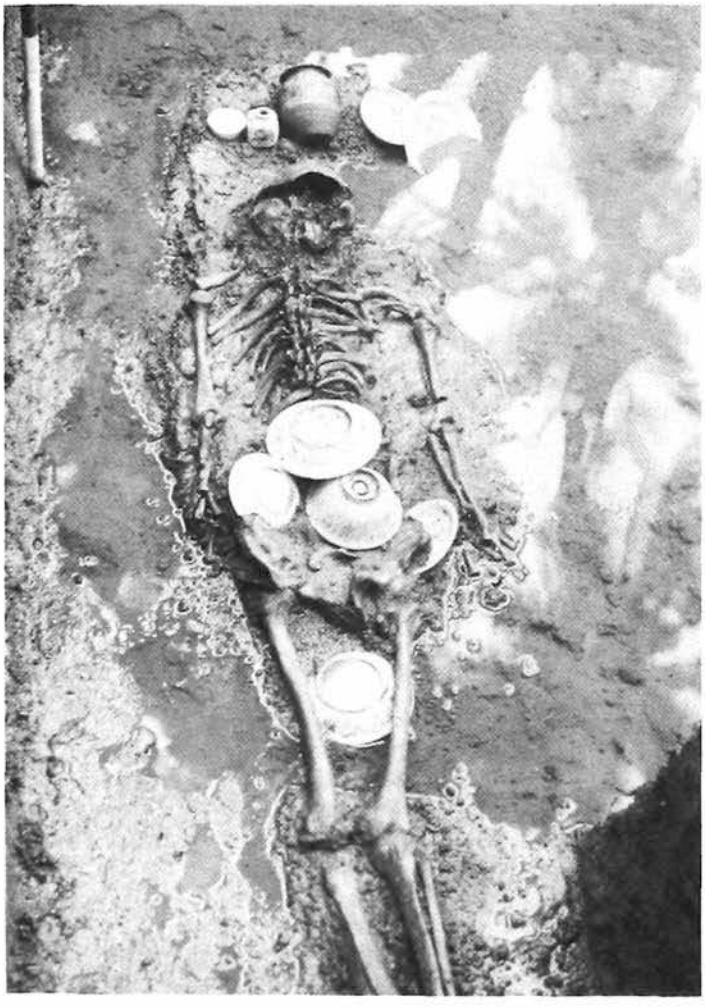


together with some of their prized possessions. In such cases, the earthenwares were found on the same level but away from the main cluster of imported ceramic pieces giving the impression that they were not bundled together with the corpse.

Again, as demonstrated in Magsuhot complex burials, the Pila burials with associations of relatively high number of pottery of better quality, exemplified by the delicately potted ch'ing pai pieces – in a good number of cases in shapes of animal and fruit and water droppers – and celadon dishes and jarlets, are attributed to personnages of higher rank in society. In contrast, the burials of lower class had only a few pottery which are generally of the more inferior, stoneware varieties.

Some Socio-Religious Concepts Found in Pila

Concepts connected with fertility are not unique to the jar burial culture of Magsuhot. The extensive recovery of net sinkers in Pila has been mentioned. These earthenware objects were recovered from the earliest to the middle phases of Period II. As an indicator of intensive fishing activities in the lake area, this mode of exploitation existed at least for two cultural levels. These pottery objects were in a number of instances realistically carved into representations of the phallus. A number of these phallic objects were recovered from the excavation floors, others in clear association with inhumation and cremation burials. A more interesting association was of a male and female symbols in a cremation burial. The female symbol takes the form of a spherical net sinker or large earthenware bead with a deep cleft along one side.



Placement of ceramic pieces in relation to the body. Pila, Period II.

Another example of how the wares were found in Pila. Period II.

Similar sexual conceptualization encountered in the Magsuhot jar burial culture appears to be an integral part of a widespread cult that involved the worship of the phallus in connection, perhaps, with ancestor worship and/or fertility. In the case of Pila, these sinker/phallic objects were probably either worn as pendants or strung to the fishnet as regular sinkers but attached with religious significance.

A category of pottery, not quite uncommon in the Delta region of Sarawak and Malaysian Borneo, is the phallic-topped covers. Phallic tops were first reported by Solheim from studies he conducted on pottery from Tanjong Kubor near Santubong.[17] These phallic-topped covers have been ethnographically correlated with the Badjau in Sabah who continue to make such lids today. The phallic lids are included in the discussion of phallic objects/net sinkers recovered from Pila because of their suggested connection with a widespread sexual symbolism. It seems to include also the Jaong anthropomorphic rock carvings of figures with legs outspread and arms outstretched. It is mentioned here that such a motif has also been encountered on some stone burial jars recovered from cave sites in the province of Cotabato in the island of Mindanao[18] and in Sulawesi in Celebes (data obtained from a communication from W.G. Solheim II).

This preoccupation with the sex symbolism in the form of phallic objects appears to find many parallels in China where these are correlated to the ***tsu*** and ***she*** ritual places for ancestor worship. The characters for these ritual places are supposed to symbolize the sex organs. This situation is likened to the marae of the Polynesians and the ***sua*** or ***sar*** of the Melanesians.[19]

Summary and Conclusions

The foregoing discussions brought out the kinds of factors that were operative in determining site placement by Iron Age communities that were widely located in space and, to a certain extent, also in time. The Magsuhot jar burial culture was located far inland in a region that, evaluated at present face value, does not appear to possess the wherewithals for a substantial food resource that was necessary for existence. But a rich culture did exist there in prehistoric times and the probable stimuli for the development of a sophisticated jar burial community lay in certain choices of usable resources, in particular clay, to sustain a flourishing trade in pottery and, possibly, accessibility to mineral ores and certain forest products that were bartered for foreign manufactures within the framework of wider commercial contacts.

The Pila settlements, on the other hand, had enjoyed an inherently favourable environment, being situated along a lakeside site teeming with exploitable equatic life and an area equally high in potentials for irrigation farming. Still, the area would have been relatively remote had it not happen to lie along the main route of traffic in foreign goods and many cultural ideas. Entry into the lake area was effected through the Pasig River which formed the main artery that connected the Lake area to the South China Sea maritime trade traffic. The traffic of goods and ideas along the Pasig River route resulted in the proliferation of important trading ports, not only around the Lake area as Bay, Pila, Lumbang, and Sta. Cruz in Laguna, but also in the area of Manila Bay as witnessed by the famous site of Sta. Ana.

Trade, rather than any other subsistence strategies, provided the stimulus for cultural development among the early Iron Age settlers of Magsuhot and Pila. The wealth amassed had, in turn, enabled the groups to procure certain items of material culture from near and distant regions that were necessary for their existence.

In Magsuhot, the negative evidence for actual iron working and cloth weaving presupposed trade for these items outside the settlement in exchange for its own pottery products. Trade as the main economic base has provided an ample source of wealth for both the Magsuhot and Pila Iron Age settlements and as demonstrated especially in Magsuhot, the growth of a rich jar burial community in a relatively remote region.

In Magsuhot, two levels of economic activities appear to have been engaged in: 1) local trade in pottery and, 2) an implied wider commercial contacts that brought in foreign products of which the only surviving testimonies are the ornaments of glass that originated from as far as the Middle East and the Mediterranean.

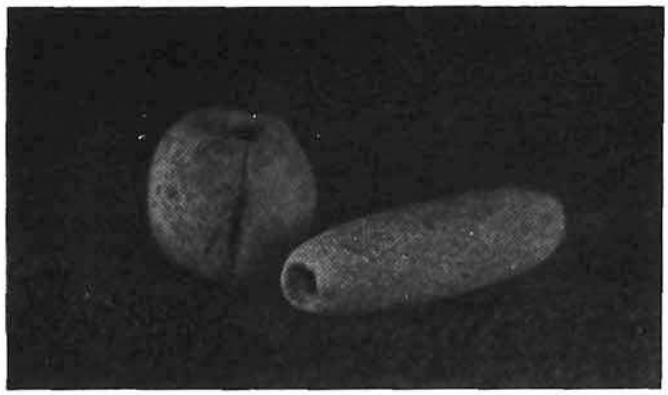
The obvious reliance on other material goods for existence presupposed some kind of craft specialization on a local or village level. Perhaps a number of communities, not necessarily related, were linked together in a trading network enabling them to transcend particular limitation in their respective environments.

It had, likewise, been shown how graves provided interesting clues for social and political organizations. We saw how status (which implies social stratification) can be inferred from the differential treatment of burials as well as in the manner of their disposition and the types of grave goods that are interred in the burials. Certain items of artifacts also can give information or clues on the political organization of a people. The existence of a pottery staff-cum-mace head, the presence of special ritual vessels and figurines from the Magsuhot site, and the stone ceremonial seat point to a developed political organization which would be expected to follow in the wake of a growing population. It is pointed out that the Magsuhot jar burial settlement encompassed three contiguous barrios: Liptong, Malabago, and Magsuhot. The density of population, demonstrated by both the Magsuhot settlement and Period I and Phases 1 and 2 of Period II of Pila, was drawn from the extensive distribution of burials in these sites. The burial sites alone belonging to Period II in the three barrios of Pila, which includes Pinagbayanan (the actual excavation site) that had been overrun in the late 60's by commercial diggings, totalled a remarkable area of 18 hectares. Consequently, a form of political structure had to be in existence.

Certain items of artifacts such as the phallic pottery objects from Period II of Pila provide an idea of the extent of the influence of cultural ideas, perhaps mainly through stimulus diffusion, a by-product of the existing trade contacts.

The secondary cremation burial encountered in Phase 2, Period II of Pila , was likewise the result of intensive contacts, resulting in its actual introduction into the area of Laguna through actual migrations and not through stimulus diffusion. The change of mode of disposal of the dead from the common inhumation type of burial to that of secondary cremation denotes a probable change in outlook that affected religious concepts, especially in the areas of attitudes towards life after death.

The motif seen on the Magsuhot jar burial complex was derived from the bird which, from ethnographic



Phallic net sinkers – male and female. Pila, Period II.

analogies, represents the skyworld. Representations of the bird motif have also been on other forms of burial, such as in the boat-coffin burials that co-existed with jar burials over wide areas in Southeast Asia.[20] Because the bird is thought of as representing the skyworld, the boat coffins of the Ngadju Dayak are shaped like a hornbill. Likewise, among groups in Assam, coffins are decorated with hornbills which they call boats. Finally, the ceremonial Dongson bronze drums on the Southeast Asian mainland and parts of Indonesia carry motifs, not only of boats, but also of birds and bird-shaped men.[21]

Thus it has been shown that certain factors of the environment can determine particular choices of the archaeological settlement: in Magsuhot, it was the source of clay for their pottery industry and in Pila, an environment rich in food resources in addition to trade in ceramics in the later phases.

The overall implication is that the particular settlement pattern chosen by early peoples can be a causal factor of social forms. Religion was seen as being expressed in certain rituals and in the types of burials encountered as well as in the quantity and types of grave goods, especially of pottery, associated with these burials. The nature of the political organization was partly inferred through trade (predominantly) as well as in certain artifacts (e.g. the pottery mace head) and, in the case of Magsuhot, the megalithic structure that is interpreted as a chief's ceremonial seat.

Footnotes

1. Rosa C.P. Tenazas, "A Progress Report on the Magsuhot Excavations in Bacong, Negros Oriental, Summer 1974" **Philippine Quarterly of Culture and Society** 2 (3), 1974.
2. R.C.P. Tenazas, **A Report on the Archaeology of the Locsin – University of San Carlos Excavations in Pila.** Manila, 1968; cf. R.C.P. Tenazas, "Salvage Excavation in Southern Luzon, Philippines: A Summary," **Philippine Quarterly of Culture and Society** 1 (2) 1973, pp. 132-137.
3. O.W. Wolters, **Early Indonesian Commerce.** New York: Cornell University Press, 1967, p. 154.
4. Harold C. Conklin, "Buhid Pottery," **Journal of East Asiatic Studies** 1 (1), 1953, pp. 1-12.
5. Wilhelm G. Solheim II, "The Functions of Pottery in Southeast Asia: From the Present to the Past," **Ceramics and Man,** Frederick Matson (ed.). New York: Wenner-Gren Foundation for Anthropological Research Inc., 1965, p. 256.
6. W.G. Solheim II, "The Ibanag Pottery Manufacture in Isabela, Phlippines," **Journal of East Asiatic Studies** 3 (3), 1954, pp. 305-307.
7. W.G. Solheim II, **The Archaeology of Central Philippines.** A Study chiefly of the Iron Age and its Relationships. Manila: Bureau of Printing, 1964; cf. Solheim, "Pottery and the Malayo-Polynesians," **Current Anthropology** 5 (5), 1964, pp. 360 ff.

   In his classic study on the Philippine Iron Age, Solheim identifies at least three groups of people that introduced the technology of iron working into the Philippines which he calls the Kalanay, Bau, and Novaliches, after the type sites where their pottery complexes were first recognized.

   Apart from definite areas of distribution, each of these complexes is distinguished from the other through formal elements of decoration diagnostic of each group.

   A pottery complex which Solheim assumes to be a subgroup of the Kalanay is what he calls the Bagupantao. The diagnostic decoration are lenticular cut-out designs while sharing certain elements of forms with the other complexes such as the ring stand attached to bowls with or without cut-out designs.
8. L.G. Loeffler, "Beast, Bird, and Fish: An Essay in Southeast Asian Symbolism," Paper read in the Symposium on Folk Religion and World View in the Southwestern Pacific, 11th Pacific Science Congress, Tokyo, 1966.
9. Rudolf Rahmann SVD, "Shamanistic and Related Phenomena in Northern and Middle India," **Anthropos** 54, 1959, pp. 736 ff.
10. Tenazas, 1974, **op. cit.,** p. 135.
11. W.G. Solheim II, "Notes on Burial Customs in Near Sagada Mountain Province," **Philippine Journal of Science** 88, 1960, pp. 123-131.
12. See attached Table showing the Chronology of Cultural Developments in Pila.
13. Nils-Gustaf Gejvall, "Cremations," **Science and Archaeology,** Don Brothwell and Eric Higgs (eds.). USA: Thames and Hudson, 1965, p. 381.

    Fragments of any given sample in primary cremation only have an average size of 1.5-2.5 cm.
14. Cf. R.C.P. Tenazas, "Notes on a Preliminary Analysis of Cremation Burial," **Philippine Quarterly of Culture and Society,** 1 (2), 1973, pp. 137-138.
15. Henry Ling Roth, **The Natives of Sarawak and British North Borneo.** 2 vols. Kuala Lumpur: University of Malaya Press, 1968, pp. 146-154; 160-163.
16. The following are some graphic descriptions of secondary cremation burial practices in China and Japan: "Among the Lolo of Yunnan and Sikiang... when a person dies, offering of medicine is at once made to him; usually his corpse is placed on a platform. When it completely decays, the bones are removed and washed five times and finally cleaned with fire, that is, burned." The information on Japan states that "bones which have been washed, or burned, and buried for a second time, have been widely found in archaeological sites of Japan; the evidence strongly indicates the past existence of the bone-washing (secondary burial) in Japan." Cf. Shun-Sheng Ling, "The Bone-Washing Burial Custom and Ancestral Bone Worship in Southeast Asia and Around the Pacific," **Academia Sinica** 2 (1), 1955, p. 192.
17. Wilhelm G. Solheim II, "The Prehistoric Earthenware of Tanjong Kubor Near Santubong," **Sarawak Museum Journal** XII (25-26), 1965, p. 17; figs. 6 and 14; plate 10.
18. Marcelino N. Maceda, "Preliminary Report on Ethnographic and Archaeological Work in Kulaman Plateau, Island of Mindanao, Philippines," **Anthropos** 59, 1964.

19. Shun-Sheng Ling, "Ancestral Tablet and Genital Symbolism in Ancient China," **Academia Sinica** 8, 1959, p. 39 ff.
20. R.C.P. Tenazas, "The Boat-Coffin Burial Complex of the Philippines and its Relations to Similar Practices in Southeast Asia" **Philippine Quarterly of Culture and Society"** 1 (1), 1973; cf. Loeffler, **op. cit.**
21. H.G. Quaritch Wales, **Prehistory and Religion in Southeast Asia.** London: Bernard Quaritch, Ltd., 1957.

The boat is believed to be an alternate development by riverine and maritime peoples of Southeast Asia to the Rainbow-bridge Myth by which means the souls are carried to the afterworld or heaven.

Table 1: Chronology of Cultural Developments in Pila, Laguna

Period	Culture	Characteristics	Date	Burials
Period I	Early Iron Age	Novaliches type Pottery Complex, first identified by W.G. Solheim II (1964); limited distribution in the Laguna area; simple inhumation burial	Ca. 400 B.C. – 200 A.D.	9
Period II Phase I	Early Late Iron Age	Characterized by the first evidence of direct maritime trade contact with China and, indirectly, with Middle Eastern countries; period of contact with the so-called "Great Traditions"; simple inhumation burials wrapped in mats; extensive evidence of metal working, weaving, and fishing; pottery objects identified as phallic symbols. The site was used, for both habitation and burial.	Ca. 10-12th Century A.D.; Associations of trade ceramics from China of early to late Sung dynasty attributions; Chinese coins from two burial assemblages with the latest dates of 1063 A.D. and 1100 A.D., respectively.	278
Period II Phase 2	Early Late Iron Age	External trade contact with China continues; first appearance of cremation burial, predominantly in jars; a crematorium of haematite, the first substantial prehistoric structure excavated in the Philippines; phallic pottery objects continue to appear. Evidence indicates utilization of the site for both habitation and burial.	Early 13th-14th Century A.D. by radio carbon dating method; trade ceramic associations as well as the burial jars are diagnostically of late Sung/Yuan Dynasty types.	91
Period II Phase 3	Late Iron Age	Abrupt fall in density of population; a period of migrations; complete disappearance of cremation burial and reappearance of inhumation type of burials; first appearance of export wares from mainland Southeast Asia.	Late 13th-15th Century A.D., by association of early Ming trade wares and export wares from Siam and Annam in mainland Southeast Asia.	17

WOOD PRESERVATION

by Perry Peralta

This contains a detailed discussion of the causes of wood deterioration and methods of preservation.

Wood statues, like this Buddha image, get attacked by termites if not properly treated.

Wood has always been a pre-eminent engineering material of man. Its advantages over other structural materials have made it invaluable in construction work. Today, despite the competition by other structural materials – steel, concrete, and plastics – the highway departments, railroad, telephone, telegraph, electric light and power companies, and the agricultural, building, mining and navigation industries still depend greatly on wood for their construction requirements.

However, wood, has a major drawback as a structural material. Being of organic origin, it is subject to attacks of bio-deteriorating agents. Where conditions permit the development of organisms, wood could last only for a very limited number of years. Although there are wood species that are naturally durable and could resist decay to a very large extent, their supply have become considerably low such that, during the past several years, wood users have resorted to less durable species. At a time of growing shortage of resources, economical handling and use of the wood are therefore required. Wood protection is absolutely necessary since wood with less natural durability has a growing market.

Outstanding among the practices developed to increase the life span and serviceability of wood is the treatment of wood with chemical substances (preservatives) which reduces its susceptibility to deterioration by destructive agencies. The different aspects of this treatment are covered in this paper.

Some of the benefits derived from the application of preservatives to wood are: increase in the service life of the material, decrease in the ultimate cost of the product, and elimination of the need for frequent replacements in permanent and semi-permanent construction. It also results in the increase in the number of available materials because naturally non-durable species could now be made durable and expected to provide long service and, consequently, in the reduction of prices of wood construction materials and in the conservation of forest resources.

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Biological Agencies of Wood Deterioration

Biological agencies of deterioration are the major causes of wood deterioration. The volume of wood destroyed by these organisms has not been calculated; but miscellaneous estimates and a variety of observations indicate that such biological damage is very large in the aggregate. Although a large

percentage of the destruction is unavoidable, much of it could be prevented or at least retarded through proper understanding of the behaviour or misbehaviour of these organisms. They are divided into two general classifications: the wood–inhabiting fungi and the wood–boring insects.

Wood – Inhabiting Fungi

Wood is usually attacked by low forms of plants known as fungi. These microorganisms lack chlorophyll and are, therefore, unable to manufacture their own food. Like animals, they must obtain the complex high-energy nutrients they need in an already synthesized form. Wood-inhabiting fungi obtain their nutrients from substances that are stored in cell lumens or the cell walls of the wood. They may be divided into the decay fungi, stain fungi, and mold fungi. These three groups differ in the nature of their development in and on the wood and the type of deterioration they cause.

Decay Fungi. This group of fungi is the most economically important since it causes most of the damage in wood. It embraces those fungi capable of disintegrating the cell walls and thereby of changing the physical and chemical characteristics of the wood. Decay fungi may, under conditions that favor their growth, attack either heartwood or sapwood giving rise to the condition known as decay or rot.

Decay fungi require a suitable source of food (wood), favorable temperature, and adequate moisture and oxygen for their growth. A deficiency in any of these requirements will inhibit the growth of a fungus, even though it is already well-established in the wood. For instance, treating wood with preservatives, exposing infested lumber to high temperatures in a dry kiln, drying wood below 20% moisture content (mc), or storing logs under water will minimize, if not prevent, the growth of decay fungi.

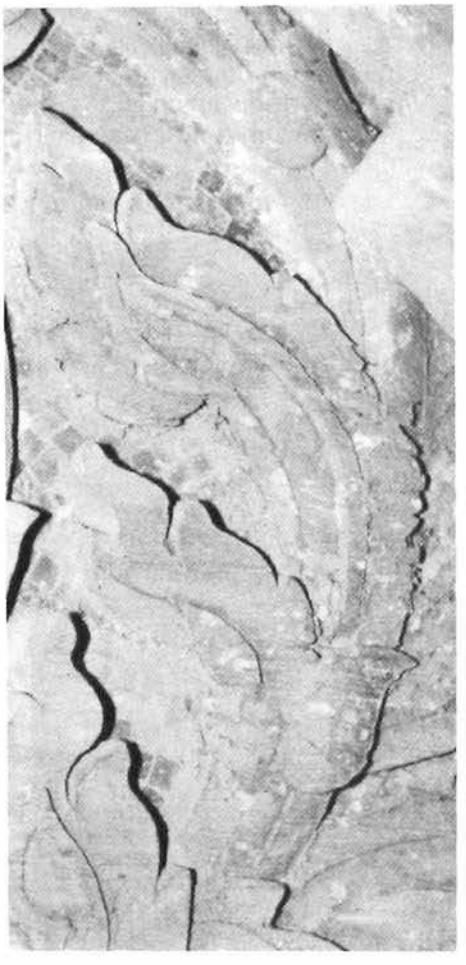
A decayed wood may be distinguished from a sound wood by the following features:

a) presence of fruiting bodies and hyphae in/on the wood;
b) water-soaked appearance, dark or reddish brown and sometimes whitish or streaky colors;
c) presence of narrow, black or dark-colored zone lines; and
d) light weight, brittle quality, spongy texture and an odor resembling that of mushrooms.

Stain Fungi. Another group of fungi that attack wood is the stain fungi. They discolor wood from blue to dark brown, and even green. Unlike the decay fungi, the stain fungi obtain their nourishment from stored materials in the cell cavities, hence, do not appreciably affect the strength properties of the wood. Stain fungi attack as soon as the tree is cut and have the capability to infest during various stages of wood processing so long as conditions for such attack exist. Most critical of these is the moisture content of the wood. Wood may be protected by immediately drying it to about 20% mc. For better protection, lumber should be treated with preservatives.

Mold Fungi. Mold fungi usually produce cottony growths which range in color from white and other light shades to black. Most of the mold fungi grow only on the surface of woods with high moisture contents and, therefore, are very prevalent on freshly cut woods that have been piled in a manner where drying could hardly take place. Molds do not cause any appreciable damage on wood because of the superficiality of attack and therefore could be easily brushed or planed off the surface.

The surface molds have the same growth requirements as that of stain fungi, thus, the presence of surface molds in wood may also result in the presence of stain fungi.



Powder-post beetle also causes deterioration of wood.

Wood-Boring Insects

Insects are second only to decay fungi in the economic loss they cause to converted lumber and wood in service. Wood-boring insects of economic importance are the termites and some beetles. For example, survey of termite infestation in the Forestry Campus, College, Laguna in 1958 showed that 63% of 79 residential and office buildings inspected had termites damage. A similar inspection of a government housing area in Manila and Quezon City showed that 45% of the 673 housing units, 2 to 12 years old, were infested with termites and/or powder post beetles.

Another example of how termites destroy wood

Termites. Termites are often called "white ants" though they are neither ants, nor white. From the standpoint of their methods of attack on wood, termites can be grouped into two main classes: (1) the ground-inhabiting or subterranean termites, and (2) the wood-inhabiting or non-subterranean termites.

The subterranean termites are by nature soil-inhabiting, entering wood only from the ground, and require a constant supply of moisture for their existence. Subterranean termites develop their colonies and maintain their headquarters in the ground. But in their search for food, they usually form runways which are constructed of tiny fragments of earth and partly digested wood cemented together by insect excretions. Thus, a telltale sign of the presence of the subterranean termites is the appearance of earthen tubes. If these earthen tubes are cut off and the termites cannot find another source of moisture, they will eventually die.

The non-subterranean termites are distinct from the subterranean termites in that the former is entirely wood-inhabiting and never enters the ground. Non-subterranean termites are further subdivided into the drywood and dampwood termites.

Drywood termites require no moisture other than that which they can derive from the wood itself. They are able to work in wood with a moisture content as low as 10 to 12 per cent (possibly lower).

One indication of the presence of dry-wood termites is the accumulation of fecal pellets which are minute, brown powder under the structure that they attack. This type of termite causes less damage than the subterranean species.

Dampwood termites differ from the drywood termites in their dependence on an abundant supply of moisture for their existence. Accordingly they confine their activities largely to damp or decaying wood. Dampwood termites are seldom encountered in buildings.

In the Philippines, there are, to date, 54 known species of termites. Luckily, however, only 6 of these cause destruction of wood and other cellulosic materials in service. Four of these belong to the subterranean group and are known locally as "anay"; while the other two belong to the drywood termite group and are known locally as "unos"

The four subterranean termite species are:

a) **Coptotermes vastator,** Light or milk termite
b) **Macrotermes gilvus,** Hagen or mound-building termite
c) **Nasutitermes luzonicus,** Oshi ma or Luzon pointheaded termites
d) **Microcerotermes losbanosensis,** Oshima or Los Banos termite.

while the 2 drywood termites species are:

a) **Cryptotermes cyanocephalus,** Light
b) **Cryptotermes dudleyi,** Banks

Beetles

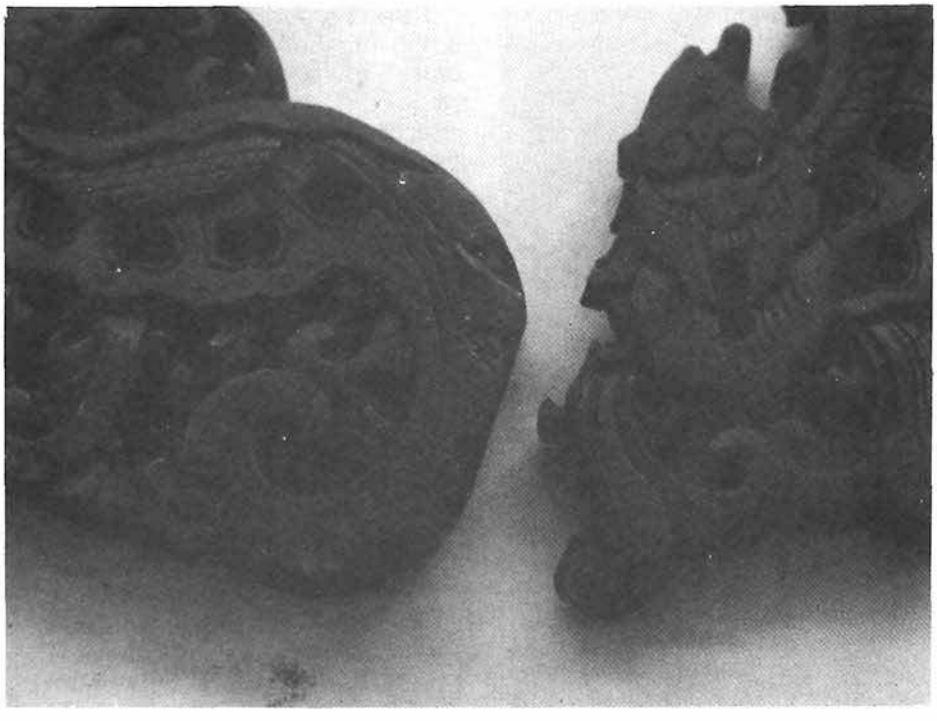
Ambrosia beetles. Insects comprising this group are more commonly known to lumbermen as "pinhole" beetles. They are pests of green logs and freshly sawn lumber and the damages they cause are characterized by small, round holes ranging from 0.5 to 3.0 mm in diameter. The holes are usually stained dark by "ambrosia" fungi introduced and cultivated by the beetles in the tunnels. These fungi furnish the entire food for the insects; the galleries cut into the wood serve only as a shelter and place for the fungi to grow.

Logs become infested by these insects immediately after felling and the pinhole injuries are manifested in sawn lumber. Freshly cut lumber may be further attacked until such time when the moisture content drops to about 40 per cent.

Infestation by these beetles in logs may be minimized, if not completely avoided, by prompt removal from the forest and immediate conversion and seasoning of lumber. Where hazards of infestation are high, lumber should be dip-treated with a preservative.

Powder-post beetles. This group of insects is, generally, a serious pest of well-seasoned sapwood lumber either in storage or in service. These insects are so-called because of the condition to which they render the infested wood. Underneath wooden structures attacked by this group of insects are heaps of fine dust or powder. These and the small holes on the woodwork are the indications of a powder–post beetle infestation.

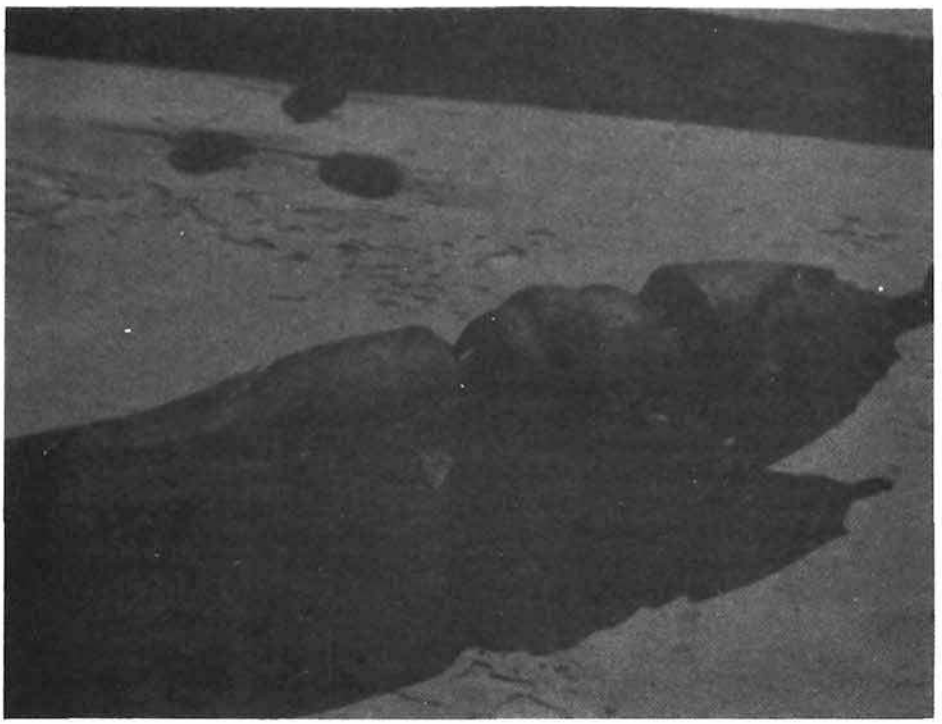
It is also difficult to estimate the value and extent of damage caused by these insects. While ambrosia beetle is more prevalent on unsawn



Insects also cause damage to organic materials.

logs with usually high moisture content, powder-post beetles generally confine their attack to dried lumber, structural timbers and wood in service.

Since starch is a principal substance of the larvae of the powder post beetles, the susceptibility of wood to their attack is indicated by its starch content. Thus injury to the wood is confined only to the sapwood of susceptible species. Logs immersed in water after felling are not susceptible to their attack. When wood is soaked in water, the parenchyma cells in the wood continue to function and the starch present in the sapwood may be entirely transformed to other materials. On the other hand, when wood is seasoned rapidly or exposed to high temperature, the parenchyma cells die before the supply of starch is used up and consequently the sapwood is susceptible to attack.



An insect-damaged wood collection

Marine Wood Borers

Two groups of organism attack wood in marine waters: the Molluscan borers which are related to the oysters and clams and the Crustacean borers which are kin to the lobsters and crabs. The marine borers reported to be active in Philippine waters are the shipworms, the Martesia of the Molluscan group and Limnoria of the Crustacean group. The shipworms and Limnoria attack wood as a source of food and for shelter while Martesia, feeding on plankton and sessile micro-organisms in their burrows, excavate wood for dwelling only.

Preservative treatment of lumber intended for ships, deepsea fishing boats, piles and other marine construction will provide protection against marine borers.

Natural Durability of Wood

Natural durability is the property of wood to resist deterioration by the various wood destroyers without the aid of applied chemicals. Different wood species possess different degrees of resistance to biological agents of deterioration. Experience has shown that some species provide long service even in hazardous conditions while others last only for a few years in less severe conditions of use. For example molave, a naturally durable species, may last for 25 to 30 years when used for railroad ties while an untreated apitong may last for only a few years or even months.

Investigations on durability indicate that the durable woods owe their resistance to deterioration to the chemical components they contain which are collectively known as extractives. These chemical components can be removed from wood by extraction with water, alcohol, benzene, or other organic solvents. These extractives may be toxic or repellent to the wood-destroying microorganisms. The extractives are found in the heartwood. It has been suggested that as the sapwood changes into heartwood when the parenchymatous cells die, the extractives are formed or deposited in the cellwalls and cavities. These extractives include tannins, essential oils, complex phenolic substances and other sugars and ethers. The effect of toxic extractives on prolonging the life of wood in service has been demonstrated unequivocally. The removal of extractives from wood and its subsequent rapid decay as compared with a natural, unextracted sample is a convincing evidence of this.

In woods with comparatively durable heartwood, the relative amount of sapwood present in untreated timbers will naturally have a decided influence upon their serviceability when exposed to conditions that favor decay. Thus, in a pole or post, complete decay of a thin ring of sapwood may not seriously impair the usefulness of the piece. On the other hand, if the band of sapwood is wide, its destruction will probably result in failure of the timber, even though the small center of the heartwood is not attacked. In the latter instance, the decay resistance of the heartwood is of little or no consequence in determining the service life of the timber.

A number of studies have been made to determine the natural durability of Philippine woods. Notable of the earlier studies are those of Nano (1924) and Aguilar (1941). A more recent report is that of Siriban (1970) who is currently studying the durability of some Philippine species. Table 1 integrates the three reports. Except for a few species, their classifications are in general agreement.

Wood Preservatives

One of the best protections that can be provided to wood against the degradations of the various organic agencies of deterioration is the application of chemicals known collectively as wood preservatives. Since the first successful impregnation of wood with chemicals about 150 years ago, a large number of chemicals either as single compounds or mixtures of compounds have been introduced, most, rather dubiously, as wood preservatives.

Not all preservatives provide the same degree of protection to the wood. Some are effective than others for a particular use while others may not be adaptable to certain use requirements. All, however, must penetrate the wood to some distance to provide more lasting protection and should not be easily carried away from the wood by moisture. For general construction purposes, a good wood preservative must possess the following properties:

a) High toxicity to wood destroyers,
b) Permanence in the treated wood,
c) Capable of deep penetration into the wood,
d) Not health hazards to the wood preserver and user
e) Non-corrosive to metals and also not deleterious to the wood itself,
f) Readily available and economical.

For specialized uses, there are other characteristic requirements. The preservative should not be poisonous to men or higher animals if the treated wood is to come in contact with foodstuffs or animal feeds. Furthermore, it should not increase the flammability of the materials treated; it should be non-swelling, moisture repelling, clean and paintable; and it should not give off fumes that may be injurious to plants and animals nearby.

No one preservative possesses all the properties mentioned nor is there one that suits all purposes and occasions. In most instances, the choice is limited and the user must decide which properties are most important for his purpose.

Wood preservatives are subdivided into two groups, the oil or oil-borne type and the water-borne type.

Oil and oil-borne preservatives

Oil preservatives include by-product oils obtained in coal distillation, coal-tar refining, petroleum refining, wood distillation, and the manufacture of gas. Important examples under this type are the following:

The tunnels in the wood are built by termites.

Coal-tar creosote. Coal-tar creosote is a distillate of coal-tar produced by high temperature carbonization of bituminous coal. It is still regarded as the most effective substance for general use in protecting wood against all forms of wood-destroying organisms. It also penetrates well especially when heated and used in well-dried materials; is chemically stable, not volatile and does not leach out; presents no health hazard except probably to a few who may develop some allergy to it; and although not produced locally, is easily obtainable at reasonable price.

Although creosote is in general use for various purposes, it is far from being a universal preservative. It could not be applied to materials that come in contact with food due to its color. Also, workers especially of telephone and power companies show objection to creosote as it is dirty to handle and soils clothes.

Creosote-petroleum solution. To lower preservative costs, certain additives are often mixed with coal-tar creosote in various proportions. Petroleum of the heavy, fuel-oil type is often used as the diluent. The usual mixture is 70 per cent creosote and 30 per cent petroleum, by weight.

The addition of petroleum reduces the toxicity of the resulting solution. Hence, the mixture is not recommended for use in marine or salt water. Moreover, since the resulting mixtures becomes more viscous, it does not give as good a penetration as the straight creosote.

Oil-borne preservatives are prepared by dissolving toxic chemicals in solvent oils. One example under this type is pentachlorophenol. Pentachlorophenol is a compound formed by the reaction of chlorine on phenol. It is very soluble in heavy petroleum oils, but has lower solubility in lighter petroleum solvents such as kerosene and mineral spirits like turpentine, and similar oils. When pentachlorophenol is mixed with petroleum oils, its concentration should not be less than 5% by weight. It has been found that pentachlorophenol is toxic against fungi and insects but not effective against marine wood borers. It is irritating to the skin and mucous membrane, thus, long contact with the skin should be avoided.

Water-borne preservatives

Water-borne preservatives are prepared by dissolving the chemicals in water. Well-known examples under this group are the following:

Chromated Copper Arsenate (CCA). Most of the present-day water-borne preservatives are of the CCA-type. CCA type preservatives are toxic to fungi and insects. However, it is not recommended for use on marine or salt water. Some proprietary CCA-type preservatives available in the Philippines are Boliden K-33, Wolman CCA, and Tanalith CCA.

Flour-Chrome Arsenate Phenol (FCAP). This type of preservative is highly effective against fungi and insects. It is recommended for interior use. A proprietory preservative of this type available locally is Tanalith U.

Acid Copper Chromate (ACC). Tests on stakes and posts exposed to decay and termite attack indicate wood well-impregnated with ACC gives good service. It also has some resistance to marine wood borers. However, the protection against marine borers is much less than that provided by a standard treatment with creosote. A proprietary preservative of this type available is Celcure A.

Wood Preserving Processes

The wood treating processes may be classified into two groups: (a) the non-pressure and (b) the pressure processes. The former is carried without the use of artifical pressure while the later is carried out inside a treating retort or cylinder with the preservative forced into the wood under considerable pressure.

The non-pressure processes

The processes in this group are simple, cheap and easy to apply. However, the penetration and absorption obtained are superficial, inadequate and generally low in effectiveness except when applied to extremely permeable materials. The low cost associated with their application does not necessarily mean true economy since they seldom provide adequate protection. The more common methods under this group are:

Brushing and Spraying. The application of wood preservatives by brushing or spraying is the simplest treatment available. It requires a minimum investment in equipment.

Penetration of preservative is slight and superficial and therefore this method can not be recommended except as a temporary measure. If any physical damage should rupture the thin protective shell, the piece is subject to attack through the open area.

Dipping. This treatment consists in merely immersing wood in a bath of preservatives for a few seconds or minutes. It provides a little more effectiveness than brushing or spraying. Complete immersion probably provides greater uniformity of coverage than brushing and spraying and gives more assurance that all checks are filled.

Steeping and Cold Soaking. Steeping and cold soaking are merely prolonged immersions of wood in preservative solutions. The term cold soaking refers to the soaking of wood in an unheated oil or oil-borne preservative while steeping is simply submerging wood in a tank of waterborne preservative. If the wood is submerged in the preservative for quite a long period, absorption and penetration would equal, if not exceed, those obtained in pressure treatments.

Hot and Cold Bath Treatments. This method of treatment is undoubtedly the most effective of the so-called non-pressure treatments. In this process, the materials are first heated in a preservative solution and then transferred to a cold preservative solution.

Diffusion Processes. The processes included in this group allow gradual diffusion of preservative from a concentrated source. Some of the more popular processes in this group are:

a) the dip diffusion process involves dipping the green materials into the solution of water-borne preservative. Later they are solid-piled and covered tightly with waterproof paper or other suitable material to prevent loss of moisture. The treated wood is left covered for 3 to 4 weeks during which time the pure salts which cling on the surface of the wood diffuse into the water of the green material and thereby penetrate it.

b) the double diffusion process consists of soaking the green materials in a solution of copper sulfate and, then, in a second solution containing sodium chromate and sodium arsenate. The chemicals diffuse into the wood and react to precipitate a toxic preservative with high resistance to leaching. Other pairs of solutions can be used in the same manner.

Pressure Processes

Pressure processes constitute the more commonly used commercial methods in the country today. Under these processes, the wood is flooded with preservative in an air tight cylinder, then, pressure is applied to force the chemicals into the wood. These methods provide deeper and more uniform penetration than those obtained in the non-pressure processes. Furthermore, the absorption of the chemicals can be controlled to obtain the proper amount needed for effective protection. However, these methods are more complicated and require expensive equipment.

Table 1. Relative durability of some Philippine woods from stake tests of heartwood specimens.

SPECIES Common Name	SCIENTIFIC NAME	CLASSIFICATION1/ Nano	Aguilar	Siriban
Acacia	*Samanea saman*	25	21 (MD)	(SD)
Akle	*Serialbizzia acle*		90(VD)	
Almaciga	*Agathis philippinensis*	5	13 (P)	(ND)
Almon	*Shorea almon*	20	15 (P)	(SD)
Amugis	*Koordersiodendron pinnatum*		25 (MD)	(D)
Anabiong	*Trema orientalis*		5 (VD)	(P)
Antipolo	*Artocarpus blancoi*		60 (D)	
Anubing	*Artocarpus ovata*	100	100 (VD)	
Api-api	*Avicennia officinalis*		5 (VD)	(ND)
Apitong	*Dipterocarpus grandiflorus*	30	16 (P)	(ND)
Apitong, broad winged	*Dipterocarpus speciosus*			(ND)
Apitong, round leaf	*Dipterocarpus orbicularis*			ND)

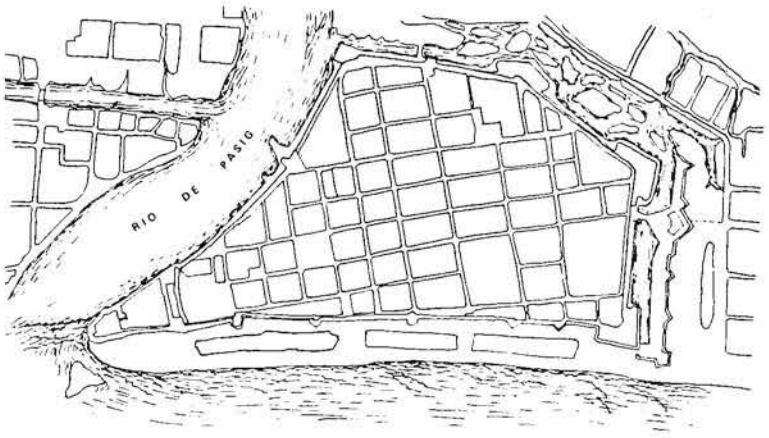
Continued on page 46

INTRAMUROS

Founded by the Spaniards, destroyed by the Americans during the war, the walled city is being restored by the Filipinos.

by Esperanza B. Gatbonton

In the summer of 1570, Martin de Goiti, Legaspi's master-of-camp, and Juan de Salcedo, the *conquistador's* grandson, sailed off for Manila from Panay, in search of a more congenial settlement than the Visayan island had been for their expedition. With them was a native Manilan, a trader newly converted to Christianity, who had followed the Spaniards to their new settlement from Cebu. He was to act as interpreter for the questing Spaniards. He probably guided them as well, northwards to Luzon and into Manila Bay, past Mindoro and Balayan Bay. The Spanish fleet consisted of one armed frigate, one junk and fifteen *praus.* The Spanish chronicler's account of the expedition's first view of Manila was little short of rapturous.



Map of old Intramuros

"The land all around this bay, in the part where we anchored ... the port of Menilla, was really marvellous. It appeared to be tilled and cultivated. The slopes were smooth, and had but little herbage. In fact, so excellent indications have not been seen in this land as were seen there... The town was situated in the bank of the river, and it seemed to be defended by a palisade all along its front. Within it were many warriors, and the shore outside crowded with people. Pieces of artillery stood at the gates, guarded by bombardiers, linstock in hand."

A Reprint from "Weekend," a Magazine of the Daily Express issued in Manila on 4 May 1980.

This was to be the Spanish promised land. On the very same site of this palisaded town that the voyagers came upon, the Spaniards built their city. They enlarged the original palisade which the displaced *indios* has built at the mouth of the Pasig River and encircled their new settlement with a defensive wall.

The Walls took 300 years to build. Beginning from Legazpi himself, up until 1872, successive governors-general sought to improve Manila's defenses — in between fighting off invasions from land and sea: the Chinese Limahong, the Dutch, rebels from the Chinese *Parian,* and the British. Each assault showed how formidable the Walls were in certain places and how vulnerable they were in others. Over the centuries, the Walls became a sophisticated fortress — surrounded by moats and ramparts, bastions and gates and look-out towers, which kept an enemy at bay and the Spaniards safe within.

Even Intramuros, the Spanish city within the Walls, took on the character of its Walls — turned in on itself, smug, brooding on gone glory and in the end, defenseless against the outside world. Until 1852, its eight gates closed at 11 o'clock in the evening to open only at dawn.

History of the Walls

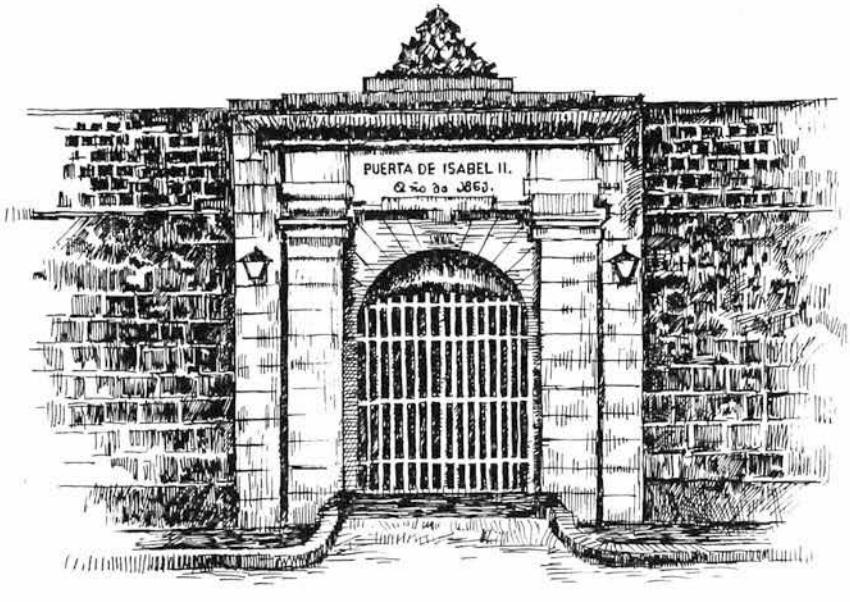
The first defenses which the Spaniards built were no better than Soliman's palisades of palm tree-logs banked with earth. Guido de Lavezares (1572-1575) strengthened this main line of defense along the seaside, adding boxes and barrels filled with sand. As a precaution against fire, he ordered all straw roofs removed from within the city limits. It was De Lavezares' fort which the Chinese pirate Limahong attacked in 1574. With some luck, it held.

The succeeding governor, Francisco de Sande (1575-1580), was appalled by the primitive conditions of Manila's defenses. He ordered the riverside staked in and the seaside filled in with earth. He joined the palisades with embankments and raised mounds. This gave the garrison a commanding view of the surrounding area. In those early years, the danger often came from the sea — from raiding "moros," and from Chinese and Japanese pirates. At times, these marauders were joined by the Portuguese, who were primarily interested in dislodging the Spaniards from the East.

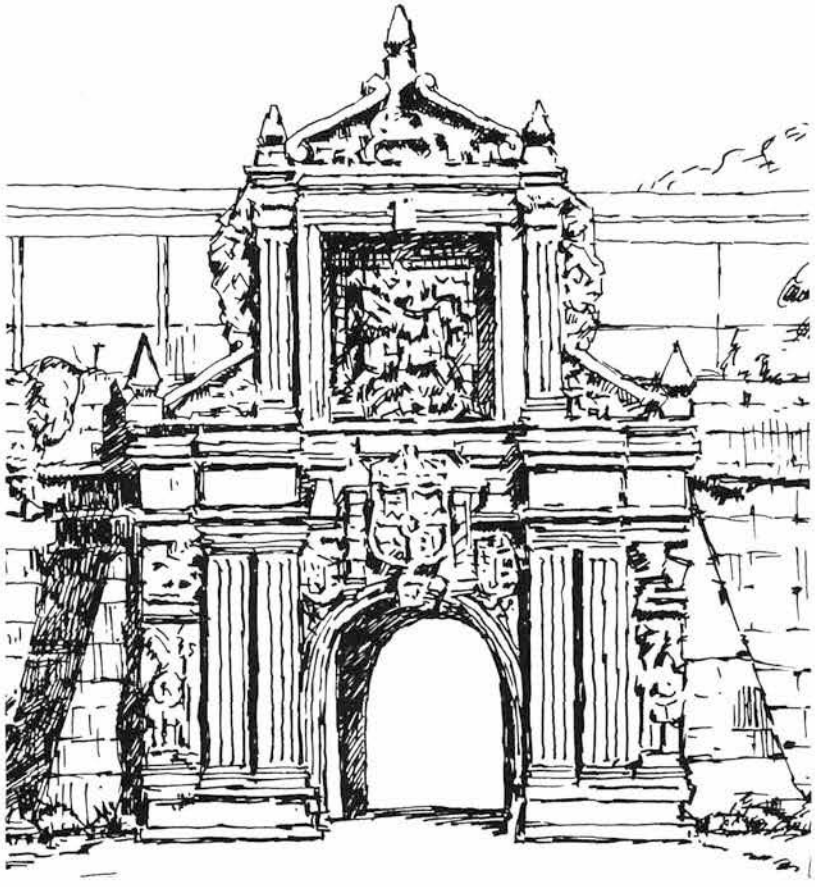
The following year, with another Governor General — Santiago de Vera (1584-1590) — and the services of Antonio Sedeño, a Jesuit who had once worked as a military engineer, a more lasting type of defense went up. De Vera wrote of his plans:

> "From this fort (Fort Santiago) and the beach near the sea, I have dug a deep ditch, 34 feet wide, which fills with the incoming tide and even at low tide has sufficient water to float several vessels used in carrying materials to the said work. This ditch extends from the sea to the river and at that side around the entire city in such wise that the latter is an island formed by sea, river and ditch. In the place of the wooden fortress, I am going to build a bulwark to defend the entrance to the river and beach which can correspond to the tower already built; and the new fortress will defend both sides of the ditch and the sea. Along the river bank I have ordered stone breastwork built, extending from the old wooden fortress, on one side, to the ditch on the other."

The material De Vera chose for his defenses was adobe or volcanic tufa, which he described as "so suitable that when it is wet, it can be worked like wood and when dry it is very strong and durable; and it is better than brick for artillery,"



Puerta Isabel, a gateway to Intramuros, has been restored and transformed into a small museum.



A more elaborate gate in Fort Santiago

Like Lavezares years before him, Santiago de Vera ordered all inflammable roof thatch huts in the Walled City brought down. With the new technology and the skill of Sedeno, roof tiles soon became fashionable in the Intramuros houses.

The fortification of Manila now took a more professional turn. Gomez Perez Dasmariñas came in 1590 (1590-93) armed with a letter from King Philip, and apparently accompanied by an engineer, Leonardo Iturriano, who designed the fortress and the buildings. (Whether Iturriano did come to the Philippines at all is still being disputed by historians.) Dasmarinas fortified Fort Santiago, raising its walls to double the height of a man, and greatly reinforced defenses on the landward side.

Resentment from overworked natives and exploited Chinese created uneasy times for the Spaniards. In fact, Dasmariñas was murdered by Chinese mutineers on an expedition to the Moluccas. De Vera's handiwork, the Fort of the Nuestra Señora de Guia (now the Bastion de San Diego located directly opposite the Manila Hotel), Dasmariñas supplemented with breastwork and ramparts. He added the bastions of San Andres (in front of ***Bulletin Today);*** San Gabriel (beside Letran); San Fernando Dilao or San Lorenzo (near Mapua). For some time Dasmarinas' Walls sufficed, and except for minor repairs and alterations, not much was done to change them.

The seventeenth century, however, saw many disturbances. Dutch raids were most frequent, and most fierce during this period, and Chinese disturbances endemic. Governor Sebastian Hurtado de Corcuerra, noting the inadequate protection of some of the strategic areas, introduced some remedies. On the southern portion, near the site of the old Fort of Nuestra Señora de Guia; and the Fundicion, Corcuerra built a moat which connected to an older one. He also demolished several houses which adjoined the Walls, but this decision was to be a very costly one for Corcuerra. For he incurred the ire of the Recoletos, whose convent outside the Wall, that of San Juan, only stood several paces away. But Corcuerra's foresight was to be vindicated, since the British used this weak spot for attacking the city's defenses in 1762.

Juan de Silva (1609-1616), Nino de Tabora (1626-1632), Diego de Fajardo (1643) and Manrique de Lara (1653-1663), successively worked on changes on the western side, adding bastions and redoubts: San Francisco, San Juan, San Jose, San Pedro. Fajardo, who completed the building of Bastion de San Diego, also finished what Tabora had begun. He enlarged and improved San Andres and Dilao far beyond Dasmarinas' concept of these bastions.

Dr Lara was kept busy by repairs and additional fortification. The ***Revellin de Parian*** is of this date. Two major earthquakes in 1645 and 1658 necessitated major repairs. Bastion de San Diego, which had just been completed in 1644, suffered heavy damage. It was said that De

Lara was so dedicated to rebuilding the Walls that he gave the work his own money and all his time. He practically lived in a little hut by the beach, so that he could always be on hand.

In the eighteenth century, the bastions of San Andres and San Fernando de Dilao metamorphosed into their final stages — a far cry from the breastwork in Dasmariñas' plans, but bearing traces of Silva's and Tabora's planning. The restoration of Fort Santiago was undertaken by Fernando de Valdez y Tamon (1729-1739). Its inner gate used to carry an inscription dedicated to this governor-general, who did much to rehabilitate and rebuild the old fort.

Succeeding governors-general heightened, modified, added to the Walls. The addition of the battery of San Gregorio just outside the Bastion San Diego more or less completed its development. The British took the city in 1762. They laid siege to Intramuros by training artillery fire on the Spaniards from the churches of Santiago and San Juan — both churches were situated across what is now Padre Burgos Drive on General Luna Street. Afterward, the British themselves destroyed the two churches, seeing the wisdom of Corcuerra and Pedro Manuel de Arandia, who had repeatedly advocated their relocation.

The British departure in 1764 marked the last phase in the development of the Walls. The Spanish engineer Miguel Antonio Gomez repaired Real Gate and changed the right flank of San Gabriel. He made several changes on the Parian Gate — starting with the bridge, which used to be flushed to the left of the inner gate. This was moved to the center and a ***revellin*** or outerwork added. Another Spanish engineer modified the ramparts facing the Pasig and converted them into a bastioned front. Then Plano Bastion(Bastion de Sta Lucia), San Francisco and San Pedro were improved. San Pedro, an outerwork, became a small fort, while San Francisco also became an independent unit, not an extension of the curtain (plain span of the Wall connecting two Bastions).

Work on the most continued and became more complicated. The Spaniards were confronted with the problems of constructing a ditch on wet and boggy soil. They dug as close to the wall as possible while working clear of its foundation. At the end of the scarp they built a long slope way below the water line and extending to the bottom of the moat.

But the end of the empire was now nearing for the Spaniards. They did no additional building, as though realizing the futility of hanging on to the four kilometers of terrain that the Walls enclosed. Even the city within, with its seven churches and beautiful homes, was sadly falling apart. The earthquakes also exacted a heavy toll on Spanish finances and Spanish energy. Extensive repairs were cumbersome. Some of the repairs done on damaged structures were done in patches, without regard for consistency with the old architecture. Typhoons and earthquakes were constantly damaging rooftiles, so that by the end of the nineteenth century, the familiar red roof, quite often moss-grown, had given way to more practical galvanized iron.

Intramuros architecture used methods and materials familiar to the Spaniards; but in spirit it reflected the realities of living in the tropics. Massive, squarish foundations of adobe that hug the earth gave buildings stability against tremors; wood tenoned and dovetailed together could absorb the earth's movement without splitting. Large windows let in the wind and sunlight; when drawn to shut out the excess sun and rain, translucent ***capiz*** shells lightened the gloom within.

Intramuros architecture used methods and materials familiar to the Spaniards, but in spirit, it reflected the realities of living in the tropics.

Intramuros homes had all the creature comforts of the East and imported goods from the West. Up till the turn of the twentieth century, popular shops in Intramuros sold fineries, wines, cheeses and sausages from Europe. At the same time, circumstances forced the breaching of Spanish exclusiveness — allowing a rich Chinese trader or two, or an ***indio*** servant or maid to reside within the Walls.

Intramuros After Spain

By the time the Americans came, Manila had grown well beyond the Walls. Extramural development left the Walled

City to the friars, to students and to a few aristocratic families clinging to the past. Slowly it became a city of dormitories and boarding houses. Impoverished mestizos shared the *entresuelos* of grand old houses their owners could no longer keep up in style.

Intramuros Churches still called the faithful to their doors for the pomp and pageantry of Holy Week processions and *novenas* to centuries-old images. The Recoletos' most famous image was a *Paciencia* or Christ at the Pillar brought from Mexico in the seventeenth century. The Augustinians had an image of La Consolacion, and the Dominicans a celebrated image of La Soledad (Our Lady of Solitude). Intramuros, despite its decay, kept its own charm and its nostalgic air.

During the Pacific War, Intramuros suffered heavily from bombardment and artillery fire, inflicted by the advancing American forces and the retreating Japanese army. The Spanish city, which the Walls had protected from threats from land and sea, proved vulnerable to attack from the air. When the bombings stopped, there were only shells of buildings and debris. The Walls themselves fared much better. Some 75 per cent of the network remained intact, though two of the most beautiful gates — Sta. Lucia and Fort Santiago — were rammed by American tanks.

After a long period of neglect, Intramuros is today being restored. A presidential decree issued on April 10, 1979 created an Intramuros Administration, which became responsible for the restoration and administration of Intramuros. Its chairman is the Minister of Human Settlements and Metro Manila Governor, Mrs. Imelda R. Marcos. Its Action Officer is the Minister of Budget Jaime C. Laya, a history connoisseur of Philippine antiquities.

Restoration is related to archaeology, history and architecture. The first two provide the key to past history and reconstruction; architecture objectifies the past.

The Restoration Work

The restoration of Intramuros calls for the reconstruction of its Walls and rebuilding of the city. The word "restoration" implies reinstatement to its original state. Thus the immediate goal of the Intramuros Administration is to rebuild and complete the Walls, in places where no streets or buildings stand. Work has begun on the revellin of the Parian. Puerta Isabel, Bastion de San Diego, Puerta Sta. Lucia, Bastion de San Andres and Fort Santiago.

Rebuilding the Walls might seem fairly easy work to do — except that modern "restoration" is a very exacting science that is intrinsically related to archaeology, history and architecture. All three are interrelated disciplines. The first two provide the key to past history and reconstruction; architecture objectifies that past.

To rebuild the Walls, extensive research both by way of documentation and actual excavation of the structure is necessary. Besides historical and archaeological researches, laboratory control is crucial to restoration. In Intramuros, where the materials for restoration are mostly adobe, tiles and bricks, laboratory experiments analyze the composition of each, so that replacements for the missing parts may approximate the originals as closely as possible. A range of firing temperatures for the bricks and tiles used in Intramuros is recommended by laboratory technicians to control the coloring and texture of the new prototypes.

Typing of stones is also done to determine the "compatibility" of stones in terms of color, texture and porosity. A porous stone will suffer placed side by side with a non-porous type. Take only the action of rainwater. The porous stones will absorb a heavier amount of water than the non-porous one. If a porous stone is mixed with non-porous types, the water will not be able to drain off and evaporate. Excessive moisture will cause the growth of harmful organisms and fungi. Each type of stone also has distinctive mineral properties which, in contact with other substances, can cause adverse reactions.

Two types of reconstruction are being done in Intramuros. One is the restoration of structures which are in ruins. The other is the reconstruction of buildings and structures that have completely disappeared. Each type

poses specific challenges to the restoration team, which consists of archaeologists, researchers, architects and builders.

Where existing structures are concerned, the actual condition of the building has to be fully evaluated. Is it structurally sound? If not, how can it be reinforced by modern methods of construction, without altering the character of the building and its appearance? In judging its architectural members, one asks the questions: which belongs to what period, and how integral is each part to the spirit of the original structure?

These questions cannot be answered precipitately, but must be thought out with great deliberation. For mistakes made now will create difficulties for the future, affecting the entire pattern of historical detail.

Undoubtedly, there will be errors along the way. Hence the full documentation of each building by way of pictorial record and field documentation is done religiously, so that mistakes can easily be corrected. In matters where questionable decisions had been taken in the past, documentation may explain why such a decision was reached — and, justifying future generations in feeling some compassion for those who made it.

In the second type of restoration, where the plans of buildings are based on archival records, determining the accuracy of given details creates difficulty for the architect. He has to think instinctively into the construction methods of the past and evaluate details from the context. In both cases, restoration requires great humility from the architects and builders for their sensitivity and creativity must always be subservient to the character of the structure itself. Restoration requires of them a very strong sense of discipline and history.

Intramuros is a symbol of the Filipinos - the builders of the Walls.

The Walls in the Modern Era

In the process of rebuilding, one very hard but vitally relevant question is: How does one adapt these structures to modern use and modern times? Even the electrification of these ancient structures creates problems. Wiring that will deface the structure is unacceptable, so that what would have been a fairly straightforward installation in any other building becomes a problem in restoration work. The adaptation of the Walls to modern use has to take into consideration the character of the structure itself. And in the case of those portions of it that are being renovated into a museum site, one needs to evaluate as well the artifacts that such a museum will house. As they are, the bastions, *fortins,* and gates are not ideal locations for museums.

Atmospheric pollutants — dust and carbon monoxide from car exhausts — and a high degree of humidity necessitate a drastic correction of the museum environment. The introduction of dehumidifiers and airconditioning should normally solve the problem. But they do not. Most of the specimens involved — church vestment, images of saints, icons, architectural details — never existed in a dry atmosphere. A sudden change, instead of doing them good, can hasten their deterioration. One settles for cross ventilation, waterproofing of the structures and the extensive use of dessicants. Better answers might be in the years ahead. When that happens, the restorers of Intramuros will also be better qualified to judge their usefulness.

Why restore Intramuros at all? In the short time that restoration has been going on, various critics have come forward to criticize the Philippine government's decision to restore the Walls. The most common remark is that a developing country such as ours should not spend money on restoration, and should pour it instead on projects that will materially and demonstrably benefit the greater part of our national community. Besides these, critics add, Intramuros is a *colonial* symbol.

Rationale for Rebuilding

All of these points may be valid — but the reasons for restoring Intramuros transcend them all. The Walls may be regarded as a colonial symbol, because they were made for our conquerors. But they are as much a symbol of the Filipinos themselves — the builders of the Walls — signifying the fortitude and greatness of spirit of the thousands of workers who labored to build it. And whether we like it or not, the Spanish colonial period shaped us to be the people we are today.

Perhaps because we are constant victims of war and destruction, we often fail to see how relevant the past is to our present condition. "Colonial" architecture met that challenge of relevance with greater success than we are doing today. This is one reason why a whole block of period architecture will go up in Intramuros as part of the restoration project.

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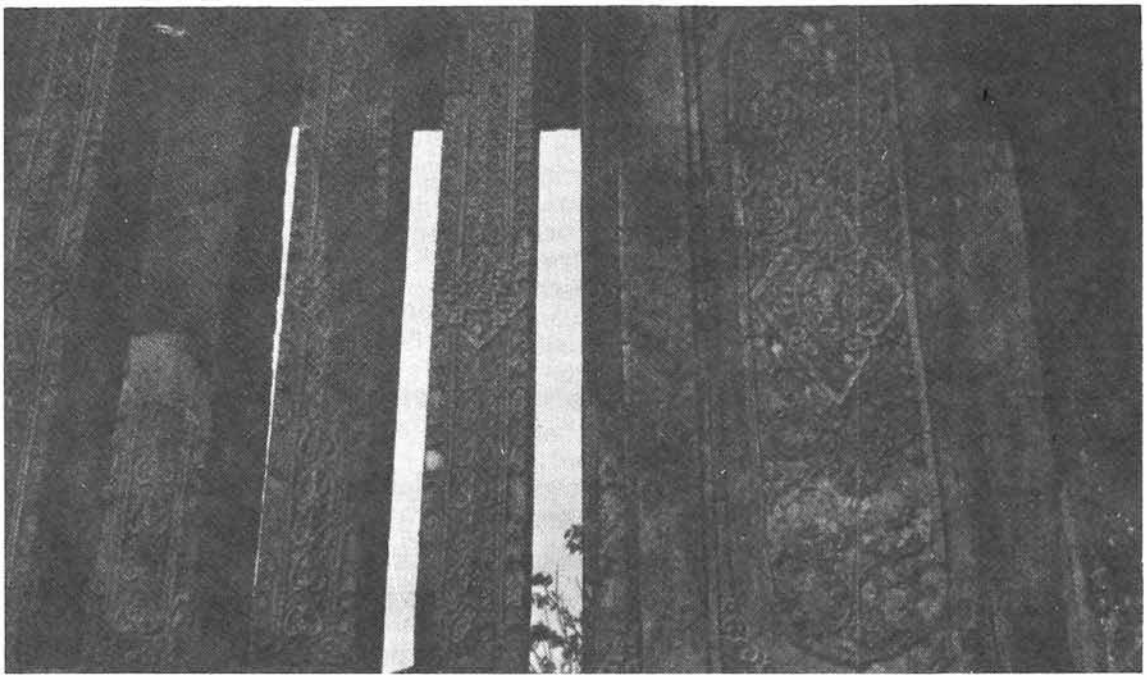
CONSERVATION OF ANCIENT STUCCO

by Sirichai Wangcharoentrakul



The stucco ornamentation in Wat Nang Phaya

Wat Nang Phaya, a temple located at the southern side of the city wall of Srisatchanalai in the Sukhotai Province, was reputed to be constructed by a queen around the 16th century.

The temple is noted for its stucco ornamentation. The motifs range from half-man and half-animal figures to creeping vines. Inside the temple are numerous columns decorated with devas (angels) in prayer. Its windows have long narrow openings, typical of Sukhotai architecture,which allow shafts of light to enter and illuminate the buddha image.

At present, only the west side of the temple still stands. Approximately 25.5 square meter of this is covered with ornamental stuccoes. They were extremely brittle and weak, especially in the small and narrow extremities, when first brought to the attention of the Conservation Division of the Fine Arts Department. Their surface was also covered with algae and lichen, thus hiding the original details. The ceramic representations of the devas were also in serious state of decay.

The broken pieces in the design are joined using paraloid B72.

Conservation Procedures

The condition of the temple prompted the Fine Arts Department to execute conservation work. It proceeded using the following steps: all details of the ornamentation were recorded before the cleaning process began. Excess dust and grime were cleared using a soft dry brush. Then the surface was brushed again and washed with distilled water. When it was already dry, a solution of 5% paraloid B72 in acetone was sprayed. This served to consolidate the stucco as the solution penetrated its porous sections and held them together. Finally, when the stucco was strong enough, moulds were made using silicone rubber (silastic ERTV). These were used in restoring missing designs.

Recommendations

Based on their experience, the staffmembers involved in the conservation of Wat Nang Phaya forwarded these observations and recommendations. They admitted that the work done was, at best, only temporary. Owing to the importance of the stucco ornamentation, extremely delicate chemicals were avoided. Yet, certain chemicals with reversible reactions were used for lack of a better substitute.

Looking back, they also discovered that it would have been better to use photogrammetry, rather than moulds, in replicating the designs. Certain parts of the ornamentation had extremely intricate designs which did not appear in the moulds and were easily destroyed as the latter was removed.

They also recommended the construction of a roof over the structure to contain damages caused by temperature change and humidity. The rising damp, they said, may not bring about serious problems because the stucco panel lies on the base of the temple constructed with laterite. Still, if algae and lichen appear, suitable biocides can be used to destroy them, they added.

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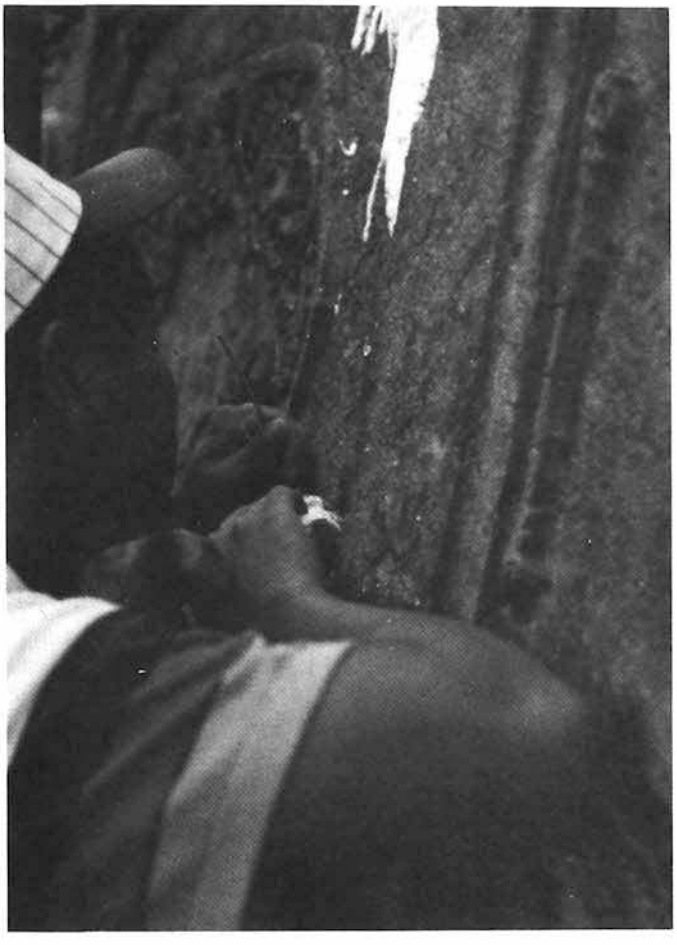

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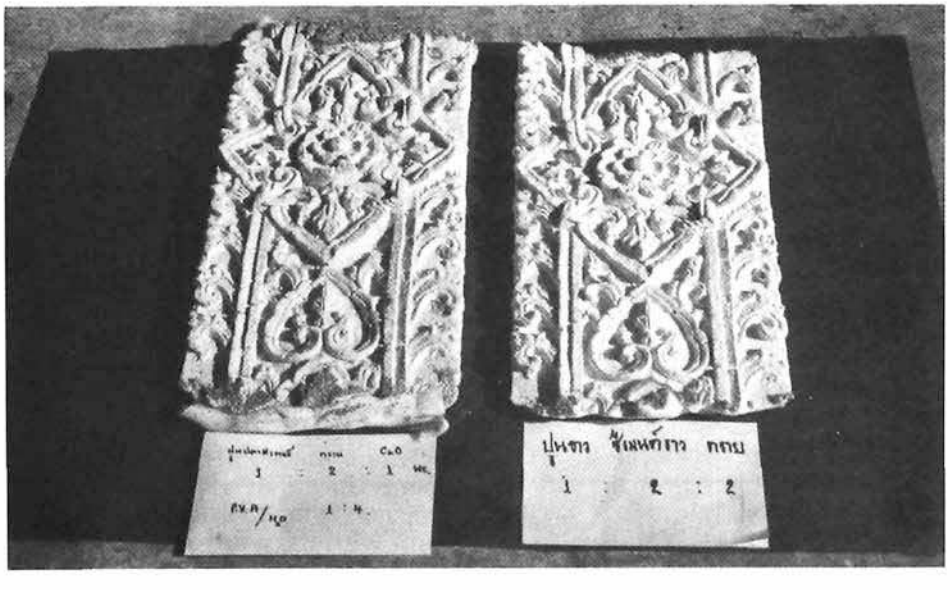


1. The conservator uses silicone rubber to make moulds.

2. Extreme care is required in duplicating the design.

3. Reproductions of a stucco panel

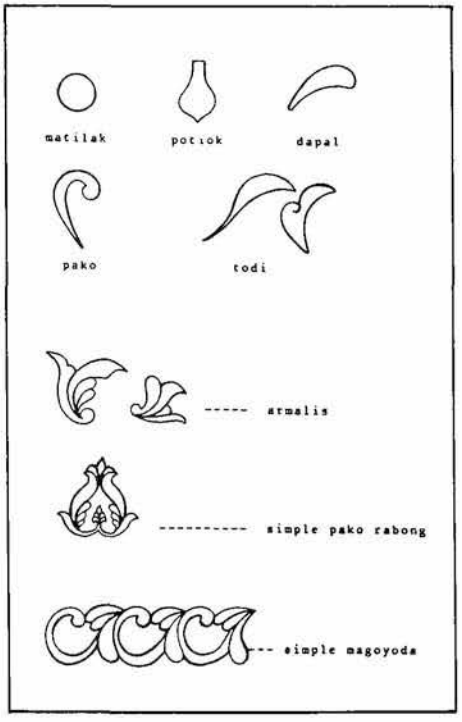
SOUTHWESTERN PHILIPPINE ART

A distinct decorative art in the Southwestern part of the Philippines - the Okir- is indigenous to its people.

A naga

by Jesus T. Peralta

The Philippine society is complex made so by the highly textured maritime environment and the internal and external dynamics of culture change. The southwestern part of the Philippines is a fine example of this specialized adjustment to change agents. Its nature differs from the other parts of the country because over an indigenous matrix that was probably similar to the other peoples of the Philippines, an overlay of Islamic influence has been absorbed. Among the peoples who have absorbed such cultural specializations in varying degrees are the Malundanaw, Maranaw, Tausug and Sama-Badjaw.



Basic male designs

The Okil Art

Among the more distinctive of the culture traits shared by these people is their *Okil* or *Okir,* a decorative art, which although specific to each group, nevertheless constitutes a style that distinctly belong to this part of the country. Exemplified and best studied of these art forms is that of the Maranaw. *Okir* is the Maranaw term for ornamental art.

A distinction exists between the male and the female forms of *Okir.* The predominantly curvilinear design is the male art of *Okir-a-dato* while the largely geometric form is the female art or *Okir-a-bai.* In both art forms, representation is not realistic specially in the case of living things for this is frowned upon in the Islamic context. This produces an abstracted kind of decorative art that reduces nature to symbolic art motifs that are combined in an increasing order of complexity. Each motif is identified by a specific term, as also the various combination of one motif with others. The terminology is made more complex by the presence of male and female terms for the same motif. For instance, the *sarimanok* is a male term with the word *papanok* as the female equivalent.

Examples of masculine decorative compositions are usually devised from a few basic motifs like, the circle *(matilak),* bud *(potiok),* leaf *(dapal* or *raon),* fem *(pako),* flower *(todi).* A simple combination of a few of these motifs, e.g. *todi, dapal* and *pako,* produces a combination called an *armalis.* The repetition of a motif, e.g. of a *pako,* horizontally is called a *magayoda;* while an upward and spreading elaboration of the same motif would be termed a *pako rabong,* or growing fern. A complex design combining different motifs in vertical and horizontal developments is called a *birdo.*

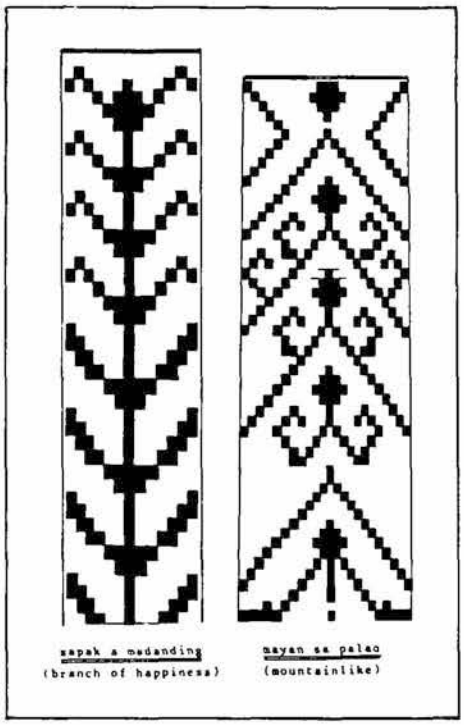
Some of the basic motifs in the feminine form of the *Okir* include the circle also "artificial moon" *(olan-olan),* square *(pialang),* rectangle *(biagon),* diamond *(katiambuang),* and zigzag *(onsod).* Again the basic motifs are combined in varieties of designs with corresponding names, e.g. *pinatola* for adjacent squares with contrasting colors; *pinagapat* or any four-sided design in a series; *saragonting,* a cross; *binitoon,* or starlike and so on. Completed designs are further given poetic names, e.g. the designs in multi-colored *langkits: mayan sa palao* (mountainlike), *sapak a madanding* (branch of happiness), *raon a kayo* (leaves of trees), or *tring indawa* (yellow bamboo.)

A Reprint of the Anthropological Paper No. 7 of the National Museum, Manila Philippines, May 1980.

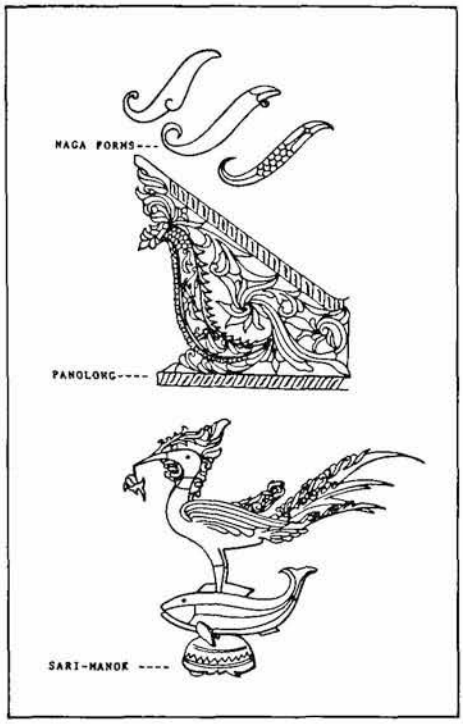
In the same manner that calligraphy is difficult to divorce from Chinese painting, design and color among the ethnic peoples of the Philippines are concepts difficult to separate, specially among the geometric art forms. Color is also used with the curvilinear form except in the case of beveled relief work which ordinarily are not painted. Before the advent of commercial paints, earth and vegetable dyes are used. Some of the plants from which colors are obtained are: ***kanaloda,*** for a light red color; ***latipo,*** orange; ***kalawag,*** yellow; ***rapa,*** light green; ***mangilas,*** black; and many others.

Animate Representations

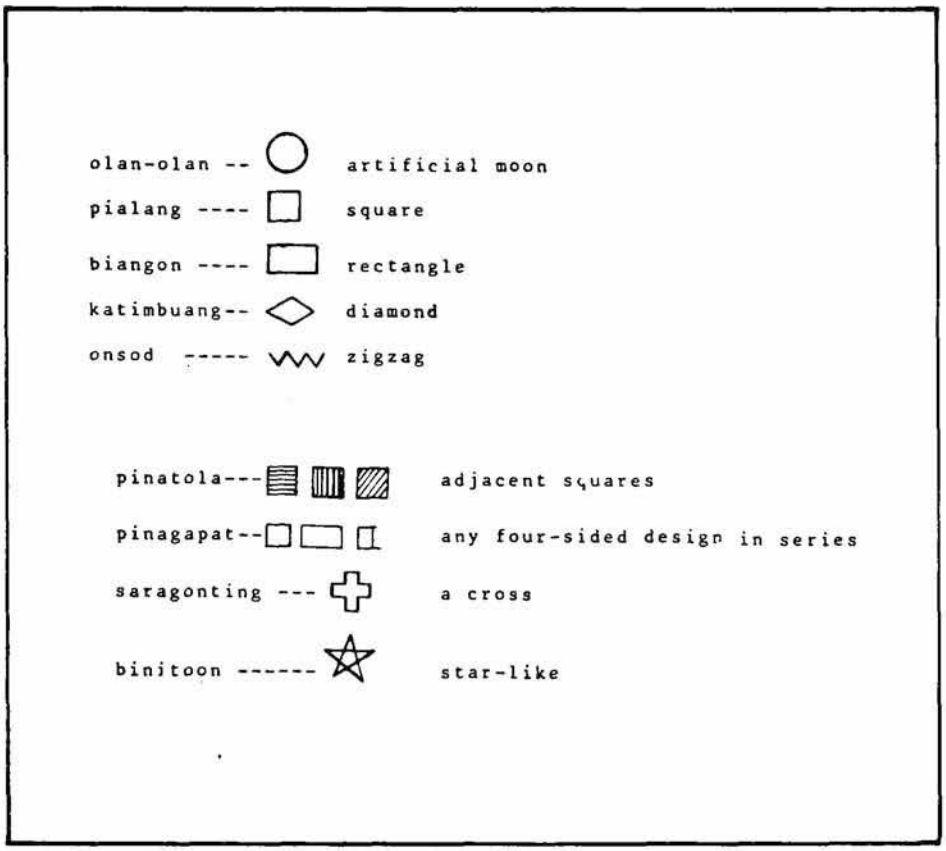
The depiction of human and animal figures in art is inhibited by Islam and this has in some ways affected ***Okir,*** although certain indigenous forms have persisted. The earliest and the most common of animate abstractions are the ***naga*** (serpent) and the ***sari-manok*** (artificial cock).



Langkit designs



Popular animate abstractions in okir art



Basic female designs

Naga. The "S" form is the most simple abstraction of the serpent. The most commonly used figure in Maranaw art, it comes in varying degrees of elaboration depending on the profusion of curvilinear decorative motifs. It is often confused with the ***sarimanok.*** The latter is an integral artifact whereas the naga, often the central motif, is a decorative piece as the ***panolong*** or end beam of large houses like the ***torogan.***

Sari-Manok. The other more popular decorative figure in Maranaw art, the ***sari-manok,*** is surrounded with controversy with regards to its symbolism. Confused with but easily distinguished from the ***naga,*** it is identified by the cock-like figure represented and embellished by curvilinear motifs and often associated with a fish suspended from its beak, or another clutched in its talons. The ***sari-manok*** is often placed atop bamboo poles among flags and buntings during festive occasions.

Other figurative motifs in Maranaw art are forms like the crocodile, parrot or grasshopper head, and swallow's tail. They appear in

various modes as integral part of a larger design or object. In recent years, contact with other cultures has added to the repertoire of the artisans, thus figures like the eagle, lion, peacock, elephants and others have emerged.

Grave Markers of Sulu

The indigenous art, *Okil,* of the peoples of the Sulu archipelago antedates the arrival of Islam. The earliest extant examples of this art are found in the ancient gravemarkers carved from coral and stone, the ownership of which could no longer be established by genealogical methods. The later wooden markers scattered in many of the islands, which presumably belong to generations now in varying degrees of Islamization, still retain the indigenous flavor of floriation of motifs.

It is said that when a Badjaw dies, parts of the frames of his boat are used as structures for the grave marker. The marine motifs indeed are profuse. The abstracted form of the sea cow or *duyong* with the stylized form of a person riding its back is the motif that appears most often. Others, like the four-sided frames, are again with figures. Female figures are identified by the presence of combs or mirrors, while males are often provided with turbans. Age differences are often indicated by relative sizes. A design which appeared recently in Sulu is stylized frames of beds ornately conceived to mark graves. Canopies, buntings, flags and food offerings in the graveyards exude a feeling of life, liveliness and continuing relationships with the nonliving.

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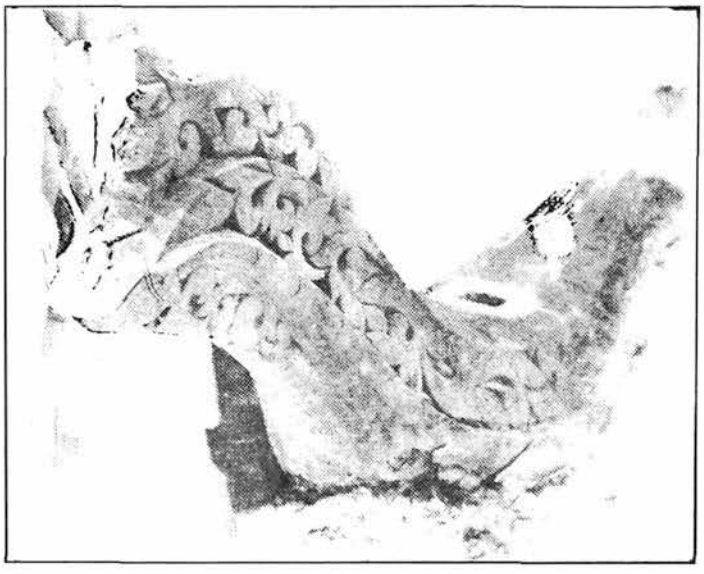

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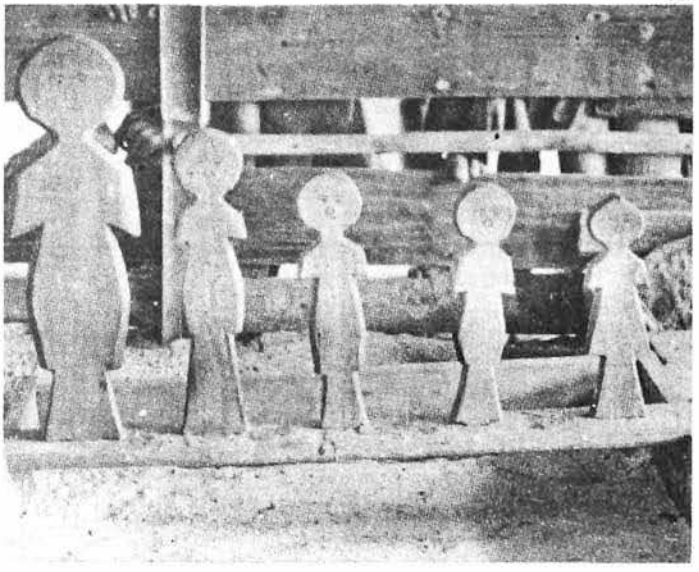

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1. *A male marker now in the Notre Dame de Jolo Museum*
2. *The sea cow or duyong*
3. *In some grave markers, the different sizes often indicate the age variation.*
4. *A female gravemarker*
5. *A bed frame gravemarker*

Acknowledgement: Photographs of the gravemarkers came from Sulu Studies 2, 1973.

NAVIGATION IN THE SRIVIJAYA PERIOD

by A.B. Lapian, LEKNAS-LIPI

The kingdom of Srivijaya still poses many questions to researchers, but one thing is certain - it was a maritime power in Southeast Asia.

The main problem faced by students of the Srivijaya period is the lack of historical sources. Only a restricted number of sources helpful in the study of this period have been found. They come in the form of inscriptions in Old-Malay or Tamil and Chinese, and Arab records. Moreover, a wide knowledge of archaic languages and ancient history is needed for the interpretation of events and messages carried in the edicts and manuscripts, and the identification of toponyms and names of persons.

This paper does not give new data nor new theories on the Srivijaya period. It is meant only to focus on shipping and navigation in the times of Srivijaya. Therefore, interpretations and identifications made by scholars who are more versed in the research of sources are included here. However, anything suggested in these pages need to be revised when new research will prove that previous theories from experts are no longer tenable.

Srivijaya: A Naval Power

Among the hypotheses and attempts at historical reconstruction of the period, the only thesis acceptable to all is that the kingdom of Srivijaya was a maritime power in the Southeast Asian region. The location of its capital can be disputed, but its naval strength cannot be denied.

The controversy whether the capital was at Palembang, Jambi, or Riau, or even in the Malay peninsula (Malaysia or Thailand) does not mar our assumption that Srivijaya must have possessed a sufficiently big naval force in order to maintain its power in an area consisting of islands and a peninsula. The inscriptions uncovered indicate that the domestic traffic consisted of maritime or riverine means of transportation. In the Kedukan Bukit inscription of 683 A.D., it was explicitly stated that the king used a vessel for his siddhayatra journey. The Kota Kapur inscription mentioned that in 686 A.D. a sea expedition was prepared to cross over to and attack "Bhumi Jawa'.

A knowledge of the geography of the area at that time is also necessary for a better understanding of the period. Obdeyn hypothesized that the Straits of Malacca started from the islands of Bangka and Belitung (Biliton). The extension of the geomorphological research done on the east coast of Sumatra (Soekmono 1963) to the off-shore area is necessary to test that hypothesis and to determine the real shipping lanes of that period.

Indicators of Maritime Activities

Navigation in the Archipelago had begun centuries before. Most probably, it was closely connected with the spice trade. Rouffaer (Rouffaer 1900) saw in the chain of archaeological sites (starting from mainland Southeast Asia along a curve passing through Sumatra, Java, Bali, the Lesser Sunda islands further to the Kei islands in the southeastern Moluccas), where bronze kettledrums were uncovered, an evidence that a traffic in spices did exist in the so-called Bronze-Iron Age. In another article, Rouffaer (Rouffaer 1905) cited few European sources who had written about Indonesian spices (particularly cloves and nutmegs) as early as the first century A.D. It suggests that trade and navigation between the Indonesian archipelago and foreign lands could be, at least, as old as these sources. Besides export commodities, imported ware may also be used as indication of the existence of navigation and trade. For example, Chinese ceramics (S. Suleiman 1978) may help determine the period of sea trade with China.

Early Indonesian commerce and navigation, especially in the western part of the Archipelago, had

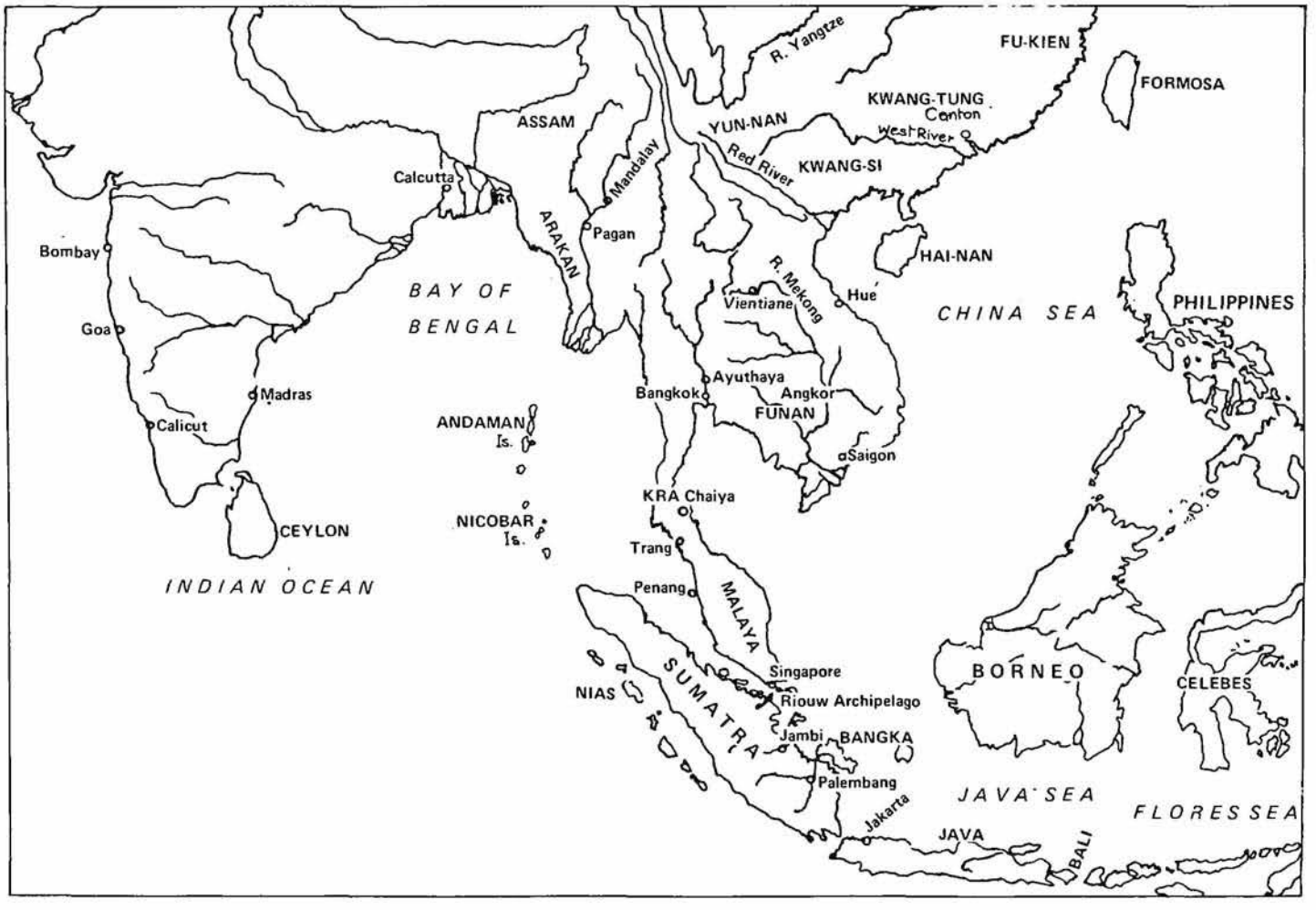
been the focus of a study by Wolters (1967). He collected data pertaining to the pattern and nature of the trade which formed the background of the rise of Srivijaya in the 7th century. Trading and shipping activities, he stated, caused the emergence of a number of ports along the maritime route from west to east. The east-west route is the oldest known route in the history of navigation since shipper out in the open sea determined his exact positions through astronomy (Celerier 1956, 1965). It can be assumed, therefore, that the trade route between Southeast Asia and India and other areas further west had developed long before the northbound route to China. By the fifth century, however, in the days of Fa-Hsien and Gunavarman, the route to China was already established (Wheatly 1961).

After the trade route to China had become better known and more developed, the eastern coast of Sumatra and its off-shore islands became more important. Local rulers sought dominance over the Western part of the Indonesian archipelago in order to control this very strategic position. Srivijaya was the first sea power in history successful in taking a dominant place over the Straits area which held the key to the trade and navigation to China as well as to the West. Evidently its expansion to the north was not only aimed at the control of in-and outgoing sea traffic of the Straits, but also of the traffic overland on the Kra Isthmus. Moreover, the expedition to the south to conquer Bhumi Jawa has usually been interpreted as a move to bring both sides of the Sunda Strait under the command of Srivijaya.

Expansionist Policy

The government was a thalassocracy, a confederation of petty kingdoms and harbour towns where the Maharaja of the islands of Zabaj held supreme command. Rivalries within (such as with Malayu) as well as with outside powers were a constant threat to the position of the Maharaja. For instance, according to an Arab source, the Khmer king demanding the head of the king of Srivijaya found himself dead on order of the latter, instead. A more serious threat came from the Chola kings: Rajaraja, the king who boasted to be 'conqueror of 12,000 islands', and his son who continued his naval ambitions launched an attack on the kingdoms in the south, including Srivijaya. This rivaly appeared to be a consequence of the growing amount of trade and shipping activities Srivijaya was having with the Indian subcontinent and Sri Langka.

Mauny (1965) and an Arab source mentioned that an Indonesian invasion to East Africa took place in 945 A.D. According to some interpretations, this was related to the expansionist policy of the Srivijaya. It rests on the assumption that navigation and trade were in the hands of Srivijaya, in other



words, that Srivijaya possessed a merchant fleet of its own. Some scholars doubt this despite I-tsing's description that navigation to China was carried out by Srivijayan ships. Wolters' study on the pre-Srivijaya era, too, suggests that 'the shippers of the Persian trade' were, in fact, Malays. A Japanese source (OeTadafusa) of the 12th century hints that Po-ssu had to be sought in Southeast Asia implying that its identification with Persia was not always necessary. A study of the navigation along the coasts of Champa and Annam revealed that several toponyms on these coasts are of Malay origin. This supports the view that Malay shipping to China was indeed carried out by Malay ships with a Malay crew (Manguin 1972). The ***roteiros*** or books for sea-pilots on this area used by the Portuguese in the 16th century were based on information from Malay shippers. Therefore, no reason exists to suppose that the missions from Srivijaya to China were carried out by foreign ships.

Types of Boats

Contemporary pictures of the shape and construction of the ships are also available as can be seen at the reliefs of the Chandi Borobudur. Among the eleven boats depicted, Van Erp (1923) was able to distinguish three types, viz. (1) the very simple dug-out canoe, (2) dug-outs with raised side-boards without outriggers, and (3) dug-outs with raised sideboards with outriggers. In addition to this, Van der Heide (1927) made another typology based on the use of masts, i.e. (1) plain proas without masts; (2) single-masted ships without outriggers, the mast consisting of a square perpendicular pole; (3) ships with a bipod mast without outriggers; (4) ships with a bipod mast with outriggers; and (5) ships with double bipod masts with outriggers.

The reliefs depicting the bigger ships show a variety of types, an indication of how diversified and well advanced the technique of shipbuilding was in that period. However, it should be noted that until now no data are available regarding the interior parts of those ships.

The Orang Laut

Perhaps no ethnic group has a more maritime culture than the Orang Laut. These so-called sea-gypsies or sea-nomads live in the estuaries and mangrove jungle of the east coast of Sumatra, the Riau-Lingga archipelago, and the west coast of the Peninsula up to southern Thailand and Burma (Sopher 1965). Their peculiar way of life, boat-dwelling, has made them 'sea people' in the true sense of the word. Wolters' theory that the Maharaja of Srivijaya made use of the navigational skills of these sea-gypsies is plausible and should be the object of a more intensive study on the role of the Orang Laut in the rise and fall of the maritime kingdoms in the region (Wolters 1970). Is it a mere coincidence that the Orang Lauts are now concentrated in the very area which was once ruled by Srivijaya, i.e. from the Riau and Lingga islands up to the island of Phuket in southern Thailand where Srivijaya reached its northern most frontier? Is the close relationship between the Orang Lauts and the kings of Malacca, and later with the kings of Johore (Andaya 1975), a continuation of a traditional link which had its roots in previous generations? A more thorough research is needed to come up with answers to these questions. And it has to be carried out with colleagues in Malaysia and Thailand.

Bibliography

Andaya, Leonard Y.
1975 **The kingdom of Johor, 1641-1728. Economic and political developments.** Kuala Lumpur, Oxford University Press.

Célérier, Pierre
1956 **Histoire de la navigation** Paris, Presses Universitaires de France.

Celerier, Pierre
1965 **Technique de la navigation.** Paris, Presses Universitaires de France.

Coedès, Georges
1948 **Les états hinduisés d'Indochine et d'Indonésie.** Paris, E. de Boccard.

Coedès, Georges
1964 'A possible interpretation of the inscription at Kedukan Bukit (Palembang),' **Malayan and Indonesian Studies, essays presented to Sir Richard Winstedt on his 85th birthday,** ed. by John Bastian and R. Roolvink. Oxford, Clarendon Press.

Erp, Th. van
1923 'Voorstellingen van vaartuigen op de reliefs van den Boroboedoer,' **Nederlandsch Indie Oud & Nieuw,** 8 ste jg, 1923-1924, 227 – 255.

Heide, G.J. van der
1927 'De samenstelling van Hindoe-vaartuigen, uitgewerkt naar beeldwerken van den Boroboedoer,' **Nederlandsch Indie Oud & Nieuw,** 12e jg, 1927-1928, 343 – 357.

Krom, N. J.
1927 'Kambodjaansche en Javaansche reliefs,' **Nederlandsch Indie Oud & Nieuw,** 12e jg, 1927-1928, 239 – 248.

Lapian, A.B.
1975 'Peranan Orang Laut dalam sejarah Riau,' **Seminar Sejarah Riau,** Pekanbaru.

Manguin, Pierre-Yves.
1972 **Les Portugais sur les côtes du Viet-Nam et du Campa.** Paris, Ecole Francaise d'Extreme-Orient.

Mauny, Raimond
1965 'The Wakwak and the' Indonesian invasion in East Africa in 945 A.D.'**Studia,** Lisboa, no.15 (1965) 7-16.

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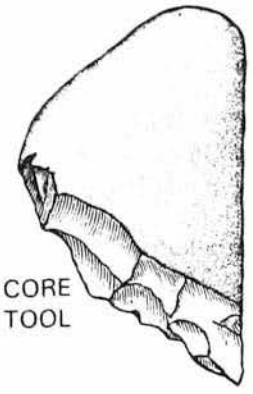

CORE TOOL


FLAKE TOOL

The beginnings of Philippine prehistory lie during this period of intense geologic upheavals, probably during the last half, which elsewhere in the world appears to be the time when man also made his presence known. Various estimates of the Pleistocene Epoch place the duration from one to two and a half million years. Exactly when man made his appearance in the Philippines is a present object of archaeological research. The different cultural chronologies that categorize Philippine prehistory are continually being defined and identified by the diagnostic cultural materials that mark the periods. Prior to the appearance of man, excavation sites have yielded fossilized remains of animal life that are characteristic of the Pleistocene Epoch. Among these animals are elephas, stegodon, and rhinoceros which became extinct in the Philippines some 250,000 years ago. The Probabilities are that early man in the Philippines lived contemporaneously with the above animal life as early as the middle part of the Ice Ages.

Lower Paleolithic

The earliest presence of man in the Philippines has been detected in the Cagayan Valley. When research in this area began in 1971, flake and core tools have been found in different localities at times by themselves and at other times within the vicinity of fossilized remains of extinct animals. It proved difficult to relate the tools with the animal remains. Early in the research, two pieces of flake tools made of chert and bones of an elephas were found within an earth stratum. Late in 1979, the earth layer was identified to be the Awidon Mesa Formation — a layer which is definitely identified to be Pleistocene in age. Although the tools and fossils were not directly associated, all fall within the same lithology, hence contemporaneous in geologic time. They provided the first concrete evidence of the earliest presence of man in the Philippines, placing this during the Pleistocene together with now extinct fauna.

Paleolithic Period

The earliest period in man's chronology is the Paleolithic, also known as the old stone age. It is identified by the type of tool technology prevalent during this period — the flake and core tools which are the only types that survived through time. The Paleolithic is a period when several species of man lived sequentially or contemporaneously, depending on varying conditions. The most common sequence: ***Homo australopithecus, Homo erectus, Homo neanderthalensis,*** and finally, ***Homo sapiens.*** In the Philippines the appearance of these human species is probably limited to the last two, due to the particular geologic history of the archipelago. The Philippine Paleolithic is divided into two phases with the appearance of ***Homo sapiens*** distinguishing the Upper Paleolithic from the Lower Paleolithic.

The Philippine Paleolithic is tentatively placed from about the Mid-Pleistocene to approximately 6,000 years ago. The culture associated with this period is that of foraging which includes hunting and food gathering. It is highly probable that the earliest beginnings of plant domestication began during the latter part of this age with the practice of incipient cultivation.

The real base of subsistence is food gathering. With the kind of tools in use, man at this point in time is an ineffective hunter, his game largely limited to the young, the aged and weak of the animal population. But the broad food spectrum available to him and the density of the population relative to land area allow man to remain quite sedentary in certain areas, or to move about in a cyclical pattern through the seasons in a particular territory. Populations are probably organized into small multi-household groups with bilateral descent of cognatic types of kinship.

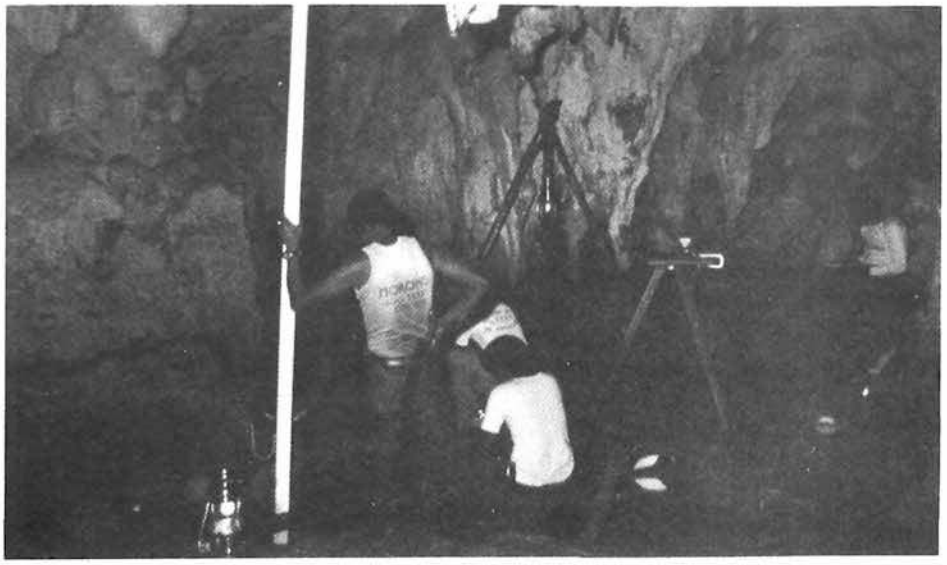
Lithic Technology

The tool technology of the Paleolithic or Stone Age in the Philippines is characterized by two types of tools: the flake and core tools. Tools of other materials like wood, bone and other organic materials might not have survived time. Philippine tools are generally unifacial, or flaked on one side only.

Flake Tools. When a fragment of rock is chipped off from a module of quartz, the fragments are known as a ***flake*** and the remaining part of the module, a ***core.*** The flake may be used directly for cutting, or scraping which makes it into what is referred to as a ***flake tool.*** The flake may be further modified along the working edges for more efficiency. This modified flake then is known as a ***retouched flake tool.*** Stone flakes are often recognized by features as striking flatform, point of percussion, bulb of percussion, bulba scar, fissures, ripples, hinges, and other features.

Core Tool. This type of tool is made by chipping off pieces from one side usually of a module to shape it into a working form. Tools of this category have been called variously as chopper-chopping tools, pebble or cobble tools; several types of these core tools have been identified as conforming to definite metal templates. There are two general categories: points and high angle scrapers.

Two other types of maintenance equipment have been also identified: the hammerstone and the anvil.



Excavations in the Cagayan Valley still go on.

Flake Tools of Tabon and Cagayan. A controversial piece, variously identified as fresh ivory and fossilized wood, was uncovered in Cagayan Valley. The tool, however, exhibits the stepped methods of flaking previously thought to be found exclusively in the Australian continent. The "horse hoof" scraper, which is basically a high angle, stepped flaked scraper 360 degree edge, is found to be abundant not only in the Tabon Caves and Cagayan Valley but also in the island of Panay as shown by four specimens.

High angle scrapers were found in the Tabon Caves, showing different shapes of edges and angles of retouch.

Two large flake tools were unearthed in Tabon, while two smaller ones were excavated from the Cagayan Valley proximate to some remains of elephas.

The Paleolithic Pebble-cobble Tool Industry. Asian literature refers to these materials as chopper-chopping tools as formulated by Movius (1944) or generally pebble tools. Later studies, however, approach these materials with reference to the working edge and general characteristic of the tool itself to arrive at a descriptive categorization.

Far from being randomly manufactured, the techniques exhibited show early man to be highly selective of his materials and to have taken advantage of features of his core materials to produce scientific types. This is highly suggestive of specialized tool use.

It is also noted that the same type of tool industry was persistently used in the Tabon Cave from the mid-Pleistocene period of some 400,000 years to the 23-24,000 years.

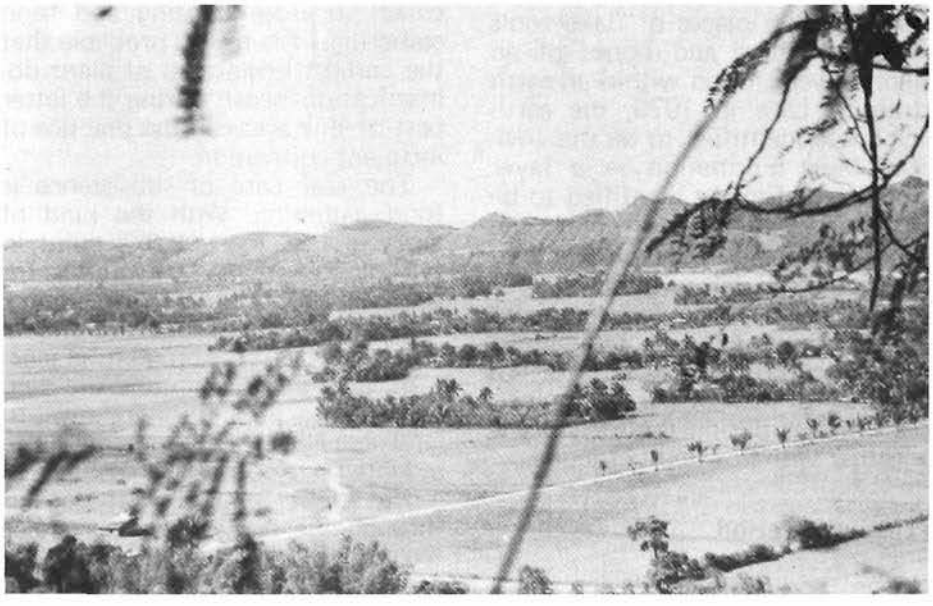
Upper Paleolithic

The first evidence of the appearance of modern man in the Philippines was revealed by the archaeological work done in Lipuun Point in Quezon, Palawan, principally in the Tabon Cave. When first discovered, Tabon cave appeared to be a jar burial site on the surface, yielding an estimated 200 jars, covers and smaller vessels scattered on the surface. The materials dated from about 200 to 500 B.C. Continued work in the cave, however, provided the earliest fossil remains of man in the Philippines dated to approximately 23,000 years before 1950. The remains, now known as the Tabon Man, is *Homo sapiens* or modern man. Five flake tool assemblages or cultural associations have been dated in Tabon Cave:

Flake Assemblage 1-B	925 to 250 B.P.
Flake Assemblage 2	21,000 B.P.
Flake Assemblage 3	22,000 B.P. and 23,000 ± 1000 years B.P.
Flake Assemblage 4	30,500 ± years B.P.
Flake Assemblage 5	45,000 – 50,000 years B.P. (estimated)

At Tabon, a possible trend toward smaller flake tools in the

Somewhere in Cagayan Valley, the earliest presence of man was manifested.



upper levels and, apparently, more secondary retouching of flake tooks in the upper pleistocene and the early post-pleistocene times were observed. Nevertheless flake tools with fine retouching were found even in the deepest levels. Tools range from large to small in all levels. The paleolithic industries of Palawan reflect in part the greater marginality of the Philippines in general, since these types of tools survive there to more recent dates than those obtained in the mainland of Asia.

Guri Cave. The sea reached its present level approximately 6000 years ago. At about this time, Guri Cave in Palawan was being used by man using a flake tool industry. Data show that the use of flake tools survived even onto recent dates along with neolithic and metal tools, showing that there is no sharp demarcation between cultural developmental stages. In the main entrance of the cave, a midden containing cultural materials was found dating to early post-pleistocene from 500 to about 2000 B.C. The second major occupational period of the cave was during the early metal age about 300 to 500 B.C. The stone tools in the cave showed the same type of tool tradition as in Tabon.

Neolithic Period

At about 6000 B.C. when the last of the glacial periods ended, the sea rose to its present level and the land bridges connecting the Philippines to the mainland of Asia were again submerged. This created a maritime environment and triggered off new technological adjustments. The development that differentiates the Neolithic Period from the preceding is that man, during this period, became a food producer instead of being merely a forager. Food production became possible with the full development of incipient cultivation into plant domestication and the domestication of animals. In Southeast Asia, early plant domestication has developed from the incipient cultivation of tubers, specially from the genus *Dioscorea,* instead of the domestication of grain. Stone tools of this period are characterized by the tabular form represented by the adze and the utilization of stone polishing, sawing and drilling. The other technologies present were pottery-making, weaving, boat building, and the proliferation of ornamentation.

The Philippine Neolithic is placed about 5000 B.C. to 300 A.D. But it does not mean that this is true to every place and each group of people for cultural developments are accretions that do not necessarily displace previous cultural traits. In terms of cultural materials, the presence of Neolithic materials does not necessarily exclude the use of paleolithic types of tools. Archeological work in the Sagung Cave in Palawan has produced both neolithic and paleolithic materials in the same context showing the functional survival of earlier tool types.

Early Neolithic

The early phase of the Neolithic Period in the Philippines is marked by the appearance of polished stone tools with the tabular form. The earliest forms are made by grinding one edge sharp, hence, the name edge-ground-tool. Later ones are polished all over after the initial flaking to arrive at the tabular form. Some of these tools included well-made chisels, gouges and ax-adzes. The materials used are basalt, diorite and varieties of chalcedony like nephrite. Giant shells, like the *Tridacna,* were also used. Shells have also been found used as ornaments like beads, pendants and bracelets.

Duyong Cave. The early phase of the neolithic in the Philippines is typified by the findings in the archaeological work in the Duyong Cave in Palawan. Here a single burial was found associated with skeletal remains, a polished stone adze, another adze made from the hinge of the shell, *Tridacna,* and stone shell pendants. Found here, too, was a shell container for lime, suggesting the practice of betel-nut chewing at this early period. The date yielded by carbon

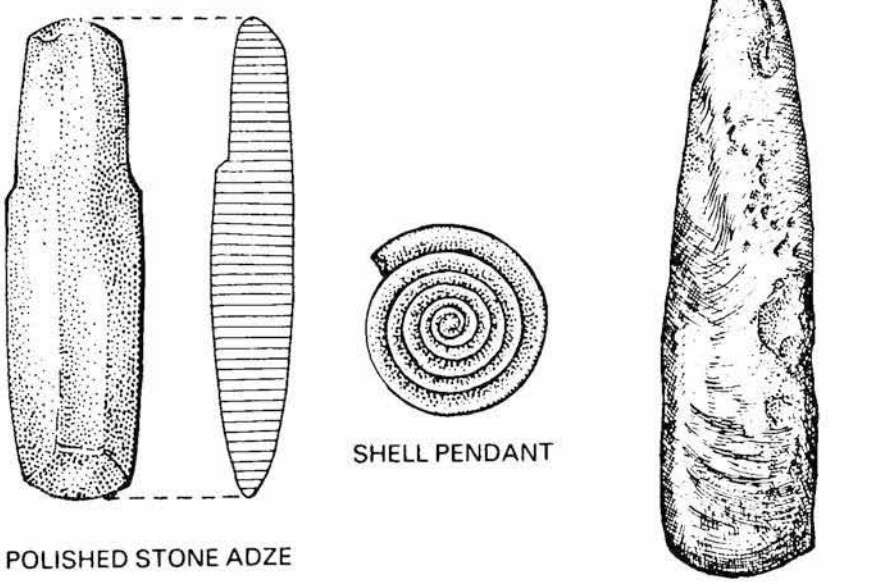


Illustration of early tools used in the Neolithic Period

samples placed the Duyong burial at 4,630 ± 250 years B.P.

Late Neolithic

Innovations in the tool technology and the appearance of a different class of ornaments and pottery distinguished this period from the preceding early sequence. The development of the techniques of sawing and drilling led to the production of stepped and shouldered adzes. The technological development also led to the production of ornaments of stone like beads made from agate, jade, jasper, onyx and other semi-precious stones. Distinctive of this period is the first appearance of pottery, an offshoot of which is the introduction of the jar burial complex. Again in Palawan, the Manunggul Cave is typical of late neolithic associations. A National Treasure found in this cave is a burial jar painted with red hematite with curvilinear designs. The cover has two figures riding a boat depicting presumably the voyage of the dead to the afterlife. The assemblage in this cave has been dated to 2,660± 80 years B.P. Other late neolithic sites have been worked in the Philippines, like the Bato Cave of Sorsogon and the shell middens of Lal-lo, Cagayan, but much yet remain unknown about this important period in Philippines prehistory.

Manunggul Jar

Details of the spirit boat on the jar cover from Manunggul Cave.

Traditional Performing Arts : Their Role in Tourism

The phenomenal growth of tourism in the past decade has brought economic benefits to most of the developing countries. It has become the main source of foreign exchange so essential to the development projects of this group of countries. However, the same poses a significant problem to the preservation and protection of their cultural heritage.

For this reason, people concerned with the preservation of the traditional performing arts came up with guidelines on how to preserve and protect them. These are contained in the recommendations given by the participants of the Workshop on Technological Development and the Traditional Performing Arts held in Jakarta. They are as follows:

1) Government and private sector should coordinate and cooperate to control activities that will insure the authenticity of cultural presentations.
2) Subsidy and support should be given to traditional performing artists.
3) Nurture the tourist guides of the future from among the younger generation.
4) Disseminate information on the traditional performing arts through books, brochures, video tapes and cassetes. They can be translated into foreign languages provided the translations capture the innate flavour of the original.
5) Proper marketing to tourists interested in quality rather than in quantity may also help attain the goals of preservation and protection of the TPAs.
6) Insure the authenticity and aesthetic quality of package and "quickie" cultural presentations in hotels so that they retain their originality and uniqueness.

A Philippine participant cited as an example of professionalization of the tourism industry the organization of the Institute of Tourism at the University of the Philippines. It trains managers, entrepreneurs and other staffmembers engaged in the tourism industry. The Indonesians mentioned that in Bali the tour guides are given training as early as their high school days.

These can be adapted by other countries to insure that tourism also contributes to the preservation of their culture.

Researches on Conservation of Organic Materials Needed

The conservation of organic materials is in flux. New and better techniques have to be developed and chemicals, experimented on. Also the results of these activities have to be disseminated and shared. It underscores the need for a continuing exchange of information on the subject. This summarizes the SPAFA Seminar on Researches on Conservation of Organic Materials held on March 9-14 1982 in the Philippines and sponsored by UNESCO.

The seminar served as a venue for conservators in the SPAFA member countries to describe some of the conservation work they had done. Delegates from Thailand, for instance, explained the procedures used in preserving Thai traditional paintings in paper. The Indonesians outlined the restoration of a historical wooden building while the Filipinos talked of ways of conserving a balanghai, a waterlogged plank boat of the 16th century, and historical papers.

Thus, the discussions provided helpful tips on how specific organic materials can be treated and preserved. Organic materials, as the participants defined them, include collections made of wood, textiles, leather, ivory, paper, bamboo and others which are subject to deterioration due to changes in the weather condition, fungis, insects among others.

Uses of Chemicals.

All the participants agreed that a lot still have to be accomplished in the area of conservation of organic materials. Primary, among these, concerns the use of chemicals. They advised caution in their use as conservation agent. Only chemicals that do not alter the physical properties of organic objects and are not health hazards should be employed, they stressed. In this context, they recommended polyvinyl acetate solution as a consolidator of fragile organic materials.

The delegates also observed that some countries forbid the importation and use of some chemicals, a few of which are proven effective conservation agents. Hence, they recommended that governments be requested to allow the entry of these needed chemicals.

Documentation of Conservation Efforts

The seminar also focused on the need to conduct a continuing research on conservation techniques and to document in detail the methods in order to facilitate replication and comparison. The participants suggested that these reports be forwarded to the SPAFA Coordinating Unit which would, in turn, distribute them to the people concerned. Moreover, the Coordinating Unit was requested to act as a go-between of international conservation centers and the conservators in the region to facilitate exchange of relevant materials. In this connection, they also recommended that another seminar on the same subject be conducted. Conservators should also be given a chance to observe their colleagues at work, they added.

The information work they said, involved not only documentation but also education of curators and museum staffmembers on the importance of conservation of their collections.

Following are the official delegates to the seminar:

Indonesia — Mr. Samidi, Mr. Kosasih, and Mr. Tjokro Soedjono;

Philippines — Engr. Susan S. Stuart del Rosario, Mr. Federico B. Aromin, Jr., and Ms. Jane Ameline R. Balbuena;

Thailand — Dr. Plitadet Pholgerddee, Mrs. Kulpanthada Janposri, and Mrs. Chiraporn Aranyanak

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Rouffaer, G.P.
1900 'Een paar aanvullingen over bronzen keteltrommen in Ne — derlandsch-Indie,' **Bijdragen K.I.,** VII (1900) 284 — 307.

Rouffaer, G.P.
1905 'Oudste ontdekkingstochten,' **Encycl. van Ned. Indie,** IV, 363-395.

Satyawati Suleiman
1978 'A few observations on the use of ceramics in Indonesia,' Hong Kong, Symposium on trade pottery in East & Southeast Asia.

Soekmono, R.
1963 'Geomorphology and the location of Criwijaya,' **Madjalah Ilmu-ilmu Sastra Indonesia,** I, 79-92.

Sopher, David E.
1965 **The sea nomads, A study based on the literature of the maritime boat people of Southeast Asia.** Singapore, Memoirs of the National Museum, No. 5.

Wheatley, Paul
1961 **The Golden Khersonese. Studies in the historical geography of the Malay peninsula before A.D. 1500.** Kuala Lumpur, University of Malaya Press.

Wolters, O.W.
1967. **Early Indonesian commerce: A study of the origins of Srivijaya.** Ithaca, N.Y., Cornell University Press.

Wolters, O.W.
1970 **The fall of Srivijaya in Malay history.** Kuala Lumpur, Oxford University Press.

Workshops on Srivijaya Scheduled

Two consultative workshops on archaeological and environmental studies on Srivijaya will be convened by SPAFA in July and August 1982, respectively. The first one will be implemented by the Thai SPAFA Sub-Centre and the second by the SPAFA Sub-Centre for Archaeological Research in Indonesia. These are follow-up activities to the Workshop on Research on Srivijaya held in Jakarta on 12-17 March 1979.

The consultative workshops will serve as a forum for the exchange of data already gathered in the two countries involved – Indonesia and Thailand – to facilitate the conduct of comparative studies on the topic. The workshop program will also include the discussion of the research and analytical methods employed in each country which are adaptable in the execution of the other projects.

The archaeological and environmental studies are but one of the seven research packages drawn up during the initial workshop in Jakarta. The others are as follows: bibliography on the Srivijaya, classification of arts in the Srivijaya Period, studies of ancient toponyms, studies of ancient toponyms, studies of Chinese sources, commerce and navigation in the Srivijaya Period and ethno-linguistics. The objectives and methodologies of the first three research proposals are given below.

Research Project1: BIBLIOGRAPHY ON SRIVIJAYA

Rationale: Bibliography is the basic tool of academic studies.

Objectives:

1. To compile the most complete and up-to-date list of work on Srivijaya by scholars within as well as outside the region
2. To make an annotated bibliography of works written in languages other than English
3. To distribute the list and the annotated bibliography to interested scholars and institutions
4. To provide interested scholars with English translation of a particular work upon request

Methodology:

1. Make out lists of publications and unpublished manuscripts to be supplied to the SPAFA Co-ordinating Unit by Member Countries for compilation and subsequent distribution
2. Make available a list of translators in Member Countries and channel the information through the SPAFA Coordinating Unit for dissemination

Research Project 2: ARCHAEOLOGICAL AND ENVIRONMENTAL STUDIES

Three 5-year archaeological research programmes to be conducted in Indonesia, Malaysia, and Thailand are included in this package.

Objectives:

1. To work out excavation programmes to determine the seat(s) of the Srivijayan Empire in Southeast Asia and in areas at present believed to be extensions of this Empire within the region,
2. To provide an innovative framework for research to which each Member Country can contribute significantly within their own respective areas and/or capacities, and
3. Whereas existing ideas of Srivijaya are largely determined by textual analyses and the few archaeological researches already done, it is agreed to launch a new approach using interdisciplinary methods in the service of scientific archaeological research on this important aspect of Southeast Asian history

Methodology:

1. Survey

1.1 Satellite photography
1.2 Aerial survey (uniform scale of 1:10,000)
1.3 Surface checking (metric system)
1.4 Geo-electric prospecting (or similar methods wherever feasible)
1.5 Land and sea survey (within 100 m. below sea level)
1.6 Study of modern and ancient coastlines and rivers
1.7 Analysis of soil types, taking into account present and potential productivity
1.8 Botanical and faunal survey which will focus on modern and ancient economic species
1.9 Utilization of informants and other sources of information for location of potentially important sites

2. Inventory of Sites

2.1 Providing adequate recording by using standard procedures of handling surface finds
2.2 Progressive documentation of maximum lists of sites
2.3 Careful selection of sites to be excavated, from the above-mentioned results of the inventory

3. Sites for Excavation by Priorities.

3 1 Indonesia
- i) Riau
- ii) Jambi
- iii) South Sumatra
- iv) Lampung
- v) North Sumatra

3.2 Malaysia

i) Kedah
ii) Kelantan
iii) Trengganu
iv) Pahang

3.3 Thailand
i) Chaiya
ii) Satingphra
iii) Takuapa and environs

4. Participation/composition of research teams/coordination

4.1 Surveys and excavations to be interdisciplinary:
i) archaeologists
ii) geomorphologists
iii) epigraphists
iv) palaeobotanists
v) palaeozoologist
vi) historians and art historians
vii) others

4.2 Exacations to be undertaken separately by each Member Country

4.3 Regional participation by invitation through the SEAMEO Personnel Exchange Programme.

4.4 Participation of other experts/specialists outside the region through invitations

4.5 Coordination through periodic consultations by way of seminars and/or meetings.

5. Analyses of Materials*

5.5 Study of ceramics (as means of cross-dating sites to arrive at a reliable cultural as well as chronological sequence)

5.2 Study of non-ceramic artifactual materials by scientific methods

5.3 Identification of structures

5.4 Study of settlement patterns

5.5 Definition of stratigraphy and soil, pollen analyses of individual localities and the study of their relationship within a single site

5.6 Comparative study of sites within the region

5.7 Study of ancient hydraulic and other agricultural technologies whenever possible

5.8 Exploitation of data derived from underwater archaeology.

6. Write-up of reports

The writing of the report is a fundamental obligation.

6.1 The collected data should be first made available bilingually in stencil for maximum local and regional access to the information.

6.2 The English translation should be put together for publication in one or several volumes for dissemination to other interested scholars and institutions within as well as outside the region.

Research Project 3: ON CLASSIFICATION OF ARTS IN THE SRIVIJAYA PERIOD

Rationale: A complete inventory of art objects and monuments is needed to determine the artistic traditions of the period.

Objectives:

1. To compile a complete and up-to-date list of art objects in museums and private collections within and outside the region to formulate the distribution of art styles within the region
2. To study the iconography of religious objects to arrive at the religious development during the period
3. To study the architectural styles and techniques and the decorative elements of monuments to determine their evolution and internal and external relationships

Methodology:

1. Conduct field surveys and studies in museums
2. Analyse material of art objects and monuments
3. Relevant Member Countries will send an inventory of art objects and monuments with slides, photographs, plans, and elevations of their respective countries to the SPAFA coodinating Unit
4. Study the non-religious art objects to define their place in society
5. Relevant Member Countries will study the evolution of art objects, iconographic materials, and architectural monuments and map out their distribution as well as determine internal and external relationships
6. Exchange results of the above-mentioned studies
7. Hold seminar on Art History of the Srivijaya Period two years after the start of the project.

To be continued next issue

**The above studies are to be conducted within an ecological context.*

From page 29

The restoration of Intramuros is expected to pay for itself — by providing both foreign and national tourism a natural attraction close to the center of Manila. Intramuros will have *pensiones* for the tourists and hostels for students studying in the city. It will have a complex of tourists and hostels for students studying in the city. It will have a complex of museums that will deal mainly with the art and history of the Spanish period. The modest exhibits at Puerta Isabel are a foretaste of what is to come.

Puerta Isabel contains a representative collection of architectural details and embellishments; visual aids that should help in reviving their use and craft; period furniture, ecclesiastical vestments and church *santos,* altars and picture blow-ups — all to provide the interested individual with a glimpse of Intramuros as it was. Other cultural activities are being planned and appropriate sites for them are being looked into, within the Intramuros area. A song recital by the famed soprano Lilia Reyes was held at Puerta Isabel in early March. Ms. Reyes sang mainly for masons, carpenters and peons of the Intramuros restoration project — whose ancestors may well have taken part in the original building of the Walls.

If in the past, Intramuros was an enclave of the Spaniards, the restored Intramuros will belong to all Filipinos — who shall be custodians of that heritage.

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SPECIES Common Name	SCIENTIFIC NAME	CLASSIFICATION 1/ Nano	Aguilar	Siriban
Bagras	*Eucalyptus deglupta*		18	
Bagtikan	*Parashorea plicata*	25	21 (MD)	(SD)
Balobo	*Diplodiscus paniculatus*		5 (VP)	(ND)
Banuyo	*Wallaceodendron celebium*		52 (D)	(ND)
Batino	*Alstonia macrophylla*		40 (D)	
Batitinan	*Lagerstroemia piriformis*		50 (D)	
Betis	*Madhuca betis*		80 (VD)	
Binggas	*Terminalia citrina*		21 (MD)	(ND)
Binuang	*Octomeles sumatrana*		5 (VD)	
Bolong-eta	*Diospyros pilosanthera*		45 (D)	(ND)
Dagang	*Anisoptera aurea*			(SD)
Dalingdingan	*Hopea foxworthyi*			(MD)
Dao	*Dracontomelon dao*	30	25 (MD)	(ND)
Dita	*Alistonia scholaris*	5	5 (VD)	
Dungon	*Tarrieta sylvatica*	100	80 (VD)	(MD)
Ebony	*Diospyros ferrea*	120	90 (VD)	(SD)
Guisok	*Shorea gisok*		100 (VD)	
Guijo	*Shorea guiso*	30	38 (MD)	(SD)
Ilang-ilang	*Cananga odorata*			(P)
Ipil	*Intsia bijuga*	100	100 (VD)	
Kaatoan bangkal	*Anthocephalus chinensis*			(P)
Kalantas	*Toona calantas*	40	30 (MD)	
Kamagong	*Diospyros philippinensis*	90	90 (VD)	(MD)
Kalunti	*Shorea kalunti*		9 (VD)	
Kupang	*Parkia roxburghii*			(P)
Lanete	*Wrigthia laniti*		12 (P)	
Lauan, red	*Shorea negrosensis*		21 (MD)	(ND)
Lauan, white	*Shorea contorta*	20	11 (P)	
Makaasim	*Syzygium nitidum*		40 (D)	
Malabayabas	*Tristonia decortica*		104 (VD)	(D)
Malapapaya	*Psidium nodosa*		7 (VD)	
Malayakal	*Hopea ovalifolia*		12 (VD)	
Malugai	*Pometia pinnata*		27 (MD)	(SD)
Mangkono	*Xanthosthemon verdugonianus*	150	224 (VD)	
Manggachapui	*Hopea acuminata*	40	59 (D)	
Manggasinoro	*Shorea philippinensis*	20	9 (VD)	(ND)
Mayapis	*Shorea squamata*	20	13 (P)	
Molave	*Vitex parviflora*	130	184 (VD)	
Moluccan sau	*Albizia falcataria*			(ND)
Narig	*Vatica mangachapoi*	120	171 (VD)	
Narra	*Pterocarpus indicus*	75	83 (VD)	
Nato	*Palagium luzonicus*		15 (P)	
Nato, white	*Pouteria macrantha*		5 (VP)	(P)
Oak, Phil.	*Lithocarpus philippinensis*		25 (MD)	
Pahutan	*Mangifera altissima*		7 (VP)	
Palosapis	*Anisoptera thrifera*	30	22 (MD)	(SD)
Panau	*Dipterocarpus gracilis*		17 (P)	(ND)
Panau, tailed leaf	*Dipterocarpus caudatus*			(ND)
Pine, Benguet	*Pinus insularis*	5	8 (VD)	
Pine, Mindoro	*Pinus merkusii*		5 (VD)	(ND)
Santol	*Sandoricum koetjape*	30	12 (P)	(ND)
Saplungan	*Hopea plagata*		96 (VD)	
Supa	*Sindora supa*	70	41 (D)	
Taluto	*Pterocymbium tinctorium*	5	5 (VP)	(P)
Tanguile	*Shorea polysperma*		29 (MD)	(SD)
Teak	*Tectona grandis*	90	50 (D)	(SD)
Tiaong	*Shorea agsaboensis*			ND)
Tindalo	*Afzelia rhomboidea*	100	102 (VD)	(ND)
Toog	*Combredendron quadrialatum*	25	12 (P)	(SD)
Yakal	*Shorea astylosa*	120	110 (VD)	