

**Project Title:**

The earliest pottery and domestication in Indonesia: Investigation of an open site at Pulau Ay (*submitted to NGS and funded in 2006-7*)

**Principal Investigator:**

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**Project summary:**

This project will bring together an international team to excavate the PA1 site on the island of Pulau Ay in eastern Indonesia (Fig. 1) to investigate what may be the earliest evidence of agriculture and domestic animals in Indonesia. A series of small test pits excavated at this site in 1997 produced dates of 2900-3200 years BP in association with pig bones and pottery. However, the site had an additional 2 meters of deposits containing pig and pottery underlying the dated layers. Civil unrest beginning in 1999 has made it impossible to return to Pulau Ay to conduct additional excavations and date these lower layers. Only recently has the area been re-opened to research access.

Data from this site is very likely to be relevant to longstanding debates about the nature of the origins of agriculture in Island Southeast Asia, the source of possible movements of people, technologies and languages into the region and to areas to the east, such as the *Lapita* cultural complex in Near and Remote Oceania. We hope to answer key questions about the chronology of the introduction of “Neolithic” technologies, the nature of the earliest agriculture (through palaeoethnobotanical analyses) and the structure of long distance exchange networks (through chemical analyses of obsidian and ceramics). We are requesting funding for the initial year of fieldwork and preliminary laboratory analyses.

**Participant list:**

- Dr. Daud Tanudirdjo, PhD (Universitas Gadjah Mada, Indonesia), co-principal investigator, pottery analysis
- Dr. Sue O’Connor, PhD (Australian National University) shellfish analysis, shell artifact analysis
- Dr. Gyoung-Ah Lee, PhD (Melbourne University), macrobotanical analysis
- Conradus Ufie, MA (Universitas Pattimura, Indonesia), local collaborator, soil and sediment analysis
- Graduate students from University of Washington, Universitas Gadjah Mada and Universitas Pattimura will participate in the excavations and analyses

**Project need:**

The introduction of domestic animals, agriculture and pottery to eastern Indonesia is crucially important in the context of cultural developments in the region and neighboring areas of Near Oceania and Mainland Southeast Asia. Bellwood, Kirch and others have posited that a “Neolithic” cultural complex including domestic animals (pigs, chickens and dogs), cereal agriculture and red-slipped pottery was carried by Austronesian-speaking people migrating out of Taiwan (e.g. Bellwood 1997; Bellwood, et al. 1995;

Kirch 2000). In this model, this complex moved through the Philippines and Indonesia and spread to the east, expressed as the Lapita complex in western Melanesia between 4000 and 3600 BP, and is ancestral to all Remote Oceanic cultures. Reports of pre-4000 BP dates for pottery in the Philippines and Indonesia have recently been questioned (Spriggs 2000)

As Spriggs (2003), O'Connor (2006; O'Connor and Veth 2005) and others (e.g. Szabó and O'Connor 2004; Terrell 2004; Terrell and Welsch 1997) have stated, the archaeological evidence to support this model is remarkably thin, particularly in the crucial stepping-stone region of eastern Indonesia. The term "Neolithic" is probably inappropriate for the region, as it assumes that pottery, domesticated plants and animals and ground stone tools were part of a package, while in Indonesia typically only pottery and domestic animals are found in the earliest sites, and ground stone (or shell) tools predate pottery by several thousand years (O'Connor 2006; Szabó and O'Connor 2004). There has yet been no direct evidence of early cereal agriculture in Indonesia except for rice found at Gua Sireh in Sarawak (which lacked red-slipped pottery) dating to 4500 BP (Bellwood 1997); otherwise evidence for agriculture comes from linguistic reconstructions. There are relatively few sites containing pottery pre-dating 3000 BP, and the vast majority of those sites are caves, which may not represent the full range of human activities, but rather may have been specialized use sites. One of the few exceptions is the open site of Kalumpang in South Sulawesi (c. 3000 BP), which has revealed a rich array of decorated ceramics and stone tools suggesting contact with mainland SE Asia rather than Taiwan or the Philippines (Bellwood 1997; Simanjuntak 1995; Simanjuntak and Forestier 2005). Most parts of eastern Indonesia are poorly suited for rice agriculture. Other plant foods, including tree and root crops, are rarely present in the archaeological record of the region (O'Connor 2006).

In summary, there remains a lack of solid empirical evidence for the movement of a traditionally-understood Neolithic package out of Taiwan, and poor fit of dates between the earliest agriculture in Island Melanesia and Island Southeast Asia. Site PA1 has the potential to greatly increase our understanding of this crucial time period in a little known, but important, region. The PA1 open site promises early dates (definitely pre-3200 BP), excellent stratification, a large assemblage of pottery and faunal remains, potential good preservation of macro and micro botanical remains.

**Project objectives:**

In 1997-98, I excavated an open habitation site (PA1) on the island of Pulau Ay, a small limestone island in the Banda Island group in the Maluku province of Indonesia. Well-stratified cultural deposits including earthenware pottery, pig bones and obsidian artifacts extended to at least 3m in depth. Radiocarbon dates ranged from 2900 - 3200 cal BP from the upper meter of deposits. The lower two meters of cultural deposits, which were divided by several culturally sterile tephra layers, were not dated (Lape 2000a, c). Sectarian violence in the Maluku province beginning in 1999 made it impossible to return to conduct more extensive testing of this unusually old site or to further analyze the collections that were left in a repository on the main island of Banda Naira. Socio-

political conditions have now improved to the extent that research can be safely begin again.

We propose to conduct new excavations at the PA1 site, which shows tremendous potential to answer key questions about the beginnings of agriculture, pottery making, long distance trade and colonization of new island landscapes in SE Asia, including:

*1. What was the nature and chronology of early agriculture in Island SE Asia? We will date the earliest appearance of domestic animals and plants and identify the species involved to address questions of whether agricultural was a local innovation or an adaptation of external influences (e.g. from Taiwan). This will involve intensive study of site formation processes at PA1 and extensive direct dating of stratigraphic units.*

*2. How is PA1 related to similarly aged sites in coastal Mainland SE Asia, Taiwan and the Philippines as well as early Lapita sites? Faunal, floral, pottery and lithic assemblages will be compared with other sites in SE Asia and Near Oceania of similar ages, including Kalumpang, cave sites in Maluku, Java and East Timor, and early Lapita sites in Near Oceania.*

*3. What is the extent of interaction with other places in the region? We expect to find additional obsidian artifacts that will be analyzed as part of a regional study of obsidian exchange (Spriggs 2006). Pottery temper analysis will be conducted on selected samples to build on previous sourcing/exchange studies in the region (e.g. Dickonson 2004).*

## **Methods**

After re-locating the 1997 excavation pits at site PA1, we plan to excavate a series of two to four isolated blocks of at least 2 x 2 meters. We will excavate following natural stratigraphy, dividing layers by artificial 5 cm levels where appropriate. Artifacts and faunal remains found in situ will be point-provenienced with a total station. Sediments will be wet screened through 3 mm mesh, and bulk sediment samples from every stratigraphic unit will be collected for additional lab processing for subsequent geoarchaeological and paleoethnobotanical analyses in the laboratory. Preliminary collections sorting and cataloging will take place in our field lab in Banda Naira. We have budgeted for six radiocarbon dates, which will be supplemented by 5-10 additional radiocarbon and thermoluminescence dates (on pottery). Laboratory analyses will include pottery analyses (formal and physical analyses—Lape and Tanudirjo), obsidian sourcing (Spriggs), macro botanical (Lee), pollen and phytolith (Lee and Hope), faunal analysis (Lape and O'Connor), site formation and sediment analysis (Lape, Ufie and Tanudirjo), and soil chemistry (Ufie).

Paleoethnobotanical analysis is a particularly important component of this project so methods are detailed here. Analysis will proceed in three steps: sediment sampling from archaeological features, flotation, and laboratory analysis. An extensive blanket sampling strategy (Pearsall 2001) will be employed at the PA1, with almost every feature and stratum will be subjected to sampling. This will be ideal for detecting diachronic changes in plant remains. At least 50 samples will be collected and each bag of samples will be

standardized to 10 l. Water flotation using a manual decanting method (Crawford 1983) will be used to separate plant remains from sediments and artifactual remains. 0.2 mm and 1 mm mesh sieves will be used to collect floated light materials and heavy fractions respectively for laboratory analysis. Light fractions will be separated by a series of sieves of mesh sizes of 2, 1, 0.4, and 0.2 mm and weighed. Previous attempts to recover pollen from another site on Pulau Ay (PA2) were not successful but phytoliths were present (Lape 2000b). A portion of sediment samples described above will be tested for presence of phytoliths, and if present, a sample (guided by macrobotanical recovery) will be further analyzed, using the extensive comparative library at ANU.

Identification and quantification are essential for cultural interpretation of plant remains. Light fraction from the upper sieve (2 mm) will be separated into wood charcoal, bone, mineral, and charred plant remains. We will identify, weigh, and record each component. From the lower sieves, we will sort only charred seeds and vegetative tissues other than wood charcoal to expedite analysis. We expect that only charred materials will be preserved at PA1 (except for calcified plants). The recovered seeds and vegetative remains will be identified, quantified, weighed, recorded, and stored in gelatin capsules and aluminum containers. Heavy fractions will be also examined to check any remnant charred plants. We will use a stereoscopic binocular microscope for the initial identification. Then, if necessary for identification, the surface patterns of plant remains will be examined by scanning electronic microscopy and digitally recorded. We will conduct local vegetation survey in Palau Ay Island to supplement existing SE Asian botanical reference collections at ANU and to enable a comparison between archaeological and modern vegetation to address questions about environmental changes through time in accordance with changes in plant use.

### **Community relations:**

We have included local collaborators and partners in the research design of this project (at the national, provincial and local levels). This project is part of a long-term project that focuses specifically on involving local communities in the research process, funded by the Henry Luce Foundation (see <http://faculty.washington.edu/plape/Luce.htm>). It builds on efforts by Lape (see 2000b; Lape 2003, 2004) to involve local schools and museums in archaeological research. In 2008, we plan to return to Banda along with specialists in museums and cultural heritage preservation for additional work.

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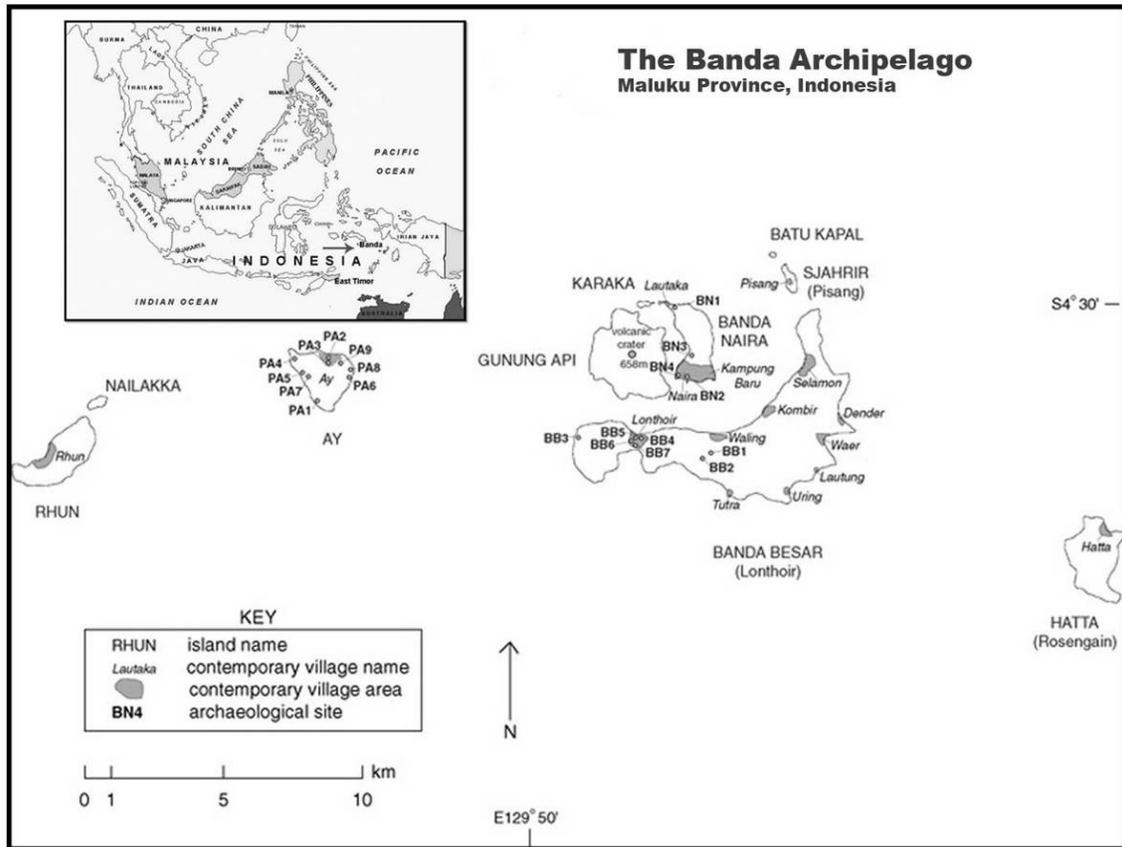
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**Appendix:**



*Figure 1: Map of Pulau Ay and the Banda Islands, Indonesia.*

**Budget:**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>NGS</b>	<b>OTHER SOURCES</b>
<b>TRANSPORTATION</b>			
<b>Airfare</b>	Lape and Peterson: Seattle-Banda, Lape airfare paid by Luce grant, O'Connor: Canberra-Banda; Tanudjro + student, Yogyakarta-Banda	\$6,340.00	\$2,500.00
<b>Vehicle Rental</b>	boat charter, 8 days @ \$40	\$320.00	\$-
<b>Field Vehicle Gas and Maintenance</b>		\$-	\$-
<b>Other</b>		\$-	\$-
<b>SUBSISTENCE</b>			
<b>Lodging</b>	10 people at \$20 x 24 days	\$4,800.00	\$-
<b>Food</b>	10 people at \$20 x 24 days	\$4,800.00	\$-
<b>Other</b>		\$-	\$-
<b>FIELD WORK</b>			
<b>Equipment</b>		\$-	\$-
<b>Field Supplies</b>	bags, labels, field tool kits, batteries, sat phone rental paid by Luce grant	\$500.00	\$500.00
<b>Assistants/Consultants</b>	3 local field assistants @ \$15/day x 21 days	\$945.00	\$-
<b>Other</b>		\$-	\$-
<b>LABORATORY ANALYSIS</b>			
<b>Equipment</b>		\$-	\$-
<b>Lab Supplies</b>	bags, chemicals, slides, costs split with Luce grant	\$500.00	\$500.00
<b>Assistants/Consultants</b>		\$-	\$-
<b>Tests</b>	C14 (12 @\$600) and TL (10 @ 300) dates, costs split with Luce grant	\$4,800.00	\$5,400.00
<b>Other</b>		\$-	\$-
<b>OTHER</b>			
<b>Telephone/fax/postage</b>	collections shipping	\$1,000.00	\$-
<b>Miscellaneous</b>	visas, permits, project reserve	\$1,000.00	\$-
<b>TOTAL</b>		<b>\$25,005.00</b>	<b>\$8,900.00</b>