

ABSTRACTS FOR THE MELAKA CONGRESS, 1998

NB: The abstracts are here listed by author, in alphabetical order (by initial surname in the case of East Asian delegates). A correlative list follows immediately below of sessions and abstracts. Each abstract is preceded by its session number. Institutional addresses, emails etc of the authors are not given here; they will be added to those papers presented for final publication after the congress.

ABSTRACT-SESSION CORRELATIONS

Session:

- 2: Carlson; Huang and Hou; Keates; Morwood and Aziz; Rolland; Schepartz; Sørensen; Wang Youping; Wei Qi.
- 3: H. Allen *et al.*; di Lello; Falguères *et al.*; Gaillard *et al.*; Nishimura; O'Connor *et al.*; F. Sémah *et al.*; Simanjuntak and Forestier; Tan.
- 4: Boyd *et al.*; Bulmer; Ha Huu Nga; Ha Van Tan; Higham; Maloney; Nishimura and Nguyen; Paz; Penny; Sørensen.
- 5: Blench; Kajale; Misra; R.K. Mohanty; A.K. Singh.
- 6: Cao Bingwu; Chen Xingcan; Fu Xiang; He Jiejun; Jiang Zhilong; McNeish; Meacham; Yang Yaolin; Yuan Jiarong; Zhang Chi.
- 7: Chen Chungyu; Li Kuangti.
- 8: Chisholm; Habu; Hudson; Takamiya; Tsude.
- 9: R. Prior; Vandiver; Vincent; Voelker; White.
- 10: Higham and Thosarat; O'Reilly; Pombejra; Stark and Sovath; Talbot; von Dewall; Walters.
- 11: Davis; Kallen; Karlstrom; Lape; Leong Sau Heng; Pham Thi Ninh; Sayavongkhamdy; Theunissen; Weiss and Pigott.
- 12: Allard; Li Liu; Schoenfelder.

13: Fiskesjo; Lefferts and Cort; Longacre; Reith; Shoocongdej; Wang Ningsheng.

14: Ikawa-Smith and Habu; Johar; Nelson; Sanday.

15: J. Allen; Godley; Godley *et al.*; Scarborough and Schoenfelder; A-M. Sémah *et al.*; Spriggs.

16: Anderson; Araho; Bedford; Bellwood; Bulbeck; Clark; Fredericksen; Mahirta; Ngo The Phong and Bui Phat Diem; Sand *et al.*; Shutler; Solheim; Summerhayes (X2); Tanudirjo.

17: Beardsley and Basilius; McNeill; Olsudong; C. Prior; Rainbird and Wilson; Streck; Welch; Wickler.

18: Buckley; Domett; Grimaud-Hervé *et al.* (X2); Marzuki *et al.*; Nguyen Kim Thuy; Oxenham; Tayles *et al.*; Valentin; Walters.

19: Beardsley; Burns; Carson; Taomia; Field; Green; Rolett *et al.*; Wickler.

20: Green; Lilley; Reid; Spriggs and Bellwood.

21: Blundell; D. Comer; E. Comer; Egloff; Gibson and Finnigan; Gunadi; Hor Lat; Jones; Lape.

22: Doherty and Beavitt.

23: Baer; Bulbeck; Fix.

24: Apilis-Mondiguing; Baig; Box; Sangache.

THE ABSTRACTS

12. POLITICAL STABILITY AND DEVELOPMENTAL CYCLES IN THE PREHISTORY OF SOUTH CHINA

Francis Allard

The archaeological record (especially burial evidence) of southern China points to the presence of native complex societies prior to the incorporation of the region into the Chinese political sphere at the end of the first millennium BC. A comparison of the developmental trajectories associated with a number of Neolithic and

Bronze Age complex societies in Lingnan (a region made up of the modern provinces of Guangdong and Guangxi in southeast China) reveals an interesting contrast between stable "integrated" systems which appear to develop slowly until their incorporation into China proper and unstable "dislocated" ones characterised by rapid hierarchical evolution and devolution. In the former, it is found, both the location and contents (number and types of goods) of burials point to the successful integration of the leadership within the native population, while the opposite appears to be true of dislocated systems, where external contacts and the acquisition of prestige goods are associated with the physical, social and ideological separation of leaders from commoners. It is suggested that the structural integrity of dislocated systems may be compromised when the cost of supporting a leader is not balanced by the benefits gained from doing so. Interestingly, there is also evidence of cycling between integrated and dislocated systems. Finally, we point to the fact that other hierarchical Neolithic societies in China, including the jade using cultures of Hongshan and Liangzhu, display in both their materials and developmental trajectories the features of dislocated systems. As in the case of complex societies in southern China, neither of these appears to have developed into complex state societies.

(Dr Allard is unfortunately unable to attend the congress in person)

3. HOLOCENE-RECENT ARCHAEOLOGY OF THE PUNUNG REGION, EAST JAVA.

H.Allen, Gunadi Nh., R.P. Soejono and T. Sutikno

This paper reports on surveys and excavations at Song Agung and Song Gupuh in the Punung Region (Kab. Pacitan, Prov. E. Java) carried out by a New Zealand-Indonesia research team, under the auspices of the National Centre for Archaeological research. The research complements that undertaken by Dr T. Simanjuntak and others in the same region. Artefacts from the mid-Holocene Song Agung show few deliberate implements and consist mostly of short broken flakes with edge damage or limited retouch. The cores are also small and irregular. Associated fauna is from the forest and includes elephant and rhinoceros (possibly used as a source of industrial bone rather than as food) but is dominated by *Macaca* sp. Shellfish were collected from the coast or tidal sections of the Pacitan river. Song Gupuh is of Recent age and contains debris from adze manufacturing as well as pottery and metal artefacts. It can be related to the many open workshops of the region which specialised in the use of indurated tuff (*rijang*), a

resource which turned this isolated area into a centre of adze manufacturing and trade. These excavations, along with others, create a new understanding of changes in occupation and artefact manufacturing in E. Java since the late Pleistocene.

15. COASTAL PROGRADATION AND ITS INFLUENCE ON THE LOCATIONS OF EARLY HISTORICAL SITES IN PENINSULAR MALAYSIA AND ISTHMIAN THAILAND

Jane Allen

Coastal landscape change has been dramatic in Southeast Asia during the historical era, which began ca. 2000 BP in most areas. Long segments of the east and west coasts of Peninsular Malaysia and Isthmian Thailand are today dominated by broad floodplains. But evidence produced during geoarchaeological studies in Kedah, on the northwest coast of Peninsular Malaysia, and Satingpra, on the east coast in South Thailand, suggests strongly that these broad plains formed recently, creating very changed environments for archaeological sites located nearby.

Many sites dating to the period between ca. AD 400 and 1500 in Kedah and the Satingpra area are landlocked today behind these broad plains. Since the plains produce large quantities of irrigated rice today, some researchers have assumed that the occupants of these sites were supported by an agrarian, irrigated rice-based economy. If the plains are more recent than the sites, however, and the sites were coastal at the times in question, their subsistence systems and locations need reinterpretation.

The results of studies focusing on soils, sediments, and geomorphology in Kedah and Satingpra, and, in Kedah, on radiocarbon-dating, indicate that the coastal plains in these areas were created during the early historical era, as soils increasingly eroded from inland hills and were redeposited at the coast; and that this erosional regime was largely the result of overly intensive use of fragile hillslope soils for dryland cereal cultivation. The coastal sites supported by this cultivation were located on coastal and estuarial sand beaches, ridges, and hills; their occupants were integrally involved in foreign trade and used water routes to transport forest goods to the coast and out, and to bring foreign imports into interior areas.

Seemingly anomalous finds of early foreign trade items at other sites in Malaysia and Thailand, each site landlocked today behind a broad coastal floodplain and located many kilometres from the coast, might also be more easily understandable if the plains in those areas,

too, have formed recently. Further geoarchaeological and dating studies are needed in areas like Melaka and at the former mouths of large rivers such as the Muar, where current appearances may be deceiving.

16. IMPLICATIONS OF OBSIDIAN TRANSFER IN SOUTHERN POLYNESIA

Atholl Anderson

Obsidians from two sources, Mayor Island in New Zealand and Raoul Island in the Kermadecs, have been transferred between archipelagoes in southern Polynesia: the New Zealand mainland islands, Kermadecs, Chathams and Norfolk Island. Early settlement occurred in the period 800-500 b.p. on all groups. The distribution and ages of the obsidian destinations have interesting implications for current discussions about colonisation in East Polynesia, particularly for propositions about voyaging and interaction. In southern Polynesia the level of both activities appears to have been significantly lower than elsewhere in the region.

24. INVOLVING LOCAL COMMUNITIES IN THE CONSERVATION OF ARCHAEOLOGICAL SITES AND CULTURAL LANDSCAPES: IFUGAO RICE TERRACES OF THE PHILIPPINE CORDILLERA

Carmelita Apilis-Mondiguing

The Ifugao rice terraces in the Cordillera region, northern Philippines, have the distinct honour of being the first to be inscribed in the UNESCO World Heritage list as a "continuing cultural landscape" in December, 1995. They are a living monument to the engineering and artistic ingenuity of the indigenous people of Ifugao who still continue to cultivate and maintain the rice paddies (since 2000 BP) following their forebears' traditional farming practices and beliefs.

However, in recent years, the grandeur of these rice terraces has started manifesting adverse alterations induced by changing socio-cultural values, inroads of modern influences, environmental degradation, harsh economic realities and perhaps sadly, political indifference among a few other factors. Alarmed by these undesirable impacts, personal and official initiatives to generate community awareness have galvanised concerted efforts with the national government, concerned individuals and entities for the protection of this historical, natural and cultural heritage of the Ifugaos.

The process of involving the local communities and recognising the important participation of the different

stakeholders, particularly the marginalised farmers and their families and the business sector, has created positive directions. Addressing conflicting interests harmoniously through genuine concern and consultations has contributed to realising early modest successes in the sacred task of ensuring the conservation of the Ifugao rice terraces not merely as archaeological sites and cultural landscape but more meaningfully, as a continuing legacy for future generations in the next millennium.

16. OBSIDIAN PRODUCTION AND TRADE IN THE BISMARCK ARCHIPELAGO, PAPUA NEW GUINEA

Nick Araho

The aim of this thesis is to find out about the manufacture and trade of obsidian stemmed tools from West New Britain, Papua New Guinea.

Discussion of specific features, such as the definition of trade goods, stemmed tool distribution, technology and the degree of standardisation, enables me to outline a model of the West New Britain production system as being involved in the production of two types of stemmed obsidian products - type 1 stemmed blades and type 2 stemmed flake - for use in ceremonial exchange. Specifically, four routes of investigation are followed to arrive at this conclusion.

The first route is the provision of a strict working definition of trade goods as having regular recurring forms made by applying special skills in the various stages of the production sequence. The application of this definition sets the West New Britain obsidian stemmed forms apart from other similar or utilitarian forms and enables them to be considered as trade goods.

The second approach is to argue for a restricted distribution of trade goods, particularly the type 1 and type 2 stemmed forms, to the Willaumez Peninsula and the Mopir regions. This is supported by consideration of the differences of the West New Britain stemmed tool industry from similar industries on Lou Island and Easter Island on the basis of technology and distance. In particular, the age of 3500 years BP for the West New Britain industry clearly separates it from the much younger Easter Island and Lou Island industries. The chronological differences suggest its independent innovation at a very early period.

The third approach is an analysis of the technology which was characterised by (i) the use of special skills which are not easily acquired but require a certain degree of training, and the perfection of these skills through their repeated application as well as the accumulation of knowledge and experience with the mate-

rial; (ii) the specific application of these techniques to particular stages of the reduction sequence of two types of stemmed obsidian tools; and (iii) the recognition of these skills as a set of highly technical procedures whose application was restricted to the production of the two classes of highly specialised obsidian products only in West New Britain.

A fourth approach to the question of trade is an investigation of the degree of standardisation in the production of the two types of stemmed obsidian forms. The apparent lack of standardisation is regarded as a reflection of the consumer's desire for variability rather than a reflection of the producer's intentions. I argue that producers would rather prefer standardised forms because of obvious benefits in production efficiency and ultimately higher profits. My view is that the consumer's desire for variability enhanced the ceremonial value of the trade goods and brought prestige to its owners.

The delineation of the West New Britain stemmed tool industry enables me to compare it to analyses of three other Papua New Guinea production systems: Allen's commercial production; Fredericksen's specialist trade; and Burton's ceremonial exchange. This is done in order to determine which of the three models is useful for interpreting this kind of prehistoric production system that was responsible for the production of stemmed obsidian forms in West New Britain.

Allen's (1977, 1984) model is considered inappropriate because of the lack of standardisation in the West New Britain obsidian stemmed forms. Fredericksen's (1994) model of specialist trade is appropriate to a certain degree in the sense that it dealt with specialist production of obsidian items, but is found to be too limiting.

Burton's (1984, 1989) model of Highlands axe production was deemed appropriate because it focuses on the production of huge ceremonial blades accompanied by the expedient production of smaller work axes. This situation is interpreted as being similar to the production of large type 2 stemmed flakes for ceremonial exchange and the small type 2 stemmed flakes for practical purposes in West New Britain.

This thesis thus shows that it is very likely there was a ceremonial system of production and exchange operating in West New Britain more than 3500 years ago.

23. THE GENETIC HISTORY OF THE ORANG ASLI: UNITING PATCHWORK DATA.

Dee Baer

The genetic history of the West Malaysian Orang Asli, or "first people," is only partially known. Few of the 19 or more ethnolinguistic groups have been studied. This work has found variation at the protein level and the DNA level. Genetical questions of broad interest include (1) the relationships among Orang Asli groups and (2) their relative affinities to other Asians. Both within and between Orang Asli groups, close neighbours can have large differences in allele frequencies, indicating ethnic microdifferentiation. Taking a larger perspective, a few groups have been compared genetically to other Southeast Asians, as well as to people elsewhere. Overall, these broad comparisons show Orang Asli to be distinctive from other Malaysians and other Southeast Asians. At the same time, Orang Asli fall into genetic alignment regionally between more northerly continental groups and insular groups to the south and east in important respects. Historically, Orang Asli distinctiveness can be ascribed in large part to small effective population size and continuous selection pressures. The cohesiveness of Orang Asli cultures and gene pools has long maintained an array of alleles at relatively high frequencies that provide resistance to endemic disease. Related cultural and genetic attributes suggest a long tenure by Orang Asli in the rainforest environment.

24. POLLUTION CONTROL VS. DEVELOPMENT IN THE PROTECTION OF HISTORIC MONUMENTS: THE CRISIS AT AGRA

Amita Baig

The city of Agra is located at the heart of India and although no longer the capital of the Mughal Empire which enriched it with unparalleled architectural glory; the most celebrated of which is the Taj Mahal; today it is still a bustling town and at the crossroads of national transportation networks. In recent years there has been grave concern both nationally and internationally about the rising levels of pollution in the city, particularly noxious chemicals which it was feared would discolour or worse damage the pristine white marble of the Taj Mahal. Agra was declared a protected zone in the early seventies following the commissioning of an oil refinery in Mathura about 50 kilometres from the city. Over the years legal provisions have been augmented to ensure

that this city, home to three world heritage sites, is adequately protected.

Public Interest Litigation filed in 1984 ensured that global attention has remained focused on this monument. The response from India's Supreme Court has been substantive. Far-reaching judgements preventing small scale industry from using diesel generated power, closure of iron foundries, brick kilns, glassworks and proposals to divert all major highways out of the city are monitored by a high level committee who report directly to the court.

Regrettably these judgements have little to do with the lives of the people; most of them traditional inhabitants who have lived here over generations and sought to better their economic situation in a city which lacks even basic civic amenities. The closure of more than four hundred industries and a phased, but full fledged rehabilitation of the industrial workers outside the protected zone, penalises not only to the individual but the nation as a whole. Visionary and sustained management of historic cities, negotiation and persuasion may have averted this crisis, but the pace at which urban growth has taken place perhaps was never foreseen.

Resolving the complex issues of development, infrastructure, economic opportunity and conservation requires enormous effort and is the challenge facing us today. The recently negotiated agreement between the Archaeological Survey of India, UNESCO and a multinational foundation, to seek solutions which will ensure the Taj Mahal and the other monuments can be protected from pollution and thus averting the crisis of large scale dislocation of population, must be celebrated. But it is also the opportunity for us to pause and assess how we address the management our historic cities today and in the future. Clearly without the participation and support of the community it will be an isolated effort, devoid of meaning.

19. MONUMENTAL EARTHWORKS OF BELAU: THE SHAPING OF CULTURE

Felicia Beardsley

Monumental architecture and earthworks are in every sense cultural stagecraft; the sum of a society's self-estimate and an amalgam of its beliefs, values, politics, economics and ambitions. In the definition of a culture or tradition, whether in the Pacific or on the continent, one of the first identifiable elements - public architecture - is also the most visible and permanent. These are the buildings, complexes and sculpted earthworks that form the symbols or *emblemata* of a discrete group of people,

their signature from a time of few or no written records, where material products become the texts of history. This includes the terraced hills of Belau.

Long before the memories encoded in oral history, the Belau terraces, including the crown and brim formations, were created. As the most visible sites in Belau, these terrace systems are examined within an overall context of the archaeology of architecture, previous archaeological investigations, changing interpretations about their function, and their possible reflection of specific notions of architectural form, style and the physical organisation of space. Details of construction and the process of construction are also described.

17. SNGALL RIDGE, BELAU: BURIALS, SPIRIT WALKS, AND PAINTED POTTERY

Felicia Beardsley and Umai Basilius

High atop a narrow, knifelike ridge of limestone there rests four bodies in a small chamber of a much more extensive vertical solution cave in Sngall Ridge, Belau. The four are laying in repose, together with the only burial furniture found in the cave - four painted ceramic bowls. According to oral history, however, this was not the final resting place of the departed souls but merely a way-station in their journey to Ngedeloch Spring on Angaur Island in the south, where they would bathe and cleanse themselves in preparation for their final leap into the spirit world.

To this day, the ridge continues to be described as a ghost walk, where spirits from the northern islands of Palau stop on their journey to Ngedeloch Spring. Is this a belief that has endured from the time of the Sngall Ridge cave burial, which is associated with a date of 2,630 BP? Is it a result of former burial practices that describe a number of prehistoric era interments in the caves located throughout this ridge system? Is association of this oral tradition with the Sngall Ridge cave burial merely coincidence? The cave, its burials and ceramic tradition will be described with specific reference to oral traditions and changing burial practices.

16. RESULTS FROM EXCAVATIONS AT THE MANGAASI TYPE SITE: A RE-ASSESSMENT OF THE CERAMIC SEQUENCE AND ITS IMPLICA- TIONS FOR MELANESIAN PREHISTORY

Stuart Bedford

In mid 1996 and 1997 excavations were undertaken at the Mangaasi site on the west coast of Efate, Central

Vanuatu by Matthew Spriggs and Stuart Bedford. The research was designed to develop further the pioneering work of Jose Garanger on Mangaasi pottery, partly in light of the questions concerning the central Vanuatu pottery chronology. Researchers have questioned the validity of Garanger's Early to Late Mangaasi ceramic sequence and his proposed termination date for pottery production and use. Much of the area excavated by Garanger appears to have been disturbed (discussed in detail by Spriggs), thus his pottery sequence was largely a product of post-depositional sorting of occupational deposits that we can now determine are late in the sequence at the site.

The stratigraphy of the site appears to be both horizontal and lateral. The main area of cooking and dumping of refuse is concentrated along the bank of a small perennial stream and on the prograding beach, whose location was changing due to uplift. Intact cultural deposits comprised pottery, shellfish, bone, shell adzes, armrings and beads and very occasional stone flakes.

A clear picture of the ceramic sequence from the Mangaas site has now emerged. The sequence begins at about 2800 BP with generally plain, everted rim cooking vessels, frequently with notching on the lip. The horizontal rim form and decoration on the lip are very similar to the material excavated by Garanger at Erueti on the south coast of Efate, and called by him Erueti ware. Incision occurs as a minor decorative technique on this early material. There is an increasing proportion of pottery decorated with incising at about 2500 BP, and by about 2100 BP the flat lips have largely dropped out to be replaced by simpler rim forms on incurving rim vessels decorated with both incising and punctate impressions.

Applied relief decoration so typical of Mangaasi ware appears only at the end of the ceramic sequence, along with both incised and punctate material and the appearance of handles. The applied relief pottery was recovered from the uppermost layers of the site or in testpits that were closer to the sea and clearly date to a later phase of occupation. Where the stratigraphy is not disturbed, applied relief pottery seems to date to a period after deposition of a tephra which may result from the Ambrym Volcano caldera-forming event of about 1850BP. So far, the only radiocarbon date clearly associated with applied relief pottery is 1775-1333 BP. This pottery occurs in an occupation layer which seems to have been later subjected to disturbance through gardening activities and was in turn sealed by primary and secondary tephra almost certainly from the massive Ku-

wae eruption which created the present configuration of the Shepherd Islands to the north of Efate in 1452 AD.

The re-excavation of the Mangaasi site, previously somewhat of an anomaly and used in the past to argue for multiple colonisations of the region, has revealed a ceramic sequence that has parallels within Vanuatu and other parts of both Remote and Near Oceania.

16. THE OLDEST CERAMICS IN THE MOLUCCAS, AND QUESTIONS OF CONTINUITY AND INTRUSION

Peter Bellwood

Excavations in the northern Moluccas since 1990 have revealed a 35,000 year sequence of human activity (Bellwood *et al.* 1998). A long, and presumably culturally-continuous, preceramic phase was joined about 3500 BP by a quite different ceramic assemblage, revealed most clearly in the rock-shelter of Uattamdi on Kayoa Island. Following this date, both preceramic and ceramic assemblages continued side-by-side in different sites until about 2000 BP.

The Uattamdi assemblage is characterised by red-slipped pottery with globular and open dish-on-pedestal forms, together with shell beads, bangles and scrapers/spoons, polished stone adzes with lenticular cross-sections, and bones of introduced pig and dog. By 2000 BP this assemblage had been superseded in Uattamdi by an assemblage of highly incised pottery with bronze, iron, glass beads and jar burial.

The Uattamdi red-slipped pottery and associated items have no antecedents whatsoever in any of the preceramic assemblages of the region. In the case of Kayoa, they are believed to represent selective settlement of small islands by incoming groups of Austronesian language speakers. The similarities of this assemblage with the contemporary Lapita assemblages in western Oceania, except for the Lapita focus on dentate stamping on pottery, are very marked and extend to the fabrics and shapes of pottery in both regions, as well as to non-ceramic artefacts.

Bellwood, P. *et al.* 1998. 35,000 years of prehistory in the northern Moluccas. *Modern Quaternary Research in SE Asia* 15:233-74.

5. THE MOVEMENT OF CULTIVATED PLANTS BETWEEN AFRICA AND THE INDO-PACIFIC REGION: SPECIES, DATES AND ROUTES.

Roger Blench

Although there has been extensive movement of cultivated plants between Africa and the Indo-Pacific in both prehistory and historic times, the information is extremely scattered and not easily available to integrate into models of the larger pattern of cultural interchange. It is also surprising that there are few convincing hypotheses to explain the movement of many species thought to have moved between the two areas on botanical grounds. The paper aims to enumerate as many species as possible that moved before the recent historical period and to try and establish a possible stratification of dates and routes. Introductions confined to Madagascar are excluded. It ends with a list of questions that emerge from the botanical literature that appear to have no easy resolution.

The following routes and species are tentatively identified;

1. Sabaeen lane. Ships sailing from the horn of Africa along the southern tip of Arabia to the west coast of India.

To India: Sorghum, pearl millet, ditch-millet, finger millet, sesame (?), kapok (?), velvet bean

From India: aerial yam, three-leaf yam (?), AA banana

2. Overland via the Nile Valley to the Near East and western India

From Africa: Okra, sesame, spider-flower, leaf-mustard, pigeon-pea, cowpea, tamarind, ben-oil tree

To Africa: hyacinth bean, musk-mallow.

India appears to be a major region of secondary dispersals both onwards to China and to SE Asia.

Directly between SE Asia to Africa (maritime route)

From Africa: winged bean (*Psophocarpus*)

To West Africa: triploid Musaceae, taro (?), water-yam (?)

To East Africa: rice, sweet potato, sugar-cane, coconut

In most cases, these hypotheses are derived from botany. Archaeological support is exiguous at best, especially in the case of root crops. Any dates attached to these must therefore be very tentative.

21. THE INDIGENOUS VOICE: DEVELOPING CULTURAL CENTERS, MUSEUMS AND INTERACTION WITH LOCAL PEOPLE ALONG THE EAST COAST OF TAIWAN

David Blundell

My presentation to be entitled "The Indigenous Voice: Developing Cultural Centers, Museums and Interaction with Local People along the East Coast of Taiwan," will include a look at the current process of presenting Austronesian cultures. The first part of this presentation will review the state of concepts and programs to display and promote the cultures along the east coast of Taiwan. A number of new visitor centers, cultural centers, and museums are being developed for an influx of visitors to the east coast, and for the indigenous people themselves to conserve their heritage. Large dance areas, traditional housing in open-air museums, eco-cultural tourism seminars, and craft centers have become the current development trend.

This paper will follow what I have presented at Chiang Mai, and published in the IPPA Bulletin 16, on heritage conservation and management in Taiwan, especially with the East Coast National Scenic Area, new museum projects concerning prehistory and ethnology, and the internet for a Pacific cultural "virtual" museum. The current paper will reflect my work on leading cultural seminars and participating with cultural projects related to ethnological and prehistoric sites. Native viewpoints concerning the educational process of understanding indigenous heritage in Taiwan will be presented. My concern will be with official policies, current trends, and the way to deal with cultural resource management for the sake of the sites and education, keeping in mind the public sharing the same locality.

24. GIS AS A TOOL FOR INTEGRATING ARCHAEOLOGICAL RESEARCH AND SITE CONSERVATION NEEDS INTO A DEVELOPMENT PLANNING FRAMEWORK: CASE STUDIES FROM ANGKOR, HUE AND VAT PHU

Paul Box

GIS is a digital mapping, spatial database management and spatial analysis tool that facilitates the collection, input, integration, storage, retrieval and analysis of spatial and attribute data from a wide variety of different sources and formats.

Archaeological and other cultural heritage resource data collected in support of pure or applied scientific

research objectives, forms the basis of any heritage management GIS. However in order to fully understand, manage and plan for conservation of cultural heritage resources, additional layers or themes of data such as demographic data, land cover and vegetation classification, topography, hydrology and geological is also required. The data generated for a heritage GIS is of value to a wide variety of potential users.

Destruction of the archaeological record is caused by a wide variety of actors all of whom have a claim to use and occupy land. People living on and using the land for their livelihood, can cause a great deal of destruction to archaeological resources. Excavation of archaeological sites by archaeologists and looters is responsible for a great deal of destruction. However perhaps the largest threat to the archaeological record is caused by state enterprises that are responsible for the development, construction and maintenance of service supply infrastructure such as roads, waterworks, irrigation, power and telephone supply and public service construction.

In order to mitigate the damages to archaeology caused by both public and private works, heritage managers must attempt to:

Inventory and assess the cultural resources for which they are responsible;

Develop cultural heritage protection, plans and supporting legislation within any existing planning and development control mechanisms;

Make planners aware of the importance of conserving cultural heritage resources;

Ensure that plans for public works are developed with knowledge of the location of cultural heritage resources, so that negative impacts on the resources are mitigated;

Enhance vertical communication within heritage management agencies and horizontal communication and cooperation between heritage managers and relevant public works agencies at both the strategic planning and operational levels

In many developing countries, especially in rural areas, where no effective development control system exists, an attempt should be made to raise awareness of the importance of heritage conservation amongst the local community so that they fully understand and advocate heritage conservation. The local community should be empowered to participate fully in the conservation planning process to ensure local community ownership of the plan.

The case study at Angkor, Hue and Vat Phu illustrate attempts to address the issues of lack of coordination between various public agencies on an institutional and

operational level, by utilising GIS as an information dissemination and planning tool. By involving operational personnel from relevant public works agencies and government department within a heritage GIS system and by allowing access to the GIS for other relevant government departments, the GIS can become a focal point for planning and management of a wide variety of state-managed resources. All potential users of the GIS are able to plan development based upon the same data with full cognisance of the location and value of heritage resources.

However the utopian dream of enhanced efficiency, coordination and cooperation through the freedom of information is still a dream rather than a reality. In the real world, as in the academic world, information does not flow freely. In both worlds each information producer attempts to protect and recoup their intellectual and financial investment in information generation. However if the political will to cooperate exists, the returns, in terms of enhanced management and conservation, on an investment in establishing a GIS can be significant.

4. THE GEOARCHAEOLOGY OF THE PREHISTORIC DITCHED SITES OF THE UPPER MAE NAM MUN VALLEY N.E. THAILAND, II: STRATIGRAPHY AND MORPHOLOGICAL SECTIONS OF THE ENCIRCLING EARTHWORKS

W.E. Boyd, R. McGrath and C.F.W. Higham

This paper is the second in a series of geoarchaeological reports emerging from the "Origins of the Civilisation of Angkor" archaeological project, N.E. Thailand. The project focus is the Iron Age occupation of a large number of sites in characterised by distinctive encircling earthworks. Importantly, these sites appear to provide evidence for the development of increasingly centralised social and political organisation in the region, possibly as the precursor to the emergence of the polities of Zhenla and Angkor. Much of this interpretation is dependent on a correct interpretation of the structure and function of the earthworks. While there has been much speculation in the literature, no firm interpretation has hitherto been forthcoming. In the late 40's and early 50's, Williams-Hunt published work using aerial photography to identify archaeological sites in this little known region, identifying the abundant "irregular earthwork" sites of the Mun valley in N.E. Thailand as an important group of prehistoric archaeological sites. He cautiously expressed the view that these sites had significant structural regularity and locational patterning

worthy of investigation. Significant though these contributions were, perhaps his most important contribution lay in what may have been a subconscious comment. Having carefully described the sites -- settlement sites or mounds surrounded by irregular ditches and banks -- as "earthworks" sites, towards the end of one paper he refers to "ramparts" and, importantly, "moats". This latter label was taken up by all subsequent investigators, and the sites became known as "moated sites", with all the implications that such a term brings with it. In particular, the focus on the "moat" as an essential structure has tended to obscure the relationships between site and landscape.

More recently, revised aerial photograph interpretation of the region by the authors has questioned traditional views regarding the existence of moats. Photographic interpretation and field mapping indicates that the sites are intimately associated with now-extinct rivers, rivers characterising environmental and climatic conditions very different from those at present. In this context, many of the "moats" can be adequately explained as river channels and meanders. To test this, the "moats" at six sites -- Noen U-Loke, Non Muang Khao, Ban Non Khrua Chut, Ban Non Ngiu, Ban Non Wat and Ban Makhham Thae -- have been examined in section, with backhoe trenches (the first excavations of any significance within the "moats") dug across the complex of "moats" surrounding these sites. This paper reports the preliminary results.

Detailed sedimentological analysis remains to be completed. However, lithology, stratigraphy and cross sectional and plan morphology have been recorded, and at selected localities, pollen analyses of "moat" infill is now available. From these observations, several broad conclusions may be reached. In the following, the term "channel" is reserved for the subsurface features, whereas the term "moat" refers to the surface expression.

1. The channels appear to be older towards the mound of the archaeological site, with there usually being buried older channels under the site. Those at the mound edges tend to be late Iron Age at the oldest. The outermost may be historic or later in age.
2. The surficial morphology of the "moats" usually does not reflect the buried channel sectional morphology. The latter are usually small low-flow channels set in wide shallow flood-flow style channels. The flood-flow channels may or may not equate to the surface expression of the "moat". Occasional moats overlie unambiguously large meandering river channels. In extreme cases, the surficial expression

of apparently very convincing "moats" has no subsurface expression.

3. In few of the channels is there any evidence for the substantive artificial construction of the channel. Where such evidence is clear, it resembles that of small scale channel maintenance rather than the original cutting of a channel.
4. The raised banks which line the "moats", hitherto regarded as constructed from the sediments dug out of the moats, are not substantially composed of spoil. Rather, they represent the original in situ floodplain land surface, into which the channels have been cut. While some of these banks have been augmented with channel sediments, there is no evidence for the artificial deposition of the enormous amounts of sediments which would have been excavated from the channels had they been artificially constructed.
5. There is much evidence that the regularity of shape and patterning of the "moats" in plan is a recent phenomenon, and probably reflects 20th century landscape tidying.

The conclusion reached in this study is that the surficial "moats" which has drawn so much attention to these sites largely represent modern landscape processes, in which residual geomorphological features from a former alluvial system provided optimal rice-growing conditions and thus attracted the urge to tidy landscape; these places contain the best soils, are the most expensive land, and represent the form of modern field design used to optimise rice production. These modern "moats", however, do reflect an underlying geomorphology, one of an evolving fluvial regime somewhat different to that at present. The archaeological sites are intimately linked with this fluvial regime, and undoubtedly the Iron Age occupation was strongly influenced by the fluvial regime. The buried channels, however, were not constructed, perhaps with a few exceptions where channels were kept clean, but represent stream and river channels of various types. With a change in fluvial regime and the apparent infilling and abandonment of these river channels, the Iron Age occupation in the region may have come to a halt.

18. A RECENT REVIEW OF THE HEALTH AND DISEASE OF TWO PREHISTORIC POPULATIONS FROM TONGATAPU, WESTERN POLYNESIA: A PRELIMINARY REPORT

Halley Buckley

A recent review of the health and disease of two prehistoric burial mounds from the island of Tongatapu, west-

ern Polynesia is presented. The two sites were excavated in 1964 by archaeologist Janet Davidson. Both sites revealed a continuity of inhumation over a considerable period of time and were in use up to the late prehistoric period.

Forty six individuals were recovered from the first site excavated (ToAt-1) and 56 from the second site (ToAt-2). The human skeletal material was originally analysed by Michael Pietrusewsky in 1967, and the results published in 1969. The primary aim of his work was to present a physical description of the samples from each mound. Many metrical and morphological data were collected from the cranial and post-cranial elements. Also evidence of infectious disease, osteoarthritis and trauma were recorded.

The aim of the present study was to record evidence concerning the health and disease of the populations. All adult and subadult individuals were examined for macroscopic evidence of inflammatory and anaemic changes to the bone tissue. The occurrence of degenerative joint disease in the axial and appendicular skeletons was used as an additional tool for ageing the adults. All subadults with reasonably intact long bones were radiographed, as were those with macroscopically observed changes to the cortical surfaces of the long bones.

Of the twenty three adults from ToAt-1 eight (34.7%) have evidence of inflammatory bone reaction, and one (4.3%) has anaemic type changes of the cranium. Of the forty three adults from ToAt-2 fifteen (34.8%) exhibit evidence of inflammatory bone changes, while three (6.9%) adults have anaemic changes of the cranium. A differential diagnosis of the pathology recorded is considered. A higher subadult representation at ToAt-1 was noted. Subadults contribute fifty percent (n=23) of the population at ToAt-1, with 34 percent of these under one year of age. However, at ToAt-2 the subadult sample contributes to only 23 percent (n=13) of the mortuary population, with 15 percent of these under one year of age. Furthermore, most subadults at both sites are under four years of age.

This disparity in subadult representation might suggest differential usage of each mound with more intensive use of ToAt-1. Alternatively, there was a greater threat to the survival of subadults amongst the population using ToAt-1. To my knowledge pathological changes of subadult material from these sites has not been previously recorded.

The present study identified changes to the cortical morphology in a number of the subadult individuals. This was observed both macroscopically and radiographically. There were also a number of subadults

with anaemic changes to the crania. Of the twenty three subadults at ToAt-1, eight (34.7%) exhibit changes to the cortices of the long bones. At ToAt-1, one (12.5% of pathological subadults) infant has concomitant anaemic changes of the crania. At ToAt-2 seven of the thirteen subadults (53%) were found to have changes to the cortices of the long bones or anaemic changes of the crania. There is a higher prevalence of solely anaemic changes among subadults at ToAt-2 (n=4, 57% of pathological subadults). Furthermore, it was found that subadult pathology at ToAt-1 was restricted to the earliest and most recent phases of mound usage, with the intervening phases free of subadult pathology. However, at ToAt-2 subadult pathology was restricted to the most recent phases of mound usage.

A differential diagnosis of the possible causes of the observed cortical changes are considered. The causes may include non-specific infection, nutritional deficiency, trauma induced periostitis. A manifestation of normal subadult bone growth, although poorly described in the literature, should not be ruled out. The possible underlying environmental causes for the physiological changes observed in the subadults may include periods of famine, contaminated weaning foods and infectious diseases such as yaws.

16. SA HUYNH KALANAY REVISITED: GEOGRAPHICAL ZONATION IN AUSTRONESIAN EARLY METAL PHASE POTTERY

David Bulbeck

In 1997 Ambika Flavel, writing her Honours subthesis under my supervision, detailed the late prehistoric decorated pottery from South Sulawesi, Indonesia, and statistically compared it with other Southeast Asian pottery assemblages assigned to Solheim's Sa Huynh Kalanay tradition. Her study would seem to be the first attempt to explore the basis underlying the renowned variability both within and between Sa Huynh Kalanay assemblages. Limiting her study to the 51 decorative elements that have been recorded in at least one South Sulawesi assemblage, she employed both the Jaccard and Simple Matching coefficients to estimate the similarity between decorative repertoires. Flavel found that geographically related assemblages tended to be slightly more similar, as did assemblages from the same time band, or those deposited in the same archaeological context (mortuary, habitation). However, combining these factors did not increase the similarity between assemblages any more than allowing the factors to operate separately, especially with the mortuary pottery. The study concluded

that the communities using Sa Huynh Kalanay pottery shared a body of common iconography, owing to a similar cultural background and increasingly quickening maritime trade relations; however, being mostly small and autonomous, every community intentionally selected its own range of motifs to accompany its ancestors so as to reaffirm its sociopolitical independence.

My follow-up study adopts Flavel's methodology and range of elements. The differences are the inclusion of three important assemblages which Flavel did not use, and the use of the Sa Huynh and Kalanay decorative repertoires (as compiled by Solheim) rather than employing only the illustrated pottery directly from these "type sites". Two stable clusters emerged. One consisted of assemblages from South Sulawesi and Bali, slightly more similar to the Sa Huynh than to the Kalanay idealised repertoire. The other consisted of assemblages from north Borneo and the Philippines, slightly more similar to the Kalanay idealised repertoire. Three assemblages (Batu Ejaya, Buni and Leang Buidane) consistently stood out as anomalous. While not denying Flavel's insight into the sociopolitical basis for the decorative variability among late prehistoric Austronesian pottery assemblages in Southeast Asia, the study suggests that the stable clusters may correspond to two spheres of concentrated interaction in the archipelago, one extending from north Borneo to the central Philippines, and the other from South Sulawesi to Bali.

Flavel, A. 1997 *Sa-Huynh Kalanay? Analysis of the Prehistoric Decorated Earthenware of South Sulawesi in an Island Southeast Asian Context*. Honours dissertation, University of Western Australia. Perth.

23. REDUCED DENTAL WEAR, DENTAL REDUCTION AND CRANIOFACIAL GRACILIZATION IN THE MALAY PENINSULA NEOLITHIC

David Bulbeck

When an indigenous hunting and gathering population adopts agriculture, and the use of pottery for cooking, the resulting "early Neolithic" interval should be visible osteologically from the drastically reduced wear on the teeth. The main model to explain worldwide Holocene craniofacial evolution proposes that the reduced dental wear (associated with a Neolithic lifestyle) selects for smaller teeth and jaws, which in turn select for reduced masticatory musculature and cranial superstructures, and a broader cranial vault. As natural selection takes time to affect morphology, it can be predicted that early Neolithic populations will retain large, little worn teeth, large jaws and a robust craniofacial morphology. The

effects of natural selection against unnecessarily massive teeth may be detectable early on, but craniofacial gracilization should be observable only amongst later Neolithic descendants.

These expectations are confirmed at Gua Cha, Kelantan, Malaysia. The rates of occlusal attrition experienced by the people buried in the Neolithic cemetery are markedly less than those experienced by the Hoabinhians buried in the early to middle Holocene habitation deposits. The Neolithic teeth are somewhat smaller than the Hoabinhian teeth, but only in the breadths of the upper teeth and the lower molars. The Neolithic craniofacial morphology differs insignificantly from the Hoabinhian condition.

A similar development is apparent among the individuals buried in the middle Holocene shell middens at Guar Kepah, Province Wellesley. Light dental attrition loads, and high frequencies of betel-nut (more precisely, gambier) staining, identify the burial population as Neolithic. The teeth are larger than the Gua Cha Neolithic teeth, but extremely similar in shape, indicating that the differences in size can be attributed to larger body size at Guar Kepah. The renowned archaic morphology of the Guar Kepah crania and jaws can be attributed to the population's hunter-gatherer ancestry.

Dental data are not yet available for the Senoi but, when their available craniological data are compared with those of the Gua Cha Neolithic population, the craniofacial gracilization is obvious. This accords with the theoretical expectation that this trend should be observable only after several millennia of farming. Similarly, when the Pulau Kelumpang (Kuala Selinsing) Early Metal Phase burials are compared with Guar Kepah, the teeth are clearly smaller, and the crania are broader (mesocranic) and more gracile. To be sure, it seems extremely unlikely on theoretical grounds that there has been no movement of immigrants into the Perak/Province Wellesley coastal region until the Late Metal Phase, or into the Perak/Kelantan/Pahang hinterland inhabited ethnographically by the Senoi. However, the available evidence on craniomorphological change can be explained in terms of local evolution alone.

The Semang remain a puzzle because, anthropometrically and craniologically, they closely resemble the Senoi, but they differ strongly in their somatotype, and there is no overriding reason to suspect their ancestors ever followed a Neolithic lifestyle. The paucity of human fossil material from the area where Semang anthropometric and cranial data have been collected prevents any current resolution to this quandary.

4. RETHINKING THE ORIGINS AND SPREAD OF AGRICULTURE AND ANIMAL DOMESTICATION IN NEW GUINEA

Susan Bulmer

An independent centre of agricultural development in the Highlands of New Guinea was first discovered in the 1970s, and since then a great deal of research has focused on the archaeology, the environmental context, and the ethnobotany of Highland agriculture. The key site to the history of early Highland agriculture, beginning by 9000 bp, is the Kuk swamp site in the Wahgi valley. This site contains a series of soil layers, with ditching and agricultural and environmental evidence, and was used periodically until modern times. Although it did not contain direct evidence of the crops cultivated, ethnobotanical studies suggest that the earliest crops may have been the New Guinea cultigens sugar cane, canarium nuts, taro, and *Australimusa* bananas. Other possible early montane cultigens are fruit and nut bearing pandanus and green vegetables.

This paper reviews the Highlands evidence in the context of a recent very interesting model of the origins of agriculture in Eurasia proposed by Peter Bellwood, who argues that there were three centres of origin, Southwest Asia, Central China and the New Guinea Highlands. Based on Southwest Asia, he proposed a series of distinctive characteristics of the earliest development of plant and animal domestication, and suggests that China is closely similar to Southwest Asia, whereas New Guinea appears to have "travelled a very different trajectory". The distinctive characteristics are: massive environmental change, including an amelioration to warmer, more seasonal climate; complex hunting and foraging as the immediate cultural and technological background; the presence of appropriate plants and animals; the "edge of the range factor", that is, a situation on the perimeter of the newly expanded resources of plants; and very rapid social and economic change, including rapid population expansion, and colonisation of adjacent areas, changes reflected in the establishment and expansion of major language families.

Although Bellwood suggested that there were significant differences in these parameters between New Guinea and China, it is argued here that the developmental processes were fundamentally similar, and differences were in cultural and environmental content. Differences include a basis of fruit and tuber crops, rather than cereals, domestication of two introduced animals, the pig and the dog, rather than local animals, and the situation in intermontane valleys, rather than on

lowland rivers or the coast. It is argued here that the latter reflects a similar "edge of the range" context, due to the vertical zonation of climate in New Guinea, with tropical lowlands giving way in the mountains to temperate climate. Certainly the Highlands experienced a similar massive environmental change at the end of the Pleistocene, and antecedent to the development of agriculture there was complex hunting and foraging in the mid- and upper-mountain forests. Of interest also is linguistic and biological evidence of an "explosive" expansion of population in the Highlands, rather than a relatively contained development suggested by Bellwood. The expansion of Papuan languages as far east as the Southeast Solomons and west into the eastern islands of southeast Asia, with a large number of language families, apparently without hierarchical relationships, and the phenomenon known as the "Trans New Guinea Phylum" may reflect major expansion. Supporting evidence is also found in human genetics, which suggests rapid expansion throughout New Guinea from a small founder population.

19. SHELL MOUNDS AND STONE AXES: PREHISTORIC RESOURCE MANAGEMENT AT HOPE INLET, NORTHERN AUSTRALIA.

Patricia Burns

Recent investigations at Hope Inlet, near Darwin, Australia, have revealed this small section of the coast to be rich in large mounded middens, comparable in both type and distribution within the landscape to the *Anadara* mound sites described elsewhere in northern Australia and other parts of the Indo-Pacific. Stone artefact scatters, containing large heavy stone artefacts such as edge ground axes, pestles and portable mortars are found in association with these mounds. Ethnographic data on the nature and distribution of prehistoric sites and on the utilisation of this type of stone artefact, suggests that these sites are the remains of relatively sedentary settlements, perhaps involving large seasonal ceremonial gatherings. The evidence for concentrated exploitation of the mollusc *Anadara granosa* during the late Holocene indicates significant differences in the past local environment with that of the present. This paper examines the variability in site type, which, it is argued, reflects diversity in the range of strategies employed in the management of prehistoric resources and the changing Holocene landscape.

6. A HYPOTHESIS ABOUT THE DEVELOPMENT OF THE EARLIEST NEOLITHIC CULTURES IN SOUTH CHINA

Cao Bingwu

In China, the beginning of Neolithic cultures is roughly coincident with the beginning of the Holocene. This transitional period was a critical change for both the evolution of human culture and the natural environment. According to general opinion, there are deep interrelationships between the two changes, and this is also the case for the emergence of the Neolithic in south China. Moreover, accumulating evidence concerning the domestication and cultivation of rice, and the development of ceramic technology, suggests that Neolithic developments in south China were more precocious than those in the north.

I believe the north-south differences in the pace of cultural evolution have some relationship with the environmental evolutionary factors. At the end of the Pleistocene, the climate was becoming warmer, and the glaciers retreated. During this process, north China was more sensitive to these changes than was the south, and the changes in the north were also more severe than were those in the south. A substantial amount of pollen-spore data show that warm-latitude plants began to spread northward, and to higher elevations, at this time. Although we have very few data on early Holocene precipitation patterns, as a rule the south has always enjoyed more precipitation than the north.

Human cultures were adapting to these environmental changes in both the north and south, but because conditions differed in terms of the intensity of environmental change, their patterns of adaptation diverged. Both developed increasingly sophisticated technologies, and began to exploit a wider range of floral and faunal species. But we find that the south began cultivating rice as the staple food source and using pottery earlier and more widely than in the north. The apparent result was that human populations in the south developed a settled way of life earlier than in the north. On the other hand, we find that there is a large gap in the archaeological record in north during the time span 10000-8500 BP, and we suggest two possibilities to account for this:

- 1) environmental changes during the transition from the Pleistocene to Holocene destroyed most traces of human activity, or
- 2) environmental instability during this interval made it very difficult for humankind to live in the north.

The data from the Mianchi-Bancun site of Henan Province and the Xushui-Nanzhuangtou site in Hebei

Province are of very particular relevance to this hypothesis. In the Mianchi-Bancun site, there is a mixed layer underlying the Peiligang stratum. This layer exhibits the same soil matrix as the Peiligang layer, and also includes some ashy deposits with stone fragments apparently resulting from human activity. However, no undisturbed traces of typical features such as pits, hearths, houses, etc. were encountered. This pattern suggests pre-Peiligang activities at the site, but that most traces of this occupation were destroyed by flooding.

The Xushui-Nanzhuangtou site includes the earliest known pottery in North China (C14 dated to 10,800 BP) and exhibits a more intensively deposited cultural layer, but it also has no traces of features. Significantly, the cultural layer at Nanzhuangtou was under a lake bottom deposit formed in the early Holocene. Such evidence leads us to believe that there was heavy precipitation and widespread flooding in North China during the interval 10000-8500 BP, resulting in severe damage to archaeological deposits.

These data lead us to the following hypothesis. At the beginning of the post-Pleistocene era, southern China afforded human groups with a more accommodating natural environment, cultural developments flourished, and the remains became preserved in comparatively undamaged archaeological deposits. Yet over the long run, the comparatively placid environmental conditions of the south served to restrict cultural evolution and creativity. Once the inhabitants of north China began to settle in the river valleys and the North China Plain, they developed larger and more advanced societies and cultures, and took the lead role in the formation of Chinese civilisation.

1. DIRING YURIAKH: AN EARLY PALEOLITHIC SITE ON THE LENA RIVER, EASTERN SIBERIA

Roy Carlson

Three aspects of the Diring Yuriakh (Diring gorge) site situated at 61° 12' N and 128° 28' W has been controversial since it was first reported by its excavator, Yuri Mochanov: (1) its date; (2) its significance in human evolution; and (3) the acceptability of the lithics as artifacts rather than geofacts. My purpose in presenting this paper is to focus on the third controversy, the artifactual nature of the assemblage, although I will summarise the other controversies. Robert Ackerman, Maureen Carlson, and I spent 4 days at the site in August 1990 and additional day examining the artifacts. (Ackerman and Carlson 1991).

The first dates obtained were paleomagnetic age estimates by A.V. Pen'kov who placed the site preferably between 4.2 and 3.9 million years old, but possibly between 1.9 and 1.7 million years. O.A. Kulikov of Moscow State University, then obtained TL dates from the sandy loam overlying the cultural deposit of 1.1 to 2.9 plus or minus 0.95 million years ago. Waters *et al.* (1997) discount the paleomagnetism dates because the site was subjected to cyroturbation and solifluction processes which would render the paleomagnetic reversal stratigraphy inaccurate. They give a conservative estimate of >260,000 years based on TL dating. Huntley and Richards (1997) have been attempting to use TL and optical dating on samples from the site, and wonder if the >260,000 date cited above is far too young. O.V. Grinenko of the Yakut Institute of Geological Sciences who hosted a geological congress at the site before the TL dating was undertaken indicated that none of the visiting geologists would accept a date earlier than 500,000 years. The only thing clear so far is that the site is old in geological terms, but no one knows how old. Mochanov accepts the 3.2 to 1.8 million year estimates as the probable age and on this basis plus the early Palaeolithic typology of the assemblage revives Mortiz Wanger's (1813-1887) hypothesis of northern hemisphere ape to human evolution as a response to the cold of advancing glaciers.

As of 1992 Mochanov had excavated some 4,033 artifacts, mostly made of quartzite, including 500 tools. Choppers of various forms are the most common types. Flake tools are rare to absent, although many of the flakes could have been used without further modification. Sand-blasting of many of the artifacts precludes attempts at use-wear studies. Not only do the artifacts exhibit shapes and worked edges consistent with their classification as unifacial pebble choppers, core scrapers, and scraper-planes, having flake scars consistent with human percussion flaking techniques, they frequently occur around a large anvil stone and many of the flakes can be refitted to cores and core fragments. Impact scars on some cobbles from unsuccessful attempts at fracturing are also present. In addition to their forms and flaking attributes which indicate they are artifacts, the depositional environment - a sandy terrace - is such that no natural agency could possibly have fractured these stones and concentrated them in these groupings. We also visited Ust Buotoma, one of 13 other sites situated on this terrace, and observed the same configuration of anvil stone and artifacts there. The scepticism evinced by some archaeologists who have never been to the site and reported in *Archaeology Magazine*

(1997) and elsewhere is completely unjustified. The fractured lithics from the cultural layer, Layer 5, are unquestionably artifacts.

19. ARCHITECTURE IN EAST POLYNESIAN PREHISTORY

Mike T. Carson

Traditional architecture in East Polynesia is known not only for its expansive and monumental scale but also for its widespread unity in basic form and traditional use. The structural remains in each archipelago express variations on a set of shared or ancestral themes. Ideas of an Ancestral East Polynesian architectural complex are examined critically, and a framework is proposed to classify these architectural remains in terms of labour investment in production and landscape modification. The classification system is applied to data collected specifically for this purpose during field work in the Marquesas and Hawaiian Islands over the past two years, and further potential is explored for analysis of archival data from other regions.

The proposed method allows predictive modelling of some aspects of past site-use and land-use. Also, architectural production and landscape modification can be understood in a larger context of social, political, and economic change. Finally, this work shows the potential for comparative analysis at a scale previously unknown.

7. THE PREHISTORIC SEA NOMADS OF THE SOUTHEAST COAST OF CHINA

Chen Chungyu

Ancient Chinese activities at sea can be traced back to more than 6000 BC. The Hemudu culture has tools obviously related to water traffic. Because of this culture's proximity to the sea, we may infer that its peoples were nearby to water-based movements. From Hangchow Bay to Tonkin Bay, the southeast and southern seacoast of China, there are many outer islands upon which exist prehistoric sites dating six to eight thousand years ago. Because of the relatively long duration of time which they spent in proximity to the sea, people became what may be aptly termed "sea nomads," a highly mobile floating culture. Early on, they took advantage of the local environment of these small isles, gathering shells and fish, as well as hunting small animals.

Because of their mobility, these "sea nomads" also acted as transmitters from culture to culture. The unique

attributes of individual cultures, due to their contacts spread over a broad range, produced new influences in each of the different cultures. For example, the jade technique of Hemudu culture possibly influenced the Peinan culture of Taiwan. Several unique aspects of the Tapengkeng culture of Taiwan emerged along the mainland coast in Guangdong and Fujian. Lungshanoid cultures influenced the black pottery cultures of south-west and central Taiwan.

The author, recently in Chinmen (Quemoy) Island, Fujian Province, has discovered the site of Chinguishan, which dates back to about 5600 BC. The site is located on a slope at the mouth of a river at a small bay by the sea. The important articles include clam and oyster shells; stone axes; cutting and pounding implements; pointed tools; and knives; as well as a deer antler, among other artefacts. The make-up of this culture bears similarities to the contemporary Fukuotun culture on the same island. Both of these peoples took the hunting of sea life as the basis of their substance, neither displays any agricultural tendencies. These are, perhaps, coastal sites of the above-mentioned "sea nomads". There are many more examples of such sites in China.

6. ON THE EARLIEST EVIDENCE OF RICE CULTIVATION IN CHINA

Chen Xingcan

Since a large amount of cultivated rice remains were discovered at the Hemudu site in the lower Yangzi River valley in the 1970s, China has been considered one of the most important areas for the origins of rice cultivation. A number of sites containing ancient rice have also been found since the 1980s. While most of them are dated between 7,000 and 4,000 B.P., some of them are dated to as early as 8,000 to 10,000 B.P., and have been regarded as the earliest evidence of rice cultivation in the world. In this paper, I will present and interpret archaeological data on early rice remains in China.

Three of the most interesting sites containing evidence of early rice were discovered in the middle Yangzi River region. These are Xianrendong, Diaotonghuan in Jiangxi Province and Yuchanyan in Hunan Province. The Xianrendong site has been excavated four times since 1962, and the last two excavations were conducted by a Sino-American team. Three horizons containing cultural remains of late Pleistocene and early Holocene were found. While Horizon II is considered to be the upper cultural layer, Horizons III and IV are regarded as the lower cultural deposits. Many differences existed between the upper and lower cultural

deposits. Both chipped and polished stone tools and fragments of archaic ceramics were found in the upper cultural deposits, but only chipped stone tools were excavated in the lower ones. Pollen analysis shows that the density of grains are larger and are similar to those of the rice, while phytolith studies show that there are some fan-like grains similar to that of the rice which existed in the upper cultural deposits. This provides new clues for the exploration of the origin of rice cultivation.

Diaotonghuan is a rockshelter site only 800 metres away from the Xianrendong site. It also consists of two cultural-chronological components. The upper chronological component contains rice-like phytoliths which demonstrate the possibility of evidence of the earliest rice cultivation. The upper culture of Xianrendong and Diaotonghuan are dated between 9,000 and 14,000B.P.

The Yuchayan cave site was excavated twice in 1993 and 1995 and a large amount of material related to early Neolithic culture was discovered. Besides stone cores, flakes, choppers, knives and hoe-like tools, ceramic fragments and a lot of faunal remains including various fish, birds, deer and other animal bones were found. Among the floral remains, rice husks and rice phytoliths were the most important materials. Both wild and incipient cultivated rice were distinguished from the remains. The latter showed clear traces of evolution from wild to cultivated. The Diaotonghuan site is considered to be as early as 10,000B.P. and thus remains the earliest cultivated rice not only in China but the world.

Rice cultivation has had a long development in the Yangzi River valley and the people of the Pengtoushan and Zaoshi lower cultures of the middle reaches all depended on rice agriculture. People of the Yellow River valley began millet cultivation at least 8,000 years ago and the Yellow River valley has been known as one of the places of the origin of millet farming. However, recent discoveries show rice cultivation had already been practised by people of the Yellow River valley 8,000 years ago.

Located on the terrace of the upper Huaihe River reaches of latitude 33°36' N, the Jiahu site witnessed both millet and rice agriculture in this region. There is no consensus on whether the rice cultivation originated here or from the middle Yangzi River valley; however, the rice remains do give us a different picture of the type of subsistence of the area north of the Yangzi River which traditionally was known as an area of the dry millet farming. While it is too early to say that there is only one region from which rice cultivation developed, the middle Yangzi River valley remains as an area with the earliest evidence of rice cultivation, and it seems that

the Yangzi River valley is one of the most important areas of early rice cultivation.

8. HUNTER-GATHERER'S AND FARMER'S DIET IN PREHISTORIC JAPAN - FROM ISOTOPIC ANALYSIS

Brian Chisholm,

Stable isotopic analysis of carbon and nitrogen is now a common technique for the reconstruction of food webs. While there are some methodological problems that must be considered, use of isotopic data has enabled determination of the relative proportions of marine versus terrestrial protein, or of protein from plant species such as millets or maize, in prehistoric human diet.

To successfully apply isotopic data we need the values for the food alternatives, the value of any increment between the foods and the measured tissue from the consumer, and the value for the preserved tissue from the consumer, in this case bone collagen.

Terrestrial diet species from Japan give values similar to those from other areas on the Pacific Rim, while Japanese marine species exhibit a wider range of values. The variation in marine species makes it difficult to arrive at precise proportion estimates for Japanese diets. This may invalidate some of the computer models of Japanese prehistoric diets. The situation is exacerbated when overall uncertainty values are calculated and incorporated in the proportion analyses.

Evidence from Japan shows that people in the Jomon period likely had somewhat limited menus, that varied from one locality to another, depending on locally available resources. In some cases people who live in coastal sites appear to have relied more heavily on inland resources than was previously presumed. It appears that these Jomon people did not practice seasonal transhumance extensively, and probably did not trade food in large quantities. Differing isotope ratios for males and females in some sites indicate possible differences in subsistence role.

Yayoi Period evidence suggest that the menus of different groups of people may have been larger than earlier, but that they were more similar, probably due to the increasing reliance of major staples in the diet, such as rice. Samples from more recent time periods gave similar results to those of the Yayoi Period. While available samples did not adequately cover the period of transition to rice agriculture, they do indicate that appropriate samples and careful use of this type of analysis could reveal the pattern of change between hunter-gatherer subsistence modes and rice agriculture in Japan.

16. INFLECTION AND REFLECTION: CERAMIC CHANGE IN THE FIJIAN SEQUENCE 2800-1200 BP

Geoffrey Clark

After 50 years of research the ceramic sequence of Fiji is one of the better studied in the Pacific. Although substantial research gaps exist there is now reasonable archaeological data for a number of large and small islands. The sequence appears to display temporal points where rapid change takes place followed by periods of relative stability. Results from recent excavations are presented which further refine aspects of the Fijian sequence.

Excavations carried out between 1996-97 on Viti Levu and in the Lau Group allow issues relating to the nature and chronology of ceramic change to be better understood during the first 2000 years of Fiji's prehistory. The interpretation of episodic or punctuated change compared to slower gradients of ceramic variation has become a significant issue in Fijian prehistory. Debate is polarised between researchers who view ceramic change as due to external forces and those who see the dominance of internal processes. These view points are reviewed within the context of the sequence and an archipelago-wide model which posits a greater degree of regional homogeneity is developed. The model based on ceramic decoration and vessel form is compared to a contrasting model developed from the sourcing of archaeological materials (obsidian, ceramic temper, basalt). Comparison of the models points to the difficulties in understanding the prehistory of Fiji using conventional approaches.

21. THE SPAFA INTEGRATED CULTURAL RESOURCE MANAGEMENT GUIDELINES FOR SOUTHEAST ASIA: STATUS AND SOME RECOMMENDATIONS FOR ACCELERATED IMPLEMENTATION

Douglas C. Comer

At the request of Pisit Charoenwongsa, the Senior Specialist in Archaeology for the Southeast Asian Ministers of Education Organisation (SEAMEO) Project for Archaeology and the Fine Arts (SPAFA), which is the SEAMEO centre for cultural resource management, the author prepared cultural resource management guidelines for use by the nine member SPAFA countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand, and Vietnam). These guidelines were drafted in 1993-1994, as the principal

product of a Fulbright Senior Professional Fellowship. They were first reviewed over three days at a cultural resource management seminar attended by 60 Thai archaeologists, museologists, tourism personnel, and government officials involved with cultural resource management in March of 1994.

Following modifications as recommended there, presentations about the guidelines were made in Malaysia and Singapore, and Cambodian officials were briefed about the guidelines. They were then distributed for review by all members countries in April of 1994. In May of 1995, SPAFA convened a week long workshop hosted by the Southeast Asian Studies Department of the National University of Singapore at which delegates from each of the nine countries presented review comments and recommended modifications for the guidelines. The guidelines were approved for common use by SPAFA countries at that meeting, and entitled *The SPAFA Integrated Cultural Resource Management Guidelines for Southeast Asia, Volume I: Material Culture*.

This paper will provide an overview of the contents of the guidelines and present some of the most urgent concerns about cultural resource management as they emerged from the 1994 and 1995 review meetings. It will also discuss some of the recommendations for the use and implementation of the guidelines that were put forth at those meetings. Some of these recommendations may be implemented by instituting monitoring programs for cultural resources as they have been designed in other parts of the world. The availability of both remote sensing data and geographical information systems (GIS) that can be operated on what are now standard desktop computers enhances the feasibility of putting cultural resource monitoring programs in place for Southeast Asia and individual countries there.

21. POLITICS, PUBLICITY AND PROFITS: ARCHAEOLOGY AND TOURISM

Elizabeth Anderson Comer

Tourism, and to a surprising degree business development, depends upon establishing a clear sense of place. In this paper, I will explore the many ways that archaeology can benefit development projects while accomplishing the research goals of the archaeological community. Public education opportunities linked with the heritage tourism infrastructure can enhance community pride and boost the local economy. Archaeology can contribute a unique sense of place, as well as pride of a shared history, for a community. Enhanced interpreta-

tion of historic and prehistoric sites, provided by archaeological research, can increase awareness of the past for the visiting public. The media can be used as a tool for increased funding and support of archaeology. This paper will present a how-to approach to dealing successfully with the politics, the publicity and the tourism industry while excavating the past. This approach can ultimately result in increased support for archaeology from all sectors.

11. PRELIMINARY ARCHAEOLOGICAL INVESTIGATIONS IN EASTERN KHAMMOUAN AND SAVANNAKHET PROVINCES, LAO PEOPLE'S DEMOCRATIC REPUBLIC

Bert Davis

Southeast Asia, once seen as a *cul-de-sac* in the greater scheme of Asian prehistory and history, has enjoyed considerable archaeological successes over the past several decades. However, although it may be intellectually recognised that the territory now called Laos was part of this larger milieu, relatively little attention has been given to the systematic archaeological investigation of Lao history or prehistory. Recent findings in a portion of eastern Khammouan and Savannakhet Provinces drained by Nam Kok and the Xe Banghiang suggest some promise to correct this state of affairs. *Ad-hoc* canvassing of numerous villages conducted adjunct to unrelated activities have started to generate a distribution of material culture that seem at least potentially related, and very possibly antecedent, to terraced agricultural systems generally considered atypical for mainland Southeast Asia, i.e., stone-faced terraces, stream and spring diversion utilising rock-lined channels, all very reminiscent of Pacific Island irrigation systems. One of these terraced systems has been radiometrically dated to AD 1470-1640.

3. USE WEAR IN THE TOALEAN OF SOUTH SULAWESI

Adrian Di Lello

This paper concerns the recognition of subsistence activities conducted by the mid to late Holocene occupants at the Toalean rockshelter of Leang Burung I in South Sulawesi, Indonesia. This is achieved through the use wear analysis of glossed flakes taken from the stone assemblage which was excavated as part of the Australian - Indonesian Archaeological Expedition to Sulawesi in 1969. The information presented in this paper is de-

rived from an honours dissertation submitted to the Centre for Archaeology at the University of Western Australia in 1997.

A high-power approach, as advocated by researchers such as Keeley and Grace, was utilised. Briefly, the high-power approach involves the use of magnifications from 200 x up to 1000x, and more if a Scanning Electron Microscope (SEM) is used. This allows the researcher to identify more types of use wear such as polish and striations as well as edge-rounding and edge flaking which can be observed in vastly greater detail than under a low-power microscope.

The results of the analysis suggested that the processing of soft plant materials at Leang Burung 1 from the mid-Holocene to the late Holocene lasted several thousand years. Analysis of edge and gloss morphology from the mid Holocene artefacts (represented by Trench B) suggested that the plant materials processed outside the rockshelter were somewhat harder than those processed inside the rockshelter some 2000 years later. As people shifted inside the rockshelter, as represented by Trench A, they processed a softer and/or wider variety of siliceous plants. A change in time is also recognised here as the results suggest that the lower spits of Trench A are indicative of the processing of a harder and/or limited range of plant materials. The higher spits, probably deposited at a time when Austronesian farmers were making their presence felt on the Sulawesi landscape, suggested that even softer, more yielding plants were being processed.

The implications of the results lead to the speculation that the late Holocene occupants of Leang Burung 1 were utilising a stone "Toalean finger knife" for reaping, perhaps an antecedent to the metal knives used in South Sulawesi today.

At the completion of the interpretation of the results, it was concluded that the mid Holocene occupants of Leang Burung 1 exploited the local environment in and around the Leangleang valley. Further, and perhaps at a more speculative level, with the arrival of Austronesian farmers at around 3500 years ago, Toalean hunter-gatherers moved inside the shelter. They then perhaps began trading with the newly arrived farmers, either processing a wider variety of siliceous plants such as rattan for trade, and/or participating in farming highly siliceous soft plant materials such as rice utilising the stone Toalean finger knife. This may have also been for exchange or domestic consumption.

22. RECENT OBSERVATIONS OF RICE TEMPER IN POTTERY FROM NIAH AND OTHER SITES IN SARAWAK

Chris Doherty and Paul Beavitt

This paper reports new evidence for the early use of rice in Sarawak, indicated by the presence of rice temper in earthenwares. This work was undertaken as part of a broader investigation into the factors influencing the spread of rice following its early use at Gua Sireh, as demonstrated by Datan and Bellwood, (1991), and Beavitt et al, (1996).

During 1997-98, earthenware sherds from Niah and other sites were examined for evidence of rice temper using low power binocular microscopy. To study as many sherds as possible, a rapid system of processing was followed in which freshly fractured surfaces, or series of surfaces, were screened at magnifications of x10-x20. A limited program of clay sampling was also undertaken for the Niah sites in order to verify that key sherds are in fact local, and to determine whether single or variable clay sources were used. Clay mineralogy was determined by X-ray diffraction (XRD) on bulk samples and orientated size fractions. Bulk chemical analysis was determined by X-ray fluorescence (XRF).

To demonstrate that the carbonised remains and moulds observed in the sherds were definitely from rice husks, a series of briquettes were produced from site (Niah) and laboratory clays which were tempered with modern day rice husks. In addition to demonstrating the appearance of rice husk in pottery, this replication was designed to examine the extent to which overfiring (of certain fabrics) may modify the evidence for their inclusion. Following the examination of 10,315 sherds in 1997, 9 new sites were identified which had rice inclusions in pottery. These sites cover the period from 4000-3000 BP to 400 BP. Evidence for rice was found in 375 sherds (equivalent to a find rate of 36 sherds per 1000 examined), although this is considered to be an absolute minimum.

The composition of the Niah clay samples suggests that it should be possible to demonstrate a local provenance for the sherds from these sites due to unusually high phosphate levels related to within-cave guano deposits. A program of sherd sampling and analysis will be undertaken in 1998.

During this study it became apparent that rice was present in pottery in variable amounts. From the point of view of its effect on the properties of the potting clay, it is possible to distinguish between those pots in which rice husk is present in relatively large amounts (in which

case it could have functioned as temper) and those in which rice husk is present only in minor amounts, (which could indicate that its inclusion was for cultural reasons or was accidental). All of the Niah clay deposits sampled showed similar properties, suggesting that variations in the quantities of incorporated rice husk reflect cultural rather than technological aspects of pottery manufacture. Inspection of further pottery from Niah and other Sarawak sites will be undertaken in 1998 to check for new sites and to look for possible correlations between rice temper usage and surface decoration/form. The progress of this current work will be reported.

18. AN INTRODUCTION TO THE ANCIENT INHABITANTS OF BAN LUM KHAO, NE THAILAND.

K.M.Domett

Ban Lum Khao, a Bronze Age cemetery (c1400 BC) located on the Khorat Plateau in northeast Thailand, was excavated during the dry season of 1995/1996. An investigation was undertaken into the skeletal biology of the 110 human skeletons recovered during the excavation. This paper focuses on the health and disease of the adult population.

The sample consists of 51 subadults and 59 adults with slightly less males than females (1:1.2). Females had a lower life expectancy than males and the mortality rate was particularly high in young adult females (20-34 years) compared to males of the same age. Bone growth, measured as stature, indicates these people reached similar heights as other prehistoric southeast Asians. There is evidence of sexual dimorphism in stature (6.1%), but it was also observed that males exhibited a much wider range of statures than females. Bone mass was measured in the second metacarpal and there was no apparent decrease in bone mass with age in either sex.

Results could not be statistically analysed for their relationship with age because of small sample sizes. On average the females had the lower score but this was not statistically significant. Interruption of growth during childhood is observed in the adult via enamel hypoplasia of the teeth and Harris lines in the tibia. The results are not significantly different between males and females.

Degenerative Joint Disease (DJD) was more frequent in males than females although the age structure of the sample may be influencing this result - older males and younger females being predominant. The pathogenesis of DJD is different in the timing of onset and progress in each sex. The right shoulder and elbow, both hands and feet and the left knee were more often affected in the

males than the females. The severest cases were seen in male feet. Men were also more prone to degeneration of the intervertebral joints especially in the lumbar region.

Trauma, as indicated by fractures, spondylolysis and potentially related infections, occurred more frequently in males than females. All the fractures may have been the result of a fall and there is evidence of good healing in most cases. Spondylolysis, a fatigue fracture of the lumbar vertebrae, is often caused by repetitive stress to that area. The dentition shows only a few statistically significant differences between males and females. The number of teeth with caries was higher in females than in males. On the other hand the males had more excessive attrition of their teeth than females but here the age structure of these subsamples may have been influencing this result - more older males, more younger females.

Other dental pathologies including antemortem tooth loss and periodontal disease were evenly distributed between the sexes. These seemingly random observations do point towards a pattern - one of males and females being affected differently by their environment, although neither is particularly advantaged. It is possible that social factors are involved. There may have been a sexual division of labour with males performing more weight bearing and repetitive activities and being exposed to a higher risk of trauma. There may have been a bias in resource allocation resulting in males and females consuming different diets, hence the differences in dental pathology. A bias within the male group may also have existed resulting in the wide range of statures - some males were better provided for during their growing years than others.

The high mortality rate in young adult women may well be explained by the risk of childbearing. Biological factors, such as phenotype, can also bias people individually in their ability to deal with external influences.

21. CONSERVATION OF TAM TING CAVES: PLANNING AND PROCESSES

Brian Egloff

Conservation work requiring archaeological input was carried out on a Buddhist shrine within limestone caves in the Luang Prabang Province of the Lao PDR. Tourism, processes of natural decay and the collapse of the masonry platforms endangered the 4,000 sculptures housed in the caves and detracted from the religious qualities of the shrine. In order to remedy these problems, a conservation project was initiated where archaeological excavation was interwoven with conservation actions within a flexible planning process. Critical

decisions were made during the course of the conservation process which warrant review and analysis.

19. PERCEPTIONS OF THE PREHISTORIC MANGAIA LANDSCAPE

Julie M. Endicott Taomia

The geographical landscape of Mangaia Island in the Southern Cook Islands is unusual. The centre of the island is a low degraded volcanic cone, at least 17 million years old. It is circled by a limestone bank, an old reef which was elevated with the entire island when Rarotonga began point loading on the Pacific Plate. The published oral traditions from Mangaia indicate that the Mangaiaians had developed a rich ideology encompassing the island landscape that they occupied. Surface archaeological remains indicated that a somewhat more restricted area was actually used and modified by Mangaiaians in their daily lives. This paper will explore both archaeological and ethnographic evidence for the prehistoric Mangaiaians' perceptions and use of the unusual island landscape.

3. THE GEOCHRONOLOGICAL FRAME OF THE CAVE DEPOSITS IN THE SOUTHERN MOUNTAINS KARST, CENTRAL AND EAST JAVA, INDONESIA: FIRST RESULTS

Christophe Falguères, François Sémah, Anne-Marie Sémah, Truman Simanjuntak

Dating the karst of the Southern Mountains of Java is important as recent studies gave evidence of a somewhat old settlement of the caves in the area.

In a first step, our work focused on the sedimentary filling of the Song Terus cave, near Punung, which is divided into a lower and partly fluvial sequence which yielded the oldest lithic industry found in the cave, and an upper karstic filling, interrupted by volcanic ashes.

¹⁴C dating of charcoals and bones and U/Th analysis of bones gave a consistent chronology between 5,000 and more than 100,000 BP, associated with the archaeological layers.

This program is presently extended to the Wonosari area, whose tectonic surrection is likely to be of the same age as in the Punung area, in order to know the age of the constitution of the caves. There we undertook U/Th and ESR analysis of broken stalagmitic floors, representing one of the older phases of karstic erosion.

19. LANDSCAPES OF CHOICE: SETTLEMENT PATTERNS OF THE SIGATOKA VALLEY, FIJI

Julie S. Field

The topography of the Sigatoka Valley of Viti Levu, Fiji, bears mute evidence to a long history of occupation, agricultural production, and competition. Future research into the prehistory of the area will undoubtedly be hinged on determining the sequence of settlement that led to the fortified ring-ditch and hill-fort tradition. Landscape analyses can aid in this research by determining the factors that may have been involved in site selection. Overall, these data can also indicate how and why competition evolved as a subsistence strategy in the Sigatoka Valley.

Technological innovations in the form of terrain analysis software, image enhancing software, and geographic information systems have provided several new avenues for landscape research. By converting terrain data, aerial photographs, and satellite images into a digital format, three-dimensional landscapes can be created that allow for regional and local analyses of multiple variables. Integration via a geographic information system can also provide clues as to why certain locales were selected for habitation, and reveal the variable importance of resource access and defence.

I have employed this method of landscape analysis to the Sigatoka Valley of Viti Levu, Fiji. Following work completed by Parry (1987), I have digitally analysed aerial photographs and satellite images in order to gain a more complete understanding of the occurrence of prehistoric settlements and agricultural features. My results indicate that the prehistoric climate and topography of the interior of Fiji were instrumental in the evolution of competition and warfare in the region. I also advocate that the use of image enhancing software and the construction of digital representations of prehistoric landscapes has immense potential for archaeological research.

13. ON THE ETHNOARCHAEOLOGY OF FORTIFIED SETTLEMENTS IN NORTHERN SOUTHEAST ASIA

Magnus Fiskesjö

In many parts of Southeast Asia and mainland East Asia, as well as in other parts of the world, there are systems of prehistoric and historic fortified sites which have been the focus of discussion related to competition over resources, ethnic conflict, and so forth. What were the

conditions under which such fortifications were constructed and used, what were their functions, and under what circumstances did they fall into disuse? Thus far, relatively few scholars have attempted to bring ethnographic data to bear on these issues. In this paper, I seek to contribute towards the exploration of these archaeological questions through the examination of the structure, use, and larger context of the contemporary fortified settlements of the Wa people of the China-Burma border region.

These formidable structures were created within a historical process of increasingly intense competition over agricultural lands and forest resources, and the defensive structures primarily served to protect villages from enemy revenge attack. They functioned within the context of a religious system centring on sacrifices related to agricultural production, culminating in the development over time of a human sacrifice where enemy victims were procured through ritualised headhunting.

The Wa fortifications cannot be understood outside of this context. But their regional distribution in time and space also raises other issues. In this paper, apart from presenting ethnographic data, I also discuss these distributions, and especially the implications for our general understanding of fortified sites, with particular - but also critical - reference to Jonathan Friedman's powerful model of the transformations of the peripheral societies of the northern Southeast Asian frontier region (*System, Structure and Contradiction in the Evolution of Asiatic Social Formations*, 1979).

The paper has a dual, closely related purpose: to illustrate and discuss the utility of contemporary ethnographic data for the archaeology of fortified sites in general, using the Wa data as an example; and to explore their utility for the historical-archaeological study of northern Southeast Asia, in particular the interactions on its frontier with the Chinese empire to its north, during the last several centuries.

23. GENES, LANGUAGE, AND ETHNIC GROUPS: RECONSTRUCTING ORANG ASLI PREHISTORY.

Alan G. Fix

Darwin's phrase, "descent with modification," identifies the two core historical processes in evolution: characteristics are transmitted from generation to generation but not faithfully. The natural selection of genes is a major "modifier" but the frequency of traits may also change due to mutation, genetic drift, and gene flow. Analogous but not identical processes also characterise the histories of languages and cultures.

Contemporary distributions of traits, then, may reflect the interaction of these two categories of processes. Although labelled "markers", genetic alleles do not necessarily label populations through time. Since multiple causal mechanisms exist for allele frequency distributions as well as linguistic and cultural traits, several hypotheses must always be considered to explain any observed bio-cultural-linguistic pattern.

Recent genetic studies of global human variation have emphasised "descent", constructing tree diagrams purporting to show the history of human populations. These models are based on a branching process of genetic divergence with population splits followed by isolation and gene drift providing the evolutionary dynamic. On the other hand, numerous studies of the population structures of small-scale human groups have found that networks of mobile individuals (foragers) or interlinked village clusters (farmers) are common. These studies would imply that reticulate, anastomosing population histories would provide a better model for human genetic history than would phylogenetic tree diagrams.

Recent reconstructions of the linguistic and cultural prehistory of the Malayan Peninsula along with contemporary surveys of biological variation will be used to explore the differences between a branching evolutionary model of fissioning and population replacement and a mosaic model of long-term population interaction and gene flow.

16. POINTS OF DISCUSSION. OBSIDIAN BLADE PRODUCTION IN THE ADMIRALTY ISLANDS, 2100 BP TO 50 BP

Clayton Fredericksen

This paper looks at change in obsidian blade technology in the Admiralty Islands (Manus Province, Papua New Guinea). The focus of the study is Lou Island, where excavations by W. Ambrose and colleagues have uncovered three blade production sites dating back to 2100 BP. Chronological variation in retouched blade (point) morphology is examined between the three site assemblages, and contrasted with a museum collection of obsidian-tipped spears obtained last century. The origins of retouched blade technology in the Admiralty Islands and possible reasons for its transformation are discussed.

6. THE EXCAVATION AT DING SI SHAN,
GUANGXI ZHUANGZU AUTONOMOUS REGION

Fu Xianguo

Ding Si Shan, a low mound some 60 by 80m in size, rising some 20m above the surrounding rice fields, is a prehistoric midden site located on the first terrace of the right bank of the Ba Chi Jiang River, about 1km north-east of Jiu Wan Po Village, 3km south of Yong Nin County.

The first excavation was undertaken by the Institute of Archaeology, Chinese Academy of Social Sciences, the Archaeological Team of Guang Xi and the Museum of Nan Ning City in 1997. The 500 square metres excavated in 1997 represent only about ten percent of an estimated total of 5000 square metres. This is the largest proportion excavated of any prehistoric site in Guang Xi so far. Cultural deposits at Ding Si Shan averaged about 2 metres in depth with the deepest layer extending to 2.5 metres. It proved extremely rich; the 500 square metres produced 149 burials, 6 storage pits and over 1000 whole or restorable artifacts include pottery vessels, stone tools, bone tools, shell tools as well as a lot of faunal remains. The excavation indicated that the deposit of Ding Si Shan can be grouped into four succeeding cultural periods, which are described below.

The first period is a clayish sediment of red brown colour. It is about 20-30 cm thick. It contains a large number of small flake tools and cores made of glassy aerolite. There are also a few potsherds and doughnut-shaped stone tools. All of the potsherds are coarse cord-marked, coarse-tempered and buff in colour. Some pottery has appliqué decoration below the rim. The potsherds are very soft and friable. This is the first time that cultural remains of this period have been discovered in Guang Xi.

The second period is a very loose deposit with a great number of fresh water shells. It is about 20-50 cm thick. It contains a great number of polished stone tools, shell tools, bone tools and pottery. Some of burials and a lot of faunal remains were also unearthed. The pottery only has a jar form, coarse-tempered, round-bottomed and coarse cord-marked. A basket pattern is new to this period. The colour of the pottery surface ranges from black through grey to red. The pottery is very soft-fired and friable. The temper is coarse quartz sand.

The third period is also a very loose deposit with a great number of fresh water shells. It is about 50-90 cm thick. It contains a great number of polished stone tools, shell tools, bone tools and pottery. Most of the burials with well preserved human skeletons and a lot of faunal

remains were also found in this period. The pottery type consists only of a round-bottomed jar. The colour of the pottery is the same as in the second period. However, the temper is now a medium quartz sand. The majority of vessels are harder than in the second period and not as friable. Most surfaces are decorated with a fine cord pattern. The coarse cord and basket patterns went out of use.

The fourth period is a brown grey clay deposit with no shell. It is about 20-50 cm thick. It contains a great number of polished stone tools, bone tools and pottery. Many of the stone tools are small adzes. Bone tools are more than any one of three periods above. The pottery types include jars with round-bottoms, pots with round-bottoms and high necks, and cups with low ring feet. The colours include grey, red, black and brown. The temper consists of shell and chaff as well as fine sand. Great changes in this period are the appearance of black vessels and fine clay vessels. The wheel was also used for forming during this period. The surface decoration includes fine cord patterns and incised designs.

We sent 8 samples to 14C Laboratory IA, CASS for radiocarbon dating. A recently received shell date for the second period is 10365±113 BP (uncalibrated). Owing to the limestone environment factors, the date from shell may be too old. Nevertheless, we argue that the four phases of occupation at Ding Si Shan should be dated as follows: the fourth (latest) period from 5000-6000 BP; the third period from 6000-7000 BP; the second period from 7000-8000 BP; and the first period before 10,000 BP.

3. OCCURRENCE OF RECENT LITHIC INDUSTRIES WITH ARCHAIC FEATURES IN THE HINDU KUSH (CHITRAL DISTRICT, NORTH PAKISTAN).

Claire Gaillard, Anne Dambricourt-Malassé, Jordi Magraner, Alexandre Maitrebert and Jean-Luc Voisin

The Hindu Kush mountains form a western extension of the Himalayas. The district of Chitral, northern Pakistan, on the southern slopes of the Hindu Kush, is part of the wide geographical and environmental unit which fringes the "roof of the world" and begins the transition into the vast riverine plains which stretch from the Indus to the Brahmaputra.

Two survey missions in the Yarkhun-Chitral valley, during summers 1996 and 1997, in collaboration with Pakistani archaeologists, have led to the discovery of lithic industries with archaic characters in several places, including four rather rich sites. Indeed, these industries include only a few flake products (*débitage*), and mostly

comprise cobbles or blocks roughly trimmed, usually by chipping the edges rather than by flaking them.

This technical tradition, giving a greater significance to trimming than to flaking, recalls the Soanian, well known in the Siwalik range (at least in its northwestern part) during the Lower and Middle Palaeolithic, maybe even after. It also recalls assemblages which are contemporary with the Neolithic but devoid of any ceramic material, like that of the Pamirs (the Markansu culture in Tajikistan), of Kashmir (Jhelum valley) and of Nepal. Further to the east, this prominence of trimming also occurs in the Hoabinhian and Anyathian.

The lithic industries from the Yarkhun-Chitral valley rest on the surface of terraces at 10 to 20 m above the present day river bed. In each site this material occurs in clusters rich enough to remove the possibility of transportation, but there is no bone in association and one has to keep in mind that many light items might have disappeared.

Given this situation in a still active orogenic context, and close to big glaciers, these industries cannot be older than the Holocene. Referring to studies made in the neighbouring valley before the construction of the Karakoram Highway, the 10 m terrace, at the base of which lies a bed of boulders bearing brown patination (desert varnish), may date to the early or middle Holocene and would have a minimum age of 3000 years BP.

These archaic industries dating to the Holocene and found at altitudes between 3000 and 4000 m raise the question of cultural isolation. How do they relate to the Pamir assemblages, also recent and at high altitudes, to those from Kashmir and Nepal, and even those from the Siwalik range which occur at lower altitudes and are probably earlier?

21. HERITAGE MANAGEMENT IN THE FOREST INDUSTRY: ADDRESSING INTERNATIONAL STANDARDS

Terrance H. Gibson and James T. Finnigan

The major forestry companies in the province of Saskatchewan were among the first in Canada to deal with heritage concerns in their forestry management regions. A pilot program beginning in 1992 explored in detail such issues as heritage potential modelling, detailed impact analysis and integrated management planning, and evolved into a diverse suite of heritage management methods tailored to the needs and circumstances of each company. However, the latest work suggests that this diversification in heritage management approaches can be eliminated by addressing fundamental management

principles set forth by the International Standards Organisation using their official ISO 14001 Environmental Management System specifications.

The new management approach stresses the development of a process for addressing heritage concerns that can be adopted relatively easily by any forestry company, anywhere in the world, and is based upon a high degree of self-compliance. Its advantages are that it is understandable by both heritage managers and forest industry personnel, it is highly oriented towards assistance in planning for avoidance of heritage impacts and perhaps most importantly demonstrates a high regard for heritage resources that can be used as a bulwark against national and international criticism of forestry practices. Since the management model stresses heritage management over archaeological field studies, it can be extremely cost-effective, especially for companies which must address diverse forestry operations over large tracts of land.

The management approach uses heritage potential modelling, heritage impact modelling and standard cultural resource management principles in its implementation. Practical examples of its application for road construction, cutblock harvesting and silviculture in various Canadian jurisdictions are illustrated.

15. ENSO AND INLAND SOUTHEAST ASIA: A 1000-YEAR RECORD OF FLOOD AND DROUGHT REGIMES BASED ON PACIFIC RIM PROXIES.

David Godley

The concurrence of El Niño related flood and drought around the Pacific Rim during the current ENSO (El Niño - Southern Oscillation) cycle suggests that long ENSO proxy records can be used to indicate the variability in the strength and intensity of the ENSO cycle through time. Eight 500 year long proxies for ENSO are combined to create a composite ENSO index. This reconstruction suggests that the relative proportion of La Niña events to El Niño events increased considerably between the mid 17th and late 18th to early 19th centuries. Under these conditions the flooding of Southeast Asian Rivers would have been frequent and severe.

Taking advantage of ENSO-related teleconnections to Chinese flood and drought distributions, Chinese historical documents are tentatively explored as a means of expanding this record to cover the past 1000 years. These records suggest that between the 13th and 15th centuries the monsoon rains were regularly poor and, as a consequence, conditions throughout inland Southeast Asia were dry and severe flooding was infrequent.

15. HUMAN-ENVIRONMENTAL INTERACTIONS
OVER THE LAST 2 KA AT SANGKHALOK,
NORTH-CENTRAL THAILAND

David Godley, Paul Bishop and Donald Hein

Sangkhalok (Sisatchanalai) was the vice-regal capital to the Sukhothai Kingdom and then later the heart of a major ceramics export industry. Located on the banks of the Yom River, the site has experienced over five metres of sedimentation since the 8th century AD. A reconstruction of broad flood regimes at the site has been made using the stratigraphic and archaeological records in combination with other local and regional hydrological indicators. All of these sources clearly show considerable variability in the frequency of extreme flood and drought events over the past 1500 years.

The first clear increase in flood frequencies occurred during the 10th and 13th century. This may in part account for the shift in the focus of the city to the higher ground which tradition tells us took place late in the 13th century. This was followed by a prolonged period during which the likelihood of extreme flood events was greatly reduced. Cities such as Sangkhalok which could command a regular supply of water despite these conditions continued to flourish while others, like Sukhothai, which could not, declined. The lack of a reliable source of water may, in part, help explain the rapid decline of the Sukhothai Kingdom. The return of flooding began again early in the 16th century and this culminated in a burst of regular and extreme flooding and sedimentation between the mid 18th and mid 19th centuries. The timing of this final phase of sedimentation closely coincides with the abandonment of the city. It is suggested that the burial of the city was a factor in its demise.

19. A RETROFLECTIVE VIEW OF SETTLEMENT
PATTERN STUDIES IN SAMOA - WHERE ARE WE
NOW?

Roger Green

Since the pioneering settlement pattern work of Davidson and Green in Western Samoa in the 1960's, further studies have been done there in the 1970's by Jennings and his students, and more recently in American Samoa principally by Jeffery Clark, largely on Tutuila. There have also been developments in the studies of Levi-Strauss "house societies" in the Pacific, including Polynesia, and an increasing interest in the built forms of society and its architecture. In addition there has been an emphasis on environmental change (natural and hu-

manly induced) and how it affects the landscape on which people live. Finally the role of fortifications in Samoa, initially little investigated, has been addressed.

These conceptual framework changes and the evidence they employ raise the question of where we are now in this field of endeavour and where we might next take such studies. This is considered in retrospect by one who has participated from the beginning in these developments.

20. WHAT HAS THE COMBINATION OF HISTORICAL
LINGUISTICS AND ARCHAEOLOGY
TAUGHT US IN REMOTE OCEANIA?

Roger Green

Some say one can not profitably combine linguistics and archaeology. But a rapidly growing literature on the topic has developed and one place this has occurred is in Remote Oceania. Examples will be reviewed of evidence for linguistic and archaeological adaptation in the move by Polynesians to New Zealand from tropical East Polynesia, and for dialect chain models and network breaking splits in East and West Polynesian languages. These concepts more realistically model what the archaeological evidence now also implies. Finally, the issue will be examined of how the archaeologically attested rapid movement of a foundational Lapita cultural complex into western Remote Oceania and then into Western Polynesia can be correlated with a late stage Oceanic dialect chain from which the various non-hierarchically ordered subgroups of eastern Oceanic formed, through chain breaking splits in that proto-language. These examples show there is much too to be learned from the combination of these two lines of evidence.

18. THE FOSSIL HOMINID SANGIRAN 38

D. Grimaud-Hervé, T. Jacob and H. Widiyanto.

Sangiran 38 was discovered in the Kabuh layers from Sangiran dome (East Java, Indonesia). Morphological characters observed on the skull and endocast are within the *Homo erectus* range of variation. This fossil hominid is perfectly integrated with others fossil remains from the Kabuh layers of Sangiran and Trinil.

The main differences noted between Trinil 2, Sangiran 2 and 10, on the one hand, and Sangiran 12, 17 and 38 on the other, are related to robustness. Superstructures like the temporal lines, the mastoid and supramastoid crests, the occipital torus or the muscular imprints

in the nuchal region (not accentuated, discrete or scarcely perceptible in the first group) are much more developed in the second group. These differences may be interpreted as evidence of noticeable sexual dimorphism. Thus, Sangiran 12, 17 and 38 could be attributed to male adults.

18. THE FOSSIL HOMINID FROM NGAWI

D. Grimaud-Hervé, S. Sartono, H. Widiyanto and T. Djubiantono

The skull of Ngawi was discovered, not in an archaeological context, in August 1987 on the left bank of the Solo river near Selopuro village (East Java, Indonesia). According to Sartono (1991), it would seem to have originated from fluvial deposits of one of the Pitu terraces, 5 km west of Ngawi. These terraces are estimated to have the same age as the Ngandong terraces. The lack of geological data does not permit us to substantiate this hypothesis further.

The general cranial morphology of Ngawi, and characters such as the receding frontal squama, the form of the supraorbital torus, the postorbital constriction, the sagittal frontal keeling, the position of the maximal cranial breadth, and the angular torus, allow the integration of Ngawi within the *Homo erectus* fossil group.

Its more elevated and shorter skull, as compared to those from Sangiran and Trinil, the more accentuated cranial curvatures, and the smaller postorbital constriction are some of the characters which allow us to associate Ngawi with the Ngandong and Sambungmacan group

21. ARCHAEOLOGICAL RESOURCE MANAGEMENT IN INDONESIA

Gunadi

Before 1992, the laws concerning the Indonesian cultural heritage were still based on the Dutch Monumenten Ordonantie of 1931. But after Law Number 5 was passed in 1992, the Monumenten Ordonantie became invalid.

There are three categories of cultural heritage object according to Law Number 5 of 1992. These are (1) artifacts made by man, movable or immovable, individually or in groups, or parts thereof or remains thereof, which are at least 50 (fifty) years of age, or represent a specific stylistic period of at least 50 (fifty) years of age, and are considered to possess value of importance to history, science and culture; (2) natural objects which are con-

sidered to possess importance for history, science and culture; (3) locations demonstrated or presumed to contain items of cultural property, together with their surroundings.

In my paper I will discuss how to manage archaeological resources in Indonesia, in order to conform with Indonesia's Law Number 5 of 1992.

4. RELATIONSHIPS BETWEEN THE SOI NHU AND HA LONG CULTURES

Ha Huu Nga

The Soi Nhu culture, comprising 30 cave sites distributed in Halong Bay - a World Natural Heritage Area - has been newly discovered by the author. The assemblage of stone tools is mainly made of limestone. The cultural layers contain fresh water shells and land snails. The C14 dates from Soi Nhu cave are $15,560 \pm 180$ and $12,460 \pm 60$ years ago. The features of this culture are different from those of the Hoabinh and Bacson cultures.

The Ha Long culture belongs to the Late Neolithic period, and is distributed in the same area as the Soi Nhu. The sequence from Soi Nhu to Ha Long runs through the Cai Beo culture of the Middle Neolithic period, also distributed in the same area.

Relationships in terms of settlement area, pottery, shell gathering and stone tools can be seen in this region between the Soi Nhu, Cai Beo and Ha Long cultures.

4. NEOLITHIC CULTURES RECENTLY DISCOVERED IN VIETNAM

Ha Van Tan

There are four late Neolithic cultures recently defined in Vietnam, two in the North and two in the Central Part.

The Ha Giang Culture takes its name from the capital town of Ha Giang province. To date, many sites of this culture have been discovered in Cao Bang, Tuyen Quang and Thai Nguyen provinces. Pottery with incised decoration resembles that from the Phung Nguyen Culture. The stone tools comprise axes, adzes and back-cloth beaters. The most characteristic artefact for this culture is the shouldered adze with straight step.

The Mai Pha Culture takes its name from a cave in Lang Son province. Many sites of this culture were found in Lang Son province. The main tools are quadrangular axes and adzes. The stone adze with shoulder is absent. The represented pottery is the vase or bowl with a perforated and incised ring-foot.

The Bien Ho Culture is distributed in Gia Lai province in the Central Highlands. The most common stone tool is the shouldered adze. A number of long adzes with triangular sections (Duff type 3) have also been found. Decoration on pottery is by cord-marking and incision.

The Xom Con Culture is distributed in Thanh Hoa province and on some islands. Stone tools comprise quadrangular-sectioned adzes, grindstones, choppers, hammers and borers. There are almost no shouldered adzes. Shells and bones are used commonly as scrapers, punches, harpoons and ornaments. Pottery was decorated by incision and punctuation. Cord-marked pottery is absent in all sites of this culture. Painted pottery has been found in small quantities.

8. JOMON SUBSISTENCE STRATEGIES AT THE SANNAI MARUYAMA SITE

Junko Habu

The prehistoric Jomon culture in Japan (ca. 10,000-300 BC) is often cited as an example of an early hunter-gatherer culture with sophisticated technology and large settlements. Due to the apparent complexity of the Jomon culture, many Japanese archaeologists have assumed that the Jomon people were fully sedentary, living in permanent villages throughout the year. Recently, however, some archaeologists have questioned this assumption, and have suggested a reevaluation of this conventional interpretation.

The recent discovery of a large prehistoric settlement at the Sannai Maruyama site in Aomori Prefecture (northern Japan) provided us with a unique opportunity to investigate Jomon residential mobility. Salvage excavation of the site in 1992, which preceded the construction of a baseball stadium, revealed an extraordinarily large settlement from the Early to Middle Jomon periods (ca. 3500-2000 BC). The site consists of more than 700 pit-dwellings as well as numerous other features. The number of these dwellings seems unusually large compared to Early or Middle Jomon settlements from other regions.

Because of its large size, many Japanese archaeologists have suggested that the Sannai Maruyama site was occupied throughout the year. However, from the perspective of hunter-gatherer studies in North America, this interpretation is not convincing. This is because ethnographic examples of hunter-gatherers from California and the Northwest Coast of North America indicate that large site size itself does not necessarily imply full-year occupation.

This paper examines currently available data on the subsistence strategies of the Sannai Maruyama inhabitants. These data are compared with similar data from other Jomon sites. On the basis of these comparisons, the significance of the Sannai Maruyama site is assessed within the context of Jomon studies.

6. CHENTOU SHAN: ONE OF THE EARLIEST WALLED CITIES OF ANCIENT CHINA

He Jiejun

The prehistoric remains of Chen Tou Shan are located in a village named Lan Yue, Che Xi, Li County, Hunan Province. Excavation began in 1978. After the most recent seven year programme of excavation since 1991, we have exposed about 4000 square metres of the site. (The remainder of He Jiejun's abstract is awaiting translation and will hopefully be available for circulation during the congress).

4. KHOK PHANOM DI AND THE ORIGINS OF AGRICULTURE

C.F.W. Higham

The research programme of which the excavation of Khok Phanom Di was part involved the testing of a model for the transition to rice cultivation in Central Thailand. Several alternatives were constructed, each describing a local development.

The excavation of this site provided an unusual range of biological and material data, and only now, 13 years after fieldwork ceased, are the various strands of evidence being brought together. Our present view is that Khok Phanom Di (occupied from 2000-1500 BC) had no role to play in the transition to rice cultivation. The initial occupants chose an estuarine location which gave access to mangroves and salt flats, and concentrated on the exploitation of marine resources. The material culture of early KPD is very closely paralleled at the nearby coastal hunter-fisher-gatherer site of Nong Nor, which is dated circa 2450 BC. It is suggested that the settlement involved a group with long ancestral adaptation to the marine habitat.

All data available point to a major change with mortuary phase 4, at which point marine indicators gave way to fresh water species, we find a concentration of stone hoes and shell reaping knives, and the diet incorporated fish and rice. This episode, however, was brief, for by MP5, the marine indicators returned and we find a marked fall in hoes and knives. It is suggested that at

this juncture, when some burials became extremely rich in terms of grave goods, the occupants reverted to hunting and gathering linked with the expansion of local ceramic production and exchange activity.

The presence of rice remains throughout the occupation of KPD poses an intriguing issue. If rice was not locally cultivated for much of the occupation period, then such rice might have been obtained through exchange with newly established agricultural settlements in the hinterland.

10. NOEN U-LOKE AND THE IMPLICATIONS FOR THE ORIGINS OF EARLY STATES

C.F.W. Higham and Rachanie Thosarat

Noen U-Loke is a large settlement site located in the upper Mun catchment in Northeast Thailand. It was first investigated by Metha Wichakana, and the authors have now co-directed two excavation seasons (1997-8). Our excavations to date involve an area of 220 m² and about 1000 m³ of cultural material. They were designed to illuminate the iron age culture of the Mun Valley, and to identify social and economic trends which may have contributed to the transition to early states in this region.

The data obtained have a bearing on the technological skills of the people, their health, demography and social organisation. Fifteen radiocarbon dates indicate that the area excavated is dated between c. 800 BC and AD 400.

The sequence involves inhumation burials of which the earliest was found at a depth of 5 m, and the latest 65 cm below the present surface of the mound. One interment belongs to the late bronze age, all others date to the iron age. In terms of mortuary behaviour and wealth, it is evident that people were buried in demarcated clusters. We can identify seven phases. The earliest iron age grave involved an iron torc and bracelets as grave goods. Other early graves provided bronze and iron spears, pottery vessels containing fish and much bronze jewellery. With time, we find the adoption of rice bed burials in which the dead were placed in a thick layer of white, silicified rice.

By 2000 years ago, we encounter a marked increase in mortuary wealth. Grave goods in such rice bed burials included a proliferation of bronze ornaments, including earrings, bangles, belts, toe rings and finger rings, agate beads and pendants, carnelian beads, gold-plated bronze earcoils, gold beads, silver rings and bangles, glass beads and much pottery. Iron offerings included spades, knives and arrowheads. Towards the end of the sequence, we encounter iron sickles and hoes. In terms of

evidence for conflict, in addition to the spears and arrowheads, we found a tanged arrowhead lodged against the spine of one person.

Technological skills included iron smelting, bronze casting and in all likelihood, glass bead manufacture.

Examination of the alleged moats round this and other sites in the area revealed that the sites are, in fact, surrounded by old river channels. No evidence has been found for water control measures.

The evidence gained from this and other excavations in our programme will contribute to an understanding of the complexity of iron age culture in the Mun Valley.

21. REBUILDING A CULTURAL RESOURCE MANAGEMENT PROGRAM IN CAMBODIA: ORGANIZATION, PROJECTS, AND TRAINING

Hor Lat

Cultural resource management, along with all other components of the governmental infrastructure in Cambodia, has been damaged by decades of warfare and social unrest. The capability to care for and offer to the public the great archaeological sites in the country is now being re-established. This paper will describe the cultural resource management organisations that have recently been put into place in Cambodia, a number of important projects that have been initiated by some of these organisations, and training needs that have been identified.

1. PALEOECOLOGY OF HUMANS IN EAST ASIA: THE MOVIUS LINE RECONSIDERED

Huang Weiwen and Hou Yamei

Human evolution, cultural innovation and migrations all occurred during the Quaternary period, which was characterised by frequent fluctuations of environment. The relationship between humans and their surroundings is complex and cannot be explained simply by a model of "different environments, different functions, different tools".

The "two cultures" theory proposed by the famous American archaeologist H. Movius in the early 1940's has exerted a deep influence on understanding Early Palaeolithic culture in East Asia, and is still accepted by some scholars as well as criticised by others. These criticisms focus mostly on the technology and typology of the stone industries, and an inadequate discussion of the palaeoecology of the Quaternary environment in East Asia.

This paper introduces important achievements in Chinese Quaternary research in the last twenty to thirty years, especially the results from the Qinghai-Tibetan Plateau, the Loess Plateau and the evidence from marine sources. The opinions of Chinese scholars on the formation and characterisation of the environmental frame of the Quaternary in China will also be presented. Finally, suggestions about the early human paleoecology of East Asia will be discussed with reference to several important Palaeolithic sites, and the idea of "Movius' Line" will be evaluated within the context of this new environmental framework.

8. THE OBAMA SITE AND THE LATE PREHISTORIC SETTLEMENT OF THE OKINAWA ISLANDS

Mark Hudson

The Obama site is located on the northeast coast of the island of Tanegashima off southern Kyushu, Japan. The site was excavated in August 1997 as part of a Japanese Ministry of Education funded project on the "Origins of Japanese Peoples and Cultures". Three burials were discovered comprising a male, a female and a child. The burials were simple pit inhumations in sand dunes. Grave No.2 was covered with 9 large stones. No grave goods were found and a few small sherds of pottery were the only artifacts recovered from the site. These sherds date the burials to about the 5-6th centuries AD. The absence of grave goods and of tooth ablation contrasts with well-known late Yayoi/early Kofun sites on Tanegashima such as Hirota and Torinomine.

Analysis of the Obama skeletal remains is on-going but preliminary results relating to skeletal morphology (N. Doi), dental pathology (Hudson and H. Takamiya), and stable isotope analysis (M. Yoneda) will be presented here. Morphologically the Obama adults are quite different from late Yayoi populations on Tanegashima and closer to the Kofun people of the plains of southern Kyushu. The relevance of the Obama remains for models of the late prehistoric colonisation of the Okinawa Islands will be discussed.

14. WOMEN'S PARTICIPATION IN PRODUCTION AND INTERPRETATION OF ARCHAEOLOGICAL KNOWLEDGE IN JAPAN

Fumiko Ikawa-Smith and Junko Habu

As the first stage of inquiry into women's contribution to production and interpretation of archaeological

knowledge in Japan, and its relationship to the image of women in the narrative of Japanese prehistory, two sets of publications were examined for the five decades since the end of World War II: membership lists of the Japanese Archaeological Association, the induction to which signifies professional recognition, and lists of courses and instructors in archaeological programs at universities and colleges. In spite of the fact that those who are engaged in the production of archaeological information in the field in the last few decades are overwhelmingly female, women constituted only 2.09% and 2.77%, respectively, of the 1987 and 1995 membership lists. The number of courses taught by women (as indication of the proportion of women with academic appointments) rose from zero out of 73 courses at 26 universities and colleges in 1954 to 7 (1.15%) of the 609 courses given at 93 institutions in 1985 (later figures will be presented as they become available). These figures contrast sharply with the proportion of women as students in these courses, where they often form the majority.

Descriptions of prehistoric women in some of the popular series on Japanese archaeology, such as Kodai-shi Hakkustu [Excavating Ancient History] (Kodansha, 1974-75) and Kodaishi Fukugen [Reconstructing Ancient History] (Kodansha, 1988-1990), are considered against the background of the under-representation of women among those who plan and execute archaeological investigations, and interpret and disseminate the results to students and the public.

6. NEW EXCAVATIONS AT THE BRONZE AGE SITE OF SHIZHAISHAN, YUNNAN, AND THE IMPLICATIONS FOR THE ARCHAEOLOGY OF THE ANCIENT DIAN KINGDOM

Jiang Zhilong

In May and June of 1996, we undertook new excavations at the famous site of Shizhaishan, Jinning, in Yunnan Province, Southwestern China - a cemetery of the ancient Dian kingdom. This was the fifth excavation at the site since work first began there more than forty years ago, in 1955. The 1996 excavations yielded some very important new results. The National Cultural Relics Bureau noted our findings among the most important discoveries in all of China in recent years, and a number of unearthened items were included in the national exhibit "Outstanding Archaeological Discoveries of Recent Years", in Beijing, Oct-Dec 1997.

In all, we cleared an area of 800 m², and excavated 84 burials. These included two large burials, one of which was intact. A total of more than a thousand ob-

jects were unearthed, including items made of bronze, iron, gold, jade, agate, and ceramics. Several display forms or designs not previously encountered at this important site, including drum-shaped cowry shell containers, bronze containers with tiger-shaped handles, an umbrella-carrying bronze figure 60 cm tall, buffalo heads in bronze, and others. These are of exceptional value for the further scientific and artistic study of the Dian culture as represented at Shizhaishan, Lijiashan and other major sites.

Also at this time, a relatively large number of human remains were recovered. These are also of great interest, as are the burial patterns, which differ from those identified during previous excavations. They included directly superimposed burials, headless burials, and limbless burials. The newly discovered burials date within a period extending from the late Spring and Autumn Period through the Middle Western Han Dynasty, and thus extend the known period of use of this crucial cemetery site back in time several centuries.

This paper provides an overview of these important new findings, and includes a discussion of the implications for our understanding of the Shizhaishan site itself as well as of the Dian kingdom as a whole, within its regional context.

14. GENDER BIAS IN INDIAN ARCHAEOLOGY - AFTER EFFECT OF COLONIALISM

Sugandha Johar

The concepts of archaeology, anthropology, and even history were imported to India by the British administrators to satisfy their need to know and understand the society they had subjugated. Although a number of Western descriptions about various Indian monuments dating from the sixteenth century exist, they could more correctly be termed travelogues rather than archaeological literature. The proper beginnings of Indian archaeology can be attributed to the likes of James Prinsep and James Fergusson, who between them initiated the study of the inscriptions and architecture of these monuments. Administrators like William Bentick, who once mooted the idea of dismantling the Taj Mahal and selling the marble, were thankfully more the oddities than the norm for these administrators. The interest in Indian "antiquities" culminated in the formation of the Archaeological Survey of India with jurisdiction over all antiquities in British dominions. Its mandate included a systematic study and conservation of various monuments besides reading and translating the inscriptions carved on them.

Even though archaeology has been a part of the Indian intellectual landscape for over a hundred years, it has not changed much from its origin - the 19th century incarnation. In a sense it has remained essentially an alien intellectual discipline. The various developments and debates about archaeological theory that have raged in the world for the last three decades have largely left India untouched. Only some institutions like Deccan College at Pune have shown any interest in theory.

The archaeological theory first espoused by feminists, now acknowledged as the most broad-based approach to the treatment of gender in archaeology, found no followers amongst the archaeologists working in South Asia. Rather, it is prominent by its very absence. No paper has been published dealing with any aspect of feminist archaeology in the Indian sub-continent. This is remarkable when one considers that feminism has found a fertile ground, with strong grass roots level organisations, be it in India, Pakistan or Bangladesh.

I will explore the issues of women in Indian Archaeology further by looking at excavation reports as case studies. Using a variety of ethnographic evidence I will show the lacunae in these reports, and how they ignore available evidence. For the historical period I will concentrate on the evidence supplied by inscriptions. Here I will show how the participation of women in Indian societies continues through the years - albeit in scope and areas very different from those laid down in the texts, which have been generally considered to be the repositories of all information about the ancient period.

Going beyond just chronicling the ignored evidence I will investigate the reasons for it. While doing this I will prove how the self-identity of today's Indians, which is born out of writings from the colonial period, is the main cause of this glaring lapse on the part of the archaeologist.

21. ADVANCES AND ISSUES IN ARCHAEOLOGICAL SITE CONSERVATION

Kevin Jones

In the last 5 to 10 years, advances in archaeological site stabilisation and preservation have been in codes or practice, adaptation and use of conservation concepts and processes from other disciplines and publishing. Internationally, we have seen the adoption of the ICOMOS International Charter for Archaeological Heritage Management 1990 (ICAHM) and their draft Cultural Tourism Charter is well advanced. Many best practice or conservation planning guidelines have been developed; e.g., the Avebury environs (National Trust/English

Heritage) schedule of agriculturally damaging practices. Concepts familiar in architectural or museum conservation have been adapted and applied to archaeological sites, including understanding of all the system effects (geological, chemical, biological, visitor pressure) at work at landscape scale on a site. There is better appreciation of the hazards of reconstruction and leaving excavations open for public appreciation and methods to visualise what is underground. Ecologically appropriate (and therefore cost-effective) methods of stabilisation have led to a widespread recognition that, at landscape scale, prehistorically appropriate settings may lend themselves to archaeological site stabilisation, e.g., savannah or savannah-like settings. Finally, we now have better publishing of results of archaeological site stabilisation projects and new publication outlets, e.g., Conservation and Management of Archaeological Sites (a journal from James and James, science publishers) or the U.S. National Park Service Archaeological Assistance Division's technical series.

Issues encompass timing and process of intervention, divergent values of archaeological sites and hence differing management responses, and training. There is currently very little condition reporting; no protocols for survey of condition; poor monitoring. Conceptualisation of need for and timing of interventions needs to be improved. Although one may respect the good intentions of the ICAHM with respect to in situ preservation, on many development projects, the balance is not clear between mitigation by research (excavation) and site stabilisation/conservation. The indigenous nationalist movements of the world have promoted thinking about why we value archaeological sites? There needs to be a balance between values: symbolic (including grievances about, and celebration of, the past); education (including use of research); research; fine art.

Finally, is there a need for a specialisation or career path in archaeological site conservation? Apart from the nascent efforts of the Getty Conservation Institute and the U.S. National Centre for Preservation Technology and Training, why is there so little professional training in this subject area?

5. EARLY FARMING IN RAJASTHAN, WITH SPECIAL REFERENCE TO ARCHAEOBOTANICAL EVIDENCE FROM BALATHAL, DISTRICT UDAIPUR

Mukund Kajale

The paper mainly deals with results of archaeobotanical studies on Chalcolithic and early historic habitational

deposits exposed at the site of Balathal (24°43'N, 73°59'E), under general direction of Prof. V.N. Misra. The systematic excavation and concurrent wet sieving techniques carried out on representative deposits during the last five seasons yielded grains of about forty morphotypes, representing wild and domestic species. This exercise is being undertaken to appreciate spatial and temporal distribution of plant economy and to test the possibility of its socio-economic repercussions.

The earlier pollen analysis of lake sediments had indicated "cereal" type pollen and slash and burn agriculture in eastern parts of western Rajasthan, but the factual archaeological and palaeobotanical evidence from early Holocene contexts had been eluding us. The recent Quaternary palaeoenvironmental explorations by the author and his colleagues have brought to light several temporary encampments (surface sites) on stabilised sand dunes yielding microliths, potsherds and bone pieces together in the vicinity of Bap-Malar lake. In view of the relatively infrequent and less intense natural fires in semi-arid parts of Rajasthan, it appears that sporadic occurrence of charcoal pieces in lake sediments at Bap-Malar in western Rajasthan may reopen possibility of minor human interference by pastoralists/initial plant experimenters during the early-mid Holocene period.

The oldest Chalcolithic deposits (early to mid 3rd millennium BC) of Balathal have yielded evidence for summer as well as winter crops and wild species, thereby indicating seasonal double cropping and mixed cultivation of cereals and pulses along with their weedy components. The economy comprised Panicoid grasses (*Panicum* millet - *Panicum miliare* and *Setaria* sp.), domestic barley (*Hordeum vulgare*) and domestic wheat (*Triticum cf. vulgare*, *Triticum cf. sphaerococcum*, *Triticum cf. dicoccum*), Job's tears (*Coix lachryma jobi*), and Indian jujube (*Zizyphus jujuba*). The middle and later Chalcolithic levels (c. 2500-1800 BC) have additionally yielded intermittent evidence of kodo millet (*Paspalum cf. scrobiculatum*), foxtail millet (*Setaria cf. italica*), *Brassica* sp., *Cucumis* sp., *Ablemoschus* sp., lentil (*Lens esculenta*), common pea (*Pisum arvense*), chick pea (*Cicer arietinum*), and horse gram (*Dolichos biflorus*). The early historic levels (c. 300 BC-AD 200) have provided excellent evidence of grain storage in pots and pits, with relatively pure single species accumulations of domesticants such as rice (*Oryza sativa*), green gram (*Vigna radiata*), black gram (*Vigna mungo*), Indian bean (*Dolichos lablab*) and Indian jujube (*Zizyphus jujuba*). Besides the domestic species, various weeds have come to light from Chalcolithic as well as early historic levels. They include *Abutilon* sp., *Chenopodia-*

ceae type, *Cyperus* sp., *Trianthema*, *Argemone* sp., *Portulaca* and *Medicago* types.

In summary, the present investigation gives us insights into the rich bio-diversity available to early farmers for experimental management, their attempts towards domestication of indigenous cultigens such as panicum and kodo millets, and ability to integrate and assimilate crops of Western Asian and East Asian origins besides exploiting the wild resources. Such processes and products (cultigens) eventually paved the way for subsequent subsistence agricultural systems forming the very basis of tribal lifeways in Rajasthan and north-west India in general.

11. LAO PAKO, LAOS: SIMILARITIES WITH AND DIFFERENCES FROM CONTEMPORARY SITES IN NORTHEAST THAILAND

Anna Källén

I will here present some thoughts about the cultural relations between the Iron Age site Lao Pako in Vientiane province, Laos and contemporary sites in Northeast Thailand. My knowledge about the site Lao Pako is based on the results from an investigation presented in the following abstract by Anna Karlström. This study is part of my ongoing work on a doctoral thesis.

Geographically, Lao Pako is situated on the Vientiane Plain at a bank of the Nâm Ngum river, which is one of the largest tributaries to the Mekong. Considering the connective quality of the river systems in this area in historic times it can be assumed that the rivers have also in prehistoric times played a crucial role for transport and communication. The Mekong river forms the artery of the area with its tributaries having their sources both in the north and in the south, in Laotian and Thai territories respectively.

In the Laotian part of the Mekong basin in the outskirts of the Khorat plateau, no Iron Age sites except Lao Pako have been subjected to archaeological investigation. On the Thai side of the border the situation is quite different. Extensive surveys and excavation projects have revealed hundreds of sites with traces of early metallurgic activities, mostly along the tributaries to the Mekong such as the Songkhram, the Chi and the Mun rivers. At many of these excavated sites the stratigraphic sequence has been unclear and there has been very little reliable dating. It is however clear that these sites are, at least in their earliest phases, considerably earlier than Lao Pako which shows evidence of iron working and has been dated to the mid first millennium AD. Still there are apparent similarities between Lao Pako and

Thai sites like Ban Chiang, Ban Na Di and Ban Chiang Hian.

The pottery is a significant part of the material culture recovered at Lao Pako as well as at the Thai sites. Typologically the shapes of the vessels are similar, except for a few forms that are not represented in the Lao Pako material such as the pedestalled vessels. The rim sections of the Lao Pako vessels are almost identical to the rims of the late Ban Chiang Hian and Ban Na Di pottery. The decoration is similar between the sites with cordmarked ware, incised decoration and appliqué. The appliqué decoration at Lao Pako has however a more sophisticated shape than the appliqué pottery at the other sites. Even though red painted ware occurs at Lao Pako it is not as dominant a feature as for example in the Ban Chiang pottery.

The artefacts called stamp rollers found at Lao Pako correspond in shape and pattern to similar artefacts both at Ban Chiang and Ban Na Di.

The similarities are not restricted to the typology of the material culture, but can also be seen in the structure of the sites. A common feature is that metal working activities have been carried out at or adjacent to an area where pottery was buried. At all sites large amounts of pottery have been buried in clusters, inside and on top of each other. At the Thai sites the pottery is accompanying inhumation burials together with other grave goods. At Lao Pako the vessels have instead been buried in clusters without content in small pits.

It is clear that there are similarities between these sites. But it is equally clear that there is no total correspondence in the material culture between any of them. Further investigations of Iron Age sites in Northeast Thailand as well as in Laos will reveal more similarities and differences and hopefully also more clues as to why they are similar and different.

11. LAO PAKO, AN IRON AGE SITE ON THE NÂM NGUM RIVER IN LAOS

Anna Karlström

On account of the relatively small amount of archaeological investigations carried out in Laos it is most important to announce new research. During two months, November 1995 to January 1996, a preliminary archaeological investigation and excavation was carried out at the site Lao Pako, Laos, by Anna Källén and Anna Karlström. Responsible for the excavation was the Ministry of Information and Culture, Department of Museums and Archaeology in Vientiane.

The site Lao Pako is situated on the bank of Nâm Ngum river, about 40 kilometres northeast of Vientiane. For many years this site has been known as an archaeologically interesting location. What seems to have been the central part of the site is strategically situated on a hill, facing the river with a good view both upstream and downstream.

The investigations at Lao Pako have revealed a complex picture of a site that shows evidence of metal working and textile manufacturing as well as an advanced pottery tradition. The stratigraphy in the excavated area gives us a probable time sequence for the occupation of the site. It spans quite a short period of time with the first occupation occurring in or before the fourth century AD, and the second period of dense occupation in the fifth century AD.

The most significant feature of the site is the pottery; 45 complete jars and 270 kilos of potsherds, in an excavated area of 25 m². Most of the jars were buried and placed on top of or inside one another. Several jars were decorated, most characteristic is the appliqué decoration. An intricate pattern and a screw-head decoration adorn most of the biggest jars. Most probably some kind of textile manufacturing was carried out at the site. The evidence consists of spindle whorls, rollers and cord-marked pottery. There are also clear evidences of a metallurgical tradition at Lao Pako. Iron artefacts, slag and tuyères were found. The metal working area at the site is partially demarcated as an area consisting of very greasy soil. The distribution of cultural material over the excavated area indicates a division of the site into different activity areas.

The many similarities in both typology of finds and other manufacturing techniques show that it must have been people belonging to the same cultural group who have repeatedly occupied the site. Noteworthy is also the fact that Lao Pako belongs to a larger group of contemporary sites in the surrounding area. Yet the regional cultural groups also assert their own distinctive characters. Possibly at Lao Pako, this was done by creating an intricate variant of the appliqué decoration on jars? To identify the similarities between Lao Pako and other sites, as well as the specific character of this site, the archaeological projects in the area must be extended.

1. THE DEVELOPMENT OF LITHIC TOOL TECHNOLOGY IN PLEISTOCENE CHINA

Susan Keates

This paper will discuss the artefact collections from key archaeological localities in the People's Republic of China and also those from less well known localities. This discussion will attempt to explore the relevance of artefact variability in the Pleistocene to the evolution of hominid behaviour in China.

The record of tool manufacture in China commences from the late Early Pleistocene (c. 1.0 million years ago). It is characterised by the utilisation of flake and core tools of which flake tools predominate. Detailed analysis of the Chinese record of tool manufacture suggests greater technological and stylistic variability than generally recognised. It also shows, for example, that expediency and planning seem to some extent to have been associated with the nature of the raw materials used for tool manufacture. Evidence for the exploitation of animal resources by hominids indicates by at least Late Pleistocene times selective faunal exploitation in China.

11. SETTLEMENT, TRADE AND SUBSISTENCE IN LATE PRE-COLONIAL (13TH - 17TH C) BANDA ISLANDS, MALUKU, INDONESIA

Peter Lape

Preliminary conclusions will be presented from recently completed (1997-1998) archaeological survey and excavations in the Banda Islands. The data resulting from this research in this important spice trading centre in eastern Indonesia pertain to a period before the existence of written documents about Banda, several centuries deeper into the past than the 1512 arrival of Portuguese in the islands. Interpretations resulting from the data also pertain to the 16th-17th century interaction between the Bandanese and European Colonial powers, and provide a separate line of evidence against which to interpret contemporary European accounts of the colonial "conquest" of the Bandas. Evidence will also be presented pertaining to the arrival and presence of Islam in Banda, and its role in settlement, trade and colonisation.

21. ARCHAEOLOGY AND LOCAL MUSEUM DEVELOPMENT: A CASE STUDY FROM EASTERN INDONESIA

Peter Lape

This paper addresses the question of what responsibility archaeologists have to the communities in which they work, and discusses issues of the relevance for archaeology to contemporary culture. The author presents a case study of the process of setting up a small archaeology and history museum in the Banda Islands, Maluku, Indonesia. In this case, local high school students, under the guidance of the author and local teachers and village leaders, planned and installed a small exhibit on Banda archaeology and history in the village cultural centre. Information will be presented on lessons learned from this project, both practical matters relating to museum work and the author's interpretation of its impact on historical knowledge and power in a small community where knowledge of the past plays a central role in political and traditional *adat* structure. Additionally, the author will discuss problems associated with the management and curation of archaeological collections, and the responsibilities the archaeologist has to future research based on these collections. Local museum development, if planned correctly, is one possible solution to curation problems that can involve the local community more deeply in archaeological research to the benefit of all.

13. A PRELIMINARY CULTURAL GEOGRAPHY OF CONTEMPORARY VILLAGE-BASED EARTHENWARE PRODUCTION IN MAINLAND SOUTHEAST ASIA

H. Leedom Lefferts and Louise Allison Cort

Our studies over the past five, beginning in Northeast Thailand and extending to Northern Thailand, Laos, Cambodia and southern Vietnam, have led to the development of a conceptual basis for understanding the diversity that occurs in the production of earthenware pottery in this region. At over one hundred sites, we have focused on documenting the motor patterns incorporated in the production of a vessel.

Handed down from trainer to trainee, motor patterns involve the potter's conceptualisation of the pot in production as she moves through distinct stages of transforming the clay purposefully from a formless mass to the finished form. Although final products in the region (water jars, cooking pots) appear deceptively uniform,

imbedded in them are distinctively diverse sets of motor patterns and procedures. Looking at motor patterns seems to bring us to an understanding of connections between the diffusion of ceramic technology and the relationship among various ethnolinguistic groups living in the region.

We have identified major groupings of conceptualisations and have begun to map them against ethnolinguistic and political boundaries. We conclude that motor patterns might be a more enduring and reliable statement of identity than form and decoration ("style") or petrographic analysis, the two aspects of earthenware commonly studied by archaeologists.

11. THE CHRONOLOGY OF THE BERNAM VALLEY CIST GRAVES IN PENINSULAR MALAYSIA

Leong Sau Heng

Several granite cist graves, also known as "slab graves", have been found in the Bernam Valley and its vicinity in Peninsular Malaysia. The first discovery was on a hill at Changkat Menteri near the banks of the Bernam river in 1895. This was an accidental discovery made by T.J.A. Legge, an assistant surveyor on a mission to find a suitable point on the hill to set up a trigonometry station. Other slab graves were discovered in the late 1920s and 1930s in adjacent river valleys at Sungkai and Slim and were studied by several early scholars. These stone cist graves were attributed to the Iron Age period of the Peninsula's prehistory.

Finds recovered from the graves include glass and stone beads, socketed iron tools and fragments of earthenware pottery. Typological study of the beads from these slab graves has assigned them to about AD 1 to 400. Recent archaeological reconnaissance in the Bernam Valley has discovered several more of these granite slab graves.

The first of these (grave K1) was found near the banks of the Bernam river at Changkat Menteri in 1992, almost a century after Legge's first discovery. Between 1993 and 1995 more slab graves were found. Four of these were found on a low hill now called Bukit Sejarah or Historic Hill as a result of our discoveries there. The others were found scattered in the low lying areas nearby (and nearer the river). To date we have located a total of nine graves, all but one have now been fully excavated.

Excavations of graves K7 and K8 were completed in November 1997. The recently excavated materials will be included in the discussion in this paper together with data from our 1992, 1993 and 1994 excavations. For a

long time since the first discovery of stone cist graves in Peninsular Malaysia scholars could only date this culture relatively, based on the types of beads and iron tools found in the graves. Dates derived alone from typology, however, cannot be relied upon. This is because beads are very portable objects and their uses might have spanned several centuries (being used by a few generations or kept as heirlooms for a long time before they were finally buried).

Carefully controlled recent excavations have been able to retrieve much contextual data as well as other data to help in solving the mystery of the chronology of the Bernam slab graves. This paper will focus on the discussion of our results from radiocarbon dating of charcoal samples as well as thermoluminescence dating of the sites. These dates will also be compared to dates obtained by the relative dating of some very rare but distinctive objects recovered from the graves, as well as nearby sites. The latter include fragments of a decorated bronze artefact and two types of early imported ceramics.

7. CHANGE AND STABILITY IN THE DIETARY SYSTEM OF A PREHISTORIC COASTAL POPULATION IN SOUTHERN TAIWAN

Li Kuang-ti

This research investigates change and stability in the dietary system of a prehistoric coastal population at O-luan-pi on the southern tip of Taiwan. The study highlights the interrelationships between human subsistence and environmental opportunities within a local system. As part of the general dietary reconstruction of this population, the temporal continuity and variability in O-luan-pi prehistoric subsistence systems is considered.

Two patterns of subsistence change are evaluated. The first examines whether the diversity of natural resource consumption decreased through time; while the second investigates whether marine resource exploitation increased through time relative to other non-agricultural food sources.

The excavation of the coastal site of O-luan-pi II in 1993 documents a continuous sequence of occupations beginning with an initial settlement around 4000 BP and continuing until 2500 BP. Quantitative analyses of the faunal remains and artifacts provide new comparative data for studying the relationship between long-term changes in subsistence, technology, and environment.

Faunal analyses indicate that subsistence strategies of the initial settlement utilised more available animal species, including exploitation of shellfish, turtles, marine

fish, and terrestrial mammals than those of the later occupation periods. Faunal remains indicate that food from marine fish and shellfish, were the primary non-agricultural resources of the O-luan-pi inhabitants between 3500 and 3000 BP. Comparatively, all natural animal food resources decreased in the last occupation period.

In addition, the diversity measurement indicates a fairly low degree of variation in their food resource exploitation. These changes are viewed as the result of a greater reliance on intensified agricultural production. Overall, the evidence suggests that the major subsistence pattern of O-luan-pi inhabitants was a dual exploitation of agricultural and marine resources that changed with the development of the community.

12. THE DEVELOPMENT AND DECLINE OF SOCIAL COMPLEXITY AND THE EMERGENCE OF EARLY STATES IN CHINA

Li Liu

This paper examines settlement patterns in the middle and lower Yellow River valley (including Shandong, Henan, and southern Shanxi) in the Longshan period (2600-2000 BC), when the Neolithic culture was transformed to the state-level social organisation. During this period a series of changes in climate, ecology, and geomorphology took place. This external pressure triggered large scale population movement, realignment of social groups, and inter-polity conflict, all of which are demonstrated in the changing patterns of settlement distribution. During this unstable era, many societies declined in terms of degree of sociopolitical complexity, but some polities in the Central Plains (the Erlitou culture in Henan) became highly integrated with a nucleated settlement pattern.

By comparing the environmental conditions, settlement patterns, and economic systems which distinguish the Central Plains from peripheral regions, several factors are conspicuous, which may have been responsible for the rise of the early states. In the environmentally non-circumscribed Central Plains where the Erlitou culture developed, conflict between different ethnic or local groups was intensive, so that communities may have been forced to rely on local resources and to maintain internal solidarity against outsiders. The interests of entire population groups were emphasised over the status of elite individuals, intra-group differentiation was minimal, and the search for exotic materials as status symbols gained through long-distance exchange was undermined. These factors perhaps were the major

forces contributing to the emergence of the state in the Central Plains rather than in other regions.

On the contrary, many peripheral regions are characterised by environmental circumscription. In those societies, wealth financing may have been practised, statuses of individual elites were accentuated, and the production, distribution, and exchange of valuables were essential to the economic systems. Those societies may have not been able to further develop social complexity because of the vulnerability of their economic systems and the severe environmental fluctuations encountered.

The end of the Longshan period and the initial development of the Erlitou and Yueshi cultures coincide with a climatic fluctuation in the paleoenvironmental record, a marked population decrease revealed in the archaeological data, and an era of floods in traditional legendary accounts. While the development of the Erlitou culture is characterised by the rapid integration of its settlement hierarchy, the Yueshi culture exhibits a stagnating social system. Climatic fluctuation and environmental conditions are important variables in social change, but it was the differing human responses to external challenges and social interaction which ultimately determined the development and decline of complex societies and the emergence of civilisation in China.

20. ARCHAEOLOGY AND LANGUAGE IN NORTH NEW GUINEA-WEST NEW BRITAIN: TOO GOOD TO BE TRUE?

Ian Lilley

There appears to be an exceptional correlation between archaeological and linguistic evidence for change in the Austronesian prehistory of the north New Guinea-west New Britain region. A Lapita presence in the area, at least as far west as Tuam Island in the Vitiaz Strait, links with linguistic evidence concerning the emergence and break-up of Proto Oceanic. Better still, it seems, are the links between archaeological evidence for changes around 1600 BP and again at 300-350 BP and the spread from west New Britain to the Sepik coast of languages of the North New Guinea Cluster and then from the same source area to the Vitiaz-Huon Peninsula area of the Ngero-Vitiaz subgroup of that cluster. Yet other archaeological data may link with other changes in the linguistic history of areas as far away as the Massim and the south coast of Papua. These correlations seem obvious if the data are taken at face value.

Examined more critically, it becomes obvious that they may in fact be too good to be true. This is not because any of the links has been shown to be false.

Rather, it is because of their status as untried assertions: no archaeologist or linguist has tried to demonstrate their veracity in the basis of independent evidence rather than circular logic. I happen to believe that the links are real, but I also know that I have to demonstrate that to be the case on archaeological grounds, even if everyone believes the linguists regardless! How I am going to do so seems problematical.

Decorated pottery is frequently taken to be an excellent indicator of shared culture and history. Lapita ceramics, for example, were almost certainly produced by an identity-conscious ethno-linguistic group, and are closely related from one end of their distribution to the other, most particularly at the beginning of the Lapita colonisation of Near Oceania. Similarly, a population movement of Austronesian-speakers from the Massim west along the Papuan south coast seems to be clearly marked by a form of pottery that is very similar from one end of the coast to the other at the time of initial colonisation, though it diversifies later. In the north New Guinea-west New Britain region, the earliest pottery appears progressively later with increasing distance west towards the Sepik coast, as one would expect if the linguistic evidence is correct and if the appearance of pottery is linked to the westerly spread of Austronesian languages from New Britain.

Unfortunately for straightforward interpretation, however, the four or five wares that appear earliest in the region are as different from one another as the later wares that derive from them, a situation quite different from that obtaining on the Papuan south coast, or in the case of Lapita. There are several things I have to do to demonstrate that the archaeology and linguistics are correlated in this case. I think the first is to formulate a model which hypothesises why my ceramics differ so much from their first appearance when they were produced by culturally-similar people migrating from a single source area. Such a model is outlined in my paper. In essence, it proposes that the nature of the migration from New Britain to the Sepik coast was undertaken in social circumstances quite different from those which obtained either on the Papuan south coast or during the Lapita period. In the latter cases, the situation required the migrating groups to distinguish themselves from existing populations but to retain a sense of common identity. The situation in the north New Guinea-west New Britain region, on the other hand, required the migrating groups to distinguish themselves from each other as well as from existing populations.

13. ETHNOARCHAEOLOGY FOR SOUTHEAST ASIAN PREHISTORY

William A. Longacre

Ethnoarchaeology has been a part of anthropological archaeology for well over 100 years. Over the past 40 years it has been a part of the strengthening of inferences for archaeology in SE Asia. Professor N Wang of the Minorities Institute in Kunming, Yunnan, PRC, began ceramic ethnoarchaeological studies in the 1960s. My own work with Kalinga ceramics in the Philippines began in the early 70s as did the work with Agta hunter-gatherers by the Griffins from the University of Hawaii. This paper presents a more elaborate history of ethnoarchaeology with emphasis on SE Asian research. Several case examples are presented in some detail, briefly summarised here.

Of broad, general interest to SE Asian prehistorians is the ability to discern the beginnings of social/political complexity in the early stages of state formation. Recent ceramic ethnoarchaeology in the Philippines suggests there is a link between the degree of craft specialisation and the degree of standardisation of the product. Studies of pottery making communities that involve household modes of production are compared to more specialised modes of production revealing a clear pattern of increased standardisation. Armed with such information, it should be possible for SE Asian archaeologists to evaluate the degree of standardisation of the pottery and compare that to the ethnographic patterns. Specialised production reflects socio-political complexity beyond a "tribal" level of society. Such work has been done in Southwestern USA archaeology with good success. A second example is presented from the Kalinga project wherein a distinctive pattern of interior carbon deposition on cooking pots is strongly associated with the cooking of rice. This pattern appears at the end of the Jomon period in Japan and might also be identified in SE Asia reflecting the beginnings of rice cooking and possibly the beginnings of rice agriculture.

Other examples support the argument that I make that ethnoarchaeology does hold great promise to increase the archaeologist's ability to strengthen inference about aspects of past organisation and behaviour, in this case with emphasis on SE Asian prehistory.

17. HUMAN SPEAR POINTS AND SPEARED HUMANS: THE PROCUREMENT, MANUFACTURE AND USE OF BONE IMPLEMENTS IN PREHISTORIC GUAM

Judith R. McNeill

Mariana Island bone projectile points are discussed on the basis of materials excavated from a late prehistoric and early contact period cemetery located on east Agana Bay on the island of Guam. Excavation of the cemetery in 1990 uncovered the remains of at least 175 individuals in a tightly compact cluster a few hundred meters inland from the shore of the bay. The cemetery appears to be part of the Latte Period native Chamorro village site of Apurguan. Latte sets at the site were first recorded by Hornbostel in the 1920s and it is likely that the cemetery itself was associated with a no longer extant latte set or sets.

The cemetery contained evidence of the selective removal of human bone from the interments. Found in association with two burials were projectile points made of human bone. Bone points have been documented at other sites in the Mariana Islands and noted in Spanish accounts of early contacts with the Chamorros. The Apurguan cemetery burials, however, provide the best information to date regarding the procurement, methods of manufacture, and the ways in which these tools may have been used. This evidence will be presented in detail and compared with the evidence from other archaeological and burial sites in the Mariana Islands.

6. THE SINO-AMERICAN JIANGXI ORIGINS OF RICE PROJECT

Richard McNeish

From 1993 to 1995 the Andover Foundation for Archaeological Research Ltd., in conjunction with Beijing University and the Jiangxi Institute of Archaeology, excavated two stratified caves in Wan-Nian County in northeastern Jiangxi Province. Diaotonghuan, over 7 meters deep, had 21 stratified zones; Xianrendong had 24. These excavations provided evidence of a complete Neolithic sequence and hints of the initial domestication of rice. The earliest remains, called the Yangtze phase, 40,000 to 17,000 BP, were of a microblade hunter-gatherer culture. Next came the Dayuan phase, 17,000 to 13,500 BP, of gatherers who used wild rice and unifacial lithic, bone, shell, and antler tools.

This developed into the Xian Ren phase at 13,500 to 11,800 BP, a similar complex but with crude wiped

pottery. Following it was the Wang phase (11,800 to 9600 BP), which had paddled pottery and some domesticated *Oryza sativa japonica*, cultivated in incipient agriculture. In the Jiangxi phase, 9600 to 8000 BP, there was well-fired paddled pottery, paddy rice agriculture, and villages. The final phase, Wan-Nian at 7700 to 6000 BP, had painted pottery in a variety of complex forms, rice agriculture using *O. sativa japonica* and *indica*, larger villages and perhaps even towns.

These preliminary endeavours using interdisciplinary analyses are continuing, and both cave and "tell" excavations are planned for the future.

16. THE DEVELOPMENT OF THE MARE POTTERY TRADITION, EASTERN INDONESIA

Mahirta

Mare is a small island in the Northern Moluccas (Indonesia) where the pottery making tradition is still alive. Fieldwork was carried out in 1995 which involved both ethnographic research on recent pottery making and trade, as well as archaeological research. The purpose was to investigate the change in some aspects of the tradition from ancient to recent Mare pottery, i.e. in manufacturing technology and style, which includes form and decoration.

Observations and interviews in the field revealed that Mare potters apply a "parallel stage" sequence of production where each potter works on a number of pots at any time. This type of production is a very efficient production system to produce pottery in large quantity, and very suitable for mass production. Maybe the reason why they apply such a system is because Mare acts as the only supplier of earthenware for the Northern Moluccas today.

Surface collection and three test pits were carried out on Bukit Fato, an abandoned village on Mare. From this site much red burnished pottery of the recent and modern type was found on the surface, together with a different light-brown pottery with incised decoration. The red burnished pottery was never found below the first layer in three test pits dug in the site. Thus, the light brown pottery is ancient Mare pottery, and an associated C14 date (ANU 9726) of 990 ± 110 BP was obtained.

Thus, on Mare the ancient style is the light-brown pottery generally with incised decoration in bands, and the recent style is the pattern burnished red-slipped pottery which is still produced today.

Over time, there have been some changes in the manufacturing technology, such as in the amount of temper added, in the sorting of the sand, and in the firing

process, whereby more uniform firing characterises the pattern-burnished as opposed to the light brown pottery. Pottery forms have also changed from the more complicated forms in the light-brown paste pottery towards more simple forms in the red burnished pottery. The most prominent change is in the decoration. The light-brown paste pottery has a richer variety of design elements, arranged in bands. In the recent pottery the elements of decoration are bigger and the distances between them are wider. The arrangement of the modern decoration is also very uniform, with only slight variation amongst all the potters currently working in Mare. Perhaps these changes relate to the modern application of the parallel stage production system.

Despite these differences in design patterns, the symmetrical principles for arranging the design elements are similar, i.e. the combination of slide reflection and translation, vertical reflection, and the combination of horizontal reflection and translation. Only one type of symmetry, that is radial symmetry, occurs on the recent pottery.

The change from the ancient to the recent style is likely have been triggered by the development of spice trading in the Northern Moluccas, which made the incorporation of external ideas possible. With this, increasing pottery trade stimulated the formalisation of Mare pottery in term of manufacturing technology, form and decoration.

This study also recovered no certain evidence of trade in the older incised pottery between several excavated archaeological sites in the Northern Moluccas dating from 3500 BP onwards. Thirty three samples of pottery from Northern Moluccan sites, including both incised and burnished sherds, were analysed for chemical composition with a scanning electron microscope. The results were analysed statistically by principal components. This showed that the recent red burnished pottery found on several sites in the Northern Moluccas all came from Mare, but none of the older incised pottery was exchanged between sites, even though the decoration generally looked very similar.

4. A 22,000 YEAR OLD RECORD OF PAST ENVIRONMENTAL CHANGE FROM TRANG, SOUTH THAILAND

Bernard Maloney

Pollen analytical results from a core extracted at a lake (c.100m altitude) located near Trang, south Thailand, are presented. A continuous record of vegetation change covering the last 22,000 years appears to occur, but

there are some problems with dating which are being addressed by detailed $\delta^{13}\text{C}$ measurements of numerous samples, pollen and phytolith analysis. Pollen counting is still under way and many counts are still low (c. 100 per sample). It is hoped to improve upon this by July. About 120 pollen and pteridophyte spores are present in the total current count of less than 4000.

Results to hand are startling. While samples pre-dating c.10,300 BP are uncountable, with the exception of one from c.18,500 BP., and some have clear signs of oxidation, suggesting that lakes levels were low and fluctuating or that almost complete drying out occurred, the pollen record is almost continuous thereafter. The 18,500 BP sample is dominated by grass pollen but enough *Nymphoides* is present to indicate that a lake existed. Microfossil charcoal was at background levels (<5%). In general, the evidence supports the concept of glacial age aridity resulting from weakened monsoonal circulation. There is no evidence for climatic change coeval with the Younger Dryas cold event of Europe.

From c.10,300 to 7900 BP, *Nymphoides* frequencies exceeded 20%, so a lake was present. Microfossil charcoal percentages all exceeded 20% in 4 of the 7 samples counted from this time interval and weed *Alternanthera* type pollen was significant in two levels. *Castanopsis/Lithocarpus* pollen (secondary forest?) peaked at c.8300 BP, and between 7900 and 3300 BP (when the lake level was high again) the pollen curves did not stabilise. Microfossil charcoal reached high frequencies between 3300 and 2600 BP, when *Urticaceae/Moraceae* pollen, often an open indicator, reached its maximum. It is difficult to see the sequence of changes as purely natural in origin and the variations on the pollen curves of secondary tree (*Macaranga*, *Mallotus* and *Trema*) and herbaceous taxa are suggestive of shifting cultivation, but *Dipterocarpaceae* pollen (under-represented) became commoner after 3300 BP. *Borassodendron machadonis*, a rare palm, appeared around 8300 BP, but disappeared at c.4800 BP. This could relate to climatic change, altered soil conditions, or the impact of people on its habitat. *Areca* first appeared at c.6600 BP (with a single find of *Cocos*) but its later record was sporadic. There is no evidence for what, if anything, was cultivated in pre-history.

The sediment accumulation rate has been too slow to allow high resolution pollen analysis based upon the samples available and this important site should be cored again so that a more refined palaeoenvironmental record can be obtained. High lake levels should correlate with high groundwater levels, rivers grading to higher base levels, and marine transgressions. However, evi-

dence for high lake levels coincident with two of the three well-dated Holocene high sea-levels from south Thailand is lacking, probably because of low sample resolution.

18. MOLECULAR ANTHROPOLOGICAL STUDY OF THE PEOPLING OF THE INDONESIAN ARCHIPELAGO: PHYLOGENETIC RELATIONSHIP BASED ON MITOCHONDRIAL DNA SEQUENCE POLYMORPHISM

Sangkot Marzuki, Herawati Sudoyo and Patcharin Pramoonjago

The aim of the present study is to establish the phylogenetic relationship between the various ethnic groups which inhabit the Indonesian archipelago, by employing the sequence polymorphism of the hypervariable region 1 (HV1) of the mitochondrial DNA (mtDNA) D-loop. MtDNA polymorphism is a powerful tool in molecular anthropological study because, being uniparentally (maternally) inherited and having a high mutation rate (10-20 times of that of nuclear genes), mtDNA accumulates sequence changes radiating along human female lineages, thus providing a detailed record of past migration patterns for tens of thousands of years. The number of mtDNA sequence differences that separate two individuals is directly proportional to the time since they shared a common maternal ancestor.

Total DNA was extracted from blood samples of various Indonesian ethnic groups (30 samples per ethnic group) and the D-loop region of mtDNA was amplified by polymerase chain reaction using primer pairs of L15904 and H504. The PCR products were then purified, sequenced using dye terminator cycle sequencing kit, in an automatic ABI 377A sequencer (ABI-Perkin Elmers, USA).

We initially studied a limited number of ethnic groups to examine whether the strategy employed was able to differentiate closely related ethnic groups indicated by previous, mainly linguistic anthropological studies. We examined 3 ethnic groups living in South Sulawesi (Toraja, Buginese and Makassarese), together with the Bataks of North Sumatra and Javanese. Caucasians were included as an outgroup control.

We found that the Batak and the Toraja, suggested on the basis of cultural anthropological data to be related as early migrants to the archipelago ("Proto-Malays"), are in fact genetically remote; the D-loop sequence polymorphism indicates that the Toraja are closely related to their neighbouring Buginese and Makassarese populations.

A much larger study was carried out on a total of 20 ethnic groups including Alor, Sumba, Minahasa, Palu, Toraja, Makasar, Bugis, Sasak, Bali, Tengger, Java, Batak, Bangka, Palembang, Pekanbaru, Minangkabau, Banjarmasin and Dayak. Haplotype analysis (based on pairwise differences per site), suggests that there is a tendency that ethnic groups inhabiting the same geographical region have similar haplotype spectra. This applies to the Minahasan, Palu, Toraja, Makasaresse and Bugis populations who live on Sulawesi. The Javanese, Tengger and Balinese also have similar patterns.

6. THE HONG KONG REGION FROM NEOLITHIC TO HISTORIC

William Meacham

The first human settlement of the Hong Kong area seems to have taken place at c.5000 BC. Although there is evidence of repeated forest burning back to 11,000 BC, it is unclear whether this is due to human activity. The first inhabitants had polished stone tools but may not have had pottery. There is only one confirmed and another suspected site of this first phase of occupation.

From 4000 BC to c.1500 BC, dozens of sites and several phases are known of the Neolithic. There are many continuities from each phase to the next. Similarly, the Bronze Age of c.1500-600 BC has numerous links to the Neolithic in artifact styles, site distribution and economic patterns. There is a major and unexplained hiatus from about 600 BC; no sites can be firmly attributed to the period c.600-200 BC. There is only one site securely dated to the Western Han (206 BC-AD 24) and a handful of sites belonging to Eastern Han (AD 25-220). The reasons for this dramatic break in human occupation are unclear. A large Eastern Han chamber tomb only deepens the mystery, since it is not clear whose tomb it was, and there is no major village site in the region to suggest a settlement that would have supported such a highly ranked official or wealthy person.

By AD 300 archaeological sites again appear all along the coastlines of the territory, associated with a lime production industry. These lime kiln sites continue to about AD 900. The "early historical" inhabitants are thought to be partially sinicized Yueh, descended from the peoples of that name mentioned in Chinese texts of the late Bronze Age.

5. NEW LIGHT ON THE CHALCOLITHIC CULTURE OF MEWAR, RAJASTHAN, INDIA

V.N.Misra

A major concern of Indian archaeologists during the last fifty years has been to understand the diffusion of farming-based settled life in different geographic regions of the country. As a result of exploration of several hundred sites and excavation of some of them several Chalcolithic cultures have been identified in the Ganga plains, Mewar (eastern Rajasthan), Malwa (western Madhya Pradesh), and the northern Deccan (western Maharashtra). These are characterized by an economy based on plant cultivation, animal husbandry, and hunting-gathering; wheel made painted pottery; wattle-and-daub structures; stone blade and copper technology; semi-precious stone, terracotta and copper beads and copper bangles and rings; and terracotta animal and human figurines.

One of these Chalcolithic cultures is the Ahar Culture in the Mewar region of southeast Rajasthan. This is represented by nearly a hundred sites two of which, namely Gilund and Ahar, were excavated, nearly four decades ago. A third site, Balathal, near Udaipur, is being excavated for last five years jointly by the Deccan College, Pune and Rajasthan Vidyapeeth, Udaipur. C14 dates, ranging from c. 2600 to 1500 BC, show that Balathal is the oldest known Indian village outside the Indus/Harappan Civilization. Besides, in respect of its stone and mud brick residential architecture, a massive fortified enclosure, and a stone boundary wall enclosing the settlement, plus certain aspects of ceramics and copper technology, Balathal is not a normal Chalcolithic settlement but it represents a distinct influence of the Indus/Harappan culture of Gujarat.

This evidence proves that the Indus civilization did not die totally but left its indelible impress on the contemporary and subsequent rural cultures of neighbouring regions, thereby contributing to the evolution of the present-day rural Indian society.

(Dr Misra will unfortunately be unable to attend the congress in person).

5. CHALCOLITHIC PASTORAL SETTLEMENTS IN CENTRAL INDIA: WITH SPECIAL REFERENCE TO CHIKHALDA, DISTRICT DHAR, MADHYA PRADESH.

R.K.Mohanty

Recent discoveries of several pit dwelling sites, and excavations at some such as Pipri and Utaward, suggest that deep pit dwellings were preferred by the Chalcolithic pastoral-nomadic people, perhaps to protect themselves from the severe cold of the winter months in Central India. This tradition continued from the Neolithic, as shown at Burzahom and Gofkral in Kashmir. Though pastoralism and agriculture formed the major economy of the more permanently settled early farming communities of the Malwa region, the evidence of isolated pit/burrow dwelling sites at several places in the central Narmada valley clearly suggests that people with a different economy coexisted with and augmented the central Indian Chalcolithic Culture.

1. STONE TOOLS AND FOSSIL ELEPHANTS: RECENT RESEARCH ON FLORES, EAST INDONESIA

M.J. Morwood and F. Aziz

The paper will review archaeological, palaeontological and geochronological evidence from central Flores, east Indonesia. It will concentrate on sites of Early and Middle Pleistocene age. The implications will be discussed in the context of wider evidence for hominid evolution and dispersal. The strategies being used in our 3 year research project will also be briefly described.

14. HONGSHAN CULTURE AND THE "GODDESS TEMPLE"

Sarah M. Nelson

The Hongshan culture (4000-2500 BC) is located in both Liaoning province and Inner Mongolia, China. It seemed to be an offshoot of the Yangshao culture until several sites with large tombs containing well-crafted jades were found, giving rise to speculation about its precocious complexity. The clinching discovery, however, was a 27-meter-long lobed building which contained fragments of life-sized and larger statues made of unbaked clay.

Some of these fragments represented female breasts, therefore the human figures are considered to be female. The most spectacular piece was a complete face with inset green jade eyes, for which the site of Niuheiliang

has become well known. The face was interpreted as that of a goddess, and the building dubbed the Nushenmiao, the Goddess Temple. What, if any, implications for understanding gender in the Hongshan culture can be deduced from the circumstance of the "goddess" and this unusual building? This question is approached by considering other indications of the ideology, including grave goods and the locations of the tombs relative to the Nushenmiao. The possible uses of the building and its centrality in the site are also elements in the equation. While more evidence is needed, the possibility of a matri-centric society, and/or a gender balanced one, is explored.

16. STUDY OF THE POTTERY FROM GO O CHUA SITE, LONG AN PROVINCE, VIETNAM: AN IMPRESSION FROM THE FIRST SEASON

Ngo The Phong and Bui Phat Diem

Go O Chua is located in the westernmost area of Long An Province, near the Cambodian border. The first excavation in 1997, carried out by Vietnam Historical Museum and Long An Provincial Museum, provided new light on the archaeological culture, especially pottery, of this region. More than 2 metres of cultural layers retained a large quantity of potsherds and clay artifacts.

In the uppermost layers of the site we found pit burials of extended human skeletons with a number of funerary goods including pottery vessels. This pottery assemblage includes necked bowls, shallow bowls, pedestal bowls, small cylindrical jars, small necked round jars and lids. In addition, several ten thousand fragments of clay bar-shaped artifacts with small tripod legs were found. The pottery surfaces of many specimens were red-slipped or black-burnished. The decoration includes multi-linear incisions of an S-motif, waves, triangles and half circles.

Although the pottery of Go O Chua has unique characteristics, it shares some similarity with Go Hang, Vinh Chau, Go De, Go Cao Su, Long Buu, Giong Phet and Giong Ca Vo of the Iron Age and Oc Eo Cultures. From comparisons with these sites, we suppose the dating of Go O Chua may fall between the 2nd-3rd centuries BC and 2nd-3rd centuries AD. The materials help to fill a gap in the transitional period from the Iron Age to the Oc Eo Culture.

18. HUMAN REMAINS FROM CON CO NGUA, A DA BUT CULTURE SITE

Nguyen Kim Thuy

The paper presents all the data from the skulls at Con Co Ngua site (Thanh Hoa province). Their descriptive and metric characteristics show that the skulls are rather homogeneous. In general, they are egg-shaped, belonging to the category of dolichocephaly, even hyperdolichocephaly. The cranial breadth is small. The comparison of the skulls at Con Co Ngua and those at Nui Nap, Quy Chu and Quynh Van show that the former bear the traits of both Australoid and Mongoloid affinity.

At Con Co Ngua, beside morphological study, we have also the determinations of blood and paleopathology from the bones by biochemical methods.

The study of the skulls at Con Co Ngua provides valuable data, which contributes understanding of the prehistoric inhabitants of the Da But culture.

4. EXCAVATION OF AN SON: A NEOLITHIC MOUND SITE IN THE MIDDLE REACH OF THE VAM CO DONG RIVER, SOUTHERN VIETNAM.

Masanari Nishimura and Nguyen Thi Kim Dung

The An Son site is located in the middle reach of the Vam Co Dong river of Long An Province, southern Vietnam. The site is a large mound 170m in maximum diameter and 6m higher than the surrounding plain. Excavation in 1997, which was carried out at the eastern edge of the mound, revealed a 4 meter depth of cultural deposit. Digging by stratigraphic layers enabled us to recognise four major cultural phases. All belong to the Neolithic, probably the second millennium BC.

Although the pottery shows clear changes from the first phase to the last, the changes are continuous and show no hiatus. In the third phase, rammed hard earth floors and soft soil layers, including many cultural and natural remains, were revealed alternately. In the earthen floors we found postholes, replaced in the same locations in different layers, surrounding hearths. All this attests the former presence of earth-floored rather than pile dwellings.

In other lowland regions of Mainland Southeast Asia, there are many large mound sites with deep stratigraphy, especially during the second millennium BC, and these may be similar to An Son in the character of settlement and residence.

3. A HYPOTHESIS FOR THE SUBSISTENCE STRATEGY AND SITE UTILIZATION PATTERN OF THE HOABINHIAN IN NORTHERN THAILAND

Masanari Nishimura

Banyan Valley and Pa Chan caves are Hoabinhian sites excavated by C. Gorman in the 1970s. This study is a comparison between the two sites in terms of the subsistence strategy and site utilisation pattern of the Hoabinhian. The Hoabinhian lithic materials from both sites are different in the quantities of pebble tools per unit of excavated volume and degree of flake removal from the pebble tools. These differences suggest that the functions of the two sites were not identical.

The faunal remains from the both sites are also different in the quantities and frequencies of exploited animals. Pa Chan was preferred for hunting much more than Banyan Valley. However, the late period cultural and natural remains indicate that Banyan Valley was related with agricultural activities much more than Pa Chan. It is suggested that the broad spectrum subsistence economy proposed by Gorman needs to be revised, and that the hunting of middle-sized to large game needs to be stressed more in the economy.

3. RECENT RESULTS FROM LEMDUBU CAVE, THE ARU ISLANDS, MALUKU, INDONESIA

S. O'Connor, M. Spriggs and P. Veth

The Aru Islands lie near the edge of the Australian continental shelf in the Arafura Sea, approximately 150 km south of the Irian Jaya coast. Today part of eastern Maluku, until approximately 12,000 years ago they were a dissected limestone plateau on the Sahul Shelf. Approximately 12,000 years ago rising seas cut off this plateau from Australia and as late as 9,000 - 8,000 years ago the current Aru Islands were formed when the group was totally separated from New Guinea.

Recent excavation at Leang Lemdubu on Kabroor Island has documented an occupation sequence beginning approximately 30,000 years ago. As might be expected the Pleistocene levels show some affinities with northern Australian sites. The Pleistocene faunal sequence documents the presence on the late Pleistocene Sahul shelf of a relatively open savannah with patches of denser, lush vegetation along watercourses and in other sheltered areas. People using the site at this time focussed their efforts on the procurement of the large-bodied Agile Wallaby, *Macropus agilis*, and several

smaller wallabies, with more casual acquisition of various small to medium-sized animals.

The terminal Pleistocene/early Holocene saw the inundation of the Carpentarian Plain and the change to insular conditions. The spread of wetter forests in response to higher temperatures and increased rainfall would be expected at this time. Significantly, human occupation of the cave seems to have effectively ceased approximately 11,000 year ago. The cave appears to be reoccupied only in the late Holocene when we see the loss of the savannah element, most prominently the Agile wallaby, presumably reflecting wetter more forested conditions surrounding the site. There is a strong possibility that the recent phase of cave use was by people with a horticulturally-based economy, the pig and dog and access to trade systems.

The changes in site use can be tracked in the stone artefact assemblage. The Pleistocene industry is essentially percussion flake-based, and is strongly reminiscent of the stone assemblages found in many Northern Australian sites. There is little change in the Holocene in the type of stone artefacts represented, however, there is a major change in the dominant lithologies used. Silicified limestone dominates the late Holocene spits indicating more casual procurement of raw material, perhaps from the cave itself.

17. ORAL HISTORY AND ARCHAEOLOGY IN MICRONESIA

Rita Olsudong

Documentation of Micronesian cultures by the local people has been through oral histories. In oral histories one finds norms that govern different situations and differentiate one culture from another. It is through oral histories that one learns the proper methods and protocols of constructing a house or a stone path so as not to bring misfortune to a village or one's clan. To some extent oral histories influence the patterns of archaeological remains observed throughout Micronesia. This paper investigates the link between oral histories and the built environment in Micronesia. In another word, can the cultural norms and practices in Micronesia today be projected into the past? The archaeological records in Palau Islands will be examined with specific references to oral histories.

10. THE EXCAVATION OF NON MUANG KAO: PRELIMINARY OBSERVATIONS

Dougald O'Reilly

Non Muang Kao is a large prehistoric mound located in the Mun river catchment, Nakon Ratchasima province, Thailand. The site was recently excavated in an attempt to illuminate the origins of complex society in Northeast Thailand and the rest of Southeast Asia.

Non Muang Kao, which is ringed by several channels, was occupied during the Iron Age. Many of the burials encountered during the excavation were lined with a white clay and some were filled with burnt rice. Artefacts encountered in mortuary contexts included a range of Phimai black ware, beads of glass and agate, as well as iron and bronze jewellery. A succession of large floors which were made from the same clay as that in the burials were also discovered. Several floors contained possible structural features including the remains of walls and posts.

The preliminary ceramic analysis has revealed a number of interesting patterns. The upper layers of the stratigraphy are dominated by multi-coloured, plain and cord-marked sherds, while black, burnished sherds predominated in the lower levels. The ceramic analysis also revealed that sherds found in the layers containing the clay floors are markedly different from those found in the layers above and below. There is also a demonstrable transformation in the ceramic production technique at Non Muang Kao which may relate to the shifting patterns of activity in the excavated area including habitation, industrial activity and disposal of the dead.

18. ORAL HEALTH IN NORTHERN VIETNAM: NEOLITHIC THROUGH BRONZE PERIODS

Marc Oxenham

Little is known of the health of people living in Northern Vietnam from the Neolithic through to early metal periods. This paper reports on results of one component of a larger study of health and disease in prehistoric Vietnam. As only one aspect of human health, an examination of the oral health of a population is useful in being sensitive to issues relating to diet (including general subsistence activities), behaviour and disease in general. The aim of this paper is to present an oral health profile based on a collective sample of 92 early metal age individuals (from 11 sites: Quy Chu, Thieu Duong, Doi Son, Dinh Chang, Minh Duc, Dong Mom, Vinh Quang, Duong Co, Chau Son, Dong Xa and Nui Nap) and 91

Neolithic individuals (from a single site: Con Co Ngua) in the Bac Bo region of Vietnam.

Sex and age at death was established, wherever possible, for each individual based on a multi factorial approach. Oral health variables selected in this study included tooth misalignment and rotation, several occlusal variables, tooth wear, caries, abscessing, pulp chamber exposure, enamel hypoplasia, calculus and tooth discoloration. The oral health profiles for the Neolithic and early metal populations are compared, results and implications are discussed.

4. ARCHAEOBOTANY AND THE SEARCH FOR DIRECT EVIDENCE FOR AUSTRONESIAN MOVEMENT

Victor J. Paz

This paper addresses the need to gather new archaeological evidence that will either support or question the different explanations on the origin and spread of Austronesians. No one involved in the discourse on the origins of the Austronesians underestimates the role of the linguistic evidence in answering this question; everyone agrees that a multi-disciplinary approach is the best way to understand this specific problem. Archaeological evidence plays the part of putting the temporal frame on the question of the Austronesian movement.

Having said this, the lack of direct archaeological evidence showing human movement leaves the question of origins and its temporal context on shaky ground. While the Bellwood-Blust hypothesis remains the dominant explanation, the ground is open for contending explanations such as those of Solheim, Meacham and Tsang.

The application of charred root crop analysis may add a new dimension to the archaeological evidence. If successful, it can provide direct evidence of human movement through the identification of a botanical indicator in the form of *Dioscorea alata* (yam) - the best root crop indicator for human movement from mainland to island Southeast Asia.

The search for charred *Dioscorea alata* involves a sensitivity in the use of traditional archaeobotanical methods in the field. It also involves a strategy of search that takes into consideration the need for secured dates and samples that will fit the different time corridors proposed by the different hypotheses for Austronesian movement.

Insights from the initial field experience of the author in Lal-lo Cagayan sets the tone for the nature of the search in the other sites singled out in the Philip-

pines, such as sites in El Nido Palawan, Tawi-Tawi, Penablanca, Cagayan and Ivuhos Island in the Batanes.

14. REGIONAL PALAEOENVIRONMENTAL ANALYSIS OF THE SAKON NAKHON BASIN, NORTHEAST THAILAND: PALYNOLOGICAL PERSPECTIVES ON CLIMATE CHANGE AND HUMAN OCCUPATION

Dan Penny

The Sakon Nakhon basin has long been the focus of archaeological research in the region, and has yielded a wealth of cultural materials from a number of extensively studied sites. Despite the abundance of available data, critical aspects of their interpretation remain highly contentious. In particular, questions remain regarding the dating of earliest cultural horizons (White 1997 for example), and perhaps more significantly, the development of rice cultivation within the region. Until recently (Kealhofer 1996, Penny *et al.* 1996, Kealhofer & Penny in press), these archaeological data lacked a detailed palaeoenvironmental context. The research presented here is intended to provide that context.

Three sites were chosen for palynological analysis, Nong Han Kumphawapi (Lat 17° 11' N; Long 103° 02' E), Nong Pa Kho (Lat: 17° 06' N; Long; 102° 56' E), and Nong Han Sakon Nakhon (Lat: 17° 12' N; Long: 104° 11' E). The primary aims of this analysis were to identify human impact upon vegetation of the region during the Holocene, and longer term climatic changes from approximately 40,000 years BP.

Substantial vegetation change from approximately 6,000 years BP cal, in association with increasing levels of burning within the environment, are suggestive of either a change to arid climates or an intensification of human activity in the region, or potentially both. Given the apparent severity of the reduction in lowland deciduous forest from this time, in association with inferred hydrological changes which do not support a return to severely arid conditions, it is suggested that human impact on the vegetation of the region can be dated to this period.

The implication these data have for the interpretation of cultural stratigraphy in the region will be discussed, and the existing body of data placed within a detailed palaeoenvironmental context. The nature of the interaction between Middle Holocene communities and their environment will be drawn out, and the utility of palynological data in identifying the nature of rice utilisation will be briefly discussed.

- Kealhofer, L and Penny, D. in press. Fourteen thousand years of vegetation change in Northeast Thailand. *Review of Palaeobotany and Palaeoecology*.
- Kealhofer, L. 1996. The human environment during the Terminal Pleistocene and Holocene in Northeastern Thailand; phytolith evidence from Lake Kumphawapi. *Asian Perspectives* 35:229-254.
- Penny, D., Bishop, P., Grindrod, J. 1996. Holocene palaeoenvironmental reconstruction based on microfossil analysis of a lake sediment core, Nong Han Kumphawapi, Udon Thani, Northeast Thailand. *Asian Perspectives* 35:168-197.
- White, J.C. 1997. A brief note on new dates for the Ban Chiang cultural tradition. *Indo-Pacific Prehistory Association Bulletin* 16:103-106.

11. THE RECENT DISCOVERY AND EXCAVATION OF SA HUYNH CULTURE SITE ON LY SON ISLAND (CENTRAL VIET NAM)

Pham Thi Ninh

The paper deals with some interim result from an archaeological excavation which was carried out at Xom Oc site, on Ly Son Island, Quang Ngai Province, Central Viet Nam. The site had a stratigraphy of 1.10 - 1.5m in depth that was undisturbed and formed of sand, soil and sea shells. The objects found in Xom Oc, especially pottery, indicate that it belongs to the Sa Huynh Culture. However, there are hundreds of tools made of *Tridacna* and *Turbo* shell suggesting that Xom Oc shares characteristics with Xom Con, an earlier culture distributed along the coast of Central Vietnam.

As well as the evidence of settlement, a grave of two adults with rich gifts and a jar burial of an infant were also discovered. A date of 3000 - 2000 BP is proposed for the general dating of Xom Oc, from Early to Late Sa Huynh Culture

10. ASPECTS OF TRADE AND SOCIAL ORGANIZATION IN CENTRAL THAILAND FROM THE BRONZE AGE TO THE DVARAVATI PERIOD

Pajrapongs na Pombejra

The problems with a period in the past where epigraphical evidence is limited and textual references are inaccurate or absent is that one becomes heavily reliant upon the archaeological data to tell the story. The last twenty or so years have seen progress achieved in the methodology of archaeology and a multi-disciplinary approach has enabled sourcing of metal ores as well as the provenancing of clay from sherds. Unfortunately, however,

the establishment of trading networks is hampered by the fact that perishable materials like spices and timber are irretrievable.

The more comprehensive systematic survey and excavation become, the clearer picture one would get of site hierarchies and political boundaries. Social organisation has profited from the analysis of cemeteries in the Bronze and Iron Ages. The disparity in burial remains at a single site can suggest social stratification, achieved within a lifetime at a site like Kok Phnom Di, or inherited at an Iron Age site where children are often wealthy from birth.

The Indianization of central Thailand also took time to effect a profound change. For many centuries, the paucity of objects identifiable with India, except for beads of agate and carnelian, seem to suggest little change. But then monumental architecture, in the shape of brick temples, sprang up all over central Thailand about the 6th or 7th centuries. This was the Dvaravati culture or the To-lo-po-ti of the Chinese texts.

17. RADIOCARBON DATING OF POLLEN AND ITS APPLICATIONS IN PACIFIC ARCHAEOLOGY

Christine Prior

Traditional methods of dating sedimentary sequences involve dating charcoal fragments or the total organic carbon in the matrix. Such methods occasionally produce anomalous results. Numerous researchers have commented upon the problems concerning the use of bulk organic ages to date associated pollen or fossil plant materials in sediments. With the Accelerator Mass Spectrometry (AMS) method of radiocarbon dating, direct dating of pollen itself becomes possible.

Pollen has many advantages as a material for radiocarbon dating. Analysis of pollen morphology allows the identification of specific plant types. The study of pollen preserved in sediments is used to reconstruct a sequence of vegetational change and, by inference, other events such as climatic change or human impact upon the environment. Dating pollen itself rather than associated bulk organic materials in the sediment avoids the possibility that there is an age discrepancy between the pollen and the other materials that make up the whole organic carbon portion of bulk sediment dates.

Previously published techniques used to separate pollen for radiocarbon dating typically combined sieving with several stages of chemical treatment to produce a pollen concentrate as free from extraneous organic material as possible. These early sample preparation techniques for pollen were criticised for leaving a chemi-

cally resistant non-pollen organic fraction. More recently, density separation procedures have been developed in an attempt to concentrate and purify pollen.

In this study, a density separation technique to isolate pollen has been adapted in order to extract sufficient quantities for AMS dating. This technique exploits the difference in densities between palynomorphs and other organic debris to effect a separation. The results of trials using the reagent sodium polytungstate will be described. This method was used on sediments from a New Zealand lake core. A comparison of radiocarbon dates on bulk organics and purified-pollen samples will be presented. Initial results suggest that it is possible to produce a purer pollen sample free of extraneous organic contaminants.

The chronology of human colonisation of Pacific islands continues to be the subject of debate among archaeologists, with much of the dispute concerning the reliability of radiocarbon dates. Many of the most controversial dates are those in association with palaeoenvironmental evidence thought to be the result of human activities. Palaeoenvironmental changes such as deforestation, burning, erosion, introduction of new plants, and the extinction of native land birds have all been used as evidence to deduce human colonisation of islands. Radiocarbon ages determined directly upon pollen can be used to improve the accuracy of the chronology of environmental change and, by implication, human impact upon the environment.

9. PRODUCTION AND DISTRIBUTION OF CERAMICS IN THE THU BON RIVER VALLEY, CENTRAL VIETNAM, AS SHOWN BY PETROGRAPHIC ANALYSIS OF THE CLAYS

Ruth Prior

This paper focuses on the analysis of ceramic material, primarily pottery, from the site of Tra Kieu in the Thu Bon river valley, central Vietnam. The pottery, from four excavation seasons between 1990 and 1997, was recorded and sampled in Vietnam for petrographic analysis, as part of research undertaken for the author's doctoral thesis.

Tra Kieu was a centre of the polity known to the Chinese as Lin-yi, perhaps from the 2nd, and certainly from the 7th century AD onwards. A little later it is known as a major centre of the Indianised Champa kingdom. According to radiocarbon dates, the pottery studied in this work dates between approximately the 1st century BC and the 5th century AD, thus prior to the main development of the Cham state. This gives the

assemblage especial importance, lying as it does between the disappearance of the late Iron Age Sa Huynh culture and the emergence of the Cham.

This paper first summarises the typological study made of the ceramic assemblage which identified two cultural groups, one early (c. 1st BC - 2nd AD), one later (c. 2nd AD - 5th AD). With a typology established, the ceramic fabrics were then characterised using petrographic analysis, placing particular emphasis on detailing the fine grained clay matrix, rather than the inclusions, in an attempt to isolate the workings of individual production centres. If details of ceramic production could be ascertained, then the question of how wares were distributed in the valley could also be addressed.

Over 200 thin sections were examined, 90 in detail using grain size analysis. This resulted in the identification of 16 fabric types. The analysis showed that there was a continuity in exploitation of local resources throughout the two cultural groups (i.e. spanning several centuries). The research led the author to conclude that the majority of the ceramics were produced locally and that production centres in the Thu Bon valley functioned on a moderate scale producing a wide range of vessel types, with no one fabric being vessel specific. Distribution of the vessel types produced locally in the Tra Kieu area is understood to extend between Tra Kieu (an inland site) and Hoi An, located at the mouth of the Thu Bon river.

17. PRESENT PEOPLE AND PETROGLYPHS IN POHNPEI

Paul Rainbird and Meredith Wilson

The authors have undertaken the systematic recording of a large petroglyph site in the Madolenihmw Municipality in the south-east of the island of Pohnpei, Federated States of Micronesia. Over 700 motifs were recorded covering a large rock outcrop and nearby boulders.

Although the priority was to make a detailed record of the site and propose recommendations for management, we were also directed by two main research questions. The first was an assessment of how the motifs fitted into known regional and oceanic "rock art styles". The second concerned the situation of the site in the landscape and how it may relate to natural features and to local cultural sites, such as the large complex of Nan Madol. Both questions, it was hoped, would lead to an interpretation of the cosmological perceptions of Pohnpei islanders over the period of time that the motifs were produced.

In order to pursue these questions we have mapped the site, are assessing the motif types and relationships of the designs through statistical methods and observation, have conducted a review of the literature either directly related or potentially indirectly related to the site, and are in the process of assessing formal and informal interviews with local Pohnpei people in regard to their understanding of the site in the present. The latter, the oral testimony, is being assessed in relation to the work of socio-cultural anthropologists who have worked with Pohnpei communities. In this paper we will present an overview of the site in regard to: location in the landscape, associated archaeological features, and the motifs themselves. The motifs include footprints, handprints, enveloped crosses, anthropomorphs, and an often repeated type that has previously been described as a sword or weaving loom paddle in shape: we have preliminarily labelled these 'swaddles'. We will firstly place these motifs in the context of the other 'rock art' recorded in the northwest tropical Pacific. Next, we will present the literature related to the site and consider this in relation to the understandings of the present people of the island. These will be contextualised into a broader anthropological understanding of knowledge and secrecy derived from anthropological research conducted on the island. In conclusion, we will present preliminary comments regarding how the site may be understood as a place which provokes a broader understanding of past Pohnpeian cosmology; the cosmology of an island community which situates itself as much in a seascape as a landscape.

20. ON LINGUISTIC EVIDENCE FOR EARLY PHILIPPINE CONTACT WITH CHAMORRO

Lawrence A. Reid

Just as one finds doublets among the lexical forms in a language, one of which is an inherited form, the other a borrowing from a related language, having the same historical source but which has undergone different soundshifts, one may also find pairs of grammatical structures in a language, having the same or closely related functions. One of the structures may be a direct reflex of some earlier structure in the parent language of the family, while the other is a borrowed structure from a related language which may ultimately have had the same source as the inherited structure, but which has undergone a different set of morphological or syntactic innovations than those found in the borrowing language.

The two forms of the English possessive construction are an example of this, where the so-called "apos-

trophe s" form is the inherited Germanic construction, while the "of" form is a borrowing from Old French. This paper will discuss two such structures in Chamorro. It will be shown that Chamorro is not a "Philippine language" as some have claimed in the past, but that it has clearly had a period of prolonged contact with a Central Philippine language, long enough to have resulted in transfer of syntactic structures from one language to the other. Possible scenarios for this contact situation are discussed. The claim will be made that only a period of prolonged and frequent contact is likely to have brought about such syntactic doublets, and that this is consistent with a trading network between some Central Philippine port and the Marianas.

13. AN INQUIRY INTO THE SIGNIFICANCE OF THE MULTIPLICITY OF EARTHENWARE FIRING TECHNIQUES PRACTICED IN CONTEMPORARY BURMESE POTTERY VILLAGES.

Charlotte Reith

Whether using "bonfire" techniques or partial kiln structure, the potters in each village I have visited in Burma have developed their own firing technology without apparently attempting to borrow, change or improve their technology by observing the firing techniques of other potting villages.

Even though the differences may be subtle in the case of fuelling and constructing a 'bonfire', each village has its own unique method.

We will explore the possible reasons for this diversity. This would include such variables as isolation, fuel availability, geography, transportation, tribal identity, and ethnolinguistic groupings.

Our preliminary conclusions points to village identity as being the overriding reason for this phenomenon.

19. MONUMENTAL ARCHITECTURE AND CULTURAL LANDSCAPES IN THE MARQUESAS ISLANDS (EAST POLYNESIA)

Barry Rolett, Mike Carson, Jennifer Kahn and Eric West

We report on a two-year study designed to chart the development of cultural landscapes among Polynesian chiefdoms of the Marquesas Islands. Our work involves a detailed investigation of Marquesan monumental architecture, with the goal of understanding the emergence of monumental architecture in the context of increasing socio-political complexity and changing patterns of interaction.

The field work focuses on a well preserved complex of architectural sites located in the interior of Vaitahu Valley. Although this area is presently uninhabited, oral traditions and ethnohistoric accounts clearly identify the valley interior as the focal point for village life during the late prehistoric and early historic periods. It was only under western influence that the residential centre moved to its present location on the coast. Our project area includes some of Vaitahu's most impressive examples of monumental architecture, located in a setting that is representative of the traditional Marquesan cultural landscape.

This study combines the excavation and interpretation of Marquesan archaeological sites with geological analyses of basalt adzes and other stone tools. The geological analyses allow us to "source" the stone tools to their island of origin. Frequencies of imported artifacts provide a quantitative measure of prehistoric access to non-local materials. Our initial results document a major decrease through time in access to imported artifacts, which we interpret to reflect a significant decline in Marquesan interisland voyaging after AD 1450. Our long-term goal is to interpret this changing pattern of intercommunication among chiefdoms in relation to the overall development of Marquesan culture during a period of increasing socio-political complexity.

1. THE INITIAL HOMINID COLONIZATION OF ASIA: A SURVEY OF ANTHROPIC EVIDENCE FROM BIOGEOGRAPHIC AND ECOLOGICAL PERSPECTIVES

Nicolas Rolland

We review fossil and Palaeolithic evidence, palaeoenvironmental circumstances, and issues concerning the earliest peopling of Asia, assuming that Subsaharan Africa was the cradle for anthropogenesis and witnessed a series of biocultural formative stages prior to dispersals beyond the Sahara and/or into Eurasia. Issues include debates about "long" versus "short" chronologies for establishing a hominid presence *datum*, and determining migration routes toward East Asia and the Indo-Pacific region.

A long chronology implies settlement by pre-*erectus* populations associated with a mode 1 (*née* Oldowan) technology. The short chronology concludes that movements beyond Subsaharan Africa coincide with *Homo erectus* with a mode 2 technology. One dispersal scenario proposes multidirectional dispersals from the Near East that would include crossing directly through Central Asia to reach the Far East. An alternative sce-

nario favours roundabout population movements restricted along Asia's adaptively more familiar subtropical and tropical biomes, by considering biogeographic concepts such as dispersal route probabilities, taking into account physiographic, climatic, ecological and latitudinal obstacles, as well as ecological concepts such as biomass and carrying capacity conditions.

Securely identified and dated anthropic evidence supports a 1.4 my datum for human presence in the Near East (prior to North Africa), 1.0-1.2 my for Southeast Asia, and around 1.0 my for Northern China. Dispersals to the Northeast beyond the Fertile Crescent region must have presented hominids with major mountain and plateaux barriers, requiring a development of vertical seasonal transhumance land use systems much earlier than identifiable in the record. A route through the Indian Subcontinent, on the other hand, offered highly favourable animal food biomass subsistence conditions. Pleistocene faunal communities there combined endemic and Palaeartic rather than Oriental elements. This suggests that Southeast Asia acted as an ecological filter, coinciding as well with the "Movius Line," a Lower Palaeolithic distributional pattern defined here as mode 2 Non-Acheulian, unlike further West. Southeast Asia's predominantly forested topical landscapes offered less favourable subsistence circumstances but episodic glacio-eustatic sea-level fluctuations, which fostered insular endemism, created incipient conditions for long-term adaptations to Oceanic habitats.

Anthropic finds from East Asia testify to hominid adaptive versatility to varied subtropical and temperate palaeoenvironments. Lower Palaeolithic discoveries from Central Asia may imply movements directly from the Near East by overcoming major orogenic barriers but equally well an origin from Northern China though Xinjiang when Lower Pleistocene bioclimatic conditions were less forbidding than nowadays. All higher latitudes early anthropic evidence do not reach beyond 40°-41°, suggesting that short winter daylight duration limited migratory movements further North.

16. AT THE BORDER OF POLYNESIA: ARCHAEOLOGICAL RESEARCH IN THE EAST-FIJIAN ISLANDS OF CIKOBIA AND NAQELELEVU

C. Sand, F. Valentin and T. Sorovi

This paper will present the first results of a joint archaeological and anthropological program conducted by a team of French and Fijian archaeologists on the two small islands of Cikobia and Naqelevu, the north-eastern most islands of Melanesia in front of the north-

ern route to Western Polynesia. The scope of this program is to reconstruct the prehistoric chronology of these two islands, firstly to fill in a survey gap in this part of Fiji located in front of the poorly studied Vanua Levu and to help the cultural reconstruction of Fiji prehistory. But the program also wishes to explore cultural relationship with Western Polynesia, known through oral history, through the archaeological data.

A first field project has enabled us to make a general survey and identify archaeological sites like fortifications, villages, burial grounds and caves, with different types of prehistoric material. Preliminary excavations have led to a first general reconstruction of the prehistoric chronology, starting nearly 3000 years ago, associated in the last centuries with oral traditions. This paper will present the different results and show how they help to identify the cultural evolution between Eastern Melanesia and Western Polynesia

14. RECONSIDERING MATRIARCHY AS A SOCIAL-CULTURAL FORM: THE MINANGKABAU CASE

Peggy Reeves Sanday

Although there are many examples of female-centred social systems in the archaeological and ethnological records, the term matriarchy has been abandoned by Western scholars because of the claim (mainly by feminist scholars) that no society has ever been ruled by women. In this paper, I argue that the concept of matriarchy as originally developed by J J Bachofen in his book *Das Mutterrecht* (first published in 1861) meant "mother right" more than female rule (or "gynaecocracy"). While gynaecocracy was a theoretical term which fit Bachofen's constructed schema of universal stages of unilinear cultural evolution, "mother right" was an ethnographic term that showed a better fit with the data Bachofen consulted.

In this paper I suggest that "mother right" is the appropriate term for the ancient matriarchies Bachofen describes rather than gynaecocracy. That said, I add that "mother right" does not exclude the notion of female rule; rather it shifts the emphasis from power focused on a gender to power exercised through the symbolism attached to women's roles as mothers and nurturers of the generations. While this might in some cases lead to rule by queens, it does not exclude males from ruling positions.

The Minangkabau of West Sumatra are known to anthropologists as the largest and most stable matrilineal system in the world today. Based on long term field re-

search in West Sumatra, in this paper I argue for reconsidering matriarchy as a living social form which includes interrelated symbolic, social, economic, and political forms. I suggest this for practical as well as theoretical reasons. First, the Minangkabau themselves refer to their social system as a "matriarchaat," using the Dutch term. By this term, they do not mean female rule. Rather they refer to their female centred customs in marriage, family, post-marital residence and inheritance rules. To this one can add that the Minangkabau live by a social philosophy which is strikingly different from the Enlightenment philosophy that shaped modern social forms in Western Europe and America.

From the point of view of cultural theory, the Minangkabau case offers Western scholarship a world view and social system that can be contrasted with better known patrilineal-patriarchal forms. That the Minangkabau case is not unique is suggested by the degree to which certain details of Minangkabau social organisation resonate with Bachofen's description of ancient Near Eastern "matriarchies." Because it does not represent an isolated social form, the Minangkabau case is an important one with which to rethink the meaning of matriarchy.

24. CONTROLLING MODERN DEVELOPMENT IN HISTORIC TOWNS: THE CONTRASTING APPROACHES OF KATHMANDU, PATAN AND BHAKTAPUR

Surya Sangache

Densely populated compact settlement areas of Kathmandu, Patan and Bhaktapur are the three historic cities of Kathmandu valley. Until recently these historic core areas were considered classic examples of Newari urban and architectural form of universal interest as a living museum. Its unique attributes stem from the fact that very little change occurred until relatively recently (1960) and the process of expansion and renewal had conformed closely to the architectural and planning tradition of Newari culture.

Due to rapid population growth and extraordinary economic and development pressures, the Kathmandu valley as a whole in recent years (1960) onwards has suffered considerable degradation of its physical environment. This widely recognised process has severely affected the historic towns and traditional settlements of the valley. Among factors that have had a negative impact, the single most disturbing has been the encroachment by new buildings of inappropriate design, in many cases of illegal excessive height, the visible use of alien

constructional materials and demolition of historic residences in the city core areas. Kathmandu and Patan had lost its traditional townscape in many quarters of the town. This is because of the fact that in the absence of the integrated conservation plan for historic city core development in Kathmandu and Patan, much of the modern development is centred in and around the historic city.

Due to the efforts of the Bhaktapur Development Project (1974-86) and less development pressures than in Kathmandu and Patan, Bhaktapur has retained its traditional townscape in almost every quarter of the town. Much of the modern development is centred on the new roads to the north and particularly to the south of the town, rather than in the centre of the historic city. Thus located in the most well preserved of the historic cities, the Bhaktapur Monument Zone (inscribed in the World Heritage list) has not suffered as much from encroachment by inappropriate tall buildings as the other two Monument Zones of Kathmandu and Patan also inscribed in the World Heritage list.

11. RECENT ARCHAEOLOGICAL RESEARCH IN LAOS

Thongsa Sayavongkhamdy

In this paper I will present some preliminary results of my ongoing research. Archaeological excavation has been conducted within three provinces of Northern Laos, namely Luang Prabang, Vientiane and Xieng Khuang.

Tam Hua Pu and Tam Nang An are two cave sites in Luang Prabang Province. The first occupation in these is Hoabinhian, as evidenced by typical Hoabinhian stone tools and flakes. The caves were then used as secondary burial sites during the Bronze and Iron Age between 3000 and 1000 BP. Bronze axes, and fragments of other objects made of bronze such as bowls were amongst the grave goods. A long iron spearhead which still bears textile pseudomorphs has been recovered, amongst a rich collection of iron objects including sickles, knives and several ornamental implements. Marine cowry shells with their tops removed, together with beads made of marine shell, carnelian, semi-precious stone and glass indicate that important trade networks existed.

Lao Pako, open site in the province of Vientiane, has been revealed as a secondary jar burial site which later on was converted into an iron workshop (see abstracts by Anna Kallen and Anna Karlstrom). A typical set of burial jars included two round-bottomed globular jars with the upper placed upside-down over the lower. One

or two small pots containing an iron object (axe, knife) or spindle whorls were then placed inside the lower jar. Rice chaff was present in the pottery. Two roller stamps identical to those found at Ban Chiang were also amongst the grave goods. The metallurgical activity is evidenced by the discovery of tuyères, remains of furnaces, slag, iron ore and a large quantity of charcoal. Finally, a miniature Dongson bronze drum was found in the trench and this has brought up the role of Lao Pako vis-à-vis the expansion of the Dongson Culture and more specifically the paradigm of the Dongson drum dispersal.

The "Plain of Jars" consists of a number of open sites in Xieng Khuang province. Of the forty stone jar sites, the three largest were test-excavated; Phon Savan, Ban Xieng Dee and Pu Salato. These sites were earlier named by M. Colani as Ban Ang, Ban Soua and Champ d'aviation Latsen.

Identical artefacts to those excavated by M. Colani (1931-32) have been recovered, illustrating the Iron Age material culture of that particular part of Laos. A quarry site where stone jars were made has been located, where unfinished stone jars are still lying *in situ*. Upon the discovery of mortuary pots buried around the large granite blocks which are lying scattered in between the stone jars, it appears that these granite blocks were also used as funerary "monuments" or markers, in parallel with the regular stone jars. The burial pots under the granite blocks and those under the stone jars are, however, so distinctive from each other that their contemporaneity is questionable, unless they represent two distinct cultural communities co-existing peacefully and manufacturing their pots with their own traditions. Otherwise, this difference may indicate that the granite blocks were used as "substitutes" for the stone jars in a later stage, at a period where the "megalithic" cult was fading away.

Synthetic review of the sites under study will throw light on the role that the Lao territory might have played, thanks to its strategic location during a period of spread of not only major technologies like stone tool making, pottery, agriculture, textile art and metallurgy, but also of peoples.

15. WATER AND LAND MANAGEMENT AT SEBATU, BALI

Vernon Scarborough and John Schoenfelder

The island of Bali has fascinated cultural anthropologists for decades. The rich yet composed investment in performance ritual by the Balinese continues to unify and define their identity. In spite of the considerable time

spent in attempting to know Balinese customs and sociopolitical organisation, much remains to be learned about their ancient past and the importance of their economy. By carefully mapping and coring a present-day temple complex and its immediate association with rice paddy fields, we gain insights that illuminate the co-evolution of a state political economy and a highly engineered environment.

A "total station" was used to produce a detailed map covering Pura Gunung Kawi Sebatu (a functioning Balinese spring temple) and a 0.86 hectare area of *sawah* in a small valley immediately downstream from the temple spring. Within this zone, over twenty soil cores were extracted with a JMC Environmentalist's Subsurface Probe, to depths ranging from 1 to 5 m as local conditions allowed. Sedimentological, pollen, and phytolith analyses are currently being performed on these cores. A total of eight AMS radiocarbon dates are expected to be available by the time of the conference.

This project aims to reveal the rate and process by which the landscape and ecology were altered. In its pre-modified state, the locality investigated likely had swamp-like conditions, permitting the early establishment of long-term sedentism in part associated with the rich natural biota found in swamp settings as well as patches of level ground suitable for early broadcasted rice varieties and other horticultural crops. Evidence in hand to date does not contradict this hypothesis, but some cores may have failed to reach early levels because of an unexpectedly high rate of siltation in the agricultural fields; this may be a result of deliberate capture of sediment from eroding hillsides behind dams and rice terraces today.

The temple spring also provides water to a 31 ha area of ridge-top *sawah* (Subak Dlod Blumbang), to which the spring is connected by 4 km of tunnels and open channel. The mapping project illuminates the technical, social, and symbolic linkages between this subak, the smaller sawah area by the temple, and the water temple system represented by Pura Gunung Kawi Sebatu.

1. RECENT RESEARCH AT PANXIAN DADONG, GUIZHOU PROVINCE, SOUTHERN CHINA

Lynne Schepartz

The Panxian Dadong Collaborative Project completed its second field season in January 1998. The cave deposits contain stone tools, a diversity of middle Pleistocene mammalian species, charcoal, burnt and cut-marked bone, and isolated hominid teeth. Our fieldwork focuses on understanding the formation of the deposits,

determining their depth and extent, and dating them using Uranium-series and ESR.

The major goal of the project is to investigate the role that complex behaviours, (including strategic use of large game species, the controlled use of fire, and the fabrication of tools from various raw materials), play in East Asian evolution and to document how the development of these behaviours may be distinctive in mountainous southern China.

The faunal assemblage is a rich sample of the Ailuropoda-Stegodon fauna of southern East Asia. It is dominated by large animals that would not ordinarily inhabit caves. These include extinct species such as the elephant-like *Stegodon*, the giant tapir *Megatapirus*, and the Chinese rhinoceros. Species that inhabit dense forests and mixed woodlands are represented, suggesting a range of habitats characteristic of montane environments.

Taphonomic analysis of the fauna indicates that several processes and agents introduced materials into the cave. The collection provides evidence for hominid activity (cut marks, percussion damage or burning on 9% of the specimens), carnivore damage (punctures, scoring or mouth polish on 3%) and rodent processing (gnawing by porcupine or smaller rodents on 10%).

12. THE CO-EVOLUTION OF AGRICULTURAL AND SOCIOPOLITICAL SYSTEMS IN BALI

John Schoenfelder

The social structure of ethnographic Bali features numerous kinds of overlapping function-specific actor groups; understanding the emergence of this pattern should illuminate other cases where relatively monohierarchical "chiefdoms" developed into civilisations with different ideological, martial, managerial, and resource-possession power sources controlled by distinct institutions.

Recent ethnographic and computer work by Stephen Lansing suggests that the autonomy of ethnographic Balinese farmers' groups (*subaks*) permits, and may be causally linked to, optimisation of pest and water management in contiguous agricultural areas fed by multiple canals. If the self-organisation of the yield-enhancing autonomous "complex adaptive system" of water-temple congregations managing ricefield irrigation was indeed an outcome of increasing agricultural density, this development would have had an effect upon the development of the co-existing extractive polities.

On the expectation that ease of irrigation is predictive of age, several dozen existing irrigation systems in

the regency of Gianyar will be rated by the length of their tunnels, by the ratio of channel length to total irrigated area, and by other topographical and environmental variables. The rate of change and the plausibility of the landscape "retro-diction" scheme will be checked by comparing the resulting patterns with other landscape analyses and with the spatial distributions of various classes of sites (sarcophagi, candi, places mentioned in inscriptions, etc.) of the last two millennia.

Development of independent farmers' groups could have had either or both of two political consequences for co-existing states or chiefdoms: (1) power strategy changes as agro-managerial legitimacy sources were lost, and (2) decentralisation as their extractive abilities weakened. Evaluating this part of the equation requires a review of the evolution of political forms on Bali, with special attention to turning points such as the onset of "Indianization," the Majapahit conquest, and the fragmentation of Gelgel. This review, focusing on changes in centralised power and ideological strategies, is being built from both historical and archaeological data sources.

3. THE ARCHAEOLOGICAL HORIZONS FROM THE SONG TERUS CAVE, PUNUNG AREA, EAST JAVA, INDONESIA.

F. Sémah, T. Simanjuntak, A.M. Sémah, H. Forestier, Jatmiko and Dubel Driwantoro

Near Punung, the numerous karstic hills of the Gunung Sewu (Thousand Mountains) comprise a lot of caves which have been occupied in prehistoric times. The most evident archaeological horizon which can be found in the area has been dated in recent years between 4,000 and 8,000 BP., and has yielded a rich flake industry which has been thoroughly studied in the Song Keplek site (see Truman Simanjuntak and Forestier, this Congress).

In the Song Terus cave, besides an extensive excavation which concerns this "Keplek" horizon, two deep test pits have been conducted in order to describe the sedimentary filling of the cave, which proved to be more than 15 meters thick.

Below the Keplek horizon, between 8,000 and ca. 40,000 BP. are found layers whose archaeological content, somewhat poor, needs to be reached by extensive excavations in order to be fully understood. The lowermost horizon found up to now in the cave contains a quite rough and patinated flake industry, deposited in a fluvial environment, part of which dates back to more than 100,000 years.

This quite "old" Terus industry, unknown before, might represent a step toward the dating of the Patjitanian assemblage, which has not been so far found in a stratigraphically controlled section.

15. A C.3,000-YEAR LONG ARCHAEOLOGICAL RECORD IN THE KOUMAC VALLEY, NORTHERN GRANDE TERRE, NEW CALEDONIA.

Anne-Marie Sémah, François Sémah and Hubert Forestier

The excavation of the NKM004 cave, located about 10 km from the coast in the Koumac valley, gives evidence of early inland settlements whose age dates back to c.3000 BP. (like the so-called Lapita sites). The cave, at the foot of a karstic cliff along a small tributary of the Koumac river, has been filled with fluvial silts and then used, near its mouth, as a rock shelter.

The archaeological record, which begins with paddle-impressed, Podtanean pottery sherds, extends along more than one meter up to the arrival of European ships at the end of the 18th century. It contains a lot of archaeological remains such as pottery, shells and bones, but also a quite diversified lithic industry on pebbles and flakes which represents a somewhat new aspect of the New Caledonian prehistory.

13. A CROSS-CULTURAL ETHNOGRAPHIC ANALYSIS: FORAGER MOBILITY ORGANIZATION IN SEASONAL TROPICAL ENVIRONMENTS

Rasmi Shoocongdej

Recent progress towards understanding forager mobility has focused primarily on foragers in arctic, boreal, temperate, and arid tropical environments. In contrast, little research has been done on mobility and related organisational processes in humid tropical environments, which are complex and highly diverse ecosystems. Tropical environments are not all alike, and can be quite different from the seasonally unchanging environments archaeologists often assume them to be. In addition, much research has focused on "collector" mobility systems, while we have not as thoroughly explored "forager" mobility organisation. Archaeologists generally assume that residentially organised systems are associated with the tropics.

Based on cross-cultural comparisons, this paper explores how foragers are mobile in the Southeast Asian seasonal tropics. It concentrates on a specific aspect of a general mobility model, the relationship between sea-

sonality and mobility strategies. In addition, the paper reviews and examines the nature of Southeast Asian tropical environments and tropical ethnographic data in order to understand the range of mobility options found in tropical forager societies. The analysis of cross-cultural ethnographic data demonstrates that seasonal tropical foragers tend to employ a mixed mobility strategy in order to cope with the environment. Residential mobility is favoured in the rainy season, while specialised subsistence procurement and logistical mobility are employed in the dry season.

16. THE RELATIONSHIP OF THE RED-SLIPPED AND LIME-IMPRESSED POTTERY OF ISLAND SOUTHEAST ASIA TO THE LAPITA POTTERY OF THE PACIFIC

Richard Shutler, Jr

For almost 50 years I have been interested in the origin of Lapita pottery and its Austronesian makers. In 1975, when Shutler and Marck suggested Taiwan as the Austronesian "Homeland," as have others since. I have continued to follow the many arguments as to exactly where the Austronesian "Homeland" is. I still believe that Taiwan is the ultimate Island Southeast Asian "Homeland." That is, Taiwan is the place from which the Austronesians began to move south into the Philippines, and eventually out into the Pacific. Most scholars agree that the "Homeland" of their ancestors, the Proto-Austronesians, is on the mainland of China.

A review of the literature suggests that there is a substratum of Red Ware pottery all the way from Taiwan to the southern Philippines, on to Indonesia, and in the Pacific wherever pottery is found. I suggest a common origin for all the red-slipped and lime-impressed pottery of this wide area in Taiwan or the Philippines. If the 4,500 BC date for red-slipped and lime-impressed pottery is confirmed by further excavations, then it is possible that Balobok Rockshelter is part of the area from which Lapita pottery makers began to move east into Melanesia, north through the Philippines, and east again into Micronesia. This is a testable hypothesis.

3. LITHIC TYPO-TECHNOLOGY OF HOLOCENE SONG KEPLEK CAVE, EAST JAVA

T. Simanjuntak and H. Forestier

Song Keplek site near Punung Area in the Southern Mountains of Java present an important stone flake pro-

duction dated about 45000 to 8000 BP. These lithic artefacts will be studied in a typological and a technological perspective with a discussion of the role of flaking method. At the present time, technological analysis is increasingly framed within a systemic approach of operational chains (*chaînes opératoire*). The others artefacts like bone artefacts (borers, several bone points, spatulae, etc.) will be presented too.

5. RECENT EXCAVATIONS AT IMLIDIH KHURD, DISTT. GORAKHPUR, INDIA

A.K. Singh

The ancient settlement of Imlidih Khurd (26°30'30" N, 83°12'5" E) is located on the left bank of Kuwana river in district Gorakhpur of eastern Uttar Pradesh, India. This protohistoric settlement has yielded a cultural sequence of three periods. The major achievement of the recent excavations at Imlidih Khurd brought to light the vestiges of an antecedent culture termed as "Pre-Narhan," datable between 1700 and 1300 BC.

The hallmark of this culture is cord-impressed pottery (handmade and wheel made) which is generally found in the Neolithic milieu of this region. On the present showing the Pre-Narhan inhabitants seem to have been the first colonisers of the Sarayupar plain. The principal types of cord impressed pottery are spherical bowls, pedestalled bowls, vases with flaring rim, spouted vessels and cooking vessels. The earliest inhabitants of Imlidih were well acquainted with the decoration of the pottery. They decorated the vessels with the method of post-firing scratching and painting.

A good quantity of animal bones was collected in the excavation. The tentatively taxonomic classification of these bones shows that cattle, sheep/goat and presumably pig had already been domesticated in period I. Examination of archaeobotanical remains has shown that the inhabitants of the pre-Narhan layer cultivated two crops a year like rice, barley, wheat, millets, a variety of pulses and oil seeds.

The earliest inhabitants of Imlidih lived in wattle-and-daub beads of houses. The small finds comprise several micro-beads of steatite, terracotta, agate and faience, bone points and pottery discs. These investigations have now established that permanent villages with agriculture as the mainstay of their economy had already come into existence at the beginning of the 2nd millennium BC in the Sarayupar plain.

16. SOUTHEAST ASIAN EARTHENWARE POTTERY AND ITS SPREAD

Wilhelm G. Solheim II

The earliest securely dated pottery known to me in Southeast Asia is from the top layers of Hoabinhian cave sites, whether made by Hoabinhians or others. This is dated at about 8400 BP. in the top of Layer 2 at Spirit Cave, northwestern Thailand. Surface treatment includes cord-marking, net-marking, burnishing, appliquéing, and incising. It is probably earlier in northern Vietnam sites, but does not include cord-marking at first. Basket-marking and simple carved-paddle impressing follows soon thereafter in some areas.

The earliest dating for pottery in Island Southeast Asia and Taiwan is uncertain but falls somewhere before 2000 BC. From Sanga Sanga Rock Shelter on a small island at the very southwestern end of the Philippines pottery has twice been dated to about 6000 BC, but these are uncorrected shell dates and I would still question them. The next earliest dates are for a plain, cord-marked, basket-marked, carved-paddle impressed, or burnished pottery, dating from before 2200 BC in northern Taiwan or possibly earlier than 3000 BC in northern Luzon, Philippines, western Sulawesi, and eastern Timor, Indonesia.

Sometime before 2000 BC decoration by red-slipping and various simple circle-impressed, and crenelate *Arca* shell line or dentate-stamp impressed or incised straight line borders, often all or any of these inlaid with lime, is added to the earlier varieties of decoration. This pottery, first reported from the Marianas Islands of Micronesia and named Marianas Red, has been recovered in the same very wide spread areas as the earlier pottery. All of these elements of decoration have been reported from earlier coastal sites in South China and Vietnam. These elements as put together in pottery in western Sulawesi resemble the Lapita pottery to a considerable degree.

Evolved in large part out of this earlier pottery from about 1600 BC and later are the Lapita Pottery Tradition of western Oceania and what I have called the Sa-huynh-Kalanay Pottery Tradition from about 1200 BC.

Originating independently from these maritime spread pottery traditions was what I have called the Bao-Malay Pottery Tradition of the last possibly 2000 years. This carved-paddle impressed pottery originated in southwestern China before 2000 BC and reached the coast around Hong Kong well before 1000 BC. The earliest date for this pottery that I am aware of in Island Southeast Asia is from Gua Sireh in Sarawak at around

AD 600. It has been found in port sites of eastern India possibly as early as 200 BC. How it got there that early is still one of several problems to be solved in the spread of Southeast Asian pottery.

1. A RECONSIDERATION OF THE CHRONOLOGY OF THE EARLY PALAEOLITHIC LANNATHAIAN CULTURE, NORTH THAILAND

Per Sørensen

In Thailand Early and Mid-Palaeolithic sites, mainly pebble-tool containing sediments, have so far only been discovered in the intermontane basins in Lampang and Phrae in North Thailand, wherefore the old name of the area - Lanna Thai - was given to the culture. The sites were discovered during field surveys in 1972-73, and a major test excavation of one of the sites was undertaken in the beginning of 1974. The field surveys were continued on and off until 1987.

Some of the sites and their chronology have been discussed and published on several occasions. However, the change in recent years of the dating of the Matuyama/Brunhes boundary to 0.78 Ma BP (and thus of the border between the Early and the Middle Pleistocene) does not only push the age of the Lampang sites further backwards chronologically, as they could beforehand be shown at least to be older than the Matuyama/Brunhes boundary, but also necessitates a reconsideration of the age of the sites in the Phrae basin. They have so far been estimated to belong to the first half of the Middle Pleistocene. A re-examination of the geological age of one of the sites and of the finds makes perhaps a dating of the sites later in the Middle Pleistocene more likely.

4. SOME SHELL IMPLEMENT TYPES AND CERTAIN OTHER TOOL TYPES OF THE BAN KAO CULTURE FROM BANG SITE, BAN KAO, THAILAND.

Per Sørensen

At the European Association of Southeast Asian Archaeologists (EURASEAA) 5th International Conference in Paris in 1996, I had an opportunity to present the preliminary results of my studies of the 1045 complete or fragmentary stone adzes and axes from Bang Site, Ban Kao. However, with about 8.500 registered pieces of excavated finished or fragmentary tools made of riverine bivalve mussels, waste products from the manufacturing of the tools and indeterminable pieces, these

shell tools represent by far the largest single group of implements from the excavation.

The shells collected for the manufacturing of the tools all belong to the same species. Of size they were quite large, and it seems that they were rather intensively utilised. Using geometrical figures as basis for a classification of the tools, they are divisible into a number of main shapes, such as square, rectangular, triangular with straight sides, or 1 - 2 inverted or convex-curved sides, high triangular shape with narrow base, oblong, oval, etc. with several transitional forms. There are some indications that they may have been sawed into their functional shape. Working edges in some cases were ground sharp, but mostly the natural sharpness of the shaped side of the shell was used, while the thicker natural, slightly rounded rim of the shell was held in the hand while the tool was used. In some cases it could, however, be observed, that a part of the rim had been retouched to secure a more firm grip of the tool during use.

Functionally, the shell implements were most likely used for various cutting and scraping purposes. Thus some probably functioned as ordinary cutting knives, while others seem to have served more specific purposes, such as reaping knives. It also seems probable that a number of the shell implements served various scraping purposes, some probably in connection with the final shaping of the interior and exterior surfaces of the pottery, after this had been coarsely beaten or (slow) wheel-turned into shape. Short, slim "projectile-like" pieces, pointed at both ends may have been used as needles or for fishing purposes.

Usually the hinges of the shells were removed prior to shaping into a tool and accordingly may be considered as waste products. However, some have one end ground to a point, so they could have served as fishhooks. Fishhooks, however, were mostly made from animal bones, just like most other implements for hunting purposes. The extensive use of shells for cutting and scraping purposes may reflect a shortage of other suitable raw materials for the manufacturing of especially the cutting implements, such as stone, apparently also evidenced by the generally small sizes of stone adzes and axes. But it might also reflect the greater adaptability of the shell to be shaped to serve very specific purposes, particularly in connection with scraping. These and other problems will be further discussed in the paper.

15. SITE FORMATION PROCESSES AND DATING OF THE MANGAASI POTTERY TYPE-SITE, MANGAAS, EFATE ISLAND, VANUATU

Matthew Spriggs

Archaeological excavations have been conducted at the Mangaasi pottery type-site in 1996 and 1997. The site was originally excavated by Jose Garanger in 1966-7 and published by him in 1972. The present excavations were conducted in areas south and east of the original excavated area. Excavation transects across the site have allowed clarification of the stratigraphy and located an intact cultural deposit earlier than the period of "classic" incised and applied relief Mangaasi pottery.

Site occupation began at around 700 BC on a prograding beach in a tectonically active area subject to uplift. Occupation continued until about 150 BC, shifting in response to this progradation. There were occasional episodes of storm beach deposition and flooding from a stream adjacent to the site during this period. An airfall tephra was then deposited, possibly resulting from the Ambrym Caldera-forming eruption of about 2000 years ago, one of the largest Holocene eruptive events in the world.

Subsequently, occupation was renewed but there is a possibility of abandonment of the site for several hundred years. If so, it is not thought that this relates to volcanic activity. The later occupation is by users of classic Mangaasi pottery and dates to around AD 500 (more dates are awaited). The area then appears to have been used for gardening and/or was abandoned altogether before a thicker tephra was deposited, presumably from the major eruption of the Kuwae volcano which occurred around AD 1452. Much of this tephra is secondarily deposited from the adjacent hillslopes rather than being a primary airfall tephra.

Subsequently in the 17th century the site was reoccupied by an aceramic population and is recorded in oral traditions as being the village of the powerful central Vanuatu chief Roi Mata. The traditions suggest that upon his death the village was abandoned and considered sacred land. It seems to have lain undisturbed until this century when, with the advent of Christianity, people lost their fear of the area and returned to it to open up gardens and coconut plantations, thus initiating disturbance of the upper levels of the site.

20. AN ATTEMPTED CORRELATION OF AR-
CHAEOLOGICAL DATES AND LINGUISTIC SUB-
GROUPS IN THE SETTLEMENT OF THE ISLAND
SOUTHEAST ASIAN - PACIFIC REGION

Matthew Spriggs and Peter Bellwood

There have been several previous attempts to link the spread of the Island Southeast Asian Neolithic and its eastward extension, the Lapita Culture of the western Pacific, to the spread of the Austronesian languages through previously inhabited areas and then beyond them into parts of the Pacific (Remote Oceania) uninhabited before Austronesian settlement. Recent research by linguists reassessing their subgrouping arguments and the relative amount of time taken to develop the major identified sub-groups, and by archaeologists imposing various forms of "chronometric hygiene" on the radiocarbon dates for settlement of various parts of Island Southeast Asia and the Pacific, as well as new basic descriptive work in both disciplines, necessitate revision of past attempts at correlation by the authors and by others involved in similar endeavours

10. RECENT RESEARCH ON THE EMERGENCE OF
EARLY HISTORIC STATES IN CAMBODIA'S
LOWER MEKONG DELTA

Miriam T. Stark and Bong Sovath

One of the earliest states in mainland Southeast Asia arose in the Lower Mekong Delta shortly after AD 200. Called Funan by Chinese travellers, historians maintain that this polity witnessed the emergence of many hallmarks of the ancient state: urbanisation, political hierarchy, institutionalised religion, economic specialisation, and writing. Until recently, the only archaeological information available for this region derived from Louis Malleret's 1940s excavations at Oc Eo, a site that reputedly served as a coastal entrepot during the first through sixth centuries AD. The paucity of archaeological evidence for this early polity has not deterred historians from reconstructing its economic and political organisation.

In the half-century since Malleret's fieldwork, Vietnamese archaeologists have uncovered dozens of "Oc Eo Culture" sites throughout southern Vietnam. Yet we know practically nothing about this period and polity in Cambodia's Mekong Delta.

Our paper presents findings from archaeological excavations by the Lower Mekong Archaeological Project from the 1996 field season at Angkor Borei (Takeo

Province). We concentrate on developments in the Mekong Delta of southern Cambodia, and on the "Funan" polity that reputedly flourished from the second to sixth centuries AD. One significant finding of our research is that Cambodia's Mekong Delta housed large settlements that preceded historical accounts of Funan by more than 500 years: Angkor Borei (one reputed capital of Funan) was founded in the 4th or 5th centuries BC. While this finding does not refute historical claims for the Funan polity, our ongoing archaeological investigations force us to step outside historical models to interpret the archaeological record.

A variety of data sources available to us now -- Chinese historical accounts, inscriptions, local oral traditions, and archaeological materials -- suggest that this early Asian city was a unique mixture of ritual, economic, and political activity. While our research at Angkor Borei has just begun, we discuss some results of our field investigations and on chronometric and ceramic data now available. We also describe future directions for the Lower Mekong Archaeological Project, and place our study of this site into a broader context of early state formation.

17. APPLICATION OF ORAL HISTORY TO AR-
CHAEOLOGICAL DISCOVERY

Charles F. Streck Jr.

The collection of oral histories from local residents and/or indigenous peoples often forms a vital data set for locating the presence, determining the function, and assessing the significance of archaeological properties. This is particularly true in the Micronesian region where there is often historic continuity in the traditional culture from pre-Western Contact periods through the modern era. Therefore, the archaeologist can often consult with recognised traditional oral history specialists in the local community while performing research.

The present discussion is based upon research performed in compliance to United States historic preservation legislation as well as personal research and experience. Examples shall be drawn from locations in the Marshall Islands, Kosrae and Pohnpei in the Federated States of Micronesia, the republic of Palau, and the northern Mariana Islands. The oral history research was performed in both a systematic (employing the use of specialists in the subject) and advantageous manner (often by the archaeologist while in the field). Topics shall include discussions on both the enhancing and limiting factors often inherent to the application of oral historical data to archaeological discovery and interpretation.

Application of oral historical data can often contain "pit-falls" which may actually detract from this process. In addition, the researcher must necessarily be intimately familiar with all aspects of the collection and social provenience of oral historical data prior to successfully applying the data for archaeological discovery and interpretation.

16. LAPITA CERAMIC PRODUCTION AND USE IN WEST NEW BRITAIN, PAPUA NEW GUINEA

Glen Summerhayes

This paper addresses the nature of social and economic interaction between the prehistoric Western Pacific communities in the 3rd millennium BP by examining the nature of production, exchange and use of ceramics from one region, West New Britain, Papua New Guinea. My analysis of Lapita pottery from West New Britain demonstrates that production of pottery was mainly local. In contrast, an analysis of style and form in relationship to production supports the theory that people were moving regularly over vast areas of the Pacific. The limited amount of ceramic exchange that did occur was epiphenomenal to larger social processes occurring in the region at this time.

16. INTERACTION IN THE NEW IRELAND-NORTH SOLOMON CORRIDOR

Glen Summerhayes

This paper outlines my current research on Anir, New Ireland Province, Papua New Guinea. The project aims to investigate prehistoric interaction over a 3000 year period leading to the ethnographic present and the role played by Anir, a stepping stone island, in the regulation and distribution of goods and ideas between the Bismarck Archipelago and the Solomon Islands and beyond. Anir's location makes it a central node in the transfer of goods passing from the Bismarcks out into the Western Pacific, and this should be evidenced in the archaeological record.

Three major issues which the project will address are first, the significance of exchange in the colonisation of Remote Oceania and its role in maintaining a cohesion between far flung communities as evident by the distribution of Lapita ceramics. Secondly, the significance of the so called "break-up" of the Lapita exchange network c.2000 BP, when the classic dentate ware disappears, and pots with applied and relief decoration appear. And lastly, the identification of some elements of the devel-

opment of the present day exchange configurations, which are often used by archaeologists in modelling the past. The preliminary results from three field seasons will be presented.

8. THE TRANSITION FROM FORAGING TO FARMING ON THE ISLAND OF OKINAWA, JAPAN

Hiroto Takamiya

One of the major research topics in anthropological archaeology has been the transition from foraging to farming in human history. This has also been true for Okinawan archaeology. For the last four decades or so, many Okinawan archaeologists have attempted to understand the timing of the beginning of agriculture on the island.

However, until 1992, the earliest evidence for food production in this region had been the Gusuku Period (ca. 12th to 16th Centuries AD). In order to elucidate the beginning of agriculture on the island of Okinawa, the author has applied flotation methods to several pre-Gusuku sites. This work has shown that food production on Okinawa began at least by the 8-10th Centuries AD. At the same time, approximately 600 to 800 years prior to this, people on the island were foragers. Therefore food production in Okinawa most likely began between the 2nd and the 8-10th Centuries AD.

In this paper I will present the latest data on the beginning of food production on Okinawa island based on paleoethnobotanical research.

10. A RECENT EXCAVATION AT THE KHMER TEMPLE PRASAT HIN PHIMAI IN NORTHEAST THAILAND

Sarah Talbot

The Khmer Empire dominated much of mainland Southeast Asia during the ninth to fifteenth centuries AD. While best known for the temple complexes of Angkor in Cambodia, Khmer influence stretched far into what is now Laos and Thailand. Prasat Hin Phimai is the largest Khmer temple in Thailand and dates to the 11th century. The city of Phimai was an important centre of the Empire rather than a provincial backwater - its local ruling dynasty provided a succession of Khmer kings and an imperial road led directly from Phimai to Angkor, 225 kilometres away. Prasat Hin Phimai is now a historic park administered by the Thai Fine Arts Department.

In early 1998 an excavation was carried out to examine the cultural context of the temple's construction. A 4 x 7 metre site was excavated directly adjacent to the central sanctuary to a depth of 4.5 metres. The excavation was part of the "Origins of the Civilisation of Angkor" project which is a joint investigation in the Mun River region by the Thai Fine Arts Department and the Anthropology Department of the University of Otago.

Initial layers reflected the activities of the Khmer builders, containing red sandstone and laterite fragments from the construction of buildings around the sanctuary. Khmer pottery, Chinese porcelain fragments and a small gold plaque were found. While remaining buildings are made of stone, large quantities of typical Khmer ceramic roof tiles and several ceramic finials suggest another building made of less durable materials did not survive.

Underneath were the foundations of the temple - clay containing prehistoric potsherds and iron slag, layered with sterile river sand. Charcoal was dated and supported dates for the temple's construction from epigraphic and stylistic evidence.

A layer of apparently redeposited bricks was found below. Some bricks were marked with curved and crossed lines pressed into the wet clay. A decorated brick structure appears to have been destroyed and perhaps reused as foundation material.

Clay at the bottom of the excavation contained redeposited prehistoric potsherds, including Phimai Black fragments. These provide a link to Iron Age sites such as Noen U-Loke which is also part of the Origins of the Civilisation of Angkor project.

Northeast Thailand saw both Dvaravati and "pre-Angkorian" influence prior to the construction of the Khmer period temples. The excavation provides information relevant to an examination of the development of the Khmer Empire, particularly in terms of the growth of the state in regions of existing complexity.

3. HOABINHIAN ARTEFACTS FROM GREATER AUSTRALIA: DIFFUSION OF A SINGLE TECHNOLOGY?

Danny Tan

The resemblance between some pebble artefacts from Australia and the Hoabinhian ones from Southeast Asia has intrigued Australian archaeologists for over 50 years. The question of whether the similarity is due to pure coincidence or technological transmission remains unclear. This stalemate was partially due to the fact that the characteristics of Hoabinhian pebble artefacts were, until recently, ill defined. This puzzle has recently been

re-opened with the proposition that some attributes on some characteristic Hoabinhian artefact types are present on, and clearly restricted to, some of the pebble artefacts from Southeast Asia, Papua New Guinea and Australia, and possibly Nepal, southern China and Japan.

With this new perspective from which to view the Hoabinhian, measurements of the pebble artefacts from two sites in Australia and two in Papua New Guinea were subjected to multivariate statistical analyses to test for the degree of likeness. The results are interpreted to indicate that the pebble artefacts, though separated by considerable distances, are technologically indistinguishable. This interpretation begs the question whether it is likely that Hoabinhian pebble artefacts from Greater Australia are related due to the diffusion of a single technology.

However, based on current research, the question of whether Hoabinhian technology was introduced to Greater Australia from Southeast Asia remains to be addressed.

16. ARCHAEOLOGICAL RESEARCH IN THE NORTHEASTERN INDONESIA ARCHIPELAGO

Daud Tanudirjo

Recently, archaeological research has been conducted in the Northeastern Indonesian Archipelago. The research is aimed at generating new data on the prehistory of this area and integrating these data with results from previous research, in order to reconstruct the mechanisms of prehistoric cultural interaction within the area. The fieldwork was focused in the Talaud and Sula Islands, and Minahasa.

More than fifty archaeologically-significant sites were located during the fieldwork. Eight sites were excavated: four in Talaud Islands, one in Minahasa, and three in the Sula Islands. In terms of chronology the spread is from the late Pleistocene to the historic-colonial periods. At least two Pleistocene occupations were located in the research area: Leang Sarru (dated from 29,760±650 BP) and Leang Tahuna (from 10,610±70 BP), both in the Talaud Islands. Leang Sarru is a small rockshelter which served as a lithic workshop site. Stone debitage, cores and used flakes were abundantly recovered from this site. In Leang Tahuna, stone flakes and blade-like flakes were found down to the basal layer, about 120 cm below the surface, and a large *Tridacna* adze was discovered in a layer dated back to about 4,000 years ago. Being the oldest sites so far found in this island area, these sites will become very

important for shedding light on the nature and date of Pleistocene colonisation.

The cultural materials excavated from the younger sites witness the spread of red-slipped pottery around 3,500 years ago. This phenomenon is explained by many authorities as a result of the spread of Austronesian-speaking agricultural people from Indonesia to the Pacific Islands, an explanation supported strongly by linguistic evidence. Subsequent to this, a widespread distribution of stylistically-homogenous earthenwares, such as the so-called Rarangunusa and "scroll" styles, indicate the continuing occurrence of regional interaction.

At this stage of research, the excavated and collected artefacts are under analysis at ANU, and further dates are awaited. The final results should give more information on the prehistory of a region of small isolated islands over a period of more than 30,000 years. In regional context this will be very significant information.

18. THE IRON-AGE PEOPLE OF NOEN U-LOKE, NORTH-EAST THAILAND: A PRELIMINARY REVIEW OF THE FIRST TWO FIELD SEASONS

Nancy Tayles, Kirsten Nelsen, Hallie Buckley and Kate Domett

Noen U-Loke is one of the "moated" sites dating from the late Bronze Age through the Iron Age in the valley of the Mun River, North-East Thailand. It has been excavated over two seasons (1996-97 and early 1998) as part of the on-going Origins of Angkor project. The excavation area includes burials.

Research proposals using the human skeletal remains address two principal questions; one is to assess the biological evidence of the success of these people at surviving in this environment, compared with the earlier, Bronze Age, population at the nearby site of Ban Lum Khao. The hypothesis that the society was complex and therefore ripe for transformation to a state should be evident either in the good health of the population as a whole or in the relatively good health of a subsample of privileged individuals. Societies which have energy for political and social development must be able to support at least some of their members as non-contributors to the survival of the group.

A second focus is on the biological relationships among individuals within the site. Migration during the period of occupation of the site would be important for understanding the population history of the area and the interpretation of the material culture and mortuary ritual. This work will be carried out by Dr K. Robson-Brown,

of Bristol University. Ultimately, both these questions will be addressed in comparison with the nearby Bronze Age site of Ban Lum Khao and possible with other sites in the Mun Valley.

The material from Ban Lum Khao is been analysed by K. Domett and some results are presented in her paper to this meeting. At the time of writing, the second field season at Noen U-Loke has just been completed. So far, 126 "burials" have been identified, the largest sample from this period in Thailand, although the representation of human skeletal remains varies greatly. Some are represented by virtually no useful material, others are perfectly preserved complete skeletons.

The reasons for this variability differs over time and reflect natural processes, elements of the mortuary ritual (burial in rice-filled graves, with chemical dissolution of bone), and disturbance, probably by looters, in prehistory. The quality and quantity of data which can be recovered from much of the material has unfortunately been greatly reduced by these agents.

A preliminary review of data gathered from the human skeletal remains recovered during the excavations will be presented, including census of the site, together with some observations on health and disease.

11. THE ORIGIN OF AGATE AND CARNELIAN ORNAMENTS FROM IRON-AGE SITES IN SOUTH-EAST ASIA: PERCEPTIONS FROM A COMBINED GEO-CHEMICAL, TYPOLOGICAL AND TECHNOLOGICAL STUDY.

Robert Theunissen

Agate and carnelian ornaments from the Iron Age of Southeast Asia are generally thought to have originated from India, and, as evidence of early Indian contact, to support a diffusionist explanation for Southeast Asian state development. A geo-chemical analysis of agate and carnelian ornaments from the Thai site of Ban Don Ta Phet and two prominent Indian sites, however, suggests that most of the Thai material may come from another, possibly non-Indian, source. These results suggest the issue of origins is a complex one, and this complexity is further revealed through a technological analysis of agate and carnelian ornamentation from Noen U-Loke in Northeast Thailand. The variations in manufacture at this site suggesting that many of its ornaments were manufactured at more than one centre, and examples of ornament repair suggesting that these centres were located at some distance away.

In the face of this uncertainty concerning origins and therefore any specific external cultural influences, I sug-

gest a more useful strategy for the study of agate and carnelian ornaments may be to investigate the prestige "value" of this material in relation to other goods; how this quality may have changed over time and space, and its probable effects on local social complexity - particularly if incorporated into an existing intra-regional prestige goods economy.

8. YAYOI FARMERS RECONSIDERED: NEW PERSPECTIVES ON AGRICULTURAL DEVELOPMENT IN EAST ASIA

Hiroshi Tsude

This paper examines characteristics of agricultural practice during the Yayoi Period (300 BC – AD 250) in Japan. Generally speaking, three successive stages can be identified in the course of agricultural development throughout the world. The first is the incipient plant cultivation stage, during which cultigens were introduced to supplement a hunting-gathering economy. The second is the early agricultural stage, during which plant cultivation became the major subsistence activity, although hunting and gathering still played an active role. Finally, the third stage can be named the mature agricultural stage, during which agricultural practice was intensified in order for the ruling class to exploit a social surplus as tax.

In China, early Neolithic cultures can be considered as those of the early agricultural stage, whereas late Neolithic cultures can be identified as those of the mature agricultural stage. This paper suggests that the agricultural practice in the Yayoi Period developed under the influence of mature agriculture in China. In this context, there is clear discontinuity between incipient plant cultivation of the Jomon Period and wet rice cultivation of the succeeding Yayoi Period.

Wet rice agriculture at the beginning of the Yayoi Period was already characterised by a set of advanced traits. These included rice species suitable for cold climate, rice paddy fields with irrigation facilities, and highly developed agricultural implements. Farmers of the Yayoi Period also practised dry-field cultivation of wheat and melon. Cultivation techniques of these species originated in continental Asia, and were unknown to the people of the Jomon Period.

Immigrants from the Korean Peninsula brought with them not only wet rice cultivation techniques but also other cultural characteristics. These comprised bronze, iron, moated settlements and mounded tombs. Yayoi agriculture rapidly spread over the most parts of the Japanese archipelago. This formed the basis of rapid

growth of the early state, which was characterised by the construction of large keyhole-shaped tombs.

From the above, it is clear that agricultural practice of the Yayoi period was not an indigenous development. It was a secondary development of mature agriculture from Continental Asia. Immigrants from the Korean Peninsula and their descendants moved towards the east, sometimes invaded the regions where the Jomon people were still practising their hunter-gatherer way of life. Without this pressure from the outside, the people of the Jomon Period in eastern Japan would have continued their hunter-gatherer lifeways associated with incipient plant cultivation, at least for a while.

18. DISEASES AT THE TIME OF THE EUROPEAN CONTACT IN NEW CALEDONIA: THE PALAEO-OPATHOLOGICAL CONTRIBUTION OF MUSEOLOGICAL COLLECTIONS.

F. Valentin

A survey of palaeopathological changes has been undertaken on 182 New Caledonian calvariae housed in the Natural History Museum in Basel (Switzerland). These 182 calvariae, both male and female, are adult and come from several New Caledonia (Grande Terre) locations. They are dated back to the 19th century and perhaps earlier.

The macroscopic and morphological studies revealed a very rich pathology. Cases include TMJ arthritis (38%), occipital condyles arthritis (3%), treponemal infections (6%), rhinomaxillary changes (around 20%), non-specific lesions of the vault (around 10%), osteoma (12%), trauma and cultural modifications such as tooth ablation and post-mortem alteration of the foramen magnum.

The discussion focuses on a populational approach and shows different geographical distributions for the observed pathological frequencies.

9. CERAMIC MANUFACTURE IN EAST ASIA, 10,000-13,000 YEARS AGO

Pamela B. Vandiver

Pottery vessels produced in produced in Japan, China and the Russian Far East during the time period from 10,000 to 13,000 BP show a remarkable similarity in manufacturing technique-- small 1 to 2 cm preformed, circular to oval, slabs were pressed together in multiple layers, 2 to 4 thick, to form the vessel walls. Such wide geographical patterning of ceramic construction, narrow

range of variability, and use of a forming technique no longer found in ceramic manufacture, together, suggest the following: (1) a common ceramic techno-complex, (2) the existence of technology transfer or sharing, and (3) long distance communication and interaction on a scale heretofore unsupported by direct observation of the technological style of a particular aspect of material culture.

Determinations have been made that, on average, early pottery from East Asia was fired in the low earthenware range of 600-700°C. The use-ability, long-term environmental stability and success as vessels depends largely on the raw materials from which vessels were made. Most ceramic pastes can be described as "rock bodies," rather than "clay bodies." The most successful and homogeneous come from areas where fine-grained, clay-containing, sedimentary deposits are fairly uniform, as in riverine deposits and deltas in China and Siberia, and some of the least successful are from highly variable volcanic or igneous-derived deposits, as in Japan, in which ceramic bodies vary from one site to another--some consisting of highly micaceous or pumice-containing raw materials that do not fuse well in the firing range employed in production. Thus, a major technological problem for early potters seems to be one of raw material selection, rather than manufacturing or firing technique.

Suggestions are offered for excavation procedures of these ceramics, some of which are softer than the soil matrix in which they are embedded, as well as for measurements of the manufacturing elements. The effect of post-depositional processes on the microstructures is evaluated by simulation experiments and autoclave tests. Possible relationships to earlier instances of figurine and lamp manufacture at Kapovaya and Maina in Russia and Zazaragi in Japan are explored.

9. CERAMIC TECHNOLOGIES IN BRONZE AGE THAILAND

Brian Vincent

This paper examines ceramic technologies at various Bronze Age archaeological sites in Thailand in order to compare the kinds of methods used to prepare and process clays for pottery manufacture, and whether these techniques needed to be adapted for use in metallurgy. These questions will be addressed in the following ways:

1. First, an outline of pre-existing potting technologies will be sketched to assess the extent to which clay preparation methods differed between regions.

2. Any changes in these techniques through time, prior to the introduction of metallurgy, will be considered.
3. Evidence for any changes in potting technologies, following the introduction of metallurgy, will then be examined.
4. Possible relationships between pottery manufacture and ceramic materials used in metallurgy will also be considered. Particular attention will be given to clay preparation methods in both technologies.

9. EXAMINING THE ORGANISATION OF CERAMIC PRODUCTION DURING THE BRONZE AGE: OBSERVATIONS FROM BAN LUM KHAO, NORTHEAST THAILAND

Judy Voelker

The ceramic production sequences including procurement and preparation of clays, vessel forming methods, and firing processes at the Bronze Age site of Ban Lum Khao are the topic of this presentation. This paper discusses the results of a petrographic and technological study of mortuary vessels and domestic wares. The site is located on the Upper Mun River catchment in the Phimai region of Thailand. Ceramics from Ban Lum Khao are stylistically similar to those recovered from the nearby site of Ban Prasat.

Two techniques have been utilised, scanning electron microscopy and petrographic analysis, in the characterisation of local clays and the identification of vessel pastes. Xeroradiography was used to determine vessel manufacturing methods.

The examination of ceramics from the site of Ban Lum Khao should aid in defining local ceramic traditions of the Phimai region during the Bronze Age.

10. TISSUE AS ISSUE: TEXTILE WORK AND GENDER ASSETS IN BRONZE AGE ARCHAEOLOGY FROM AN ETHNOHISTORICAL PERSPECTIVE

Magdalene von Dewall

The presence of sets of weaving equipment in two series of distinguished Dian burial units in the Late Bronze Age cemeteries at Shizhaishan and Lijiashan (Central Yunnan) has already been used to restore - and to reflect upon the ancestry of - traditional Southeast Asian weaving tools and techniques, in particular the foot-braced back-strap loom.

With the emergence, in a further Lijiashan tomb assemblage, of yet another container lid figuratively fea-

turing, in a "domestic scene", a number of women engaged in textile work and assembled around a matron inactively presiding the group, while seated on a bronze-drumbase, the theme has acquired the consistency of a topos, i.e. a pictorial and compositional coherence in the artistic configuration around a recurrent motif with an encoded meaning.

The dominance of this feminine subject matter in art is paralleled in the well-articulated distributive patterning of gender-pertinent grave goods, with the actual tool-kits for sewing and weaving in "female" inventories balancing the weaponry and body ornaments in those for males and both sharing in an enhanced status of ceremonializing tomb furniture. Both these tendencies, when juxtaposed with the significance of female textile craft (and art) activities in the social web of traditional Southeast Asian culture, solicit reflections on the continuity not only of crafts as practised, but also on the continuance of social value networks embedded and expressed in specific female craft skills and their products.

18. SIZE AND SPECIES: IMPLICATIONS OF VIETNAM HOMINOIDS

Ian Walters

This paper is about quantitative diversity and size variation in dental samples of Pleistocene hominoids from Vietnam. Samples of teeth from a number of sites had previously been allocated to *Pongo pygmaeus*. But earlier descriptive taxonomic work done by Schwartz *et al.* (1994, 1995) and supported quantitatively by Walters *et al.* (this volume) suggests the presence of multiple hominoid taxa in the Vietnamese Pleistocene. Implications of tooth size and taxonomy are discussed in relation to the classification of Asian Hominidae and evolution of modern humans in the region.

10. SA HUYNH AND CHAM IN VIETNAM

Ian Walters

This paper examines relationships between the late prehistoric Iron Age Sa Huynh culture and the Cham civilisation in Vietnam. Sa Huynh burial assemblages are typically found in coastal sand dunes and consist of large ovoid or cylindrical thin walled lidded jars containing glass and semi precious stone ornaments, iron and bronze artefacts. Champa was an Indianised state society which flourished from about the fifth century AD to the 15th. The Cham built temples and shrines, dedicated mainly to Shiva, but also some with Buddhist

themes. They competed with Chinese, Khmer and Vietnamese for control of Indochina. French archaeologists rejected any connection between Sa Huynh and Cham.

However, modern Vietnamese archaeologists posit a continuous evolution. These competing ideas are discussed in relation to several key material culture and linguistic markers.

1. A COMPARISON OF THE LOWER AND MIDDLE PALEOLITHIC BETWEEN EAST AND WEST ASIA

Wang Youping

The palaeoenvironment, chronology and lithic industries of the Lower and Middle Palaeolithic both in East and West Asia will be discussed in this paper. West Asia, especially the Mediterranean Levant, occupies an important geographic position between Africa, Asia and Europe. It served as the corridor for the early hominid migration out of Africa. The early Lower Palaeolithic assemblages in this area, such as the early part of Ubeidiya, were similar to the Early Palaeolithic in China and the Far East. Those were just the core-chopper industries, but not the Acheulean.

After that, the relationship of the Palaeolithic industries between the two regions became more and more weak. A comparison of the Lower and Middle Palaeolithic between East and West Asia indicates the following conclusions: (1) that the connections between East and West Asia probably existed earlier than 1 myr; (2) that there were clearly bottlenecks in cultural and gene flow between East and West Asia in the late Lower Pleistocene and the early Upper Pleistocene; (3) that the principal reason that caused the interruptions between East and the West was the geographic barrier in central Asia, created by the dramatic uplift of the Qingzang (Tibetan) plateau and the Himalayan mountains since the Lower Pleistocene.

13. AN ETHNOARCHAEOLOGICAL STUDY ON THE POTTERY OF THE DAI PEOPLE, YUNNAN, CHINA

Wang Ningsheng

Since the 14th century AD at the latest, Dai (Thai) people in Yunnan already lived in complex societies, but they still kept a traditional pre-wheel pottery-making technology passed down from prehistoric times. Dai pottery is important and valuable for analogies in the archaeological study of ceramics.

From the 1960s through the 1980s, I conducted ethnoarchaeological fieldwork on Dai pottery. My approach is a combination of participant observation, interviewing potters, inventorying all tools and pots, observing sherds on the ground and undertaking selective excavations of garbage pits near pottery-making households, markets, firing places, or kilns.

According to the development of the technology, Dai pottery can be classified into 4 categories:

1. Simple coiling method, fired in the open air by part-time female potters.
2. Coiling on turn-table turned slowly with the potter's toes, firing in a "fuel oven" ("dung oven") by part-time female potters.
3. Small vessels casually built using the force of the rotating turn-table, fired in a kiln without a roof by part-time female potters.
4. Turn-table turned quickly by potter's hands, with firing in a roofed kiln by full-time male craft specialists.

All the Dai pottery, produced using different levels of technology, belongs in the same social context: the planting of rice in paddy fields, the perfection of irrigation systems, bilineal marriage, nuclear families, well-developed village organisation and social stratification. Thus I argue against the viewpoint that the pottery technology is an indication of the level of social development, a viewpoint which commonly has prevailed amongst Chinese archaeologists.

Through exchange in trade markets at country fairs, Dai pots spread to neighbouring settlements without pottery making. Even in non-Dai villages (Akha, Jinuo, Blang), we often see Dai pots in use, and Dai sherds on the ground. Based on the variation in the pottery (in the number and kind of pots, the presence or absence of the remains of pottery-making tools, and sites of firing places), I believe it is possible to distinguish pottery producers and pottery users in prehistoric and ancient times as in a living society today. However, since some kind of pots may be used by different ethnic groups, the distribution of a certain pot cannot be considered an indication of an ethnic boundary. This is my second point.

Furthermore, I also find useful clues in my studies of Dai pottery to other issues in ethnoarchaeology, e.g. how wheel-making pottery originated; how to distinguish spare-time and full-time craft potters; how to identify the pots for exchange, and how to explain the standardisation of pottery.

1. SOME ARCHEOLOGICAL SITES FROM THE LOWER PLEISTOCENE IN CHINA

Wei Qi

In China, there were only two archaeological sites discovered from the Lower Pleistocene before 1978. One of them is Shangnabang in Yuanmou County of Yunnan Province, where two incisors of *Homo erectus* with three stone artifacts were collected. Another is Xihoudu in Ruicheng County of Shanxi Province, where thirty-two specimens like stone artifacts were obtained.

Since 1978, a series of archaeological sites have been discovered from the Lower Pleistocene context in Yangyuan County of Hebei Province in the Nihewan Basin. And a lot of archaeological remains including stone artifacts and animal bones has been excavated out of the relevant strata. The Nihewan Basin was well-known for yielding abundant mammal fossils formerly and is famous for many Palaeolithic archaeological sites discovered now.

Previous research findings were believed to illustrate that there was a geological progression of lake, shrinking lake, gorge cutting and erosion, alluviation and aeolian deposition in the basin comparable to that in the Olduvai Gorge in Africa. Up to now there are fifteen archaeological sites discovered in the Nihewan Formation of the Lower Pleistocene in the Nihewan Basin, about 150 km west of Beijing. The sites known are as follows:

From the Upper Nihewan Formation:

Xujiapo (0.915-1.01 mya)

Huojiadi (over 1.01 mya)

Donggutuo A, Feiliang, Madigou A (over 1.01 mya)

Donggutuo C-D, Madigou C (over 1.01 mya)

Shanshenmiaozhui (over 1.01 mya)

Xiaochangliang, Banshan, Putaoyuan, Guangliang
(?near 1.96 mya)

From the Middle Nihewan Formation:

Majuangou (no dating)

From the Lower Nihewan Formation: no sites yet discovered.

11. COPPER PRODUCTION IN CENTRAL THAILAND: TECHNOLOGICAL, ECONOMIC, AND SOCIAL CHANGE OVER TWO MILLENNIA

Andrew Weiss and Vincent C. Pigott

Six seasons of excavation and survey in the Khao Wong Prachan Valley in Central Thailand have produced wide ranging data on the chronology, technology, and socio-

economic context of a major copper production area. Prior to the appearance of metal there was a substantial pre-metal settlement in the valley, beginning in the late 3rd millennium BC, characterised by impressive stamped and incised pottery and a variety of bangles, beads, and other ornaments made from local stone and imported marine shell. Shortly after 1500 BC the valley was transformed into a major industrial foci involved with the mining and smelting of copper ores, and the casting of copper ingots and small objects.

Production technology and organisation evolved over the 1000 year sequence as a result of changing ore compositions and a changing socioeconomic environment. While the aggregate production of copper was large, individual units of production seem to have been quite small, perhaps at a family level. Early copper production (c.1500-700 BC) at Non Pa Wai (NPW) used crucible based co-smelting of oxide and sulphide ores, and focused on the production of small "button" ingots and a wide variety of small copper implements such as awls, chisel tips, fishing tridents, bangles, and arrow points - objects rarely found in archaeological contexts. Excavations in 1994 at the site of Non Mak La (NML), across a stream from NPW, revealed the associated habitation and burial site, above a large pre-metal occupation and cemetery.

Production at the later site of Nil Kham Haeng (NKH, c.800-300 BC) shifted to multi-stage smelting as a response to increasing proportions of sulphide ores, and focused on the production of standardised socketed "cordiform" implements, which may have been projectile points, currency, ingots, or some sort of social/political marker. It is likely that copper production became more costly in both labour and resources due to the decreasing richness and accessibility of the copper ores.

Our reconstructions of the production process, along with mortuary data, allow some inferences to be made about the social organisation of production. Metal was rarely found in burials from NPW and NML. At NKH, a large proportion of graves from several areas of the site contained both artifacts related to metal production and caches of the socketed cordiform copper artifacts. Potential regions of exchange have been identified from Cambodia, SE Thailand, the Khorat Plateau, and possibly Vietnam. Items coming into the area include marine shell and sea turtle carapaces, and a variety of tin bronze artifacts.

These data span most of mainland southeast Asian prehistory - from early Neolithic settlements, through the beginnings of metallurgy, to a period that is thought

to have seen the initial rise of more complex sociopolitical organisation.

17. INTEGRATION OF THE ARCHAEOLOGICAL AND PALEOENVIRONMENTAL EVIDENCE OF EARLY HUMAN SETTLEMENT IN PALAU

David J. Welch

Recent archaeological and paleoenvironmental investigations in Palau have produced radiocarbon dates for human presence far earlier than that reliably documented by previous research. Colonisation of the islands certainly dates back to 3,000 and perhaps over 4,000 years ago. Both the paleoenvironmental and archaeological evidence indicates surprisingly early and extensive use of the upland areas of the main island of Babeldaob. While each set of dates provides some confirmation of the other set, they are not completely in agreement in terms of the time of colonisation or the form of adaptation to the island environment they suggest.

This paper examines the context of these early dates and what they suggest in terms of the time of human settlement, the effect of early human settlement on the natural environment of Palau, and cultural change in Palau before 1500 years BP. An effort is made to correlate the paleoenvironmental and archaeological evidence to produce an acceptable early cultural sequence for Palau.

9. SEX, DATES, POTS, AND BRONZE: AN EXAMPLE OF WHY FOUR+ FIELDS WILL BE NEEDED TO RESOLVE SOUTHEAST ASIA'S PREHISTORIC ENIGMAS

Joyce White

Archaeologists look to ceramics for answers to many riddles of the past. Ceramics, especially those of regional distribution, placed in a relative sequence which is chronometrically dated, can be critical to discussions of the movements, development, and interrelationships among peoples, languages, settlements, lifeways, and technologies such as agriculture and metallurgy. The accurate sequencing and dating of ceramics can provide the basis upon which very large questions of prehistoric processes and events are discussed.

However, the accurate linking of ceramic evidence to larger anthropological issues such as the movements of populations, languages, and technologies is not necessarily an easy or straightforward process and ceramics should not be the sole basis upon which the chronology

for these issues is discussed. Relative to other parts of the world, mainland Southeast Asia is at an early stage in the development of widely used and widely agreed upon ceramic chronologies, but for the past decade or more, some archaeologists have drawn attention to an apparently broadly dispersed and at least superficially similar surface decorative technique and motive style using impressed and/or incised designs. Purported representatives of this surface treatment have been noted across mainland Southeast Asia and parts of southern China. The surface treatment has been argued to date over the 1000 years from the second half of the third millennium BC to the first half of the 2nd millennium BC. The broad distribution of this surface treatment has been argued to indicate the initial dispersal of Austro-Asiatic speaking cultivators or rice with an origin in the lower/middle Yangzi region.

So far no ceramicist has examined the range of pottery with this seemingly generic surface treatment across its geographic spread to see if any other ceramic attributes support a technological as well as stylistic relationship among the various manifestations of this supposed ceramic complex. Attributes such as vessel fabrication techniques, clay body preparation techniques, vessel and rim morphology, other components of surface treatment, and firing technology would seem to be important to an argument that there is more than just a superficial relationship among the representatives of this complex. Such a study remains for the future.

This paper will have a more limited scope, and will address the following questions: What is the current dating for representatives of pottery with incised and impressed surface treatment at Ban Chiang, including evidence from recent AMS dates? Does the current evidence support that this ceramic style represents an horizon phenomenon? Does the current evidence support that it can be equated with the first expansion of potting technology into the Sakon Nakhon Basin, with no preceding or contemporaneous potting traditions? What does the current evidence indicate about the relationship of this surface treatment to two fundamental regional issues: 1) the initial settlement of the Sakon Nakhon Basin by societies practising cultivation, and 2) the appearance of bronze metallurgy?

The data to address these issues includes new AMS dates from Ban Chiang, new hypotheses of stratigraphic and social relationships among pottery forms, and other mortuary, material, and environmental evidence, primarily from Ban Chiang but with additional reference made to other prehistoric sites in Thailand. While the paper aims at only a preliminary assessment, current

models will be addressed, and questions for future research proposed.

17. THE PALAUAN CULTURAL SEQUENCE: A BABELDAOB PERSPECTIVE

Steven Wickler

The orthodox model of Palauan settlement contends that Palau was settled by 1500 BC as a stepping stone from the Indo-Malaysian archipelago into Western Micronesia (Osborne 1966). An alternative model argues that there is no evidence to suggest that initial colonisation took place before AD 1 (Masse *et al.* 1984). Recent archaeological research on the large volcanic island of Babeldaob has documented settlement by ca. 500 BC and produced a wealth of additional data which calls for a reassessment of the cultural sequence for Palau. A tentative cultural sequence is presented incorporating new data with elements of existing models. Diverse strands of geomorphological, paleoenvironmental and archaeological evidence are brought to bear on the interpretation of the dynamic interplay between settlement patterns, social organisation and subsistence through time.

19. VILLAGES AND TERRACES: TRANSFORMATIONS OF THE CULTURAL LANDSCAPE ON BABELDAOB, PALAU

Steven Wickler

Archaeologists have long been intrigued by the two most visible components of the archaeological landscape in the Palau archipelago; the spectacular terraced earthworks sculpted from natural hill formations on the volcanic islands, and the structural remains of large traditional villages. A majority of the traditional villages were still occupied at Western contact but the development of these communities is poorly understood. The age and function of terrace systems, which were abandoned prior to Western contact, also remains problematic.

This paper focuses on the complex temporal and spatial relationships between village occupation and terrace use on the large volcanic island of Babeldaob with the aid of data from recent archaeological investigations. The growth and expansion of villages on Babeldaob since the early second millennium AD is inextricably linked to changes in the function of terrace systems ranging from agriculture to habitation, ceremonial activity, burial and defence. These linkages are explored

within the context of social transformations and shifting subsistence patterns.

6. A STUDY OF THE XIANTOULING CULTURE

Yang Yaolin

The Xiantouling Site, located along Dapeng Bay, 62 kilometres east of Shenzhen, Guangdong Province, China, is an oval sand mound of 13,200 square meters, with its southwest side 350 meters from the sea. Through three excavations conducted in 1985, 1989 and 1997 by archaeologists from Shenzhen Museum, the unearthed area totals 1200 square meters

The findings of the first and second excavations have been published (*Cultural Relics*, No. 11, 1990) and a large amount of pottery and stone implements has been unearthed. Pottery characteristics are as follows: 1) more than 98% is coarseware; 2) there is an exquisite white pottery with impression or relief sculptures; 3) there appears an embryonic form of painted pottery; 4) vessels have round or flat bottoms and ring-feet are popular, but there are no tripod vessels.

Stone implements are mainly polished, and the axes and adzes have no clear shoulders or steps. Stone knives and round pie-shaped stone items also occur.

The Xiantouling Site itself is one of the most typical sand dune sites of the lower Zhujiang Valley Middle Neolithic Age (about 6500 BP). More than twenty similar sites are now known. Common to all the pottery assemblages are round-bottoms and ring-feet, a dominance of coarseware, painted basins and a white ware. Some scholars proposed to call this the Xiantouling Culture, others refer to it as the Dawan Culture or Jinlan Temple Culture. In my opinion the term Xiantouling Culture is the correct one.

With regard to the origin of the Zhujiang region painted pottery, no unanimous conclusion has been reached. Some have claimed Daxi (Yangzi), Southeast Asian or even Western origins. I hold that the painted pottery of the Zhujiang river mouth area has its own distinctive features and also its own origin.

However, I do not wish to ignore the question of exchanges between regional cultures. The Xiantouling Culture was to some extent in contact with the cultures of the Yangzi Valley, and with those in Southeast Asia. I regard this as a kind of peer-polity exchange.

6. IMPORTANT DISCOVERIES IN THE YUCHANYAN SITE

Yuan Jiarong

Yuchanyan (i.e. Toad Cave) is located in the base of a limestone hill at Daoxian Country, Hunan Province, China. In 1993 and 1995, the Institute of Cultural Relics and Archaeology, Hunan Province, conducted two excavations at this site. The most important discoveries in Yuchanyan are the earliest rice and pottery known in the world.

The fragments of pottery were concentrated in two areas near the bottom of the cultural sediment. There are only few small fragments of pottery found in the whole sediment, which indicates an early stage of pottery technique with poor pottery. The reconstructed vessels from the fragments found in 1995 are cauldron-shape vessels with wide flared rims, sloping walls and pointed or round bases. The pottery was made very crudely, and fired at a low temperature.

Pottery fabrics are brown and red in colour, and of uneven thickness, up to 2 cm thick. The temper is quartz sand from both natural river sand and broken gravel. Grain size usually is from 5 to 10 mm, but the largest is 20 mm. The pottery was made by pieces of clay which were joined together. Cord-impressed marks occur on both inside and outside surfaces, probably made by a paddle. The cord-impressions are single, thick and rough.

The rice husks found in Yuchanyan are most important, regardless of whether they belong to wild or cultivated rice. Only four husks have been found so far.

However, rice phytoliths have been found in the cultural sediment. According to a study of the phytoliths carried out by a scholar from China Agriculture University using a scanning electron microscope, the rice still has features of wild, *japonica* and *indica* rice occurring together.

6. THE EXCAVATIONS AT XIANRENDONG AND DIAOTONGHUAN SITES

Zhang Chi

Xianrendong and Diaotonghuan caves are located in Dayuan basin, northeastern Jiangxi province, Southern China. Xianrendong is a cave site which had been excavated in the 1960s, Diaotonghuan is a rock shelter site located 800 m away. In 1993 and 1995, two seasons of excavation were conducted at these two sites by the joint team of the Department of Archaeology, Beijing Uni-

versity, the Jiangxi Institute of Archaeology, and the Andover Foundation for Archaeological Research (see also the abstract by R. McNeish). These excavations yielded diagnostic artifacts that help to further understand the origins of Neolithic culture in southern China.

The analysis of thousands of plant phytoliths recovered from the stratigraphic zones showed the increasing

proportion of domesticated rice through time. The rise of pottery manufacture and rice agriculture at the same time, around 14,000-12,000 BP, suggests that an important transition from the Palaeolithic into the Neolithic occurred in southern China.

