Late Australian

ABSOLUTE TIME PERIOD: 7000–200 B.P.

RELATIVE TIME PERIOD: Follows Early Australian, precedes the historic period.

LOCATION: Australia, including the mainland, Tasmania, and close offshore islands.

DIAGNOSTIC MATERIAL ATTRIBUTES: Backed artifacts, points, tulas, axes (in the south), millstones, earth mounds, shell mounds, stone structures, complex polychrome art, and high-density cemeteries.

REGIONAL SUBTRADITIONS: Arid and Semiarid, Macassan Contact, Southeast, Tasmania, Tropical East Coast, Tropical North.

IMPORTANT SITES: Balambidj, High Cliffy Island, Jiyer Cave, Kenniff Cave, Malangangerr, Mussel Shelter, Purritjarra, Rocky Cape South and North caves, Toolondo.

CULTURAL SUMMARY

Environment

Climate. Late Australian represents the period following the arrival of the sea at close to its present level (+/− 1 m). Throughout this tradition, spatial contrasts in climate are consistent, with coastal areas to the north, east, and south of the continent receiving more rainfall than the "arid core." Lacustrine and pollen records indicate widespread climatic change in all parts of the continent. During the earlier portion of this tradition (until about 4500 B.P.), both temperatures and precipitation were higher than today, with summer rainfall being dominant. From 4500 to 2000 B.P., precipitation was reduced and summer rainfall uncertain. Increased frequency of droughts and reinitiation of dune building are visible in many landscapes during this phase. From 2000 to 200 B.P., there are increases in precipitation.

Topography. Covering mainland Australia, Tasmania, and close offshore islands. Generally low-lying country (much of the country under 600 m) with only small local relief in many areas. Mountain chains extend down the eastern side of the continent, including Tasmania.

Geology. River basins and plateaus composed of sedimentary rocks and metasediments dominate the landscape, with volcanic rocks most common in the mountainous east. Silcrete, chert, quartzite, and quartz are the most abundant rocks available for artifact manufacture. Flint is available along the southern coast, and minor obsidian outcrops were used in the northeast.

Book Title: Encyclopedia of Prehistory III | *Customer*: Kluwer Academic
Chapter No: 19 *Pages*: 132 – 149 | *Dispatch on*: 25 September 2000

Biota. Much of the continent is covered with spinifex and tussock grasslands and savanna woodlands. In more coastal regions, sclerophyll woodlands and rainforests are found. Terrestrial fauna is dominated by distinctive marsupials such as macropods (kangaroos, etc.), possums, and small carnivores. A variety of bats, rats, reptiles, and birds is also present, and these were consumed by humans. In coastal waters, abundant animal forms include fish, mollusks, and large marine mammals such as dugong and dolphin. It has been suggested that coastal biomass was low for an extended period following the marine transgression, although the regional uniformity of this pattern has been much debated. Dogs were introduced into mainland Australia during this period.

Settlements

Settlement System. Although Late Australian settlement has sometimes been characterized by moderate to high mobility of small groups at low population densities, reflecting the foraging subsistence economy, there is evidence for a variety of settlement forms operating. Mobile foraging was the norm, but there is evidence from some landscapes suggesting semisedentary groups with comparatively high population densities. All variants of the settlement system involved some functional distinctions between occupational locations and extractive and ritual localities.

Housing. Most housing was likely to have been small structures of wood, perhaps enhancing natural shelter such as rock overhangs. Late in the tradition, structures that may be houses become visible. These structures are (1) rectangular and circular stone foundations and walls, and (2) earth mounds sometimes capped with gravel that were sometimes used as the base for timber-framed houses covered with bark and dirt clods.

Population, health, and disease. Population size and distribution are difficult to determine and have been the subject of heated debate. Historical observations of population density are widely accepted to be poor indicators of precontact demography, owing primarily to the effects of diseases such as smallpox. It is likely that population densities in the late Holocene were substantially higher than observed historically, a pattern that matches well with archaeological evidence for population increases in every environment during the last 1000–3000 years. Health and the prevalence of disease are known to have varied spatially, but chronological changes are ill defined. As indicated by skeletal markers, health was comparatively good in arid and semiarid regions, whereas in the southeast (particularly in the densely populated Murray river valley) high levels of anaemia, parasitism, and infectious diseases are inferred. Nutritional stress has been seen as being common in southern coastal regions.

Economy

Subsistence. Late Australian subsistence typically focused on a diverse range of foraging practices, typically involving plant food staples supplemented by hunting. Management of both plant and animal resources was common, often resulting in increased output and regularized production. Management techniques include burning of vegetation and construction of dams and drainage channels. Storage and replanting of seeds are recorded from the historic period.

Wild Foods. Plant food staples include cycads (*Cycas media*, *Macrozamia* sp.), yams (e.g., *Dioscorea* sp.) in the tropics, seeds from grasses and trees (e.g., *Acacia aneura* and *Panicum decompositum*) in the arid and semiarid landscapes; rhizomes (e.g., *Typha* sp.), fern-root (e.g., *Blechnum indicum*), and tubers (e.g., *Microseris scapigera*) in subtropical and temperate landscapes. Some of these plant foods were toxic (especially the cycads), and virtually all required extensive processing (such as leaching, roasting, and/or grinding). In coastal landscapes, the primary wild animal foods include mollusks (particularly mussels, oysters, and cockles), fish, and large marine mammals such as turtle and dugong. In inland landscapes, a variety of animals was hunted, including kangaroos, possums, freshwater fish and eels, snakes, lizards, birds (particularly waterfowl and emus), Bogong moths (*Agrotis infusa*), and freshwater mollusks.

Industrial arts. Much of the technology was available to all members of a group, but production and use of some items was likely to have been socially restricted by criteria such as sex or age. In addition, social restrictions in accessing and exploiting resources are likely to have occurred. Production of some items required a high degree of skill, and although there may have been no proscriptions on who could manufacture them, production may have been concentrated in the hands of skilled technicians.

Utensils. The most abundant utensils preserved archaeologically are stone artifacts. Many were simply unshaped flakes used to cut or incise, but shaped specimens were hafted as axes, adzes, gravers, spear heads and

barbs, pounders, and knives. Distinctive forms of stone artifacts include ground edge axes, points, backed artifacts, and tulas. Stone was often simply obtained from cobbles on the ground surface, but in some quarries was also extracted from excavated pits. Wooden utensils are rarely preserved but include digging sticks, boomerangs, clubs, shields, spears and spear throwers, canoes and paddles. String nets and basket traps for use on both land and in water are known but poorly preserved. Traps and hides made of stone walls are widespread. Shell hooks and fiber lines spread southward along the East Coast in recent millennia.

Ornaments. Shell and bone beads and pierced teeth were used as headbands, necklaces, and armbands. Preserved materials in late Holocene deposits suggest twine and feather ornaments may also have been common as bands, headdresses, skirts, belts, and baskets. In colder regions, sewn and incised skin garments (particularly cloaks) were used. Body painting and scarification are likely to have been widely practiced, although there is no archaeological evidence. However, human remains preserve body modifications such as tooth avulsion.

Trade. Archaeological evidence from across the country suggests that the long-distance exchange networks observed historically arose during the mid-late Holocene. Arguments in favor of the existence of long-distance trade at earlier times have been based on indirect evidence, such as uniformity in material culture, rather than direct evidence of long-distance transport of items. Evidence for trade is available from sourcing studies and from evidence of large-quantity production for trade of items such as edge-ground axes, sandstone slabs used as grindstones, and other. Goods were distributed either at meetings between groups, often associated with ceremonies and other functions, or by long-distance journeys to the centers of production. ''Down-the-line'' trading allowed items to be exchanged multiple times and to move thousands of kilometers. Regular and well-established exchange networks with recognized trading localities are known from the historic period, although European and Macassan contact may have affected, even enhanced, these structures.

Division of labor. During the historic period, sex and age are known to have been major criteria for social differentiation and division of labor. Restrictions on who could produce items and the presence of specialist artisans are historically documented. Standardized production at stone workshops and very formally organized rock art panels suggest that craft specialization may be present throughout the late Holocene, although this has been debated. Similarly, there is no unambiguous evidence for sexual divisions of labor in foraging activities. However, on the basis of ethnography, it is likely that there were socially defined roles in food procurement and processing.

Sociopolitical Organization

Social organization. A key mechanism for organizing social life was kinship classifications with their associated rules for interactions between individuals. Dozens of kinship systems have been defined, differing in the number and nature of kin categories and the nature of marriage arrangements. Many obligations and rights are defined by the kinship system operating. Family units, sometimes polygynous, are typically grouped together into ''bands'' that have common descent and share a residential territory. Such local social entities are connected to larger sociopolitical units through kinship, language, and/or social categories (such as moiety, section, and subsection) that cut a cross kinship groups.

Political organization. In the final phases of this tradition, there is little evidence of formally recognized political roles or centralized institutions of political control, and no evidence for inheritance of political position. Hierarchical structures, which act as mechanisms of political power, exist and are based on age and sex and perceived knowledge.

Social control. Social control operated largely through submission to individuals who have obtained high status by their acquisition of economic power and ritual knowledge.

Conflict. Conflict is demonstrated by high levels of trauma on human remains, particularly depressed fractures of the skull and parry fractures of the forearm. These wounds probably reflect individual close combat with clubs rather than pitched battles involving spears or other projectiles. It is thought that much of this violence involves within-group conflict, although in some regions disputes over territory and resources between groups may have been prevalent. Increased population size, increased sedentism, and increased territorial demarcation are all factors likely to have encouraged high levels of conflict.

Religion and Expressive Culture

Religious Beliefs. Recent Aboriginal religion has often been characterized as totemism. However, although

there are totemic aspects, Aboriginal religion also contains other mystical components. Totemic ancestors, existing to some degree outside conventional time and space, are credited with creative acts and are thought to live within some landscape features. Creation stories involve descriptions of the ways in which landscape features were created by powerful beings, the foremost being the Rainbow Serpent. Rock art documents the emergence of regional differences in religious motifs, involving creative beings in various animal guises, in the very late Holocene. The antiquity of such religious beliefs appears to vary regionally. For example, in western Arnhem Land, the Rainbow Serpent imagery can be traced back to the major environmental changes in the mid-Holocene. It has been suggested that the notion of this Rainbow Serpent being may have arisen at that time as a depiction of a pipefish and was gradually transformed into the composite animal seen in recent art. On Cape York, the establishment of mythologies involving dangerous landscapes has been seen to be a much more recent event, occurring only during the last 1000 years.

Religious Practitioners. Religious practice is in recent centuries not restricted to any formally recognized group such as priests. Instead ritual events were organized by senior individuals who had kinship obligations to the focus of the ritual, such as the boy being initiated or the person being buried. Ritualized roles in such ceremonies involved many individuals, male and female. Other rituals might involve only males or only females, although these were less numerous. Some specialized roles involving sorcery existed, and some archaeological changes in Southern Australia have been interpreted as a consequence of a concentration of both economic and ritual power in the hands of a few individuals capable of hosting ceremonies as a means of acquiring status.

Ceremonies. Ceremonies of varied kinds were recorded in the historic period. Some rituals, such as cult initiations, were typically conducted in private. Other rituals, such as puberty and death rites, were public events. Ceremonies are known to have involved a number of groups, some of whom traveled considerable distances. In the historic period, ritual practices were "traded" from group to group in such ceremonies.

Arts. Religious art takes a number of forms. Singing, dancing, production of art, the use of sacred objects, and body decoration may all be involved in rituals. Body modification such as tooth avulsion and scarification may be performed in connection with some rites. Death rites can be complex and may involve not only an initial burial but also retrieval of remains, reprocessing (e.g., cremation), and a second burial. Burials occur in a number of ways, including burials in wooden constructions in trees, cremation, interment in the earth, and lodgement in crevices or ledges. Many material objects may be associated with death rites, including burial posts and coffins, and grave markers.

Death and Afterlife. During the historic period, it is clear that individuals, by virtue of their membership of a group, are conceptually linked to, and have obligations towards tracts of land, animals of that land, and the totemic beings that are believed to have formed that land. "Souls" of individuals are believed to originate from sacred portions of the landscape and may return there at death.

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SUBTRADITIONS

Arid and Semiarid

TIME PERIOD: 7000–200 B.P.

LOCATION: Arid and semiarid "core" and western Australia.

DIAGNOSTIC MATERIAL ATTRIBUTES: Symmetrical stone-backed artifacts, millstones, tulas.

CULTURAL SUMMARY

Environment

Covers the generally low-lying center and western two-thirds of the continent. This zone is topographically diverse, encompassing dissected uplands, gibber plains, sand plains, and dunefields. There has been debate about the environmental groupings that have adaptive meaning for prehistoric occupation. For example, is it the contrast between deserts with coordinated and uncoordinated drainage that is important, or the contrast between sandy deserts that act as "barriers" and other deserts that are "corridors" or "refuges" (Smith 1993; Veth 1989, 1995)?

Settlements

Sites throughout the arid and semiarid zones show large increases in artifacts and faunal material during the last 3000 to 5000 years (Smith 1986). In conjunction with evidence from the sandy deserts and from the Victorian mallee, that there was little or no occupation prior to 5000 B.P., this suggests that population sizes increased markedly in the late Holocene (Ross 1981; Veth 1987, 1989). This population increase may in some regions relate to colonization of unoccupied landscapes and in other regions to expansion of preexisting populations. The causal connection, if any, of these settlement processes with increased water availability at the start of this period is much debated (Lourandos 1997; Smith 1986). Settlement organization is geared to dealing with spatial and chronological variations in water availability, and it appears likely that group fissioning or aggregation and the movement of foragers involve switches between a number of strategies, depending on circumstances (Gould 1991).

Economy

A number of technological changes relating to food procurement and production of extractive tools occurred during the mid–late Holocene. For example, the stone artifacts typical of adzes appear only in the late Holocene (Hiscock and Veth 1991). Millstones likely to have been used for wet milling are added to less distinctive forms of grindstones during the late Holocene, in many places within the last 2000 years (Smith 1986). The appearance of large numbers of wet-milling grindstones in the recent past has often been tied to an intensified use of grass seeds (Smith 1986), although the functional and chronological precision of these claims has been queried (Edwards and O'Connell 1995; Gorecki et al. 1997). The reasons for such an economic change have been debated, with population increase and environmental change being seen as prime movers by some, while other authors have argued for restructuring of population aggregations and changing social relationships (Lourandos 1997; Smith 1986).

Sociopolitical Organization

Social and political organization during the late Holocene has often been seen to be a structured response to environmental uncertainty. Gould (1991) has seen this operating both as a response to short-term environmental variations and to long-term environmental stresses; with complex kinship systems and dynamic group structure facilitating access to territory and resources. Intergroup relationships are also formalized through trade, a process that extends back at least 1,000 years (Hiscock 1988). However, sociopolitical organization is not uniform across the arid and semiarid regions in the recent past, and there is clear evidence for migrations of people with different organization and diffusion of sociopolitical systems (McConvell 1996). In light of such information, and in view of archaeological evidence for dramatic and widespread change in settlement and economy, claims for cultural continuity throughout the Holocene have been critically reevaluated (Allen 1998; Hiscock and Veth 1991; Smith 1986).

Religion and Expressive Culture

Linguistic data suggest a complex series of language expansions, probably involving migration of Pama-Nyungan speakers and certainly involving conceptual shifts, throughout the arid and semiarid zones during the last 3000 to 6000 years (McConvell 1996). There has also been discussion of an increased frequency of ritual

and ceremonial cycles accompanying the demographic increases of the late Holocene.

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Macassan Contact

TIME PERIOD: 300–100 B.P.

LOCATION: Tropical north coast of Australia.

DIAGNOSTIC MATERIAL ATTRIBUTES: Stone lines, smokehouse depressions, metal fishhooks and harpoon heads.

CULTURAL SUMMARY

Environment

Current environment of the northern coast, including sandy or muddy beaches, coral fringed embayments, and deltaic floodplains. Vegetation along the coast is dominated by mangrove and tropical wetland systems, while away from the coast savanna vegetation dominates. Climate is tropical and seasonal, with cyclonic impacts regular during the summer wet season.

Settlements

Residential mobility is reduced, with people congregating into larger groups, which in earlier times sometimes attached to permanent or seasonal encampments of non-Aboriginal people such as British or Macassans (Mitchell 1994a; Schrire 1972). Demographic characteristics are affected not only by larger and less mobile groups but by overall reduction of population owing to the introduction of smallpox and other diseases. For some areas, death rates were high, especially among very young and old, producing atypical population structures for many decades.

Economy

Expansion and intensification of preexisting trading networks facilitated the spread of new technology (Mitchell 1994b). Key items leading to subsistence changes included dugout canoes and metal axes for their production and metal harpoon heads and fish hooks. These new technologies enhanced capture of turtles and dugong (a large marine mammal), with a reorganization of other foraging practices as a consequence (Clarke 1994; Mitchell 1994a; Schrire 1972).

Sociopolitical Organization

In some instances, political power became concentrated in the hands of individuals who (a) brokered interactions with Macassans or British, (b) were conduits for the movement of goods in the expanded trade systems, and (c) could take advantage of changed demographic and settlement patterns (Mitchell 1994a; Schrire 1972).

Religion and Expressive Culture

In addition to modifying preexisting economic and sociopolitical structures, Macassan contact led to modifications of language, iconography, and religious symbolism and practice (McKnight 1976).

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Tasmania

TIME PERIOD: 7000–200 B.P.

LOCATION: Tasmania and the offshore islands of Bass strait.

DIAGNOSTIC MATERIAL ATTRIBUTES: Single-piece spears, single-piece skin wraps, reed canoes, pierced shell necklaces. Absence of distinctive material culture that is found on the mainland such as stone axes, backed artifacts and points, boomerangs, composite spears, and the absence of the dingo.

CULTURAL SUMMARY

Environment

Following a long period of sea-level rise in which Tasmania was cut off from mainland Australia through flooding of the connecting land bridge, the present coastline formed by 5000 B.P. Sea-level rise formed a number of islands, some of which were large enough to retain resident populations. Warm moist conditions prevailed until 4000 B.P. and were followed by cooler and drier conditions. This climatic change is reflected in a reduction in the distribution of dense forests, creating more extensive landscapes of sedgeland and sclerophyll forest.

Settlements

Many of the smaller islands created by the last marine transgression appear to be abandoned, although a number close to Tasmania begin to be reused in the late Holocene. Larger islands, particularly Flinders island, have evidence of human populations remaining until 4500 B.P., after which time they died out (Sim 1994). Across Tasmania itself, there is evidence for an expansion of settlement, with increased occupation of areas previously little used or colonization of regions not used at all. In the central highlands, rock-shelter sequences reveal initial or renewed occupation of the region, following mid-Holocene abandonment, some 3000–4000 years B.P. (Lourandos 1983). In the south-western coastal areas of Tasmania, intensive use of the coast and offshore islands occurs within the last 3000 years (Vanderwal and Horton 1984). In northwest of Tasmania, the period since 3500 B.P. involved both reoccupation of islands and increased use of inland landscapes (Bowdler 1988; Jones 1977). Given the nature of contemporary ecosystems and the evidence of seasonally available animals in archaeological deposits, most interpretations of the settlement system involve regular seasonal movements between landscapes within the territory of any group.

Economy

During the mid-Holocene, the economy, like settlement systems, displays a focus on the exploitation of the Tasmanian coastal landscape, and particularly marine resources. In these coastal areas, fish and mollusks provide a substantial proportion of meat represented by archaeological materials. Inland sites dating to the mid-Holocene, particularly in the east of the island, demonstrate that the economy was not limited to coastal resources. This pattern changed about 4000 years ago, in association with the restructuring of settlement patterns. Fishing was discontinued, and consequently fish remains disappear from the archaeological sequence (Jones 1978). This resource was replaced by more intensive harvesting of coastal resources such as seals, by island resources such as mutton bird, and by terrestrial resources such as wallaby. This restructuring of food procurement resulted in changes to tool kits as specific fishing gear ceased to be manufactured (Bowdler and Lourandos 1982), and was matched by changes in the use of nonfood resources such as siliceous rocks. Most of these changes are clearly displayed in the two cave sites at Rocky cape.

Sociopolitical Organization

Little is known of Tasmanian sociopolitical organization, other than has been gleamed from historic documents relating to the end of this period. During the historic period, there were a small number of territorial groups, and some portions of Tasmania were perma-

nently unoccupied. The political structure of these groups was broadly the same as for mainland Australia, although it is possible that trade and its social correlates may have been somewhat less intensive. However given the scale of settlement and economic restructuring that occurred 4000–2500 years ago, it is unlikely that social and political organization remained constant. The inability to apply historic structures onto the prehistoric period is also indicated by the changes in religion.

Religion and Expressive Culture

Archaeological manifestations of religion and expressive culture may become less common toward the end of the late Holocene. Over the last 1000–3000 years, sites such as stone arrangements and large rock engraving panels, presumably with ritual functions, cease being used and are buried by sediments. Interpretations of this trend, in conjunction with the cessation of fishing, have varied between seeing this as a creative adjustment of religious expression (e.g., Allen 1979; Bowdler 1980; Collett 1994) to the decline or even abandonment of oganized religious activity by an increasing by dysfunctional society (Jones 1977).

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Tropical East Coast

TIME PERIOD: 7000–200 B.P.

LOCATION: Eastern portion of Cape York, extending south to Rockhampton, and including offshore islands.

DIAGNOSTIC MATERIAL ATTRIBUTES: Outrigger canoes, complex composite fishing gear, large asymetrical backed stone flakes.

CULTURAL SUMMARY

Environment

Coastal landscapes show dramatic transformations during these millennia. Following sea-level stabilization, embayment infilling and coastal progradation of muddy sediments have occurred in some localities, beach and beach-ridge formation in other locations (Hiscock and Kershaw 1992). Vegetation patterns have altered in response to these changing coastal landscapes, with the formation of wetland and mangrove habitats. Tall closed forests and wet tropical rainforests are found on the coastal ranges receiving high summer rainfall. Elsewhere savannas and open woodlands are common.

Settlements

A number of general trends in settlement patterns and land use are apparent. First, although visitation to islands had been initiated before 3000 B.P. (Barker 1991), possibly reflecting the introduction of the outrigger canoe and fishing gear from Melanesia (Beaton 1985; Rowland 1987), permanent and intensive occupation of island groups typically began in the late Holocene, in some cases only during the last 1,000 years. Second, occupation of rainforests on the mainland began mid-Holocene and intensified in the last millennium (Cosgrove 1996; Horsfall 1996). Patterns of housing and shelter are poorly known. Much evidence for occupation comes from rock shelters, partly because of the bias of archaeological practice and partly because of the destructive effects of cyclones on open sites (Bird 1992). However, shell middens are common along the coast, and in northern areas very large shell mounds

have built up in the late Holocene (Beaton 1985). Population increases of unknown magnitude are accompanied the utilization of these new landscapes.

Economy

Island subsistence typically focussed on mangrove and open beach mollusks together with fish. The capture of turtles and large marine mammals (dugong, dolphin, whale) begins or expands during the late Holocene (Barker 1991), facilitated by the introduction of new technologies such as harpoons and more efficient canoes. As permanent occupation of islands reduced direct access to mainland materials, new technologies were implemented to substitute local material (Barker 1991). Away from the coast, subsistence practices are diverse, but by the late Holocene plant foods are clearly important in many regions, and the ability to process toxic and nontoxic nuts has been suggested to open rainforests to more intensive exploitation late in the tradition (Cosgrove 1996; Horsfall 1996).

Sociopolitical Organization

As groups whose territories included both islands and adjacent mainland fissioned to create separate island and mainland territories, linguistic and cultural practise diverged, and distinct sociopolitical identities emerged within the last 2500 years (Barker 1991). Regionalization involving the emergence of bounded territorial groups has also been identified in mainland rock art (David 1991; David and Cole 1990), and may be reflected in the permanent occupation of the rainforest (Horsfall 1996).

Religion and Expressive Culture

Changes in religious culture are not well documented in the archaeological record, but the trend toward sociopolitical regionalization presumably involves both modification of identity and religious interpretation. One example of this is documented on Cape York, where excavations at Ngarrabullgan cave on the large Mt. Mulligan mesa reveals occupation from about 5500 B.P. and abandonment of the site 900 B.P. It has been suggested that the abandonment reflects the avoidance of the mountain top, the situation that prevailed in the recent past. Because the avoidance of the area is connected to mythologies of a resident evil spirit, it has been suggested that these religious constructions of this landscape are less that a millenium old (Fullagar and David 1997). The antiquity of such religious views may vary regionally.

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Tropical North

TIME PERIOD: 7000–300 B.P.

LOCATION: Tropical coast and savannas of northern Australia.

DIAGNOSTIC MATERIAL ATTRIBUTES: Bifacial stone points, composite harpoons, shell fishhooks, complex polychrome figurative rock painting.

CULTURAL SUMMARY

Environment

Current environment of the northern coast, including sandy or muddy beaches, coral-fringed embayments,

and deltaic floodplains. A number, perhaps many, of the floodplains have formed during the mid and late Holocene (Woodroffe et al. 1988). Vegetation along the coast is dominated by mangrove and tropical wetland systems, while away from the coast savanna vegetation dominates (Hiscock and Kershaw 1992). Climate is tropical and seasonal, with cyclonic impacts regular during the summer wet season.

Settlements

Coastal settlement patterns change throughout the mid–late Holocene in response to environmental changes initiated by the marine transgression (Hiscock 1999). In the late Holocene, mound building, using shell and/or earth, is found across Northern Australia. The causes for this pattern are much debated, but may involve reduced residential mobility for which independent evidence exists (Hiscock 1996). Island use, and in some instances permanent occupation of island groups, is initiated during this period, but the timing varies greatly across northern Australia and probably reflects local factors (Clarke 1994; Mitchell 1994; O'Connor 1992).

Economy

Economic patterns show general similarities between regions and rapid changes through time. The focus of coastal foraging reflects changes in coastal environment that occur in most regions of North and Northwestern Australia. In widely separated areas, there was heavy exploitation of mollusks in open sandy-silty coastlines, creating large mounded middens that may reflect changing settlement patterns. This focus gave way to more diversified coastal subsistence, often within the last 1,000 years, as open conditions were replaced by widespread mangrove ecosystems. A number of technological changes also occur throughout this tradition, the best documented being the introduction of bifacial points. In coastal regions, bifacial points first appear at the beginning of this tradition, but become very common in sites between about 4000 B.P. and 2000 B.P. before declining in usage in recent millennia. This pattern has been explained as an introduction from Southeast Asia, but now seems explicable as a means of moderating economic and social uncertainty (Hiscock 1994, 1999). It is worth noting that when point production declines, about 2000 years ago, there are indications of changing sociopolitical organization.

Sociopolitical Organization

Small-scale regional groupings involving the emergence of sociopolitical and perhaps linguistic territories resembling those visible historically are visible over the last 2000 years (Taçon 1993). It has also been suggested that aspects of recent social organization, such as the western section system and the subsection system, have been established only within the last 2000 years (McConvell 1996). Consequently, the sociopolitical organization known from the recent past is probably created toward the end of this subtradition, at much the same time that the recent economic strategies were put in place.

Religion and Expressive Culture

Rock art documents the emergence of regional differences in religious motifs, involving creative beings in various animal guises, in the very late Holocene (Taçon 1993). A key icon is the Rainbow Serpent, whose image in western Arnhem Land can be traced back to the major environmental changes that occur in the mid-Holocene (Taçon et al. 1996), although the cultural meaning of the imagery may have changed during that time.

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Southeast

TIME PERIOD: 7000–200 B.P.

LOCATION: Subtropical and temperate montane, coastal, and riverine plains.

DIAGNOSTIC MATERIAL ATTRIBUTES: Asymmetric backed stone artifacts, cemeteries, carved trees, simple figurative painting on rock faces.

CULTURAL SUMMARY

Environment

An environmentally diverse region containing the elevated areas of the Great Dividing Range (up to 1500 m above sea level), and the coastal and riverine plains of eastern New South Wales and Southern and Southwestern Victoria. Within these areas are networks of perennial creeks, larger rivers, marshes, and wetlands. Vegetation consists of a diverse array of open and closed forests, grasslands, and heath land. Rain falls throughout the year but is concentrated in the winter, and snow is common at higher altitudes. Lake levels indicate effective precipitation peaked 5000–7000 years ago, that there was reduced water availability 2500–4500 years ago, and another increase in moisture over the last 2000 years.

Settlements

Settlement patterns are varied but reflect a number of common foci for human activities: coastlines, watercourses, low altitudes, access routes in rugged terrain, and rock shelters. Population increase has been inferred in the southeast (particularly in the densely populated Murray river valley) where high levels of anemia, parasitism, and infectious diseases have been observed in the late Holocene (Webb 1984). Nutritional stress has been seen as being common in southern coastal regions. Population increase has also been inferred throughout this zone on the basis of increased numbers of sites and artifacts during the mid- to late Holocene. The locality best demonstrating these patterns is the Upper Mangrove creek catchment where Attenbrow (1987) can claim to have excavated and dated a large and representative sample of the archaeological sites. Here the number of occupied sites increases in the late Holocene, suggesting demographic changes. Additionally, sites in the Upper Mangrove creek catchment, such as Mussel Shelter, show much higher rates of cultural activities between 3000 B.P. and 1500 B.P. than at earlier or later times, illustrating the widespread trend toward declining amounts of material per site in the last millennium or two, at roughly the same time that site numbers increased (Hiscock 1986). This pattern has been used to suggest alterations to settlement involved changes to the residential mobility of groups, a notion for which independent evidence exists.

A number of archaeological phenomena have been used as an indication of greater sedentism and increasingly well defined territories. For instance, sedentism is said to be indicated by the late Holocene construction of earth mounds, and stone wall foundations have been interpreted as the bases for houses constructed of timber, bark, and dirt clods (Williams 1988). Increased food production for these more sedentary groups is shown by archaeological evidence of constructions designed to enhance resource production and capture, such as drainage channels to facilitate management of eels (Lourandos 1980) or fish traps. These constructions were labor intensive to maintain and probably tethered groups to the local areas of those constructions. And the emergence of burial centers for each group, particularly within the valley of the Murray river, is seen as not only another factor constraining group movement but also as a symbolic statement of territoriality (Pardoe 1988).

Economy

Substence practices vary across the southeastern areas of mainland Australia. In most localities, foraging practices involved plant food staples supplemented by hunting. Locally abundant resources were often targeted, but the archaeological record suggests that at least in some regions there was increasing emphasis on exploiting a single kind of food resource for a portion of the year. Examples of this include the late Holocene management and exploitation of eels in the Victorian wetlands (Lourandos 1980), and the seasonal harvesting

of Bogong moths in the Southern Highlands (Flood 1980). Exploitation of these resources was often facilitated by movements of groups across territorial boundaries. Along the eastern coastline, exploitation strategies changed markedly during the last 1000 years, probably stimulated by the adoption of the technology for hook and line fishing to supplement spearing (Bowdler 1976). Other economic practices included quarrying of stone for artifact manufacture, and ocher for religious and expressive activities. Such materials were sometimes distributed through exchange networks.

Sociopolitical Organization

Sociopolitical organization was constructed around kinship and residential entities operating at a number of scales, both within and between groups. Social control operated through hierarchical structures based on the high status of individuals. Exchange networks both reflected and reinforced these sociopolitical processes and territorial identity. For instance, McBryde (1978) has documented the effects of political boundaries and alliances on the distribution of axes through the Victorian trade networks, and Lourandos (1980, 1983) has argued that the emergence of males with sufficient prestige to exercise wide control over the labor of many individuals in a region arose through the mechanism of competitive hosting of ceremonial/trade events. Intergroup relationships, mediated by these social mechanisms, are linked to both local population densities and gene flow (Pardoe 1990).

Religion and Expressive Culture

Burial practices and rock art reveal changes to religious/artistic expression throughout the mid- to late Holocene, and it is likely that at least some of these changes are linked to increasingly pronounced territorial distinctions between groups. Motif, style, and technique of rock art production display alterations in most regions during the mid-Holocene, and the form of interment and nature of grave goods also change in at least some cemeteries (Pretty 1977). Skeletons also show chronological shifts in what is probably initiation-linked body modification such as tooth avulsion. These archaeological expressions of change in religious practice may well reveal alterations, of unknown magnitude, in religious belief; but these changes probably also reflect processes related to the emergence of group identity linked to the developing territoriality (Pardoe 1988, 1994).

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SITES

High Cliffy Island

TIME PERIOD: Late Holocene.

LOCATION: Buccaneer archipelago, northwest Kimberley.

DESCRIPTIVE SUMMARY

Local Environment

High Cliffy island is a rocky island 10 km from the mainland and rising 15 m above sea level. The island is composed of sandstone, and vegetation is minimal, consisting typically of spinifex and open woodland. No

permanent water is available on the island, but nearby sand islands have permanent soaks.

Physical Features

The site consists of a large number of structures constructed from slabs of sandstone. Constructions are all dry stone walls, but take a number of forms including space-defining structures such as walls along pathways as well as hut bases. The structures interpreted as shelters by O'Connor (1987) are typically circular, with walls up to 1 m high and 0.5 m thick. These walls are built directly on flat bedrock outcrops with no foundations and enclose small areas of less than 9–10 sq m. Stone artifacts are found across the site, outside as well as inside the structures. Antiquity of the site is poorly defined, although one radiocarbon date of 370 B.P. has been obtained from the site, and elsewhere on the island rock-shelter occupation extends back to 3000 B.P. (O'Connor 1987, 1992).

Cultural Aspects

Although the site is generally accepted as a late Holocene settlement containing stone houses, the functioning of the settlement remains enigmatic. It is possible that the site might have operated as the wet season base for a group with no mainland territory, but it is also plausible that this site might have provided well-defined social space for interactions among a number of groups meeting on the island (O'Connor 1987). Although the variation between surrounding islands and reef systems would provide abundant food, water would be a limiting factor except in the wet season. Consequently, sedentary occupation during one portion of the year has been proposed (O'Connor 1987).

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Jiyer Cave

TIME PERIOD: 5000–200 B.P.

LOCATION: Russell river south of Cairns, Queensland.

DESCRIPTIVE SUMMARY

Local Environment

Jiyer cave is located in lowland rainforest of North Queensland, receiving high summer rainfall.

Physical Features

Jiyer cave is a large rock shelter in a basalt cliff. The floor area within the drip line is roughly semicircular in plan and covering over 300 sq m (Horsfall 1996). Artifacts, including large grindstones, are visible of the surface of a 1.5 m deep deposit. Excavations revealed a stratigraphic sequence extending back to 5000 B.P. with good preservation of plant and animal remains for the last 1000–2000 years. Charred fragments of nutshell from species such as the Johnstone almond (*Elaeocarpus bancroftii*) and black walnut (*Endiandra palmerstonii*) reveal the procurement and detoxifying of rainforest plant foods (Cosgrove 1996; Horsfall 1996).

Cultural Aspects

Human usage of the rainforest in this locality is documented from 5000 B.P., with processing of toxic plant foods from at least 1000 B.P. and possibly much earlier (Horsfall 1996). Human use of the cave, and by implication the local rainforest region, was at a very low level in the mid-Holocene. Intensity of site use appears to have increased in the late Holocene, although one possibility is that greater usage of the area is a response to European encroachment in adjacent lowlands over the last two centuries (Hiscock and Kershaw 1992). However analysis of the artifact assemblage indicates that increased use of the site began before European contact, perhaps up to 800 B.P., and related to the introduction of a technology for processing toxic plant foods (Horsfall 1996).

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Kenniff Cave

TIME PERIOD: 19,000 B.P.–modern.

LOCATION: Meteor creek, Central Queensland.

DESCRIPTIVE SUMMARY

Local Environment

Kenniff cave is positioned in a sandstone cliff line at the top of a scree slope above Meteor creek in the Carnarvon range. Nearby creeks are ephemeral.

Physical Features

The site is a sandstone cave containing a 3.4 m deep stratified deposit, although artifact conjoining has demonstrated that the impressive stratigraphic banding is not matched by the integrity of the deposit, with vertical movement of objects short distances within the deposit (Richardson 1992). Two distinct units were defined during excavation, the lower unit being late Pleistocene in age and lying unconformably over this an upper unit covering the period 6000 B.P.–modern. This disconformity, reflecting the absence of early Holocene sedimentation, is one reason that changes in the artifact sequence were distinctive. Large quantities of artifacts were recovered from all levels of this sequence, although higher rates of artifact accumulation occurred in the middle Holocene, declining again in the recent past (Hiscock 1986).

Cultural Aspects

Human occupation at this site may simply represent sporadic use by mobile foragers exploiting the rugged gorge systems after rainfall. The significance of this cave is not related to unusual activities of prehistoric occupants but to its key role in describing the Late Australian cultural sequence. Kenniff Cave yielded the first Pleistocene dates for this continent and is the classic site used to define the sequence of implement changes over the last 20,000 years. An early suggestion for the presence of small and precisely retouched stone artifacts in the upper unit but not the lower unit was the introduction of a hafting technology where none had existed previously (Mulvaney and Joyce 1965). This interpretation was replaced first with the notion that new stylistic and ideological structures had been introduced from Asia, and more recently with the notion that the changes represented the technological component of new adaptive systems related to environmental and demographic shifts (Hiscock 1994).

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Malangangerr

TIME PERIOD: 23,000 B.P.–modern.

LOCATION: East Alligator river, Arnhem Land Northern Territory.

DESCRIPTIVE SUMMARY

Local Environment

Malangangerr is a concavity in one of a number of a large sandstone blocks near the East Alligator river. These blocks are surrounded by a gently sloping sand plain vegetated with open eucalypt and pandanus woodland. Climate is tropical with highly seasonal rainfall in the summer months causing extensive flooding of the nearby river.

Physical Features

Caused by weathering of less resistant portions of the block together with roof collapse, the shelter covers an areas 30 m by 10 m. Within the shelter, the deposit consists of 1.2 m of sand topped with 0.6 m of shell midden (Schrire 1982). The base of the sand is terminal Pleistocene in age (18,000 B.P.–23,000 B.P.), while the midden is mid-Holocene in age. Faunal material is preserved mainly from the Holocene shell midden. This preservation of organic material allowed bone, shell,

wooden, and string artifacts to be recovered from the midden. In addition, primary and secondary burials are present in the Holocene portion of the deposit (Schrire 1982). Stone artifacts occur in small numbers throughout the deposit. Ground edge axes are found in the late Pleistocene levels (White 1967), whereas bifacial points become abundant only in the mid-Holocene levels of the site (Schrire 1982).

Cultural Aspects

Malangangerr is one of the sites that have defined the cultural sequence found in Western Arnhem Land. It was the deepest and oldest of the shelter deposits dug by Schrire in the 1960s. The late Pleistocene occupation appears to be sporadic and low intensity, and although the presence of axes was initially surprising, their role in the economy has not been fully explained. An occupational hiatus during the glacial maximum has been suggested (Bowdler 1977), but the evidence for abandonment of the area is weak. The Holocene shell midden has been used to describe the economic adjustment of foragers to the massive local environmental changes that followed the marine transgression. Mollusk exploitation concentrated on the extensive mangroves, and changes in midden composition have been interpreted in terms of changing mangrove environments (Hiscock 1999; Schrire 1982). Contrasts between Malangangerr and other sites in the region have been used to depict group territories and interaction networks (White and Peterson 1969), but increased knowledge of environmental and archaeological patterns challenges such interpretations or at least restricts them to that last few hundred years (Allen and Barton 1989; Hiscock 1999). It is also possible that this site, like others in the region, was abandoned about 3000 B.P. following the local displacement of mangroves by hypersaline mud flats, and that intensive reuse of the site was reinitiated only in the last millennia (Allen and Barton 1989). This would reinforce an interpretation of the ethnographic foraging pattern stretching back only a few centuries.

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Mussel Shelter

TIME PERIOD: 9000 B.P.–modern.

LOCATION: Mangrove creek catchment, New South Wales.

DESCRIPTIVE SUMMARY

Local Environment

The Upper Mangrove creek catchment where the site is located contains sandstone cliff lines and small rock outcrops on the ridges and along most of the creeks. Valley bottoms and lower slopes are generally covered with tall open forest and the ridgetops and upper slopes with open forest and woodland. Rainforest species occur along the banks of creeks in some of the less open and more steep valleys and gullies.

Physical Features

Mussel Shelter is a sandstone overhang 13 m by 2 m in the valley bottom. The shelter has formed in outcrops of sandstone through cavernous weathering and block fall. Deposits of silty clayey fine sand have formed to a depth of 1.8 m during the Holocene. High densities of artifacts, including the implements called "backed artifacts" have been recovered (Hiscock and Attenbrow 1998). The rate of artifact accumulation is higher in the mid- to late Holocene than in the early Holocene.

Cultural Aspects

Interpretations of this site have focused on two issues. First, this is one of the sites that finally demonstrated the manufacture of backed artifacts in the early Holocene rather than their being introduced

from outside Australia in the mid-Holocene (Hiscock and Attenbrow 1998). This finding provides support for the notion that Holocene cultural change in temperate Australia is complex and incremental rather than merely the product of a package of social and technological traits introduced from Asia. A second archaeological trend at this site is the chronological changes in artifact accumulation rate, which have been used to discuss the timing and magnitude of demographic increases in the mid- to late Holocene (Attenbrow 1987). This small rock shelter probably served as a base camp and processing locality for groups foraging in this valley, with increased use of the site in recent millennia reflecting population increase as well as restructured subsistence and territorial strategies.

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Puritjarra

TIME PERIOD: 22000–500 B.P.

LOCATION: Eastern end of the Cleland hills, Northern Territory.

DESCRIPTIVE SUMMARY

Local Environment

Puritjarra is located in a sandstone escarpment in the Cleland hills. The surrounding environment consists of mulga woodland, spinifex covered slopes, and sand dunes. A large and permanent waterhole exists nearby, within 30 min walk, while ephemeral water is available in rock holes immediately adjacent to the site (Smith 1989).

Physical Features

The site consists of a large east-facing rock shelter approximately 30 m wide at its entrance. A concentration of boulders deriving from roof fall exists in the center of the shelter floor, but otherwise the floor is flat and sandy. The rear wall of the shelter is covered with paintings, mainly hand stencils and tracks completed with red, white, and yellow ocher. Excavations more than 2 m deep document occupation over at least 22,000 years (Smith 1987, 1988, 1989). Two layers contain cultural material: an upper layer of loose sand covering the period 7000 B.P.–modern, and a second layer of red clayey sand covering the period 22,000 B.P.–7000 B.P. Scattered charcoal and stone artifacts are found throughout these layers, although formal grindstones have been recovered only from the upper layer.

Cultural Aspects

At Puritjarra, human occupation is visible by 22,000 B.P. Occasional visits to the site by mobile foragers are suggested to have continued throughout the glacial maximum, because of the availability of permanent water nearby (Smith 1989; Veth 1989). Ocher fragments are found in the deposit from 12,000 B.P., and it has been suggested that paintings occurred from that time onward (Smith 1989). Low levels of habitation continued from the terminal Pleistocene until the mid-Holocene. From 6000 B.P. until the last few hundred years, occupation was much more intensive, and the presence of millstones in this phase has been used to suggest a reorganization of the local economy to harness grass-seed resources as a adjunct to population increase (Smith 1986, 1989).

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Barlambidj

TIME PERIOD: 1100–100 B.P.

LOCATION: Copeland island in Western Arnhem Land.

DESCRIPTIVE SUMMARY

Local Environment

Barlambidj is located on a sandy flat on the southern edge of Copeland island. In front of the site is a broad sandy beach; on the western side of the island there are rock platforms (Mitchell 1994). No water sources exist on the island.

Physical Features

The site is most visibly defined above the ground surface by six stone lines and three depressions. The stone lines consist of sandstone cobbles and boulders arranged into a number of adjoining bays about 1 m wide. Each bay served as a fireplace with a large metal cauldron sitting on top. In addition to these structures, there are sherds of glass and earthenware pottery, mollusk shells, fish and marine turtle bone spread across the sandy surface. Radiocarbon estimates and cultural material indicate that this surface material may date to less than 150 B.P.–100 B.P. Excavations reveal an earlier shell midden below the stone lines (Mitchell 1994). Dated to 1100 B.P.–600 B.P., this midden is similar to the more recent midden, except that fish come from a greater range of environments, and there is only a small amount of turtle bone.

Cultural Aspects

Barlambidj is the classic illustration of the effects of Macassan contact on Aboriginal economy. The contrast between the lower (precontact) midden and the surface (postcontact) midden reflects a number of economic changes initiated by introduced technology. The major increase in turtle remains in the postcontact midden results from the adoption of dugout canoes and metal harpoon heads, and Mitchell (1994) interpreted the reduced diversity of fish taxa as the abandonment of low-ranked foods as turtle became available.

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Rocky Cape South and North Caves

TIME PERIOD: 8000–0 B.P.

LOCATION: Northwest coast of Tasmania.

DESCRIPTIVE SUMMARY

Local Environment

Rocky Cape South and Rocky Cape North are caves approximately 300 m apart, in quartzite cliffs overlooking a rocky headland on the north coast of Tasmania.

Physical Features

Both shelters contain shell midden deposits nearly 3 m deep. The middens contain the remains of mollusks, seals, birds, fish, and terrestrial vertebrates such as wallabies, bandicoots, and possums. Stone and bone artifacts have also been recovered from the deposits. Dating of extensive excavations show that the South Cave was occupied from 8000 B.P. until 3800 B.P., at which time it was abandoned, whereas the North Cave has deposit covering the period 5500 B.P. until historic times (Jones 1971). The combined sequence from both sites has been used to discuss the period 8000 B.P. until the present. Several trends in this sequence have been studied, including (1) the disappearance of fish from the record at 3800 B.P. and a proportional increase in seal and wallaby; (2) decline in numbers of bone tools leading to their disappearance by 3500 B.P.; and (3) increased use of imported stone and consequent changes in the proportions and quantities of stone artifacts.

Cultural Aspects

Archaeological trends at these sites have suggested a number of explanations, involving not merely changing use of local resources but island-wide shifts in behavior for the last 3500 years (Bowdler 1980, 1984; Colley and Jones 1987, 1988; Jones 1971, 1977, 1978). Common descriptions of the sequence have included a suddenly reduced adaptive capacity and a reorganization of settlement.

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Toolondo

TIME PERIOD: Terminal phase 200 B.P.

LOCATION: Southwestern Victoria.

DESCRIPTIVE SUMMARY

Local Environment

Low-lying plain containing small perennial rivers, creeks, swamps, and wetlands (Lourandos 1980).

Physical Features

The site consists of a series of artificial channels, each U-shaped in section and up to 2.5 m wide and 1 m deep (Lourandos 1980). These channels form complex interconnected drainage networks linking Clear Swamp to the larger Budgeongutte Swamp. Infill in the base of one of the channels was radiocarbon dated to 210 B.P., providing an age for the final phase of the drain operation. Initial construction of this drainage network has not been dated.

Cultural Aspects

Suggested functions of these channels include (1) swamp management by draining excess water into well-defined swamps; (2) the extension of eel (*Anguilla australis occidentalis*) habitat by connecting new swamps to ones used by eels; and (3) management of eel movement and distribution as a means of enhancing the efficiency of animal capture (Lourandos 1980, 1987). Although one consequence of these drainage channels was an increased production of eel flesh, ethnographically informed interpretations of the site have suggested that the construction and maintenance of the channels required a capacity to organize labor provided by the development of political hierarchies and associated ceremonial competition (Lourandos 1980, 1985).

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