

The Swiss Family Robinson and the Archaeology of Colonisations

J.M. BIRMINGHAM and D.N. JEANS

Australian historical archaeology is now at a stage of development where it is essential that we pause and ask ourselves: 'What are we doing and why are we doing it?' In this paper Judy Birmingham of the Department of Archaeology, University of Sydney, and Denis Jeans of the Department of Geography, University of Sydney, strongly advocate an explicit problem-oriented approach to our subject matter rather than merely descriptive data collection. Clearly, Australian historical archaeology offers substantial opportunities to explain the process of colonisation, not only in the context of 19th century Australia but in a wider context also. The writers point to The Swiss Family Robinson by J. D. Wyss, first published in 1812-13, as an interesting paradigm account of that process of colonisation. They discuss the application to Australia of the colonisation model thus derived and conclude that problem-orientation around a model of this sort is one of our first priorities.

Since the late 1960s when the study of 19th-20th century archaeological sites and data in Australia began to acquire respectability as a discipline with the virtually simultaneous investigation of three widely-separated sites (Port Essington N.T.,¹ Irrawang in the Hunter Valley N.S.W.² and the Fossil Beach Cement Works, Vic.³), the number and diversity of historical archaeological projects has snowballed to an extent that makes it difficult to maintain an exhaustive catalogue. National Estate funded projects administered by the Australian Heritage Commission are listed in the Directory of National Estate Studies, while the state studies can be found in the year books or annual reports of the body or department through which they are administered. Studies carried out for other state bodies—state electricity commissions, rail authorities, water boards, etc.—are equally listed in their annual reports. Non-conservation oriented projects, funded by academic grants, can be found in the List of Grants Approved (Australian Research Grants Scheme)—and of course in the publications of the Universities and Colleges of Advanced Education concerned. Almost impossible of access, however, even for listing purposes, are the increasing number of archaeological consultants' reports carried out for private clients or companies, either directly or through environmental planning agencies.

The major reason for such acceleration in this field is not hard to find. Since 1973 and the introduction of the National Estate Grants Programme, annual funding for projects for the preservation and protection of the National Estate has risen from \$0.288m. to over \$2.2m (with a record \$7m. in 1974-5). Equally the introduction of heritage legislation for the Commonwealth (Australian Heritage Act 1975) together with state heritage acts or similar legislation effected or pending in most parts of Australia and the territories since 1977 (N.S.W.) has created contract archaeological programmes in areas of development which were previously non-existent.

Major archaeological programmes arising from conservation needs in the last few years include the preparation of cultural resources surveys for penal settlements at Norfolk Island⁴ and Port Arthur, regions such as the Hunter Valley (N.S.W.), the Dampier Archipelago (W.A.), West Central Victoria and South Australia (the Ngaiawang and Woakwine Folk Provinces),⁵ a range of industrial and historic sites such as Lal Lal Blast Furnace,⁶ Hyde Park Barracks Sydney, Arltunga (N.T.), Boydton (N.S.W.), Elizabeth Farm Parramatta, Irvinebank, the Venus and Kidston gold batteries (all Queensland), and the Dutch and Colonial Wrecks programmes (W.A.). Such cultural resources surveys comprise an assessment of the historical and archaeological evidence in preparation for a conservation plan, and are usually non-disturbing; in addition there have been an increasing number of mitigative (or salvage) excavations of which one of the earliest was Wybalenna (TAS.),⁷ and two of the largest, Bowens Landing (TAS.) and Hyde Park Barracks (N.S.W.). Even the nominally academic projects usually have some conservation component—the need to collect and interpret historical data (physical and oral) under a generalised threat of destruction by natural or human cause. MacKnight's work on the Macassan trepang sites of the northern coastline of Australia,⁸ Young's continuing evaluation of ethnic aspects of the Hahndorf-Barossa settlement pattern (S.A.),⁹ Connah on early settlement in New England,¹⁰ Jones on early agricultural technology,¹¹ Jeans on historic landscapes of N.S.W.,¹² and Jack on the Chinese involvement in the Palmer River gold rush all fall into this second category. The main difference between the two lies in the research priorities and cut-off points which bear more heavily on the conservation-funded projects.

One characteristic of these projects has been their diversity and unco-ordinated nature. A planned approach to related studies is understandably difficult in many aspects of conservation-related archaeology,

since contracts and funding are tied to localities selected for resource development in governmental and commercial processes which until recently in most states had little or no role for the planned protection of the cultural environmental heritage. Another characteristic is their predominantly descriptive site catalogue nature. There is little sign of the explicit problem-oriented approach which has gained strength in U.S. conservation archaeology since the early 70s.

Even the more academic studies—those carried out by the Department of Mechanical Engineering at the University of Melbourne, for example, by the Department of Mining and Metallurgy at the University of Queensland, by the Department of Prehistory and Archaeology at the University of New England, by the Departments of Archaeology, Geography and History at the University of Sydney and the Australian National University—reflect rather the specific interests, disciplines and circumstances of individuals than co-ordinated contributions to a structured and developing subject area.

Even so certain benchmark projects have indicated ways in which studies in historical archaeology can contribute to the larger historical enterprise. Allen's Port Essington paper of 1973 set clear guidelines for further development as in another way did the Ngaiaawang Folk Province concept of Pretty, unfortunately aborted by financial cut-backs in 1976. The new National Parks and Wildlife Service conservation programme for Port Arthur will contain problem-oriented research provisions, and the National Parks and Wildlife Service of N.S.W. has a current research-oriented survey of mining sites in the Central West.

A major contributory cause of these deficiencies is the still inadequate data base from which such studies must work. Unlike the associated discipline of prehistory, historical or colonial archaeology totally lacked until recently a foundation of basic survey, recording, classificatory and organisational studies carried out by meticulous and highly-motivated scholars and amateurs of older generations. Not only has this meant a large and unsorted universe of potential sites and themes for investigation with equally unsorted and untested techniques and a paucity of comparative data, it has also meant that the essential preliminary stage of surveying, estimating and ordering the archaeological data base has to be carried out simultaneously with the accelerating development of its output, and the formulation of methodology and structure simultaneously with the very conservation projects which should be using them.

In fact the very diversity of the last five years' work as well as its quantity, both academic and conservation-oriented, has achieved almost accidentally a sufficiently-varied sample of the archaeological resource to enable realistic problem areas to be defined, and the formulation of useful and enlightening hypotheses to aid in their exploration. Even were this not so, the adoption of a more problem-oriented methodology with a greater emphasis on making significant contributions to historical interpretation is already overdue in Australian historical archaeological studies today, and the exploration and formulation of interpretive hypotheses and models must take priority over further descriptive data collection. Archaeologists must now be concerned with abstracting appropriate models of Australian development which will incorporate those historical aspects to which historical archaeology can best con-

tribute. This paper considers this question.

It may well be asked—especially among the more traditional historicalist archaeologists—what advantage is there in explicit problem-investigation and model-testing as opposed to straightforward descriptive investigation especially if meticulously carried out? This question is widely explored by Gumerman¹³ and Goodyear.¹⁴

Moreover for contract archaeologists working on government-financed projects there is also a cogent practical reason. The hypothesis-testing method, unlike the descriptive, has predictable results for which a bureaucratic system not necessarily totally committed to the absolute value of archaeological investigation can be prepared in advance. Public archaeology—especially of the colonial period—in Australia is by no means assured of a tenured role as a priority for public expenditure in state budgets in spite of the growing recognition that the field exists. Demonstrable results in terms of significant advancement of scholarly knowledge are increasingly essential if state funding is to be justified, especially when funds are low. The prior formulation of significant historical hypotheses together with properly-planned test programmes must ensure that a recognisable contribution to knowledge is made whatever the precise details of the outcome. The alternative—to investigate and settle for what chances to be found—leaves both the investigator and his or her sponsor in an uneasily vulnerable situation, especially as the visible relics of most historical archaeological sites in Australia—glass bottle fragments, bits of painted china, bones, buttons and the like—markedly lack *prima facie* distinction.

This latter point is especially relevant to the costly process of mitigative excavation. Such collections of rubbish, undistinguished to those newly returned from recent exposure to the stored treasures of Europe, will not impress either government officials or their voters unless a major effort towards interpretation, presentation and explanation of significance is maintained throughout the whole operation; a problem-oriented project is manifestly more necessary in this context than where more obviously striking finds are constantly being found.

The historical preoccupations to which archaeologists are now being urged to address themselves are not of course new to anyone but the archaeologists. Historians, historical geographers and economic historians such as Blainey,¹⁵ Butlin,¹⁶ Jeans,¹⁷ Linge,¹⁸ Perry¹⁹ and Williams²⁰ have defined and explored many facets of the white settlement of Australia and its socio-economic processes, highlighting different factors as dominating and formative influences. Environment, topography, distance, the settlers themselves and their social structure and institutions, dumped technology, have all had their turn as dominant factors in the development of Australian society. What historical archaeologists have to offer is potentially exciting information about the changing past biophysical environment, from the hitherto inarticulate and underprivileged members of society, and actuality in social and technological areas, all of them with the added dimension of changes through time. Little of this evidence has yet been organised and used to illuminate our knowledge and interpretation of Australian history. It would seem high time for such archaeologists, as a start, to take a long hard look at Australian historical interpretation and their own possible role.

THE SWISS FAMILY ROBINSON

Hints for a paradigm account of the process of settler colonisation can be found in *The Swiss Family Robinson*, written by Johann David Wyss and published in 1812–13 in Zurich, and in English translation in 1814. It is remarkable that one of the most revealing documents about colonisation was written by a native of almost the only western European country that made no colonies. The immense popularity of this book derives from its presentation of the most romantic view of a movement that involved so many 19th century people, either as participants, friends or relatives of participants, or as citizens of countries which derived some pride from their successful colonising efforts. Romantic, but at the same time highly practical, for the romance lay in recreating at the end of the earth a replica of technological European society with the additional spice of exoticism and adventure.

The Robinsons were the only apparent survivors of the wreck on a deserted South Sea Island of a vessel which 'had been sent out in preparation for the establishment of a colony in the South Seas, and had been provided with a variety of stores not commonly included in the loading of a ship.' The colony in New South Wales had thus already seized the European imagination, and this stranding was its replica. The ethos of 19th century colonisation was thoroughly spelt out in a sermon father Robinson preached to his wife and four sons: God's sending of man to the Earth is seen as an act of colonisation. God chose an uninhabited island from his domains, called 'Earthly Abode', and it was his wish to people and cultivate it, for 'all within it was a kind of chaos.' Here is the belief that the migrating Europeans would bring order and wise use to the imperfectly employed lands of the savages. And colonisation was a test; 'he who shall have passed some time in it, and by his virtue, his application to labour, and the cultivation of the land, should have rendered himself worthy of reward, was afterwards to be received into the Heavenly City and made one of its happy inhabitants.' This reward, promised to those who preserve their land in the best order and show the largest return from it, is a colonial version of the work ethic related to the ambition of many colonists to acquire a sufficiency and return to their home country. This parable, concluding with the claim that 'Human creatures are the colonists of God', is a remarkable assertion of a colonising ethos which is not merely reflective of an age, but from the book's immense popularity must itself have contributed significantly to the 19th century colonising impulse.

The tale of how the family recreated the comforts of Europe on their island is a paradigmatic account of contemporary colonisation. Negative feelings are not entirely neglected. There is the desolation of being landed on an uninhabited shore, and the poignant reminders in the landscape of home in Switzerland are jarred by the observation that the swans are black. So some in New South Wales saw the park-like landscape of the Cumberland Plain around Sydney. Homesickness occasionally intrudes, and the reader is reminded that 'the remembrance of our native land is never obliterated from the mind'.

These feelings, however, only occasionally come to the surface, and life is mostly all healthy open-air activity: exploring the rich resources of the island and caring

for the cattle, pigs, sheep, goats, asses and chickens which luckily survived the shipwreck. Tools and equipment are fetched from the vessel in order of utility, beginning with carpenters' tools for building a home, and guns and gunpowder, followed by spades, hoes and ploughshare for husbandry, harpoons and cauldrons for whaling, and finally a sawmill, grindstones and a tobacco grater as manufacture begins. Stability is guaranteed by social control imposed by the father, to whose paternal care the task of guiding the enterprise for the safety of his beloved family was as much entrusted as to any royal governor.

Exploration of the island takes a familiar form not yet fully developed in New South Wales by 1812. There is the reconnaissance of the surroundings of the landing place, finding fish and pasture. Longer journeys follow, tracing the river, and entranced by delight in 'a truly embellished nature', a 'picture of magnificence and new and exquisite delight'. In the journals of the Australian explorers we similarly learn of the delights of entering fresh country and of open-air living: colonisation was an adventure. There is danger, here from buffalo, snakes and panthers, and also the joy of shooting strange creatures. Nineteenth century ecological attitudes are fully captured in father Robinson's remark to his sons; 'You may then be highly flattered with your adventure of killing an animal at once so rare and so remarkable' (a kangaroo). From these early forays, exploration develops into longer journeys now based on hypotheses about the island's form, in the same way that the hypothetical 'big river' and the 'inland sea' shaped Australian exploration for a generation. Naming the country went on during exploration, but the lords of the English treasury found no commemoration among the Swiss.

A colonial settlement pattern emerged as this little society matured. At first there was a makeshift camp at the landing place, a 'little opening' in the rocks with water and a safe anchorage, where thanks to the Supreme Being for preservation were first offered. After a short time there was a shift inland to a site with better resources, but incurring transport problems as the wreck on the rocks was still the chief, maritime, source of supply, so that the landing place survived as a 'port'. Then, with the planting of crops, a third settlement was made among the arable fields. These practical measures taken, a *cottage ornée* was built at Cape Disappointment among rocky prominences and cascades. There, 'in short, every feature of the picture contributed to form a landscape worthy of the homage of a taste the most delicate and refined'. This place was named 'Arcadia', and reflects the final imposition of the full gamut of European landscape improvement upon the island's settlement. Only the mines were absent. The *Swiss Family Robinson* is not a paean to the idea of the noble savage and a return to nature, but a tribute to settled European society and its civilized appropriation of the ideas of Rousseau to provide sophisticated ornamentation. It is a measure of the intention to create an ornamental and not just a workaday colonial landscape that Hogarth's serpentine line of beauty, an essential feature of the English ornamental park, appears in an early plan of the Australian Agricultural Company's settlement at Carrington on Port Stephens. The Blue Mountains resorts and Mount Buffalo may be seen as the Australian equivalents of the building at Cape Disappointment.

The paradigmatic nature of the book is seen in the range of resources discovered on the island. The average colonist looked hopefully to the discovery of products which would replace imports. On the Robinsons' island he found gourds for making vessels, porcupine quills for needles, bamboo stalks for making arrows, karata bark for tinder, thorns of a tough acacia for nails, and berries whose wax made good candles. New South Wales was much more disappointing. In time, more elaborate manufactures developed, using equipment rescued from the ship and based on local resources: salt from seawater; leather-tanning; flax retting, spinning and weaving; pottery; hats; and sugar. The four sons came to a division of labour after an early sharing of common tasks, and noxious industries were isolated from dwelling places in a way imitated by Governor Bourke in the 1830s.

Moreover, the island contained virtually all those exotic products the Europeans were seeking in many different parts of the world: sugar cane; coconuts; cochineal insects; caoutchouc; New Zealand flax; cotton; ginseng; vanilla beans; cacao; and bananas, though only pearls in the end produced a fortuitous and portable export commodity. Instead of the usual pattern of importing the skills to exploit particular resources, father Robinson fortunately carried them all in his head.

But living was not a matter merely of collecting natural produce. There was agriculture, first of all in the form of a kitchen garden for immediate needs, then an experimental planting of maize which by chance coincided with the seasonal requirements of that crop, and then, experimentation over, bounteous harvests of maize, rye, oats, barley, peas and lentils, all thriving in a tropical environment that supported the buffalo, the boa, the elephant and the tiger. Worst of all were the monkeys who raided the standing crops. Father Robinson eliminated them using a poison distilled from the *Euphorbia* plant; the Australian parallel need not be pointed out.

Wyss had thus anticipated the process of colonisation as it would proceed to evolve in the South Seas and elsewhere in the following decades, so that in time it could be said of each colony: 'such was the state of our colony ten years after our arrival on the coast; our resources had multiplied as our industry increased; abundance reigned around us.' Governor Macquarie said as much as this at his replacement. It remains to

reduce this model story to a more systematic form which will provide a framework for the incorporation of the findings of historical archaeologists.

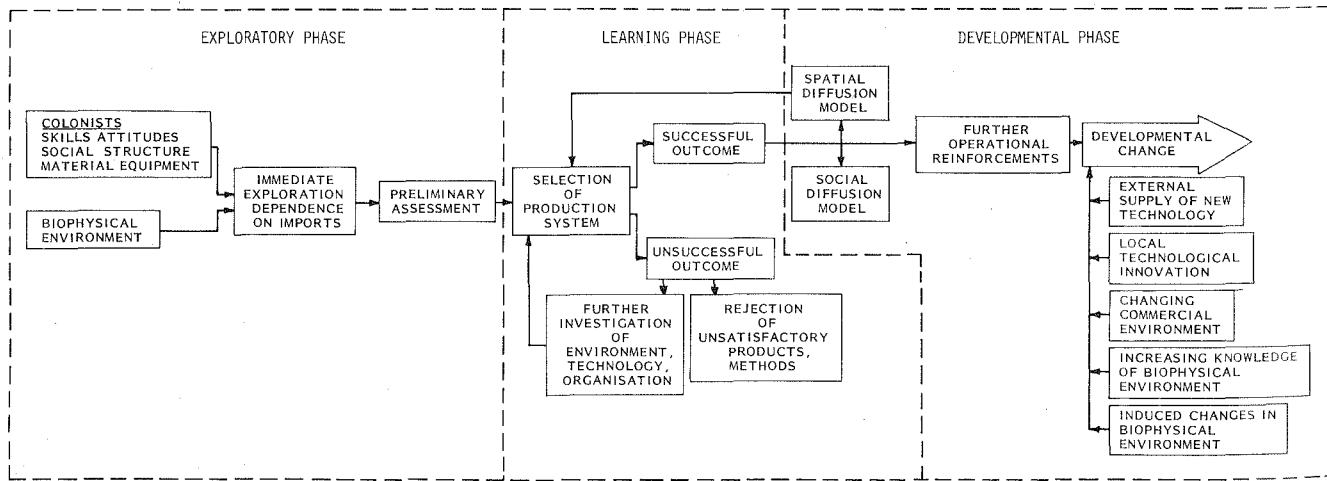
A COLONISATION MODEL AND ITS APPLICATION

The historical and industrial archaeologist investigates machinery, buildings and sites that are to be explained within a continuing historical process, and by his or her findings he or she contributes to our understanding of that process as it is built up through multi-disciplinary research. The form which the account of the process might take in Australia is illustrated in Fig. 1, which shows an initial exploratory phase, probably short-lived; a longer phase of learning, largely by trial and error; and a developmental phase in which the established industry shares in the special world-scale economic and technological development peculiar to its own commodity, in the general economic and social development of its Australian communities, and in an increasing understanding of a changing biophysical environment.

The arrival of colonists in a far-off land confronts them with a strange biophysical environment: the interaction that ensues is characterised by these two ingredients. The initial white settlers of Australia drew on a developing geography of the world, based on the ancient Greek theory of climatic zones and the discoveries of the maritime explorers, to predict they would find a highly fertile temperate land suitable for most known useful crops, an optimistic view fostered by the preliminary surveys of Sir Joseph Banks and James Stirling. By and large the colonists were disappointed to find a much harsher land than imagined, and the story has been one of continuing and still-uncompleted technological, ecological and aesthetic accommodation.

The climate is mostly temperate with few extremes of temperature, though heat and humidity hindered some industries such as dairying, and over much of the

Fig. 1: Flow chart illustrating the process of colonisation from initial contact to the development of a mature economy. The chart can be used for the economy as a whole, or for individual industries and sites.



early-settled lands maize grows better than the preferred bread grain, wheat. But the recurring droughts had not been foreseen, and they markedly hindered expansion and directed it to the safer coastlands for a long while, as in the severe New South Wales drought of the 1820s. Attempts at predicting droughts failed, and there was a need to replace the European idea of a stable ecosystem with the idea of a fluctuating ecosystem with all that entailed in changed management practices.

Soils were poorly supplied with plant nutrients, chemical or organic, and most were quickly exhausted without the intensive manuring practices of Europe. There was an early retreat to the richer alluvials, periodically refreshed by floods which created new problems. The problem was overcome by the discovery of better soils, notably the red-brown earths of New South Wales, Victoria and South Australia, by the adoption of fallowing, by the discovery of fertilisers, notably superphosphate, and by mechanisation which made farming profitable even with low yields.

Despite the Aborigines being able to live from it, the vegetation failed to provide that rich fund of resources found on their island by the Robinson family. There were no exportable vegetable products such as tea or cotton; the timber was hard to work and warped or split in the hot sun; and the really large resources, the pastures, were not noticed for a while. The Cowpastures incident suggests that the discovery of the value of pastures by a settlement with few animals was an accident. The theme of *learning* about the environment is a major one for the historical archaeologist to note.

Minerals proved plentiful in the long run, with coal found in the 1790s, copper in the 1840s, and gold in the 1850s. Lack of skills, despite the pressure to develop an advanced economy, may account for the slow development of non-ferrous metal mining in an area so abundant with resources. Gold, then silver, lead and zinc, eventually helped to finance a major development of industry from the 1860s on. The process of discovery from that time followed a frontier pattern, first following and then going beyond the spreading pastoral runs into the north and west.²¹

Expansion meant a special environmental problem, distance.²² Arable lands, pastures, timber and minerals were abundantly available but spread over vast areas and usually remote from the seacoast to which their products had to be delivered and from which supplies came. The problem was solved by a society with access to the skills and techniques of the industrial revolution—railways, the telegraph, wire-fencing. Distance and the sheer extent of land called forth special Australian technological and institutional solutions for the archaeologist to investigate.

This land, with all its problem environments, was encountered by a people predominantly British and supplied with the technology and surplus capital of the leading nation of the Industrial Revolution.²³ As the Swiss Family Robinson demonstrates, the drive was to recreate a complete industrial civilisation in the colonies, with the history of Australia in the main the history of this achievement. Only in New South Wales was there a beginning without a bourgeoisie, a settlement of administrators, soldiers and convicts, and even there the trading function soon emerged, and from the 1820s free settlers with capital were encouraged to come. Also, Australia followed a different economic path from the

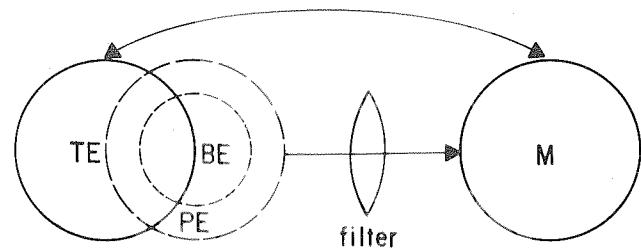


Fig. 2: The process of perceiving the environment. M is a group of men. TE is total real environment. PE is perceived environment. BE is behavioural environment. Interaction between men and their environment is not confined to the process of perception, but involves action where the outcomes continually mediate perception which therefore undergoes progressive adjustment.

industrialising countries of Europe, for it has depended on the export of primary commodities, the products of great staple industries that set their marks on large regions of the country. Only in the second half of the 19th century did the full range of manufacturing industries begin to emerge.²⁴

Settlers, once a shelter is made, explore their environment with a view to becoming self-supporting in essentials. This exploration has continued, yet even today we cannot say we know the Australian environment objectively and in full. It is with respect to a *perceived environment*, not the real *total environment*, that Australians have made their decisions. Fig. 2 illustrates this situation.

Men (M) are influenced in their decisions by a perceived environment (PE) which differs from the total environmental (TE). The perceived environment contains some aspects of the total environment, but may well embrace, mistakenly, aspects which are not present, such as high soil fertility, or increased rainfall resulting from ploughing. Studying the way that man's perceived environment has changed in Australia since 1788 is a major contribution of historical geographers. Some aspects of the perceived environment, the aesthetic aspects for example, are not seen as relevant to practical production, so that there is a subset *behavioural environment*, defined as that which decision makers take into account, to be investigated. Often, past actions which seem illogical cease to be so when the actors' behavioural environments are reconstructed.²⁵

The perceived environment differs from the total environment because the land is seen through a cultural lens or filter carried as baggage by the colonists. Belief that tall trees mean fertile soil, and that climate is stable, are two European ideas reinforced by American colonisation that formed parts of the cultural filters of early Australian colonists and led to environmental misperceptions. The ideas that good pasture necessitates a complete ground cover, and that only grass provides good fodder, are two other filter elements that had to be unlearned.

The history of Australia can thus be written around the idea of growing knowledge, in which the perceived environment becomes more and more congruent with the total environment in depth and accuracy. But is it in the light of preliminary assessments that the first decisions to produce were made.

The first attempts at production were based on the direct importation of overseas technology and systems. Early agriculture reflected the primitive nature of contemporary British farming, as did coal mining methods. Learning began almost immediately, however, with the discovery by 1816 that alluvial soils were the most reliable, the discovery that most eucalypt timber was best used for building in split slab construction, that the ashes of mangrove timber make a good lye in soap-making, and that wattle bark would replace English oak bark in tanning. All the European ingenuity set to work by father Robinson was displayed here, usually victoriously, though long-term results have sometimes been adverse.

This was strictly a trial-and-error process without much aid from science. If an imported technology failed, it might be given up. R. I. Jack has shown that the water mill proved rather useless in most parts of Australia because of alternating droughts and floods, and was not persevered with beyond a few early examples.²⁶ The first attempt to grow sugar in Australia, too far south at Port Macquarie, was given up despite the efforts of an imported West Indian planter, Thomas Scott. If the outcomes of early efforts were unsuccessful initially, settlers sometimes became discouraged and gave up.

The alternative was to persist, trying to find new methods and reassessing the biophysical environment. In this way, the *general* perceived environment became increasingly *differentiated* as regional and local variations were discovered.²⁷

Thus, in the revival of sugar growing in the 1860s on the Manning and Hastings rivers, early failures were met by northward migration to warmer valleys and a search overseas for frost-resistant cane varieties. In the same way the gold-miners acquired a good deal of practical geology which increased their chances of success as they spread westward and northward.

This early learning process is important to the understanding of any industry in Australia. Sometimes it is almost anonymous, like the discovery of shepherding techniques as being more suitable than folding on natural pastures, but mostly it was a highly explicit process for which documentary evidence survives which can be supplemented by field investigation. Thus, there was a fierce debate on whether light or heavy railways were best suited to the great distances and sparse populations of Australia, most of which survives in documentary form, but which can be supplemented by field study, often of abandoned lines, such as that which served Walhalla (Victoria).

By the mid-19th century, Australians were scouring the world for appropriate technology, from whims, whips, winches and sluices in gold mining to the later disc plough and cream separator. Australia was rapidly being incorporated in an international technological community highly efficient in transferring new techniques from one country to another.²⁸ As the Australian economy grew and diversified, there was more scope for an increasing range of skills brought by immigrants. Developments were shaped in detail sometimes by government policies, such as the Limits of Location of 1829, the various selection acts of the 1860s, the building of railways, and tariff protection in Victoria, but the overall form of the process set going by the interaction of immigrants with the Australian environment seems to move inexorably to its outcome,

a high-technology consumer-based economy and society.

The discovery of a suitable production system adapted to Australian conditions was always localised, so that for each industry there is a hearth and a diffusion process. The county of Cumberland was the technological hearth of the early pastoral industry, its methods spreading by 1850 into Queensland, Australia Felix south of the Murray, South Australia and Western Australia, though environmental limits to this spread then appeared on the semi-arid margins. Arable agriculture, including wheat-growing, was first adapted in this same area, and illustrates a major theme, for most Australian rural industries are no longer carried on much in their hearth areas. Sugar growing, for example, no longer occurs on the Hastings river in New South Wales, nor is butter made in the Jamberoo Valley where the factory butter industry was acclimatised to Australia. Copper is no longer mined at Burra, Moonta and Walleroo, hearth of non-ferrous metal mining in Australia after a false start around Orange in the 1840s.

With technological development, leading to two-stage industrial growth, secondary hearths emerged. It was the South Australian wheatlands that led in the mechanisation of wheat growing in Australia. Northern Victoria pioneered the new water-and-fencing technology that gave a new lease of life to the wool industry from the 1850s. Broken Hill provided the new ore-extraction technology that revived non-ferrous metals mining at the end of the 19th century. Just as prehistoric archaeology deals with cultural hearths and diffusion process, so also does historical archaeology, and the statistical methods now used to study diffusion processes in prehistoric archaeology may find a place in historical studies.²⁹

The process of spreading technology is a social one as well as spatial. Attention must be paid to the social mechanism for spreading ideas successfully adapted in technological hearth areas, and a large sociological literature exists to help, concerned with the business process³⁰ and with the characteristics of innovators.³¹ But innovators are helped or hindered by an economic environment, which for example, tends to produce greater rates of innovation in periods of high prosperity and opportunity. Thus the creation of the first dairy factory industry in Australia is connected with the presence of J. Weston and D. L. Dymock at Kiama, both 'cosmopolites' in Roger's terminology and actively seeking out overseas ideas, but it is also connected with Kiama's prosperity as the main producing area for high grade butter in a market rapidly expanding because of population increase in Sydney. Those early butter factories are gone now, but their remains lie out in the paddocks for archaeological investigation, which can tell, for example, how many were steam-powered, a fact not available in the documents. Recreating the historical context helps to understand the site; investigation of the site adds new data to the context. Investigations should be chosen which offer the opportunity of contribution to the wider historical account.

In the spreading of a technology from a hearth there is continuing interaction with fresh environments, a continual retesting in new circumstances, so that learning does not cease to be an aspect of economic development. The gold miner needed to adopt the dryblower to work alluvial deposits in arid areas. In a similar way,

the pastoral industry was obliged to adopt tanks and wells in order to advance into regions with low rainfalls. Environmental adaptation is a major theme for the historical archaeologist to investigate even after the early stage of settlement.

From the emergence of a suitably-adapted production system in the hearth area and the spread of an industry to all those areas in Australia in which it can compete, there is a continuing process of adjustment, reinforcement and change which never ceases as the industry reacts to new local and international circumstances. This can be called the *developmental phase*.

Technological innovation generally continues. Each Australian industry has its overseas counterpart, some of which is located in industrial countries with high rates of innovation, some in countries with similar biophysical environments to Australian regions, so that there is a continual inflow of new ideas from outside. Thus the archaeologist needs to be aware of the vacuum pans which increased the advantages of the larger sugar mills in the 1880s, and the pasteurising equipment that assisted the larger central factories to drive out the many small butter factories, leaving their sites to archaeological study. The steam-powered roller-mills introduced from Hungary similarly led to the demise of many small flour mills in the wheat-growing areas. The Platt brick press and the iron ship are both overseas ideas that changed the industrial archaeology of Australia.

Local innovation was more limited, but created similar changes. There was a series of agricultural innovations, peculiar to Australia, from the Ridley-Bell stripper to McKay's harvester and the stump-jump plough, that changed the landscape of arable farming. In the food industry, Australia made important contributions to refrigeration and canning. The building industry shows a fascinating history of adapting overseas styles and techniques to Australian social and climatic conditions and materials. Some local products are highly characteristic, including the vernacular Georgian style and the cavity brick wall.

All this innovation occurred in a changing commercial environment. The economy was for long based on a few export staples, each with its own technology, equipment, landscape and social structure, but enterprise aimed at import replacement led to the rise of ancillary or linked industries producing inputs to the staple industry, consumer goods, and beneficiation of the staple export commodity.³² R. M. Hartwell has pointed to a sequence of industrial development in Tasmania which accords well with the activities of the Swiss Family Robinson. First came food-processing industries, then later import-replacing consumer goods such as soap, salt, pottery, clothing, shoes, hats and furniture, and finally industries supplying producer goods.³³ By the end of the 19th century, Victoria and New South Wales were almost self-sufficient in consumer goods production, as a result of a great stimulus received from immigration and capital imports from the 1860s.³⁴ Industrial maturation was also shown in the turn away from integrated works carrying out all stages of production to more specialised concerns. It was the First World War, which cut off many imports, that gave the next great stimulus to industrial development in Australia.

The general process of growth and diversification was therefore influenced in detail by temporary financial

and commercial circumstances, and development was not a smooth matter. The first half of the 19th century saw a series of financial depressions originating in the parent British economy: the downturn of the early 1840s created many of the boiling downs whose remains are still to be seen. Gold discoveries, and the subsequent inflow of people and capital, created a long boom which came to an end only with world-wide depression in the 1890s. M. T. Daly has shown the effects of successive boom and bust on Sydney's landscape,³⁵ but in archaeological investigation, the impact of a particular large financial event on a region or locality should not be automatically assumed; even during the 1890s, areas deriving their basic income from wheat or butter were still doing well as their export expanded. In the 20th century, financial boom and bust patterns have continued, but government intervention is often important too, in terms of Federal tariff policies and programmes: such as imperial preference, soldier settlement, and environmental conservation.

The changing commercial environment has influenced the location of activity. A number of important industries have left remains to be studied not merely in terms of a linear technological development, but also in terms of a spatial pulsation that first decentralised the industry throughout the country areas, then recentralised it in the capital cities. The brewing industry made a small start in the cities, finding it difficult to compete with imports, but then spread quite widely into the country towns where for a long time it was protected by high transport costs, so that most towns had a brewery in the 1880s. Then, advantages of large-scale brewing, the penetration of railways, the growth of tied hotels, allowed city breweries to outsell and then buy up and close down the country breweries. Much the same trend has occurred in the flour-milling industry.³⁶ Whereas in the 19th century the country towns were small industrial centres, in this century they have reverted to a purely service role, but many buildings survive from that earlier era.

Developing economic activity has also changed as knowledge of the biophysical environment has increased, particularly as new resources have been discovered. This has been illustrated in terms of the continuing learning process, but there also needs to be taken into account the welding of the six colonial economies into a single Australian economy even before Federation. As this happened, different regions variously endowed by nature came to compete in terms of comparative advantage, leading to a resorting of land-use and industrial location. Thus, when the excellent wheatlands of South Australia were opened up close to the ports of Spencer Gulf, their cheap high quality grain quickly drove out the product of the tablelands of New South Wales. The discovery at Broken Hill displaced production at Silverton and the Umberumberka. Not only the exhaustion of ores, but the discovery of more profitable deposits has created ghost towns, while the life of a mining area can be expanded by new discoveries, as with the Greta Seam on the Newcastle coalfield, and new extraction techniques have encouraged the reopening of old workings or the reprocessing of tailings. Natural resources undergo a continual reappraisal with effects on the cultural landscape.

Human activity, however, changes the biophysical landscape, usually for the worse. Widespread soil erosion exists in Australia, and salting of the soil

due to clearing and unwise irrigation is creating abandoned farmlands for the future archaeologist to unearth, as he can now discover the old wheatlands around Adelaide from the low ridges that display the ploughing of 'lands'.³⁷ Resource depletion of minerals is a well-established story, and it was the depletion of useful timbers, as well as the coming of the iron steamship, that removed the widespread shipbuilding industry from the eastern coasts. Removal of fodder vegetation by overgrazing, selective grazing, trampling and mineral depletion has widely reduced the carrying capacity of Australia's natural pastures. This degradation of the biophysical environment provides one of the most widespread material evidences of the presence of European man in Australia, and regional history will be obliged to take an increasing account of it.

When one turns to archaeological work already carried out the implicit relevance of such a model is clear, although it has rarely been made explicit.

Allen's work at Port Essington³⁸ is a strikingly good example in which both exploratory and learning phases are specifically illuminated by the archaeological dimension.

At this site—Britain's third attempt to settle northern Australia—between 60 and 73 people, almost all Marines, maintained a tiny outpost between 1838 and 1849 and battled natural hazards, pests, diseases as well as an unexpected climate and the tyranny of extended distance to survive. The settlement is a first-class example of the first two phases of the Swiss Family Robinson model—a short exploratory phase dependent upon imported technology and skills (including seven imported prefabricated buildings), a preliminary assessment of the biophysical environment, and an interesting adaptation of the progression phase in which the further investigation of environment and technology never wholly resulted in a successful outcome to the selection of a production system. Rather, it was reinforced by a second infusion of imported skills in 1840 (from the crew of the wrecked ship *Pelorus*) and yet a third similar infusion in 1844 when twenty picked convicts, masons and quarrymen stayed at the settlement for four months. The successive adaptations of imported British technology in this remote site can be detected archaeologically and make absorbing reading.

In this instance an excavation programme associated with the observational analysis of standing structures allowed the wider investigation and interpretation of the changing factors of technological skills and knowledge of the biophysical environment in terms of the Robinson model.

In many more comparable sites study is at present limited to observational analysis of visible structures and features, with limited or no excavation. Fort Dundas, a remote settlement, (1824–9) is closely comparable to Port Essington, in location and purpose. Survey and limited excavation here showed an apparent discrepancy between the surveys of 1827 and 1975, but apparently little change at least in settlement lay-out during the life of the settlement.³⁹ Penal settlements offer the same potential. The archaeological survey of Kingston and Arthur's Vale, itself wholly non-disturbing, highlighted (implicitly) a number of aspects where changes and innovations from 1st to 2nd, within the course of the 2nd, and again from 2nd to 3rd Settlement were best interpreted in the light of growing knowledge of the island's environment, growing tech-

nological capacity to cope with it, and a shifting social structure to accommodate it.⁴⁰

The earliest exploratory phase in any colonial movement is of considerable interest, but usually leaves too fragile a record archaeologically to survive. The biophysical environmental evidence usually survives better than the cultural items, while such written documentation (and sketches) that survive give a good idea of the perceived environment. Archaeological enquiry appears likely to be most informative where it explains the initial degree of fit between the two. Bowen's Landing at Risdon Cove is a valuable example of a site which reflects this transitory exploratory stage.

The government settlement for the Tasmanian Aborigines on Flinders Island is another remote settlement site (1836–47) for which this model is illuminating.⁴¹ There the exploratory phase (1832–6) was spent on a separate part of the island (Green Island) where fragile remains are just visible, and the more established learning phases at the more elaborate Wybalena.

Such a model is as applicable to single homesteads as to total settlements. Innumerable family properties throughout Australia demonstrate in their physical remains the initial exploratory phase with the single-roomed primitive shelter, evidence of fire, drought or flood, followed by the increasing awareness of local resources, precautions against hazards and local technological adaptations to give greater comfort and convenience. Studies of such homesteads as Mamre, Throsby Park and Elizabeth Farm in N.S.W. can be explicitly oriented around this model. Clearly the earlier phases (exploratory and learning) offer particular scope to the archaeologist, especially where a fully integrated programme of documentary research, observational analysis of visible structures and features and excavation and sampling can be employed.

Even in the more restrictive spheres of conservation archaeology value may be derived from an explicit statement of problem-orientation related to it. For example, in studying the remains on the Tasman Peninsula, in addition to historical themes concerned with penal philosophy, there would appear to be a role for identifying and demonstrating the exploration and learning phases in its settlement and exploitation.

Irrawang is another example of the early colonial situation. While Sydney and Parramatta were well through the learning phase by 1827 when King arrived, the Hunter Valley was not and King in the Williams River area went through an explicit learning experience in reference to both his vine growing, about which he wrote a lot, and his pottery making, about which he wrote little but for which the excavated material is revealing.⁴²

While the model is particularly interesting for the investigation of settlements, homesteads and industrial sites of pre-1851, it also has useful application in those of the later 19th century. Settlements of this period—which include construction workers' camps along railways, roads and water supply systems (many of which are now identified), gold rush ghost towns and archaeological remains (such as White Range at Arltunga, N.T.), as well as later prison settlements (St. Helena, Moreton Island), military sites (Sydney Harbour defences), industrial settlements (coalminers, quarrymen, meatworkers)—often still exhibit exploratory and learning phases where they have a pioneering frontier quality.

The developmental phase of this model is particularly applicable to the later 19th century aspects of both rural and urban industry and settlement and allows the formulation of explicit problem domains for either specific industrial sites or total regions where a successful production system is operating.

The aspects particularly susceptible to archaeological investigation are the identification of the stages of operational reinforcement and developmental change, the input of new and the adaptation of older technology, and the changing interrelationships with both the man-made and the natural environment.

Such large-scale late 19th or 20th century industrial projects as the study of a large sugar refinery, coal mine, power station or a transport system, for example, which necessarily have the investigation, recording and comprehension of the relevant technology as their major content, acquire greater historical substance if in addition the subject of study is seen in the wider social, spatial, technological and economic contexts outlined.

Sometimes the record of the delicate balance between all these factors—which represents the success or failure of most production enterprises in the developmental phase—can be read in the Company minutes and annual reports, if they survive. Often they do not and often also the concept of actuality—what actually took place on site in contrast to what was reported to Boards in Sydney, Melbourne or London—is a vital issue. For consideration of the roles of technological innovation, maintenance, adaptation and viability, the assessment of on-site items (or good historic photographs) is essential; for consideration of social factors also, together with assessments of biophysical interactions, physical evidence on and around the site (as well as full use of maps, plans and photographs) is equally critical. Perhaps only the changing commercial environment can be satisfactorily assessed from the literary record alone.

At present many first-class technical studies of historic industrial sites or complexes stop short of explicit problem orientation or historic overview while often presenting virtually all the relevant material. Reference to a model of this kind may trigger off ideas and hypotheses for structuring specific lines of enquiry on individual projects.

Historical archaeologists have considerable potential for revealing the minutiae and particulars of the historical enterprise from a class of data not hitherto widely explored. The assessment and evaluation of this formidable mass of detail into a larger and more meaningful contribution to the historical enterprise may best, it would seem to us, be contemplated by testing against hypotheses derived from models set up on the basis of existing historical theory and at the same time adapted to the peculiar circumstances of the archaeological discipline. The adaption of even one such model as that proposed could mean even for projects already completed limited extra work and analyses but a considerable gain in a co-ordinated approach to historical interpretation.

ARCHAEOLOGY AND SOCIAL STRUCTURE

The Swiss Family Robinson, while it demonstrates the economic and technological course of new settlement, has less to say about its social aspects. The image of a

successfully patriarchal family overlays and disguises the more complex relations that emerge in actual colonies. Indeed, a more appropriate social model might be extracted from Daniel Defoe's *Robinson Crusoe* (1719), where Friday represents the subject peoples, indigenous or imported, who provided the labour power for many colonies. The Australian Aborigines were of some use as labour in certain areas and over limited periods, but in Australia only the convicts occupied the place of a servile working class, in New South Wales, Tasmania, and in Western Australia from 1850 to 1886, at least before the brief period of 'blackbirding' began.

When the convicts at Port Macquarie were set to growing sugar, in the 1820s, they were specifically seen as equivalent to the negro workforce of the West Indies. The convict contribution was a major one, in creating public works, notably roads, in supplying a pastoral workforce, and in the skills and enterprise that many of them brought to Australia. Under sentence, they could be directed to work in unattractive and remote districts, so that decentralisation, particularly from about 1820, was encouraged. The archaeology of the convict period is relatively well-advanced.

Historical archaeology ought also to be contributing to the social history of Australia as that field develops, although such development has been rather slow until the present time. This requires an awareness of theories of social development which prompt hypotheses for investigation, in the field as well as in documents. The first such theorist in fact published in the early 19th century: in proposing a scheme for British colonisation, Edward Gibbon Wakefield exposed the social bases of new settlements in *A Letter from Sydney* (1829) and *The Art of Colonisation* (1849).

Wakefield was concerned to create replicas of British society in the overseas territories. So far, he suggested, only a fragment of society had emigrated. 'We send out colonies of the limbs, without the belly and the head—a single class of persons in the community, and that the most helpless and unfit to perpetuate our national character or to become the fathers of a race whose habits of thinking and feeling shall correspond to those which in the meantime we are cherishing at home'. The result was shown in the United States of America, 'a plebeian nation, with an extravagant abhorrence of rank, a want of high breeding and gentle blood—a money-making trafficking nation'. Wakefield argued for restricting the sale of land by charging a 'sufficient price' for it, so preventing workmen from becoming landowners too quickly, and creating a labour supply which would attract those with capital. He clearly thought the existing colonies of eastern Australia too plebeian, and South Australia was founded in 1836 to demonstrate his method of 'systematic colonisation', while from 1831 the land system in New South Wales was changed to accommodate his opinions.

Two ideas of Wakefield's were taken up by later theorists. F. J. Turner, in his *The Frontier in American History* argued that it was the presence of free or cheap land that created an egalitarian and democratic America.⁴³ It was the ownership of land by a few that supported the class system of Europe, and its absence in America created an almost uniform society. More recently, L. Hartz in *The Founding of New Societies*⁴⁴ has put forward another suggestion for the social development of colonies, in which he argues that every col-

ony contains only a fragment of the parent society, a fragment that is set free from opposing classes by shifting overseas and there develops the logic of its ideology in a complete way impossible in the parent country. Thus he sees the Latin American colonies and French Canada as feudal fragments, the U.S.A. and English Canada as bourgeois liberal fragments, while Australia was settled by a lower class group dominantly radical in opinion. This radical group has imposed its ethos on the small numbers of gentry and bourgeoisie who came to Australia, and sets the present condition of the country. R. Ward's *The Australian Legend*⁴⁵ describes this absorption as a cultural process.

Turner and Hartz by implication suggest we see the Australian population as increasingly a uniform mass at cultural, economic and political levels. For the historical conservationist, this points to a concern for the typical and more humble buildings of the ordinary people as being worth more attention. Similarly, the historical archaeologist can contribute to this populist social history by recording the remains relating to the bulk of the population.

Such a view, however, works only at a high level of generalization, and while it may serve as a disciplinary ideology, corresponding with the rising interest in populist social history long neglected with the eclipse of J. R. Green's *Short History of the English People* (1874), studies at the local and regional scale need to take account of a more hierarchical and stratified society. After all, W. D. Howell's realist novels of Boston life, written around the time Turner published his hypothesis, show an American society very far from being egalitarian.

So in Australia we need to recognise the early importation of a class system in which at first army officers, and officials, then army officers, officials, merchants, some clergy and landed gentry constituted a privileged class. In 1829 this group split as the squatters separated some of their interests from the landowners within the Limits of Location, but squatting, through its opportunities, and the coup of 1847, created new recruits to an upper class. The rise of cities, making the fortunes of merchants, developers and financiers, further increased social differences. The fact that radical views predominated in politics at the expense of upper class conservatives as self-government was granted, and the high wages of the working class, should not hide the reality of a society with strong inequalities. The kind of social history practised by R. W. Connell and T. H. Irving in their *Class Structure in Australian History* provides for an ongoing discussion to which historical archaeologists should pay attention if their work is to find meaning in the overall historical enterprise.⁴⁶

In detail, most sites and localities will reveal social differences rooted in functional requirements and social status attributions. In a rural area, Kylie Tennant in *Tiburon* described a society made up of large landowners, small farmers or 'cockies', settled rural labourers, itinerant workers on the land such as shearers and fruitpickers, and town business people. If Gundagai were hidden under a tell, the various remains of these groups might be looked for in excavation: instead, the material remains of all these people are scattered on the ground surface throughout the district.

The archaeological domain is indeed far more able to contribute significantly to a theoretical structure which recognises a multi-stratified society at the level

of individual communities, whatever the national concept. Investigation of ranking in social structure at the levels of both communities and individuals is something for which archaeological data is well suited not only at a given time but often also through time. Settlements such as Kingston at Norfolk Island throughout the 2nd Settlement present a complex system of social distinction as presented in the living space and amenities considered appropriate respectively for convicts, ticket of leave men, prison officers, civil officers, church incumbents of different denominations, military men, military officers and commandants, all demonstrable in observational analysis. Similarly elaborate but of a military nature was Port Essington where rank distinctions between governor, officers, married men and single men are rigidly adhered to in the fabric of their dwellings. Equally at Wybalena where superficial survey shows a similar stratification in terms of physical space and amenities from commandant, white officers to military men, the Tasmanian Aborigines rating what can only be considered particularly handsome homes in contemporary terms—an interesting example of the lack of fit between perceived and real environments on the part of the white authorities.

Similarly remote mining settlements such as White Range at Arltunga, N.T. (1890s–1940s) with industrial, commercial and civilian components rather than penal and military still reveal a comparative situation where even the horrors of a 400 mile trek from the rail-head at Oodnadatta did not iron out distinctions between manager, and assayist, mining officials, married and single men. Living memorials of many later social systems survive as archaeological data—the rigidly stratified structures of military and naval stations (H.M.A.S. Creswell at Jervis Bay), the no less strictly uniform rows of coal miners', quarrymen's, meatworkers' or gas-workers' houses in innumerable industrial streetscapes of most Australian towns from the 1880s and 1890s. These latter present a simpler overall picture than their pre-1850 predecessors—a larger manager's house, and rows of mass-produced, uniform, balloon-framed, weatherboard, workers' cottages.

A particularly promising area of archaeological study as regards the development of Australian class structure may well lie in the innumerable construction workers' camps now being identified throughout the bush in most parts of Australia—railway workers', road builders' and water board workers' camps, as well as the ubiquitous remains of gold miners' and prospectors' settlements. For these sites the archaeological data must constitute the major class of evidence, unlike the heavily-documented government enterprises. This is an undeveloped area of historical study of Australian colonisation to which the historical archaeologist may be able to a special contribution.

In the rural landscape the relationship between changing land ownership, land use, and social stratification as revealed in structures and settlement pattern is a promising area of study, and one particularly suitable as a problem domain for conservation archaeologists. The study and co-ordination of this type of landscape archaeologically carried out over a locality rather than a single site (such as the Braidwood area, Illawarra or Hunter Valleys or the Penrith-Castlereagh district) can clearly make a real contribution to the study of social theory in Australian history.

In a recent Penrith study the proliferation of the

small post-and-wired plots of the 1860s–1880s farmers, with their slab and weatherboard cottages, subdividing the earlier augmented original grants, is a visual feature of the landscape, as are the subsequent arrivals of European smallholders as market gardeners, the soldier settler plots of the 1920s and the bungalow development of the 1930s. Common to all these later rural subdivisions is their uneconomic size, with the consequent pressure towards dairy production (and associated railways), and fruit production for drying, preserving and jam. The final reuniting of these fragmented plots under the massive company ownership of the gravel extraction companies makes sound economic if less satisfactory heritage conservation sense.

Moving on from rank, role—and once again especially the process of changing roles—is an aspect of social relevance in which archaeological techniques and methodology are likely to make an increasing contribution in terms of the model's exploration and learning phases, at least in the inevitable adaptations of the social structure which must occur alongside technological adaptations to the new situation.

Archaeological excavation is peculiarly suited to the exploration of such subtle changes in role, as opposed to rank, which by definition are unlikely to be written up in official reports. Increasing sweetheart deals between trusty convicts and civil officers, decreasing distance between assigned convicts, military offices and other ranks—or the absence of such changes—are almost certain to leave their imprint in the archaeological record given reasonably favourable circumstances.

Investigation by excavation especially is able to document changes in settlement plan, building function and activity areas from which can be interpreted behavioural changes within the social groups concerned. At Wybalena the brick houses built by Robinson for Aboriginal occupation were decreasingly used for habitation, most activities being transferred to the area in front of them.

A third aspect of the social implications of this model concern the inarticulate human interest groups within the enterprise. A colonial model represents the motivation and the circumstances of colonisation from the view point of the colonisers—in this instance shared between the British Government and the colonisers in person, i.e. the person who was documentarily responsible.

In terms of this model the major unknown factor of the role played by the inarticulate—convicts, women, children, Aborigines, the sick, aged and lunatic—is represented in Fig. 1 in the learning phase as part of organisation. Archaeological techniques alone for the early period—and in conjunction with oral history techniques later—can themselves contribute meaningfully to the recognition of the contribution of the illiterate and the under-privileged in the 19th century.

Already the subject areas have been opened up—a range of convict sites at a dozen key penal settlements where the degree of continuity between outstanding convict craft skills and the subsequent community developments of the 1850s and 1860s lacks as yet any sort of archaeological research base; sites of major topical interest in terms of Aboriginal contact situations like Wybalena, Arltunga—and no less significant County of Cumberland contact situations of 1793–1851 with the potential to demonstrate more of the 1788

European debt to Aboriginal technology; and a major publicly funded project—the Female Immigrant Hostel of the 1840s and 1850s in the former Hyde Park Barracks area—a major research area for those concerned with the beginnings of the female presence in the colony.

Lunatic asylums, civil prisons and hospitals still—but only just—retain research potential for the historical archaeologist. The task of defining problem domains—probably with the richest research potential still here of all Commonwealth countries—is an urgent and challenging one—but nevertheless one that requires some grounding in the theoretical structure of the relevant areas of medical science and penology.

Perhaps as a fourth group here a specific role should be listed for other ethnic groups, inarticulate in the early periods except in terms of their impact on the land and the landscape. Again archaeological—and architectural historical—techniques are the dominant ways in which these groups will be seen as significant; their voice in standard governmental reportages is incommensurately small. Once again it would seem essential that the archaeologist working in this field review recent scholarly historical literature and select such problem areas as may seem relevant to the archaeological input—the identifiable presence and development of an ethnic sub-community, or their assimilation through time into an undifferentiated community. The degree to which such a sub-community if identified in fact had a voice in contemporary politics may reflect a need for inter-disciplinary co-operation. A problem domain of ethnic involvement in the origins of Australian society, tied into both the learning and the developmental stages of the Swiss Family Robinson model, would seem to be a rewarding source of working hypotheses particularly in both mining and other rural areas of the later 19th century.

NOTES

1. Allen 1973.
2. Birmingham 1969.
3. Culican & Taylor 1972.
4. Davies & Wilson 1980.
5. Pretty 1977.
6. Staughton & Ashley 1976.
7. Birmingham 1976.
8. McKnight 1976.
9. Young 1982.
10. Connah 1977; Connah et al. 1978.
11. Jones 1980.
12. Jeans & Spearritt 1980.
13. Gumerman 1973.
14. Goodyear 1976; cf. also Schiffer & Gumerman 1977: 79–182.
15. Blainey 1963; Blainey 1966.
16. Butlin 1964.
17. Jeans 1972.
18. Linge 1979.
19. Perry 1963.
20. Williams 1974.
21. Blainey 1963.
22. Blainey 1966.
23. Woodruff 1966.
24. Linge 1979.
25. Jeans 1974.
26. Jack, in press.
27. Cameron 1982.
28. Jeans 1979.
29. Hagerstrand 1966.
30. Chamberlain 1968.
31. Rogers 1962.
32. McCarty 1964.
33. Hartwell 1954.
34. Butlin 1964.
35. Daly 1982.
36. Jack, in press.
37. Twidale et al. 1971.
38. Allen 1973.
39. Crosby 1975.
40. Davies & Wilson 1980.
41. Birmingham 1976; Birmingham, in press.
42. Birmingham 1968.
43. Turner 1893.
44. Hartz 1964.
45. Ward 1974.
46. Connell & Irving 1980.

CONCLUSION

This paper has argued the need for the historical archaeologist to place himself or herself within the ongoing historical enterprise dealing with Australia and the colonised world. Existing studies must be reworked in the light of a general historical model, while new studies must be given operational programmes designed to explicitly illuminate hypotheses derived from a general model. Serendipity cannot be legislated out of existence, but it is inadequate as a disciplinary basis. Here a model of potential archaeological value has been presented for debate. Agreement on the general form of the historical process of colonisation and development is one of the first priorities in Australian historical archaeology, ranking ahead of lesser problems concerned with technique and piecemeal conservation studies.

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