NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION NEWSLETTER

KOHEKOHE RIDGE PA - A SOCIAL RECONSTRUCTION

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SUMMARY:

A pa in South Auckland is described and analysed. Accurate survey data on the size of the defensive units, the rectangular surface pits and the arrangement of the site indicate the size and organisation of the group which occupied the site. This organisation is compared with other accounts of Maori social organisation. An account is given of the environmental and archaeological studies in the general area.

INTRODUCTION

A large ridge pa, N47/21, at Kohekohe on the Awhitu Peninsula forming the south head of the Manukau Harbour was recently plane table surveyed by members of the Auckland University Archaeological Society.

Survey plotting was done using simple sighted allidades and a tape for distance control to a scale of 1 to 393.7 (due to a mixing of metric and British units). Table alignment was by compass. Accuracy is probably of the order of one metre per 100 metres and never less than 0.25 metres. Total time spent on the site was about 57 man hours. However, reducing the two survey teams to the minimum, the same could be achieved within 42 man hours or a survey rate of 210 square metres of site per man hour. Without this reduction, allowing for travelling time, mileage on cars, and labour at conservative rates, this site could not have been surveyed for less than $140.00. Even admitting this is a large site, it is apparent that very large expenditures will be necessary to recover accurate plans of a statistically adequate number of sites from which metrical data on site areas can be obtained for analysis.

This work is vital to the future of field archaeology in New Zealand, and its present absence from any considerations of field monuments is not surprising in view of this work figure. It was the size of the expenditure donated by the members of the society, and the possibility of demonstrating the uses of quantitative analysis in field archaeology which prompted the author to attempt to analyse the site.

ENVIRONMENT

The peninsula is basically formed of Pliocene coastal sediments, principally indurated sand. To the south there is an overlay of fixed Pleistocene dune sand, and to the ocean side there is an overlay of shifting, recent sand. On the Manukau Harbour shore, Pleistocene sediments occur beneath raised terraces (N.Z. Geological Survey Sheet 3, Auckland, 1967). The ocean coast is an exposed beach, while the harbour coast is tidal and sheltered. Typical of consolidated dunes are the small, swampy lakes, the majority of which have no outlet; nine lie between Manukau Head and the Waikato River.

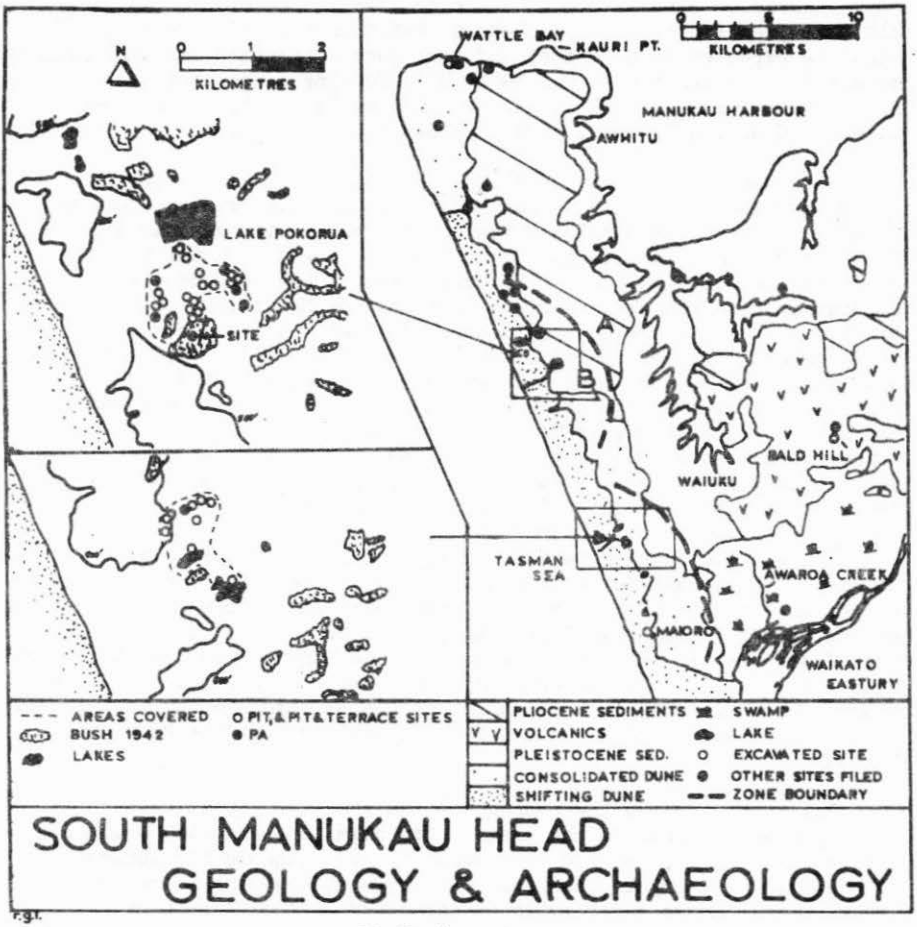

N
0 1 2
KILOMETRES
LAKE POKORUA
SITE
WATTLE BAY
KAURI PT.
0 5 10
KILOMETRES
MANUKAU HARBOUR
AWHITU
BALD HILL
WAIUKU
TASMAN SEA
AWAROA CREEK
OMAORO
WAIKATO EASTURY
AREAS COVERED
BUSH 1942
LAKES
PIT, & PIT & TERRACE SITES
PA
PLIOCENE SEDIMENTS
VOLCANICS
PLEISTOCENE SED.
CONSOLIDATED DUNE
SHIFTING DUNE
SWAMP
LAKE
EXCAVATED SITE
OTHER SITES FILED
ZONE BOUNDARY
SOUTH MANUKAU HEAD
GEOLOGY & ARCHAEOLOGY
F.G.I.

FIG. 1

The area of this survey is just to the south of the largest lake, Lake Pokorua, which the site overlooks. It is of interest that the only lake which produces trout is in the Pleistocene dunes, although all have been stocked. Lake Pokorua being in the pliocene material might be expected to be older, and thus more eutrophied and biologically mature (Powers and Robertson, 1966: 95), forming a more suitable environment for fish such as eels which, unlike trout, use matured lakes. Eels, of course, were a valuable Maori food.

The steep ridges in the valley are still covered in trees of native species; this light bush would seem to have extended further, judging by the stump dimples which can be seen on the grassed hills in the valley. Similar patches of bush still extend from the Waikato Heads to the Manukau Heads. However, maps of the pre-European vegetation show the area as scrub or fernland (McLintock, 1959, Map 14). Hochstetter in 1859 described Kauri Point as "almost treeless and little fertile" (Hochstetter, 1867: 267), and described Waiuku as fertile, but does not mention any bush. Further south he mentions swampy bush on the Awaroa Creek, giving way to grassland to the north (Hochstetter, 1867: 280); to the east at Mauku through to Drury, he mentions both bush and fernland. The implication seems to be that bush formerly covered much of the area, while some of the fernland may be the result of cultural interference.

The Waikato Estuary varies widely in salinity and is almost devoid of shell-fish for this reason. The ocean coast does not appear to produce the shell-fish either; open beach shell-fish such as toheroa do not appear in the few middens so far located, nor at present is the area frequented in the toheroa season. The Manukau, on the other hand, with large tidal areas, is probably a rich shell-fishing area. Shell midden occurs on only four sites out of the 31 inspected by the writer. All of these sites are more than four kilometres from the Manukau Harbour.

Soil types follow the geology of the area, and quite well developed soils occur in the area. The climate and soils, which are for the most part light and well drained, are suitable for kumara cultivation. It would seem from the argument that there are two environmental zones which could be exploited by the Classic Maori:

(a) Coastal Manukau with shell-fishing and fishing, with some agriculture, fernland and possibly food-gathering in the bush.

(b) Interior lakes with eeling, possibly more pronounced agriculture, fernland, and bush food-gathering. Seasonal movements between the two may, of course, have taken place. All the sites inspected by the author fall in zone B.

ARCHAEOLOGICAL EVIDENCE

Finds of Archaic adzes are known from the area (Golson, 1959: 68), but it was probably only a marginal area in this period. A site known as Wattle Bay (the University site) produced Archaic material and has been investigated (Ambrose, 1961: 52), (Bramley, 1966: 112). A further site at Maioro produced a sequence of pits and a palisade when excavated by Dr R. C. Green. Two of a large group of pits at Bald Hill were investigated by Jan Allo and Jim McKinley, and drain and post-hole patterns recovered. All the sites so far surveyed in the area (see Fig. 1) have had rectangular pits, and these pits are the dominant surface feature on all these sites.

The site under investigation has been plane tabled whilst some of its neighbours have been visited and reported previously (Maddock and Taylor, 1962: 87: being a verbal description, this account is inadequate when compared with the surveyed plan, and some of the generalisations cannot be substantiated, nor can some of the interpretations).

Wested (Wested, 1948: 16), quoting a Maori informant, refers to a fight on a pa south-west of the Walton's home. The pa was stated to be on a ridge, with a burial ground in the sandhills behind it, and is very probably that described in this article. The fight was a local dispute arising through jealousies over eel-fishing rights in the lake. The defenders at one stage ran out of water, and the fight ended with a loss of life.

Despite its late collection and the lack of the usual features of names of places and participants, which weigh against its authenticity, this story accords well with the deductions which can be made on the archaeological evidence of the site, in that it shows how the inhabitants of a small area could readily fall out and fight over some local dispute. Similarly, it adds support to the environmental zones suggested.

It would appear from the site density that the area was one of large or long Classic Maori population history, possibly both. The frequency of pits, because of their kumara storage function (Law 1969, in press) suggests that agriculture in this region may have been more important than some allow (K. Shawcross, 1967: 349).

THE SITE

As can be seen on the plan (Fig. 2), the site extends between a large and a small knoll along a narrow ridge. Defensively, it is broken into six sections or areas, lettered from A to F, by banks (D to E), ditch and scarp (B to A and E to F), bank, ditch and scarp (C to D), and bank, ditch and bank (A to C). Externally, the site relied principally on natural slopes and a ditch at the end. A feature interpreted as kuwaha, or exit (Best, 1927: 94), by Maddock and Taylor, runs down a ridge from a smaller knoll, unit F. Karaka trees are present on the site, although not all of these are recorded. A small area of midden on unit A, the lack of a close source for water, and the slight stock damage forming paths past the ditch defences, are the main points of interest apart from the pits and rua.

Three definite bell-shaped rua are on the site, as well as six other depressions which could be rua. The only partially open rua is one metre deep. Maddock and Taylor record a bell-shaped rua 21 feet deep "for water storage", which apparently no longer exists. Interception of the water table within 21 feet on the top of a steep ridge is unlikely, and the porosity of the natural ground makes this interpretation surprising. About 79 rectangular pits are on the site, mostly well defined. Table I summarises the metrical data recovered from the survey for each area, and for the site as a whole. The total flat area converted into acres gives a value of 2.1 acres.

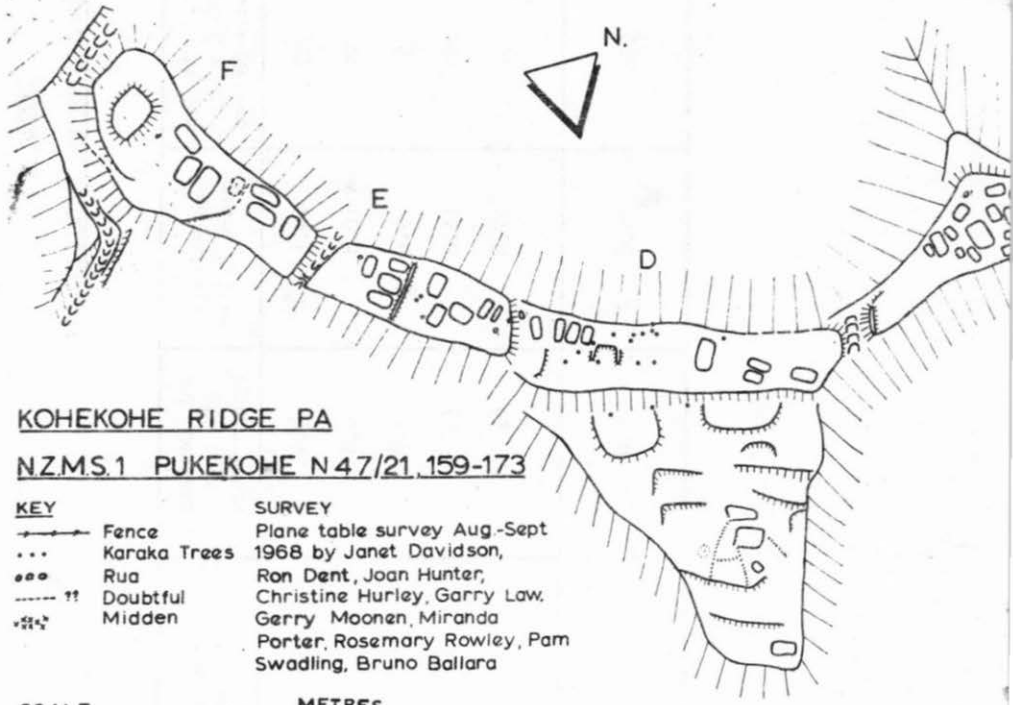
It may appear that the flat area, including the area of the pits, is not as basic a measure as the flat area excluding the pits, but much of the area is narrow strips between pits, and useless for any other purpose. To exclude these narrow strips involves a subjective estimate of what area is useless. Objectivity is, of course, the aim.

It can be seen from the table that the mean pit areas of areas B, C and D (particularly C) are smaller than those for areas A, E, and F. Statistical checks showed that the lower size on area C is significantly different from an aggregate of the other areas at a 5% level, and an aggregate of the areas C and D is significantly different from an aggregate of the other areas at a 1% level. The 5% level indicates that, with a random distribution of pits, this pattern would occur on one occasion in 20, while a 1% level indicates it would occur on one occasion in 100 (Students t). The distribution is therefore significant and the pits on the two knolls are larger than on the ridges. Similarly, it can be seen that the flat area per pit also varies, as does the percentage flat area used for pits. A check to see if the variation was significantly greater than could be expected with a random variation showed that the distribution both of pits and of pit

TABLE 1

KOHEKOHE RIDGE PA, METRICAL DATA

Area	Flat Area Including Pits Square Metres	Definite Pits No.	Total Pit Area E (L x W) Square Metres	Mean Pit Area Square Metres	Std. Deviation Pit Area Square Metres	Flat Area/Pit Square Metres	% Flat Area used for Pits
A	3,650	26	377	14.5	5.4	140	10
B	300	9	97	10.8	4.8	33	32
C	1,070	17	153	9.0	5.8	63	14
D	2,350	17	186	11.0	55	139	8
E & F	1,300	10	177	17.8	61	130	14
Whole Site	8,670	79	922	11.6	6.4	110	10.6



KOHEKOHE RIDGE PA

N.Z.M.S.1 PUKEKOHE N47/21, 159-173

KEY

- Fence
- Karaka Trees
- Rua
- Doubtful
- Midden

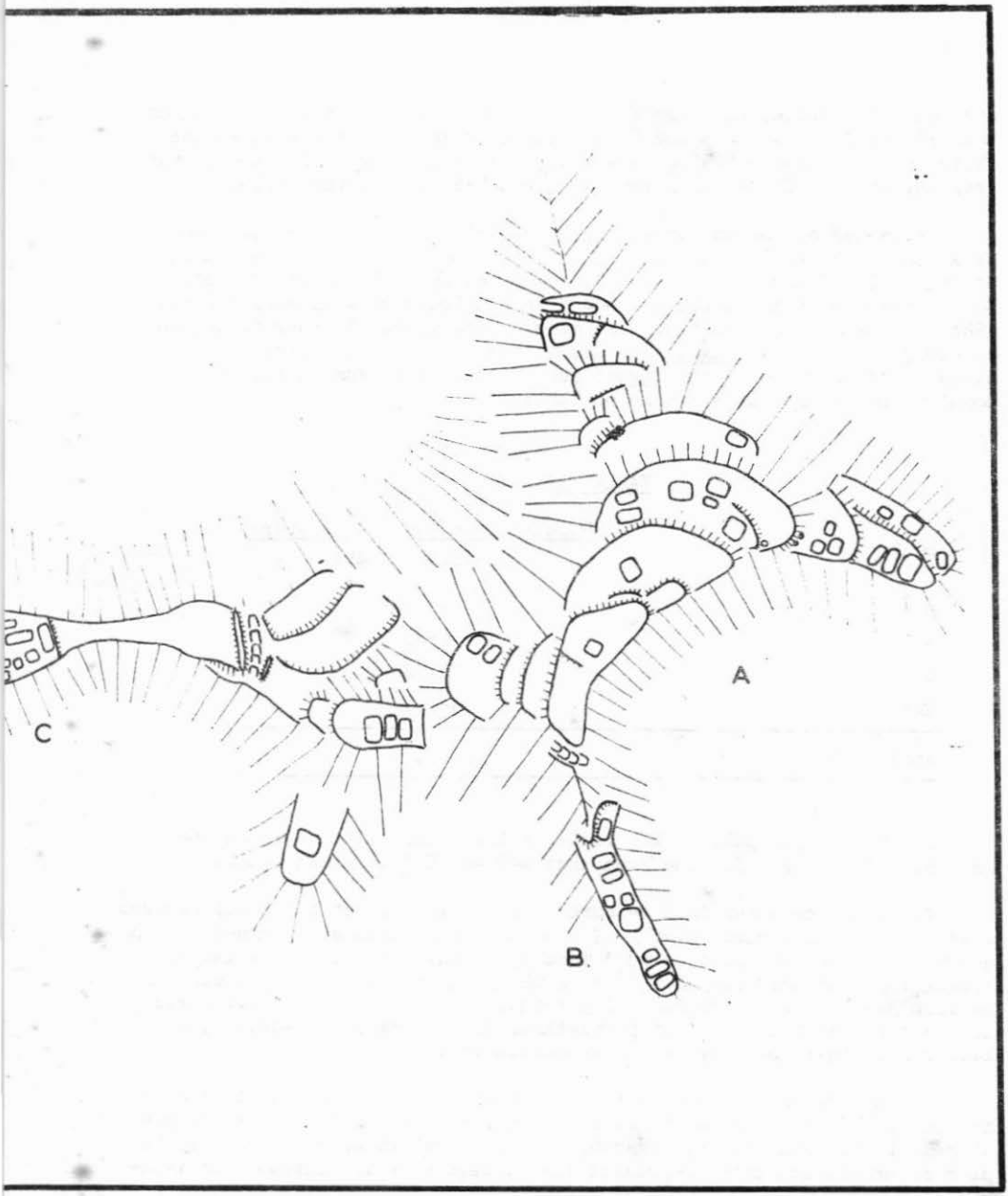
SURVEY

Plane table survey Aug.-Sept 1968 by Janet Davidson, Ron Dent, Joan Hunter, Christine Hurley, Garry Law, Gerry Moonen, Miranda Porter, Rosemary Rowley, Pam Swadling, Bruno Ballara

SCALE

METRES

10 0 20 40 60 80 100


A
B
C

area was not random, but significant. (Chi squared significance better than 1% level). Areas B and D were the principal contributors to the distribution: area B having more pits, and area D fewer than their flat area warrants. These variations will be discussed further below.

Estimates by the author of the kumara stored in pits on two sites of a similar size, Taniwha Pa (Green, 1963: 76), and the northern unit of Ongari Pa (Shawcross, 1966: 53), suggested that there was adequate food stored for between 200 and 400 people between growing season (Law, 1968). Making some arbitrary estimate of the value of other foods, we can imagine a group of hapu size using these two sites. Similar calculations for this site suggest sufficient stored kumara for the populations in the ranges shown on Table II.

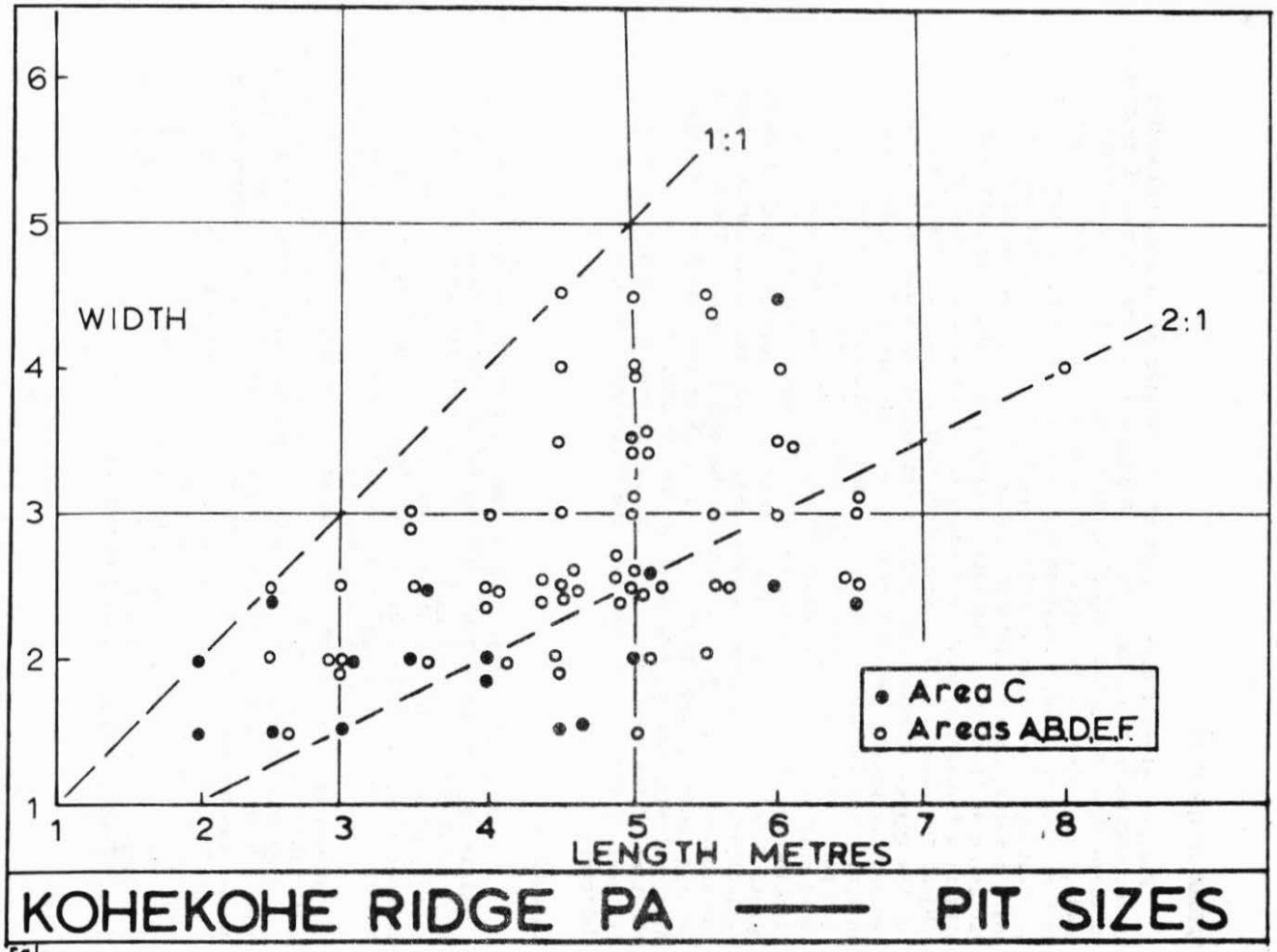
TABLE II

Unit	Population supported on stored kumara, range
A-B	135-300
C	40-95
D	50-120
E-F	45-110
Whole Site	270-625

It is hoped to publish the basis of these calculations in the near future. The reason for the groupings A-B and E-F is given below.

Allowing for other food resources is difficult, but in a well endowed area such as this, particularly if seasonal or occasional movements to the coast were made, at least as much food again must have been available, suggesting that the size of the group which built the whole site was between 500 and 1,200 people. Any suggestion that a site of 2.1 acres is adequate for this order of population, without major ill-health, is ludicrous, other than for temporary habitation.

The undefended sites of a few pits each could, if many of them were in use at the same time as those on the pa, have increased the available storage in the district considerably. It is possible, however, that the pits on undefended sites represent the storage mode in outbreaks of peace.


6
5
4
3
2
1
WIDTH
1:1
2:1
Area C
Areas A.B.D.E.F.
1
2
3
4
5
6
7
8
LENGTH METRES
KOHEKOHE RIDGE PA —— PIT SIZES

r.g.l.

FIG. 3

NATURE OF THE PITS

Figure 3 gives a scatter plot of the lengths and associated widths of rectangular pits on the site. It possesses a large degree of scatter - so large that any useful comparison with another site is statistically inadequate, unless it is based on quite a substantial sample or a very uniform sample. This variation may serve as a warning against postulating size-changes in pits through time (Parker, 1962: 22) on small samples, as a complete population of pits may show as much variation as these do. The task of excavating such a population of pits is a formidable one. Pit features may be a more rewarding subject for study in pit types, rather than pit sizes. The place of the few rua as storage structures is intriguing on a site with so many rectangular pits. Two different kinds of storage exist contemporaneously on many sites (Shawcross, 1966: 66), and it has been suggested that one kind performed a seed tuber storage function. The few rua on this site could only perform this function if propagation beds and shoot transplanting was the propagation method. This method can give hundreds of plants from a few tubers. This method has not been recorded for Maori agriculture - the recorded method produces only one plant per seed tuber and requires 10 to 20% of the crop to be kept for seed. The volume of the rua could not perform more than 1 or 2% of the storage on this pa. Alternatively, the rua may have been in decline, or in introduction, at the time of the construction of this pa, or they may have been to store the best of the crop through into the following growing season, as a delicacy.

DISCUSSION

The principal contribution to the study of the social role of fortified pa has been Groube (Groube, 1964b), who concluded from mainly historical data that most pa were not places of residence, but retreats in time of war - the population being normally in scattered hamlets. Economically, the role of pa has been less well defined, but the undefined term "storage pa" occurs quite frequently in discussion. Many sites such as this have as many pits or even more on the surface. On Taniwha Pa, the proportion of the site area used for pits is 15%, and much of the interior is steep. Calculations for the sites mentioned, assuming the pits to be mostly full of kumara, suggest they could provide food for an incredible number of people in relation to the area. This number can be made credible in a variety of ways. Either kumara can be assumed to form the total diet (an unjustified conclusion), or the assumptions on the filling of the pits are wildly incorrect, or the sites concerned performed a primary storage function rather than a habitation function. The last interpretation is that preferred by the author, for reasons which will not be elaborated here.

Many defended sites can be broken down into units by inspection. Many, such as this, can be divided at defensive points which divide the site. Occasionally these internal divisions are defensively meaningless, such as at Ongari Point where extensive excavation on one unit suggests it was self-contained. The implication in these units is that they represent a social sub-group of the group which built the fortification, sufficiently estranged not to want to build an integrated site which they would all occupy. The contradiction in this is that, if a site was only occupied temporarily, these differences might be expected to be forgotten. The varying and temporary nature of Maori political units is a possible explanation which could allow for non-permanent occupation, as there was always the chance of a sub-group being related to an attacker changing sides or acting perfidiously (Vayda, 1960: 32). On other sites the subdivision into units is meaningless, as the defences are clearly stages of defence leading to an interior, highly defended area, while many more sites are simple, with only one external defence.

Kohekohe Ridge Pa shows two peaks, presumably the most strongly defended areas. The progression from the weaker knoll, unit A-B, to the stronger, E-F, does not show defences purely against progress in this direction. The defences between A and C, C and D, and D and E could equally well be used in both directions. For this reason, the division of this site into units rather than considering the defences as stages is preferred. Area B is completely dominated by area A, and its high concentration of pits suggests a storage area, and this is not consistent with a political division; and the trench B to A must be regarded as stage defence. Similarly, area E must be regarded as part of unit E-F.

Before considering the implications of the pit area variations, it is relevant to ask what is the nature of the economic unit which constructed a pit, and by implication cultivated the ground to fill the pit with kumara.

Communal production of agricultural food is the system normally alleged for the Maori, so that we might expect the storage made of communally produced crops to be communal too. This argument obviously breaks down for a site which shows evidence of political divisions, but within the units we might expect the evidence to show a central store for each unit. An alternative might be that communally produced goods might be partially distributed at harvest, and thus the storage could suggest both a central main store and others, possibly smaller. This could be evident at the group level, but is more likely at the politically cohesive sub-group level.

A third alternative is that the ethnographic records of communal production have been over-emphasised by observers with "socio-political leanings" or, that it existed, but was a post-European development in the intense competition in flax and food production to trade for guns, or that production was communal but the crop was distributed at harvest. We could thus expect a prehistoric site to show the effect of some primitive capitalism in that a disparity would exist between the family units within the sub-groups and between the sub-groups, reflecting the amount and the quality of land each family and sub-group controlled and the amount of labour (including slaves) they could put on their plots. We might on this basis expect the stores to be scattered within a site and a unit consistent with clustering of families and to show considerable variation in size both within a unit and between units.

Three patterns of storage reflecting three different economic organisations have been postulated. Which does this site best fit? Only one unit, unit C, shows evidence of a central store, yet why were so many small pits dug here? A communal store would most economically be a few large pits. Certainly no central store exists for the whole site, and the first alternative for economic organisation of communal production and storage at either sub-group or group level is untenable.

Our second alternative of partial distribution and partial communal storage is more consistent with the evidence. Considerable pit size variation exists within units and the larger could be communal stores, but the larger lack centralisation within the units. On a site level, the concentration of the larger stores and the concentration of storage generally, towards the two knolls, might suggest some communal storage. The pits are generally sufficiently scattered to be consistent with family stores.

It is the scatter which is an attraction to the third economic organisation, that of a purely family level. The strongest sub-groups could be in a position to claim the strong points of the fortifications; each family of these sub-groups would have more and better land to cultivate; they would be polygamous and thus have more female labour available as well as owning more slaves; family production would be higher and their few pits per family larger. The reverse would be the case for the weaker sub-groups (which could be a defeated remnant, or an aged group), who are assigned a poorer part of the fortified ground and build smaller pits. The reason for the clustering of pits on unit C may be found in the percentage of flat area used for pits, which is high. Clustering the pits provides more flat space.

The author prefers the third explanation which makes the pit and unit evidence consistent. This argument based on pits and defences is entirely dependent on the site being built and used in the one period. Introduction of a time degree of freedom, whereby some of the pits or site were built, even in different growing seasons, would make the argument invalid.

This is an assumption with a fair degree of risk. Confirmation of these kinds of storage distributions from other sites is desirable, and it is hoped that this demonstration of possible methods of analysing sites may elicit some such studies of other sites.

Apart from the positive evidence from the site, there is a point which can be made from negative evidence. There is no flat area within the pa large enough to have held a marae - meeting house complex of sufficient size to accommodate the entire population of the site. This suggests that either this local group was not operating as a social unit, or this social area may have been elsewhere, possibly because of the extingencies of the site, or that prehistoric marae may have been different in character, as has been suggested previously by Groube (Groube, 1964a: 37).

MAORI SOCIAL ORGANISATION

It is instructive to compare the social organisation inferred from this site with the reconstruction of Maori organisation done by modern anthropologists from historical material. Biggs has treated Maori marriage (Biggs, 1960) and concluded that the extended family group (whanau) was exogamous, an incest taboo extending to at least second cousins while the hapu (a territorial kin group) was normally endogamous, marriages at inter-hapu or inter-tribal level occurring only irregularly, mainly for political purposes. If the second cousin incest practice is to be maintained, counting on both male and female lines which seems to have been Maori practice, and the degree of social stratification is to be maintained where marriages between equals are possible, an endogamous group of the order of at least 300 is obligatory. However, Biggs gives no opinion or data on the size of the endogamous groups. Vayda, in his discussion of Maori warfare (Vayda, 1960), concluded that the hapu was the most common offensive unit, though certainly larger expeditions of tribal level were occasionally organised. Presumably defence of pa was most commonly organised on a hapu basis also. Vayda gathered a number of estimates of the fighting strength of hapu which commonly varied between 100 and exceptionally 600 men. The proverbial preferred number of men forming a taua (140) may represent in itself the largest body of men amongst whom sufficient kinship relationships exist rather for efficient military co-operation than for a suitable logistic force.

Counting fighting men as about one-third of the population, we arrive at a hapu size of between 300 and 1,800, though the lower size is probably closer to the average. A rather crude approach of dividing a reasonable estimate of the 1,800 population of New Zealand, say 200,000, by the number of tribes controlling territory at the time, about 40, gives us a figure of 5,000 for an average tribe size. Again assuming about five effective hapu per tribe, we arrive at an average hapu of about 1,000 people. This at least indicates that we are working the right size range.

Firth, in his study of economics (Firth, 1959), allowed some economic organisation at all levels from tribe through hapu and whanau to the basic family, but stressed that hapu and whanau organisation was the most common. He regarded hapu as the inhabitants of a kainga or village, a defended variety of which constituted a pa, and considered the fenced divisions of pa noted by Cook as whanau level. In agriculture he regards the agricultural land as held by the hapu and to a large extent co-operatively planted, the crop however being distributed to whanau groups. In size he does not closely define his groups but he indicated that he regards a reported whanau group of 100 as exceptional, regarding it rather as about three generations of one family living together; this group would not often exceed 30 people.

Firth's conclusions are incompatible with later studies in the field of settlement pattern. Groube's thesis puts a strong case for the retreat pa, hamlet organisation as against Firth's kainga - inhabited pa organisation. However, the hamlet settlements imply economic organisation at the same level. As Firth shows, there is considerable evidence that higher levels of organisation also existed. One of the best examples is the fishing-net seen on Cook's first voyage. It was five fathoms deep and 3 or 400 fathoms long, and must have been the product of an economic organisation far in excess of a group of whanau size.

In general, the economic organisation of gardening presented by Firth is compatible with the distribution of pits on Kohekohe Ridge Pa, in that storage at a minimal level seems to be the rule, and that the division of the land might be down to a fairly small group (sub-group level on the site). On the group sub-division at least two correlations with ethnographic groups seem possible, as shown in Table 3.

TABLE 3

Site	Terms used	Ethnology	
		A	B
Whole site	Group	Tribe	Hapu
Units A-B, C, D, E-F	Sub-group	Hapu	Whanau
Pit ownership	Family	Whanau	Nuclear family

Both systems A and B have attractions and disadvantages. System A does not suit the computed food storage data which suggests the group was a hapu, and in addition tribal organisation for defence was supposedly uncommon. System B, although it reverses the points above, in addition seems to over-estimate the size of whanau, and over-emphasise whanau divisions of hapu.

Confirmation of these contradictions in other studies could result in some interesting new data. It would appear from this analysis that a previsouly unsuspected social division in Maori society may have existed of a size between whanau and hapu level.

CONCLUSIONS

This site has been subjected to a fairly lengthy and perhaps speculative analysis and discussion regarding its function. The site was in part a vehicle to, rather than the object of this discussion. Apart from the approach to a site implicit in the argument, the following points can be made which have more general relevance to New Zealand problems:

(1) Pa are not necessarily constructed by a cohesive military unit.

(2) Pa are not necessarily constructed by an economic unit.

(3) Pa can show evidence which suggests there was no communal storage of food at any level greater than family.

(4) By implication from the above, the function of some pa as a social whole is unlikely.

(5) Rectangular pits can show a wide variety of size range within a site - range which is unlikely to be random, and can have cultural explanations.

(6) The place of rua is ambiguous, at least on this site.

(7) The social organisation inferred from this site is not entirely compatible with other accounts.

These conclusions were developed on the study of one site. There is no reason to believe it is atypical.

ACKNOWLEDGMENTS

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