Session - Sessíon

05

Archéologie Précolombienne-Session générale

Pre-Columbian Archeology-General session

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Pre-Columbian Jamaica : The Sites in the Landscape

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Abstract - Pre-Columbian Jamaica: the sites in the landscape
This work is based upon the Lee Collection CD ROM Inventory which was published together with "Pre-Columbian Jamaica" (2008). The data was originally formatted in Microsoft Access, which did not allow for a computer generated comparison of all the sites considered as a whole. This work presents a wider analysis. It has been achieved by downloading the data into Microsoft Excel and interpreting the data in Surfer.
The data has been broken down into its constituent parts and fitted into the Jamaican landscape, in order to achieve a fuller explanation of the sites, considered analytically, and their distribution in terms of the island's geography and geology. The sites are considered in terms of their size and type and cultural associations, including in some cases the presence of human remains. The physical characteristics of the island are considered in terms of topography, rivers and drainage basins, and underlying geology.
It is hoped that our work, which goes beyond the study of the individual sites in isolation, will encourage further research of this type in Jamaica.
Key words : Lee Collection, Jamaican landscape, site distribution, computer generated comparison.

Résumé - La Jamaïque Précolombienne : Les sites dans le paysage.
Cet ouvrage est basé sur l'Inventaire de la Collection Lee sur CD ROM, publié avec "La Jamaïque Précolombienne" (2008). Les données ont été formatées à l'origine à l'aide de Microsoft Access, ce qui ne permettait pas une comparaison générée par ordinateur de tous les sites dans leur ensemble. Cet ouvrage présente une analyse plus large. Ceci a été accompli en téléchargeant les données dans Microsoft Excel et ensuite en les interprétant dans Surfer.
Les données ont été divisées dans leurs groupes constitutifs et appliquées au paysage Jamaïquain, afin d'accomplir une explication plus complète des sites, considérés de manière analytique, ainsi que leurs distribution par rapport à la géographie et géologie de l'île. Les sites sont considérés en termes de taille et type et associations culturelles, en incluant dans certains cas la présence de restes humains. Les caractéristiques physiques de l'île sont considérées en termes de topographie, rivières et bassins de drainage, et géologie sous-jacente.
Nous espérons que notre travail, qui va au-delà de l'étude de sites individuels isolés, encouragera une recherche approfondie de ce type en Jamaïque.
Mots clefs : Lee Collection, paysage de la Jamaïque, distribution des sites, comparaison générée par ordinateur.

Resumen - Jamaica Precolombina: los sitios en el paisaje.
Este trabajo está basado en el inventario en CD ROM de la Colección Lee, el cual fue publicado conjuntamente con el libro "Jamaica Precolombina" (2008). Los datos fueron originalmente formateados en Microsoft Access, lo que no permitió una comparación computarizada de todos los sitios considerados como un conjunto. Este trabajo presenta un análisis más amplio, desarrollado a través de la descarga de datos en Microsoft Excel y su interpretación en Surfer.
Los datos fueron divididos en sus partes constituyentes y ajustados dentro del Paisaje Jamaiquino, con el objetivo de lograr una más completa explicación de los sitios, considerados analíticamente, y su distribución en términos de la geografía y la geología de la isla. Los sitios fueron considerados de acuerdo a tu tamaño, tipo y asociaciones culturales, incluyendo en algunos casos la presencia de restos óseos humanos. Fueron consideradas además las características físicas de la isla, incluyendo su topografía, ríos y cuencas de drenaje y la geología subyacente.
Se espera que este trabajo, el cual va mas allá del estudio de sitios individuales y aislados, aliente futuras investigaciones de estas características en Jamaica.
Palabras claves : Lee Collection, paisaje jamaiquino, distribución de los sitios, comparación computarizada.

Introduction

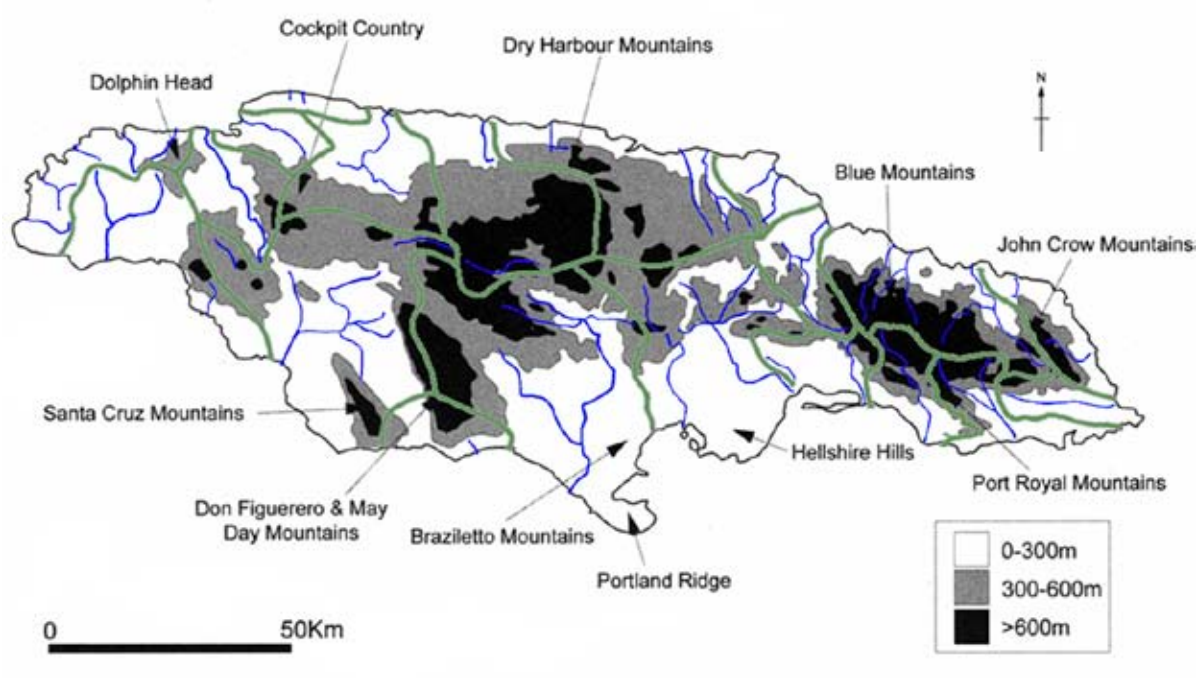
The data as presented on the CD of the Lee Collection has been written using Microsoft Access and is a useful resource for those wishing to extract particular information on a site by site basis, or to sort data into categories by pre-determined criteria. Thus, under Quick Queries, the user may seek specified geographical information in terms of site elevation, size, and distance from the sea, and basic statistics are also provided in ten given categories, which provide a listing of all sites within a parish or a drainage basin, all those with petroglyphs or pictographs, and so forth. These are primary inventory procedures.

However, it is not possible to extract the data in a format which can be translated into a graphical representation, to give a visual interpretation of how the sites are distributed in the landscape. To this end, it was necessary to open the Lee Collection file in the spreadsheet program Microsoft Excel. This gave all the data in tabular form, allowing for any amount of sorting by user-defined criteria. The data could then be imported into Golden Software's Surfer 6 program, which is a powerful tool for the graphical representation of numerical data. The downside to Surfer is that its visual interface lacks the refinements to present images in a way that can be used in a presentation. The graphical elements from Surfer were therefore imported into the desktop publishing program CorelDraw, which has the ability to combine many visual elements into an accurate and interpretive presentation. The results provided the basis for this study.

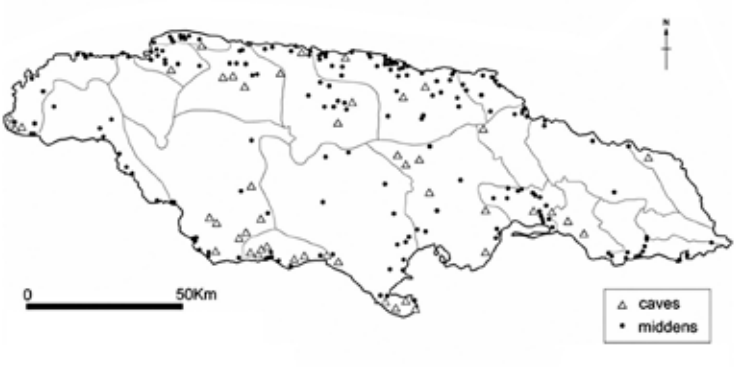
Broadly speaking, two advantages have been obtained. Firstly, we can for the first time see how the sites relate to each other in terms of the GEOGRAPHY of the whole island. Secondly, a detailed examination reveals some facts about the structure of the data which were perhaps not immediately apparent. In part this has to do with the relationship between the material contained in the Lee Collection and that which we know about from other sources. A comparison between the two reveals certain lacunae in our present state of knowledge and also suggests some lines of research which it would be profitable to pursue. The data provided in the CD should be seen not as static but as a stimulus to further work.

Jamaican topography, drainage basins, and main rivers (Figure 1)

This map corresponds to those given in "Pre-Columbian Jamaica" (2008) Figures 6 and 7, with the addition of some main river courses. There are 20 drainage basins in the island, as defined by the National Atlas of Jamaica, with in most cases one major river which gives its name to the basin. In a few cases there is no single dominant stream, so the choice of which to represent has been somewhat arbitrary. The significance of drainage basins as a fundamental natural way of dividing up the landscape has been emphasized by Peter Harris in relation to Caribbean prehistory. This map therefore provides the standard framework for our study.



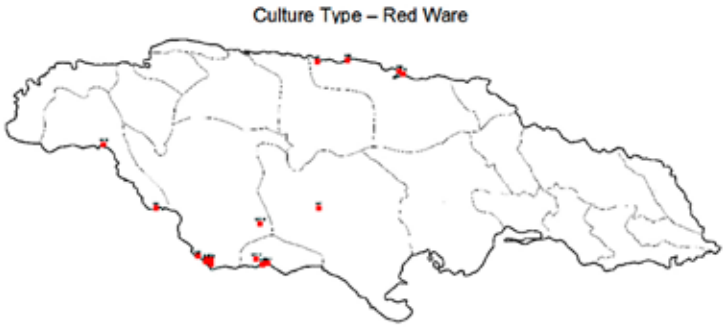
Distribution of all mapped cave and midden sites included in this study (Figure 2)



This map corresponds to Figure 17 in "Pre-Columbian Jamaica". It relates to 66 caves and 214 middens for which statistics have been calculated, including nine related "double" middens, and five sites that have been added since Lee finished his work (Allsworth-Jones, 2008: 79). Lee made a note of 77 other sites that he did not succeed in locating, 36 mentioned by previous authors, particularly Duerden, and 41 known only on the basis of unverified reports. Despite uncertainties about these sites, it must be true that the numbers given here are a minimum for the true Taíno occupation of Jamaica.

Redware sites (Figure 3)

One of the most obvious and long recognized ways of categorizing Jamaican prehistoric sites is by their cultural properties, usually determined on the basis of pottery types. 16 middens and three caves are shown here as Redware sites. The term Redware is that commonly used in Jamaica, although the "Little River" style that this represents corresponds to the Ostionan recognized elsewhere in the Caribbean. It is so far the first known prehistoric occupation of the island. As Lee remarked, the sites with very few exceptions are right on the coast. Porus (M7) close to the headwaters of the Milk River is much further inland than the others, but the few artefacts available show slight but definite indications of Redware style. Newly excavated locations include the more easterly of two sites at Paradise Park (Paradise) (Keegan et al., 2003; Carlson and Keegan, 2004), which is shown here, and a site which has been named as Blue Marlin, in the immediate vicinity of Great Pedro Bay (E4) (Rampersad, 2009), which is not indicated..



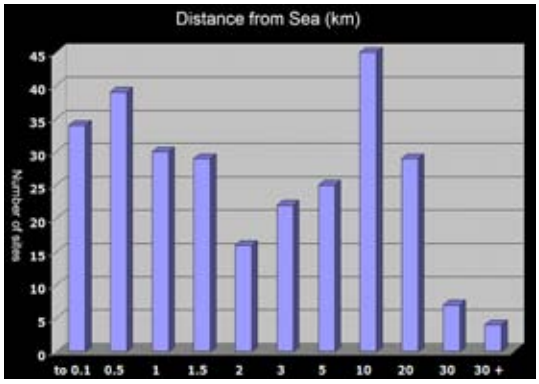
Montego Bay sites (Figure 4)

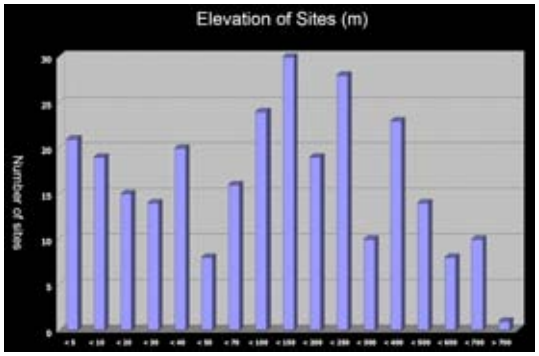
22 middens and one cave are here mapped as Montego Bay sites. The definition of what constitutes a Montego Bay site for this purpose follows the classification decided upon by Lee, and he in turn was guided by the criteria laid down by Howard (1950, 1956, 1965), who first defined it as a "variant sub-style" of the predominant White Marl style, which is itself equivalent to the Meillacan recognized elsewhere in the Caribbean. The mapped sites include the more westerly of the two locations at Paradise Park (Sweetwater) excavated by Keegan and his colleagues. Bengal (A8) has not been included, but it is evident that it should be. Vanderwal did include this site, together with Hartfield and Fairfield, in his so-called "Fairfield complex" (equivalent to Howard's Montego Bay), and it is not clear why Lee excluded it. It was already suggested (Allsworth-Jones, 2008:17) that a re-examination of the excavated material might tell a different story. This has now been carried out by Conolley (2011) and it is clear that Bengal does indeed belong with the other sites of this group. He also lists two other sites, Spotty Hill (J2), and Lucea, a new site given the designation H14. The overall distribution of the sites, which are confined to the western part of the island, is unaffected. Both Howard and Vanderwal took the view that the Montego Bay sub-style was relatively late, and that it had probably evolved out of the predominant White Marl complex. On the basis of his excavations at Cranbrook and Fairfield, Conolley (2011) has established that the sub-style emerged between about 1070 and 1295 AD, and the already available (but less securely provenanced) dates from Cinnamon Hill and Bengal are not inconsistent with this, so evidently it was not that late. It is however still seen as a local development within the general Meillacan context. It will be for future research to look more closely into the meaning of the regionalization of style in the island which this development indicates.

Port Morant sites (Figure 5)

The creation of a sub-style, having the same kind of status as Montego Bay, and named after Port Morant in the east of the island, was suggested by J.S. Tyndale-Biscoe. Eight sites which can be tentatively placed in this category are shown here. Two of the most important, Bowden (09) and Spanish Wood (Duckenfield) (02), were excavated by Vanderwal. It is unfortunate that his results were not published, and it would be useful if the material from these sites, presumably still held at the JNHT, could be studied.

The remaining sites in the island are regarded as White Marl, by default, so it may be something of a ragbag, but the group as such is certainly a reality, and it is well defined on the basis of White Marl itself (S1) (Allsworth-Jones, 2008: 93-97).





All sites : Distance from the sea and elevation (Figures 6 & 7)

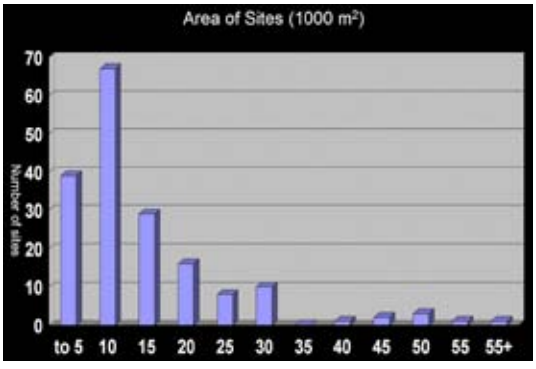
Taking all the sites (both middens and caves) together, and using five class intervals, it was determined that their mean distance from the sea was 4.78 km ("Pre-Columbian Jamaica", 2008, Figure 18 upper). Nonetheless, those <2.5 km from the sea accounted for 57 % of the total (n=160). There was a second minor peak at a distance of 5-9.9 km from the sea. The diagram here, with eleven class intervals, shows one peak at 0.1-0.5 km and another at 5-10 km from the sea. The impression of bimodality is therefore reinforced. As in the first case, the class intervals selected are not all equal in size.

Considering again all sites and using five class intervals, it was determined that their mean elevation was 164.30 metres above sea level, but the most frequent interval represented was <50 metres and there was a second peak at 200-399 metres ("Pre-Columbian Jamaica", 2008, Figure 18 lower). The diagram here with 17 (unequal) class intervals reveals a similar bimodality, corresponding to two broad groups respectively less than and more than 50 metres above sea level.

In other words, the original conclusion is confirmed, that "most of the Pre-Columbian sites of Jamaica are fairly low down and near to the sea, but a significant minority are higher up and well inland" (Allsworth-Jones, 2008: 82).

All middens : Areas in 1000 m² (Figure 8)

The length, breadth, and area of 177 open air sites (middens) could be established on the basis of sketch plans measured in the field by Lee (Allsworth-Jones, 2008: 79). The results for area were displayed as a histogram, with four (unequal) class intervals, and it was calculated that the mean value for all the sites was 1.2 hectares. Nonetheless, as in the case of distance from the sea and elevation, the data were obviously strongly skewed, with 60% of the sites (n=106) being less than 1 hectare in extent ("Pre-Columbian Jamaica", 2008, Figure 19 upper). The diagram here has 12 equal class intervals, and demonstrates even more clearly how strongly skewed the data are, as also the predominance of the first two classes, up to 1 hectare in extent. What was not hitherto done however was to show how these sites were distributed in the landscape, and we can now see the pattern that they make.



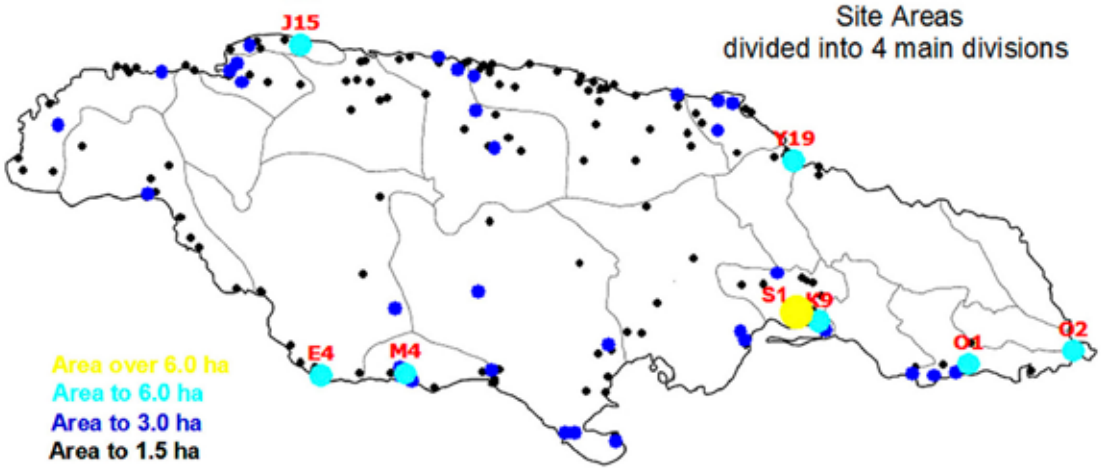
Mapped open air sites, divided by measured area into four main divisions (Figure 9)

The sites are divided by size into four main categories, <1.5, 1.51-3.0, 3.1-6.0, and >6.0 hectares respectively. Only one site comes into the last category, and that is White Marl (S1). Its size was estimated by Lee at 12.74 hectares, and by Vanderwal at slightly in excess of this. It obviously is unique among Jamaican sites. It is a tragedy that the results of the excavations conducted by Howard and Vanderwal were never published in full. There are seven sites in the interval between 3.1 and 6 hectares. They are certainly not homogeneous in character, and it is worthwhile considering in some detail why they have come to occupy this position.

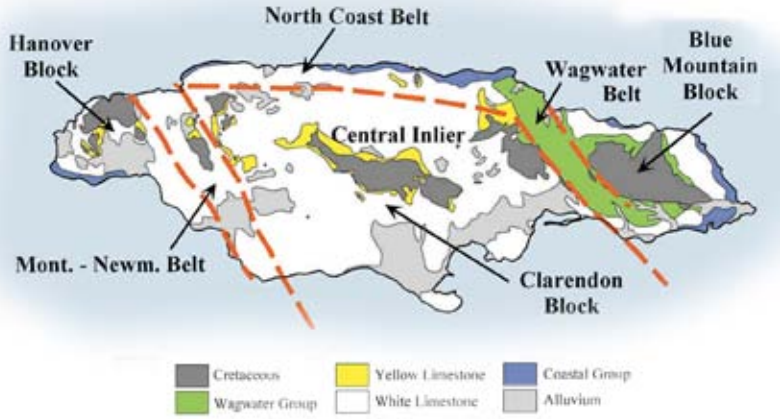
Two of the sites are classed as Redware, Great Pedro Bay (E4) and Bottom Bay (M4), measuring 5.09 and 4.38 hectares respectively. They correspond to Lee's description of Redware sites in general, as shallow but often spread over a wide area, with a "halo" of material around them that may be several hundred metres in extent. The material at Great Pedro Bay was uncovered over a number of years thanks to the removal by quarrying of a large sand dune which had accumulated on top of it, revealing what were described as small areas of thin midden deposition on the pre-dune land surface. At Bottom Bay likewise Lee stated that the deposition of midden material was rather shallow, although he believed that six or seven middens in the area as a whole were practically intact. This description was confirmed by Vanderwal's excavations in 1966 when he ascertained that the maximum depth of cultural deposit was 10 inches.

Very little is known about three of the remaining sites, Spot Valley (J15), Belvedere N°.1 (O1), and Rennock Lodge (K9), with measurements of 4.42, 3.60, and 4.74 hectares respectively. Spot Valley is regarded as a Montego Bay site, whereas the others are attributed to White Marl. Lee commented that although the area of midden material stretched over several acres at Spot Valley, no part appeared to be still intact, since sugar cane had been cultivated here for 200 years. Disturbance therefore might account for the apparent dimensions of this site. Belvedere N°.1 was excavated by Vanderwal in 1965, in order to investigate the occurrence of certain depressions in the landscape, which he subsequently interpreted as a moisture catchment system for growing cassava or maize. He did not provide a plan of his excavations, and there is no known parallel for this occurrence in the island, so, if true, the circumstances here are unique. For Rennock Lodge we are essentially dependent on the description given by Duerden, for though Lee mapped the site in 1965, it has now been totally built over. While giving very few details, Duerden (1897: 44) did express the view in connection with this site that "the Long Mountain" (west of the Hope river) "was evidently a thickly populated locality in Pre-Columbian times". This view seems to be well substantiated, since apart from Rennock Lodge there is also the Martello Tower site (K6) (also known as Fort Nugent or Harbour View) in the vicinity, and it is now known that Taíno settlement extended to the eastern side of the Hope river, opposite Harbour View, as well.

For the last two sites, Coleraine (Y19) and Spanish Wood (Duckenfield) (O2), with dimensions of 4.81 and 4.91 hectares respectively, we are rather better informed. Coleraine, a White Marl site, was mapped by Lee in 1970 and identified by him as "without any doubt a village of major importance". He considered that it may have been equivalent to the settlement named Guayguata by the Spaniards, and he believed that he had identified over 30 distinct house foundations at the site. The site was re-investigated by the joint UWI-Murray State University team in 2003, and although doubt was cast on the accuracy of the supposed house foundations, there is no reason to think that this was not indeed an important site, one of several at the mouth of the Wagwater river. Spanish Wood, as noted already, has been identified as a Port Morant site, which was excavated by Vanderwal in 1968. Lee observed that (as at Spot Valley) the land in the vicinity had been intensively cultivated for sugar cane for 200 years, but it seems the site has not been destroyed, since Vanderwal's excavations reached a depth of four feet. He gave an estimate of its area in agreement with that of Lee and stated that it constituted the "second largest" site on the island. As such, it certainly merits re-examination. Nonetheless, the fact that it is only one third to one half the size of White Marl brings into focus again the unique predominance of that site in the island.



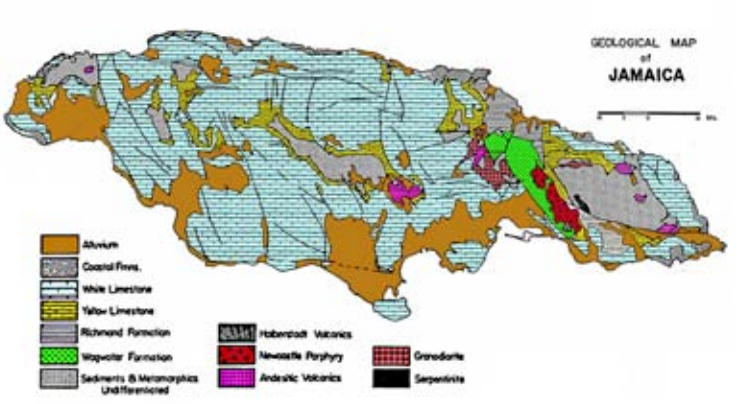
JAMAICAN GEOLOGY, BLOCKS, AND BELTS (after Simon Mitchell) (Figure 10)



This map corresponds to Figure 8 in "Pre-Columbian Jamaica". It shows the basic geological structure of the island, starting with the Cretaceous "inliers", which were followed by the tectonic movements of the early Tertiary. These created the three main Hanover, Clarendon, and Blue Mountain blocks, separated from one another by the Montpelier-Newmarket and Wagwater belts or troughs. In the middle Tertiary marine transgression accounts for the deposition of the Yellow and White limestones, which together make up two thirds of the island's present land surface. The Coastal Group (formed by fluvial transport of material from the interior) and the alluvial plains came into being during the Quaternary.

GEOLOGICAL MAP OF JAMAICA (modified after M.-P. Aubry) (Figure 11)

This map corresponds to Figure 8 in "Pre-Columbian Jamaica". It shows the basic geological structure of the island, starting with the Cretaceous "inliers", which were followed by the tectonic movements of the early Tertiary. These created the three main Hanover, Clarendon, and Blue Mountain blocks, separated from one another by the Montpelier-Newmarket and Wagwater belts or troughs. In the middle Tertiary marine transgression accounts for the deposition of the Yellow and White limestones, which together make up two thirds of the island's present land surface. The Coastal Group (formed by fluvial transport of material from the interior) and the alluvial plains came into being during the Quaternary.



CAVE SITES WITH REFERENCE TO GEOLOGY (after Mitchell and Aubry) (Figures 12 & 13)

These two maps show the position of the cave sites recorded in the Lee collection inventory in relation to the geology of the island. It is quite obvious that they are concentrated in the limestone areas. Although only 66 sites are recorded here, Fincham lists 1073 caves of all types in the island, and once again these are overwhelmingly in the limestone areas, particularly the White limestone (Fincham, 1997: Figure 1, Appendices 3 and 6). Even the caves in the Coastal Group "seem to be in hydrological continuity with the older neighbouring limestones". Some clarification is needed as to what exactly is included here under the heading of cave sites, which follows the classification system established by Lee. As he said, two types of sites were grouped together and numbered consecutively in a different sequence to that employed for the open air sites or middens (Allsworth-Jones, 2008: 75). These were (1) "burial caves", and (2) sites with petroglyphs and/or pictographs. 25 sites are here listed as belonging to the second group (though in the light of subsequent information regarding Windsor [TC4] that total should be 26: Allsworth-Jones, 2008: 104). Most of the sites have petroglyphs only, but two (Potoo Hole and Spot Valley Cave) have pictographs only, and two (Mountain River Cave and Worthy Park No 1) have both. In some cases, e.g. Warminster (Loubser and Allsworth-Jones, 2009) and apparently Mountain River Cave (Allsworth-Jones, 2008: 112), the rock shelters with petroglyphs or pictographs contained deposits with traces of prehistoric settlement, but more often the petroglyphs at least seem to stand alone.

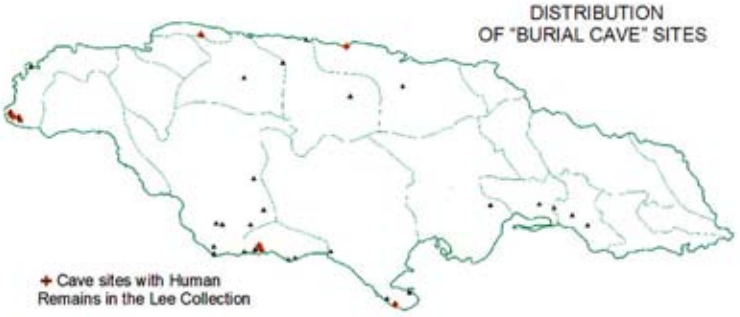
The term "burial cave" certainly needs some explanation. It became well known thanks to the work of Duerden. He wished to combat the idea then current that the caves had acted as places of refuge, pointing out with good reason why this was unlikely, and suggesting instead that they had served as "natural ossuaries" (Duerden, 1897: 25). Lee adopted the term "burial cave" accordingly. 38 sites are listed here under this heading (or 39 if the caves at Pedro Bluff [EC4 A and B] are counted as two). The strength of the evidence suggesting that these caves were indeed burial places varies from very good to quite poor. Lee himself admitted that three sites listed here but not specifically counted as burial caves (Taylor's Hut No 2, Gut River No 2, and Nonsuch Cave) contained traces of pottery only, and a few others were excluded all together because of the sparsity of information about them (Allsworth-Jones, 2008: 126). Nonetheless the majority of the sites probably did have the function claimed for them. Only two sites classified as "burial caves" are also listed as containing petroglyphs and/or pictographs. At Cuckold Point Cave (MC5) Lee found traces of human occupation and a block of limestone with the engraving of a face. The evidence is much more extensive at Spot Valley Cave (Allsworth-Jones et al., 2010) where at least eight individuals were buried and a good deal of archaeological material was recovered in a context which also included a dozen poorly preserved pictographs.

To complete the list it should be added that there are two more sites which fall into a different category, Aboukir and Image Cave (MC3), both of which have definite traces of Taíno occupation, without being either petroglyph or burial sites. Aboukir is well known as the place of origin of three carved wooden figures which only came to light fairly recently (Aarons, 1994; Saunders and Gray, 1996). Image Cave, located by Lee in 1966, contained a wooden spindle which may be of Taíno origin, and in his view the site may correspond to the well-known but elusive site of "Spots" where three carved wooden figures were also found by Isaac Rebello in 1792 (Allsworth-Jones, 2008: 96).

Distribution of "burial cave" sites, and cave sites with human remains in the Lee collection (Figure 14)

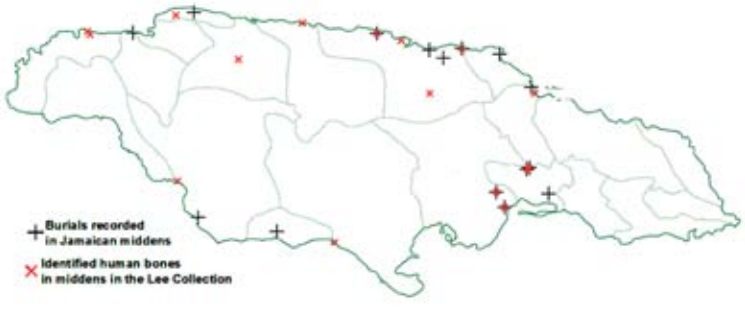
The "burial caves" just referred to appear in this map. They were all located by Lee, except for three east of Kingston, which are recorded by Fincham: Halberstadt, Dallas Castle, and Cambridge Hill. These sites were well known to Duerden, and they all contained important human remains, a minimum of 34 individuals at Halberstadt, and seven "practically perfect crania" at Cambridge Hill cave according to him (Duerden, 1897: 21-22, 28). But he also mentioned three other sites east of Kingston (Bloxburgh, Richmond Hill, and Botany Bay) which have not been re-located at all, as well as four on the south coast, and four in the west of the island. The caves in the last two groups were re-located by Lee, except for California (Burnt Ground Pasture), Three Sandy Bay cave, and Great Goat Island. In the "deep cave" on Great Goat Island, a "flattened skull of a young individual" was found inside a boat-shaped vessel, similar to the one at Richmond Hill (Duerden, 1897, Plate VI.1). So, the map of "burial caves" given here is certainly not complete.

On the other hand, material from eight of the caves is contained in the Lee collection, and has been described in full. Four of these sites (Belle Air, Taylor's Hut No 1, Bull Savannah No 2, and Spot Valley Cave) were located by Lee himself and the contents were rescued from possible destruction by him. The minimum number of extant individuals from these four caves alone amounts to 16 ("Pre-Columbian Jamaica", 2008, Table 13). The fact that these sites were found between 1968 and 1986 shows that there are still valuable discoveries to be made. Apart from new discoveries, there is also a great deal of work to be done to describe the finds that have already been made. Thus, at White Marl Cave No 1 (SC5) excavations conducted by St. Clair in 1969 produced a total of at least 12 individuals, but these have never been studied in detail, and the published drawing of the interior of the cave is apparently quite misleading (Allsworth-Jones, 2008: 172-173). Michelle Braham (2010) has recently shown the potentiality of what can be done in this regard, in her study of the material from Halberstadt and Cambridge Hill cave. Duerden sent the bones recovered from Halberstadt to Professor A.C. Haddon and Sir W.H. Flower (Duerden, 1897:22) and some of this material at least is still available for analysis in the Duckworth Laboratory in Cambridge. By Cambridge Hill is meant not the site investigated in the 1890's but the adjacent cave investigated by C.B. Lewis from 1944 to 1950 (Allsworth-Jones, 2008:125), the majority of the material from which is now housed at the JNHT.



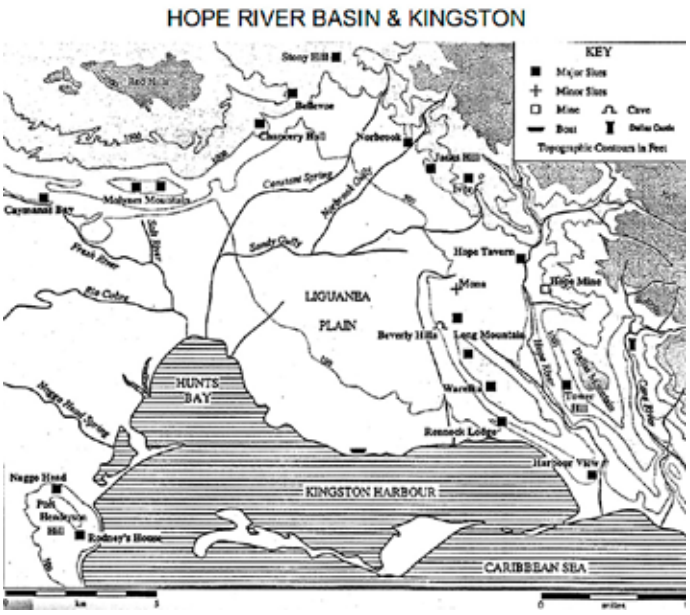
Burials recorded in Jamaican middens, and identified human bones in middens in the Lee collection (Figure 15)

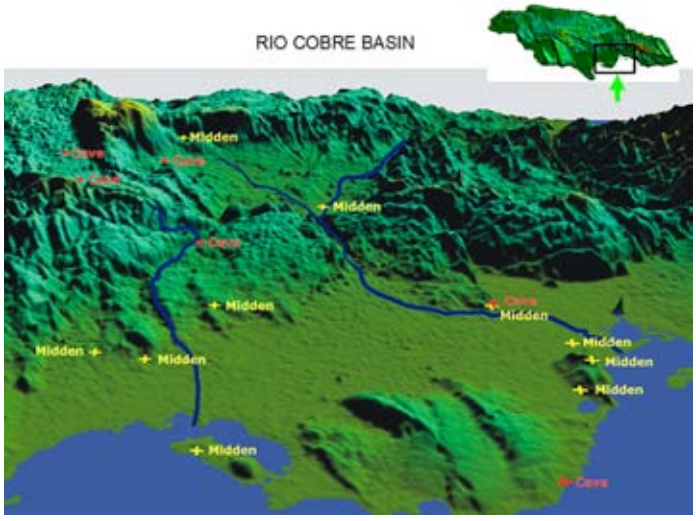
It was at one time thought that human remains scarcely existed in Jamaican middens (Duerden, 1897: 21) but this idea was dispelled by the excavations at White Marl, which produced the remains of at least 16 individuals who had obviously been intentionally buried (Allsworth-Jones, 2008:126). On the basis of an examination of the literature, a list was drawn up of 15 sites with such burials ("Pre-Columbian Jamaica", Table 12). These sites are shown in this map. The map also shows 16 sites which have produced remains found in the Lee collection ("Pre-Columbian Jamaica", Table 13). Six sites are common to both lists, but there are eight others which are new. Some of these, e.g. Black River West (E12) and Hartfield (J1), contain quite substantial remains, and it is clear from present day field conditions that others, e.g. Round Hill (C1), are likely to do so as well. So it may very well be that some of these locations could justifiably be regarded as burial sites, and no doubt there are more out there in the landscape. Once again, we are here probably dealing with what is only a minimum record.



The Hope river basin and Kingston (after Allsworth-Jones et al) (Figure 16)

This map is taken from a paper presented to IACA in 1999 (Allsworth-Jones et al., 2001, Figure 1). It shows the Taíno sites in the Kingston area, which mainly but not entirely corresponds to the Hope river basin. The intention was that "the pattern of interdisciplinary investigation employed in this study, using geographical units larger than the individual site, can be extended to throw light on the Pre-Columbian occupation of Jamaica in general". The present work, based on Lee's indefatigable collection of field data, has hopefully done that. There was a clear tendency observed in this case, for the Taíno sites to be placed on hills surrounding the Liguanea plain, and the importance of being aware of present and past drainage patterns was also emphasized.





The river Cobre river basin (Figure 17)

The adjacent Rio Cobre river basin is shown here, mapped as part of the current project, using a 3D topographical map of Jamaica kindly made available by Ed Hunter of HowardDigital.com. The relation of the sites to the main river courses can be clearly seen, but more work is needed to uncover the real story, which no doubt would make this map (and others like it) more complicated. An illuminating study by Jo Stokes of the area between the White and Rio Nuevo rivers on the north coast (unfortunately still unpublished) has demonstrated that in that area there were many smaller settlements surrounding the larger ones, which on the whole form the heart of Lee's survey. No doubt that pattern is repeated elsewhere, and it will be up to future work to reveal it.

The river Cobre river basin (Figure 17)

The present work builds upon "Pre-Columbian Jamaica" (2008) and the CD-ROM which accompanied it, which was written in Microsoft Access. To provide for a wider means of comparison between sites, the data were re-recorded in Microsoft Excel, and then imported into the Surfer 6 and CorelDraw programs, which have provided the basis for the present study. As a result, we have an informative series of new maps, and some facts about the structure of the data have emerged, which were perhaps not previously apparent.

The work is based upon an analysis of 66 caves and 214 open air sites or middens. Currently, these sites are regarded as belonging to four different cultural variants, three of which (White Marl, Montego Bay, and Port Morant) appear to be more or less contemporary. Much more work needs to be done to determine the meaning of the regionalization of style which this phenomenon apparently indicates. A bimodality in terms of these sites' distance from the sea and elevation has been confirmed, most (as already stated) being "fairly low down and near to the sea". The areas of 177 middens were recorded by Lee and it was already determined that their mean size value was 1.2 hectares, although the data are strongly skewed. They can now be seen on a map of the island as a whole, in terms of four main size categories. The largest site by far is White Marl, with an estimated size of 12.74 hectares. Seven others, of an apparently heterogeneous nature, are in the interval between 3.1 and 6 hectares. Spanish Wood (Duckenfield) had already been identified by Vanderwal as the "second largest" site on the island, and the (now unverifiable) dimensions of Rennock Lodge emphasize the point that the mouth of the Hope river was undoubtedly a centre of major settlement in Pre-Columbian times.

The cave sites mapped by Lee included both "burial caves" and sites with petroglyphs and/or pictographs. With a few important exceptions, such as Spot Valley Cave, these sites are for the most part mutually exclusive. The two sites which have produced carved wooden figures (Aboukir and "Spots", which may be equivalent to Image Cave) did not contain burials. 38 of the sites mapped here are listed as "burial caves", but this list is certainly not complete, since for a start it excludes six well known ones described by Duerden (1897), which could not be re-located. On the other hand, the Lee collection includes material from four new sites which were located by Lee himself and the contents of which he safeguarded. Apart from continuing the process of finding and recording caves with traces of Taíno settlement, it is surely important to conserve and study the extant remains which

have already been recovered from these caves, such as Cambridge Hill among others. The same goes for the remains from the open air sites, particularly those which are threatened with destruction.
This study has taken river basins as an important unit of analysis, and it is suggested that a wider geographical perspective such as this would be a useful guide for further research in the island. It is evident from studies carried out in the area of the White and Rio Nuevo rivers on the north coast that the larger settlements, many of which surely do feature in Lee's inventory, were surrounded by smaller ones. So here too a good deal of prospection and excavation work remains to be done. The maps and the geographical data provided here are provisional only. Hopefully they constitute a useful framework, to which much else will be added in the future.

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