Journal of Danish Archaeology vol. 3, 1984, pp. 187–198

# A Contribution to the Evaluation of Archaeological Field-Surveying

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## INTRODUCTION

In recent years field-survey (reconnaissance) has been of increasing importance to the archaeological collecting of data, partly in connection with purely scientific prospecting projects, partly to an increasing extent, as part of the archaeological rescue work made possible by the Conservation of Nature Act of 1969. A number of archaeological investigations carried out in connection with big-scale road constructions have now been terminated and made accessible for further treatment. The material from this store of data now available gives possibilities for a critical evaluation of reconnaissance as an archaeological work method. The following pages are to be seen as a contribution to an evaluation of this kind, and – at the same time – as an invitation to a methodical debate, making use of future experience in the practice of reconnaissance.

The material on which the present article is based, originates from the investigations of the East Jutland motorway, the motorway of East Funen, and from a smaller road project on Southwest Funen (Andersen, N.H. 1977, Jeppesen and Thrane 1979) (1) The investigated test area totals 2.45 sq.km, inside which 116 prehistoric phenomena of widely varying type and extent were observed (2). A total of 41 localities were later made the subject of excavations. These localities were selected according to rather varied criteria, however, mainly due to expectations originating from research problems of current interest. From a methodical point of view consistent trial excavation at all localities would have been the most informative, but for obvious reasons hardly practicable. As a supplement to and in support of the observations from these areas, data from the prospecting project on Southwest Funen have been frequently used (see Thrane 1976 p. 5–17, Thrane 1978 p. 108–119).

To illustrate the applicability of reconnaissance to the archaeological collecting of data, the above mentioned material has been confronted with the following questions:

1. What is found by surface survey and what is missed? The question concerns types of material as well as types of subsurface deposits.
2. Which factors inherent in the landscape might bias the observations either negatively or positively?
3. How precise are the datings of surface material – are they operational?
4. To what extent are the datings of surface material in accordance with the datings of the excavated material?
5. Are there any alternatives to reconnaissance?

## 1. WHAT IS FOUND? – TYPES OF MATERIAL AND ARCHAEOLOGICAL REMAINS

In order to sort out the indications of prehistoric activity which dominate surface collections, a comparison is made between observations from the 3 test areas, supplemented with registered material from the Southwest Funen investigation.

In spite of considerable mutual variations, it is observed that flint and combinations of indicators including flint are predominant – this is hardly surprising.

The reason is obviously that the material resists disintegration as well as damage caused by agricultural activity. The significant dominance of flint in the surface material clearly has predictable consequences on the representation of finds, it tends to lead to a skewness in datings: finds from the later prehistoric periods, which mainly manifest themselves by surface finds of sherds, might be expected to be underrepresented in the material, as indicated by table 2. Concurrent observations have been made in connection with the Scanian Hagestad-prospecting project (Strömberg 1978 p. 7). In the regional surveys from West Jutland and Northwest Zealand conducted by Th. Mathiassen, Stone Age ma-

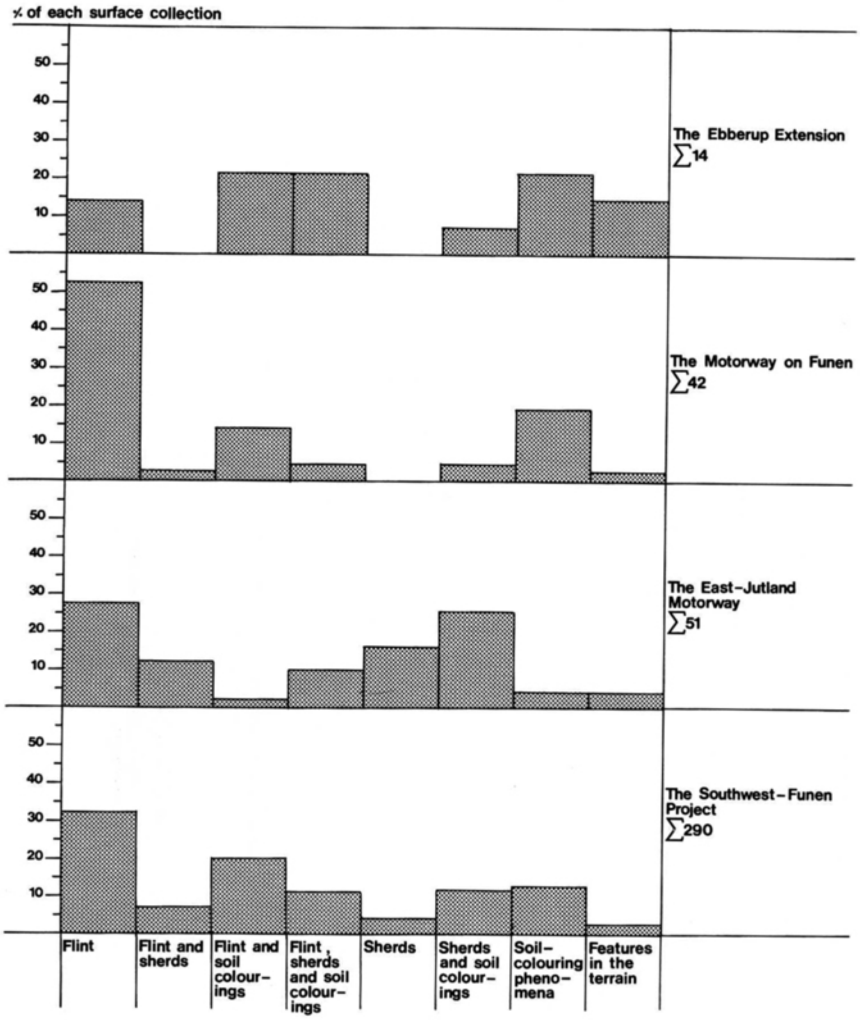


Fig. 1. Dominating categories of finds in surface collections. Pia Vallø *del.*

terial dominates to the extent of 91.46% and 94.49% respectively, calculated from the total collection of finds. However, Mathiassen's material is not quite comparable with the material treated here, as he included registrations of private collections – inspite of that, though, the trend is evident (Mathiassen 1948 and 1959).

As sherd-producing finds predictably might be underrepresented by reconnaissance, it seems essential to explain how far the phenomenon is due to the rate of decomposition of prehistoric pottery: Whether reconnaissance early in the season contributes to a higher frequency of sherds than in the months of spring, when field surfaces have been exposed for a longer period to precipitation and heavy variations of temperature.

To examine the question a test has been made on the basis of surface finds from the Southwest Funen project. All surface finds which can be ascribed to specific months of reconnaissance have been included, a total of 637 surveys, of which 248 were sherd producing (see fig. 2).

Taking into account a possible bias caused by extreme conditions of climate or precipitation in a single year or more, the test material includes the years from the initiation of the project until now, i.e. 1973–1980. If distributed over the 3 periods of reconnaissance, autumn (October–December), winter (January–February), and spring (March–April), the sherd producing finds show the following distribution: autumn 55, winter 52, and spring 141. If these observed values are con-

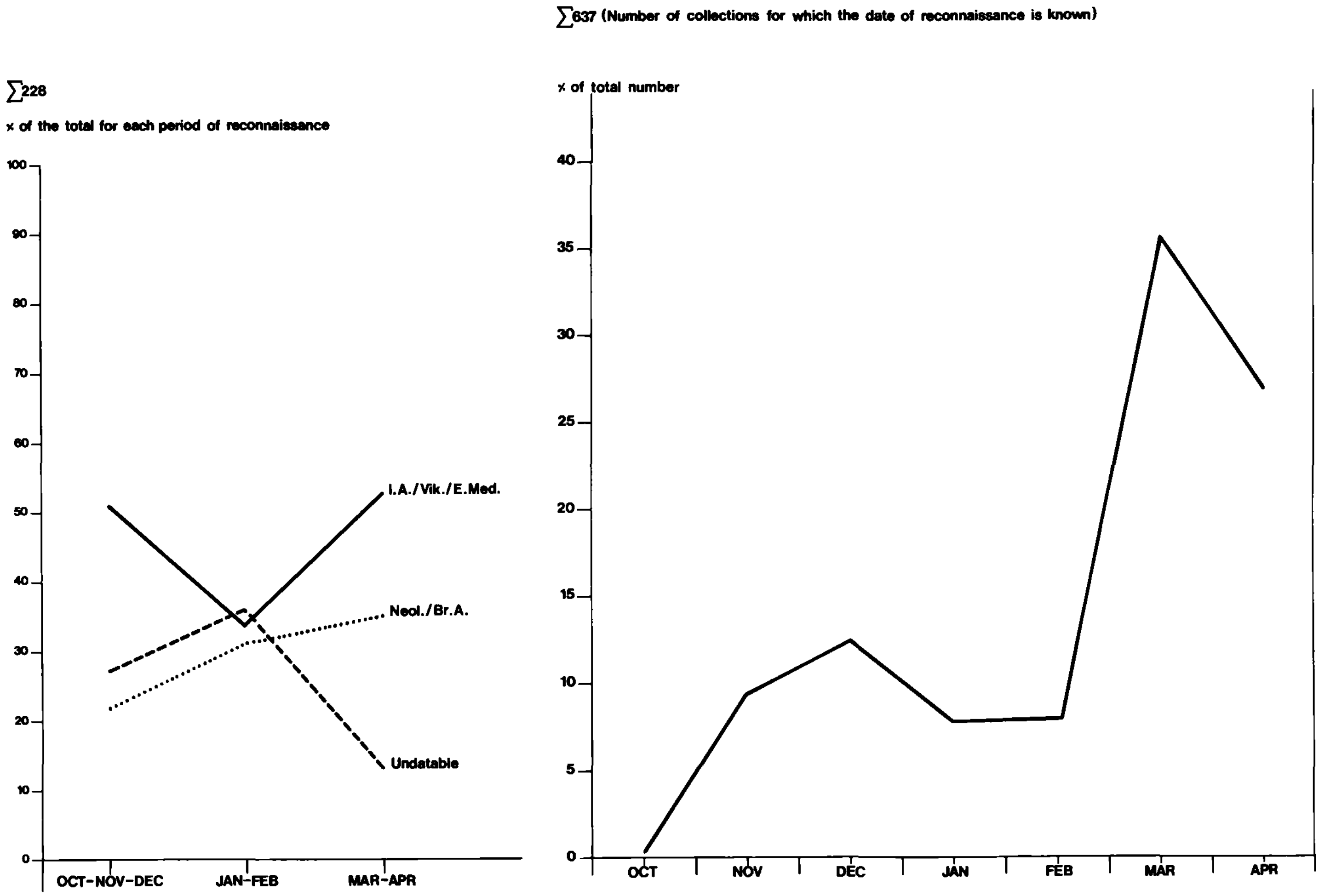


Fig. 2. Left: Reconnaissance activity in the SW-funen area 1973–1980. Pia Vallø *del.* – Right: SW-Funen. Graphical representation of the distribution of sherd-finds during the season of reconnaissance in the years 1973–1980. Pia Vallø *del.*

fronted with an expected distribution, based on a null hypothesis postulating an even distribution throughout the season, no significant difference between the expected and the observed variation in sherd frequencies is found (3.).

According to test 1., the chance of finding prehistoric sherds on the surface does not seem dependent on the period of reconnaissance. The question arises, however, as to how far this is equally valid for finds of pottery from all 3 pottery producing main periods in prehistory. It would thus be reasonable to assume that precipitation, frost and large changes of temperature would rather quickly cause the decomposition of the generally fragile Neolithic, partly Bronze Age ware, whereas the more resistant ware from the Iron Age might be expected far better to be able to withstand the actions mentioned. Furthermore, it might even be expected that the Iron Age ware would be seen better by reconnaissance in spring as a result of prolonged washing. On the basis of the previously mentioned material from Southwest Funen, the distribution of sherds over the different prehistoric periods throughout the survey season has been visualized graphically in fig. 2 (values per month are shown to the right). According to the graph, the proportion of Neolithic/Bronze Age sherds is seen to decline considerably in the winter towards the end of the survey season, whereas the tendency for the Iron- and Viking Age ware (Baltic ware) deviates markedly: the same frequency both in autumn and spring, broken by a rather inexplicable decline in the

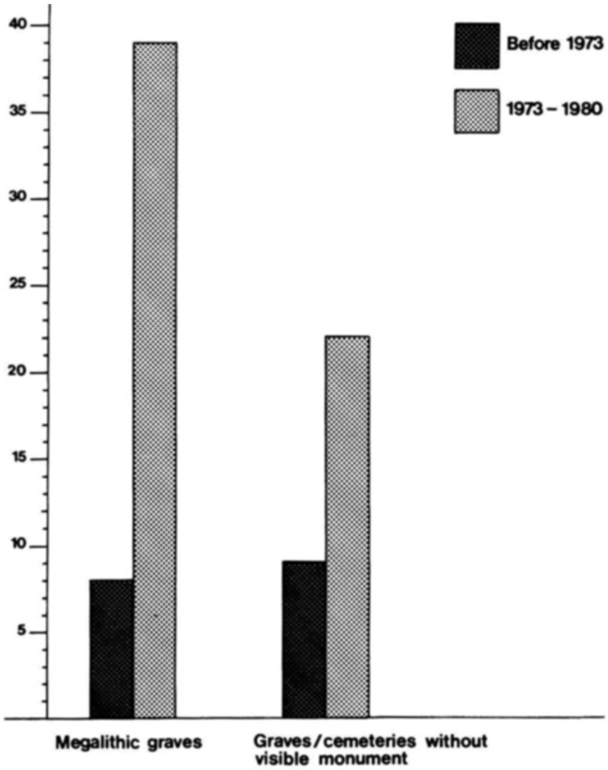


Fig. 3. The increase in megalithic graves and graves/cemeteries of the Bronze- or Iron Ages without visible monument. The parishes of Dreslette, Hårby and Flemløse on SW-Funen after the initiation of systematic reconnaissance in 1973 (cemeteries containing several urns counted as one unit). Pia Vallø *del.*

middle of the season. The increasing part of undatable sherds might be interpreted, with caution, as a rising amount of Iron Age ware in disintegration. To estimate how far these observations can be statistically supported, the material has been subjected to a $X^2$-test. The starting point for this is a null hypothesis postulating that the ratio between the different periods' share of sherd finds does not show any significant mutual variation, but a stable mutual ratio throughout the season.

An $X^2$-value of 15,232, with 4 degrees of freedom gives a probability between 0.01 and 0.001, that is – admitting less than 1% of occurrences, where the situation analyzed would come out by chance (Dalton a.o. 1972, Appendix 4). The test clearly rejects the null hypothesis, thereby supporting the observed tendency on the graphs. As seen, the finds of sherds of Neolithic/Bronze Age ware mostly suggest the rejection of the null hypothesis, in favour of the above mentioned assumption that there is a decreasing proportion of this ware towards the end of the survey season. The reason why the ratio between observed and expected distribution of Neolithic/Bronze Age ware is more positive in the winter months, may be because sherds have by that time gained optimal visibility from washing. Admittedly, the test method and numerically rather limited material prevent sweeping conclusions from being drawn. Yet these observations will perhaps be of future interest for reasons which will be mentioned.

In consequence of the stated predominance of flint in surface material, settlement indicators are the prevailing types of finds. In the road project material the few instances of surface finds interpreted as burials have all been discovered by virtue of features in the terrain such as mounds (1780, 1793, 1794, 1831). The degree of certainty for the identification is suggested by the two finds of lowest rank shown in table 1! The clearest category of burial finds is presumably megalithic barrows, the discovery of which is promoted by indications like large, ploughed up stones and calcinated flint. In fig. 3 is shown the increment of megalithic graves since the start of the survey in 1973 in the intensively surveyed parishes of Dreslette, Flemløse, and Hårby on Southwest Funen. In addition fig. 3 shows the increase of finds of moundless grave sites during the same period. Although subject to a considerably higher degree of chance discovery, the increase in this category of finds is evidently furthered by reconnaissance as well. In the motorway material, the degree of chance is illustrated by the site FSM 4100 (see table 2).

## 2. THE INFLUENCE OF LANDSCAPE FACTORS

*Field conditions.* Field surfaces covered by crops, no matter of what kind, are clearly an obstacle to a favourable survey result. In Mathiassen's surveys, large parts of the areas were covered by crops (Mathiassen 1948, p. 7). Concerning the motorway on Funen, about 3.5 out of 12.55 km of road line were grass-covered; this was an obstacle to the efficiency of the field survey. Similar conditions were found in the East Jutland area. On Funen experimental sampling by ploughing in some of the grass-covered areas proved unsuccessful, presumably because a great deal of surface washing is a prerequisite for optimal conditions of visibility (e.g. Thrane 1978, p. 111). Due to the duration of the project in Southwest

Funen, it was possible to wait for the best field conditions: field surfaces ploughed in the autumn and exposed to precipitation for some time.

*Soil types.* The investigated stretches of road are all situated in regions covered by the last glaciation, and the results of investigations here can hardly be held valid for areas with a different geomorphological character. Here heavy clay soils are the dominant soil types. It is the experience of the author that no existing map material gives sufficient information about soil-type differences as even minor areas contain quaternary – geological variations – to a considerable extent. This applies to the formerly published geological soil maps (Bornebusch and Milthers 1935), as well as to the newly elaborated soil classification maps of Denmark, which are the most relevant for archaeologists (Ministry of Agriculture 1979). The latter, however, must be characterized as being sufficiently detailed for settlement studies at a regional level (as e.g. Jensen 1979). For the purpose of survey projects, the soil classification done by the field worker on location is the only adequate procedure. The higher degree of subjectivity is presumably compensated for by far more detailed data. In the material treated here, descriptions of soil-type conditions made by the field surveyor or excavator have been exclusively used. Concerning the South-west Funen project, soil-type differences are recorded within every single survey area – usually every field. In spite of the fact that prehistoric pottery found in heavy clay soil is generally in a rather bad state of preservation, there does not seem (according to table 1) to exist any correlation between soil type and the discovery of the different categories of surface finds.

*Slopes and erosion: Veiling and revealing factors in surveys.* As a factor obviously distorting survey results, the humanly created influence on the relief of the terrain must be mentioned – more precisely the effects of erosion. A comparatively flat surface is unlikely to be exposed to any erosion caused by agriculture in later times. In areas of this kind, the only critical factor concerning the discovery of artefacts and constructions is presumably the depth of topsoil. Quite the opposite is the case in undulating terrain, where the depth of topsoil and relief seem far less stable. During surveys on Southwest Funen, characterized by a rather hilly landscape, it has frequently been proved that agricultural activity is constantly the cause of soil movement from the higher ground to the lower.

The term "constructions" is used here to describe archaeological remains such as ancient monuments, traces of settlement, graves, pits, etc.

When examining field maps in the scale of 1:2,000 on which such observations are routinely noted, it appeared that 44 of 224 completed maps (scarcely 20%) had notes of uncovered, ploughed up subsoil material. Presumably the phenomenon has been accelerated by the mechanization of agriculture and the introduction of deep-ploughing during the 1950's (See Strömberg 1978, p. 11 and Thrane 1974).

The consequences of this artificial erosion are not hard to predict: the removal of high-lying constructions (e.g. the well-known over-ploughed mounds), and the veiling of artefacts/constructions in low-lying situations. An increasing depth of topsoil downwards in sloping terrain was detected at 11 of the test-excavated localities. One of these sites had an apparently secondary deposit of burnt, brittle stones, whereas 3 other sites turned out to be far more extensive than estimated from the surface. One of these even contained finds dating from a period not indicated by surface observations.

An observation made during a systematic test pit sampling on Northeast Funen indicates the existence of quite a different kind of veiling phenomenon. There appeared to be a man-made increase in the layer of topsoil, apparently a result of intensive manuring within a short radius of agrarian settlements. In the case mentioned, an extensive topsoil layer at a depth of 40–60 cm covered a Roman Iron Age site and a Bronze Age settlement, which had not been discovered during the preceding intensive surface survey. Unlike localities exposed to erosion, the topsoil depth here decreased towards the lower parts of the area (Jeppesen T.G. 1978, p. 104). In the test material treated, similar observations have not been made, which may be due to the localization of motorways. Whereas the gradual disappearance structures due to erosion can be expected – and has been observed – the phenomenon does not seem to be accompanied by any appreciable horizontal dislocation of the artefacts. As regards flint artefacts, it is obvious that while pits and structures are being destroyed by the plough, the flint itself is not moved to any perceptible extent. The locational stability of flint seems to be certified by various excavations of Stone

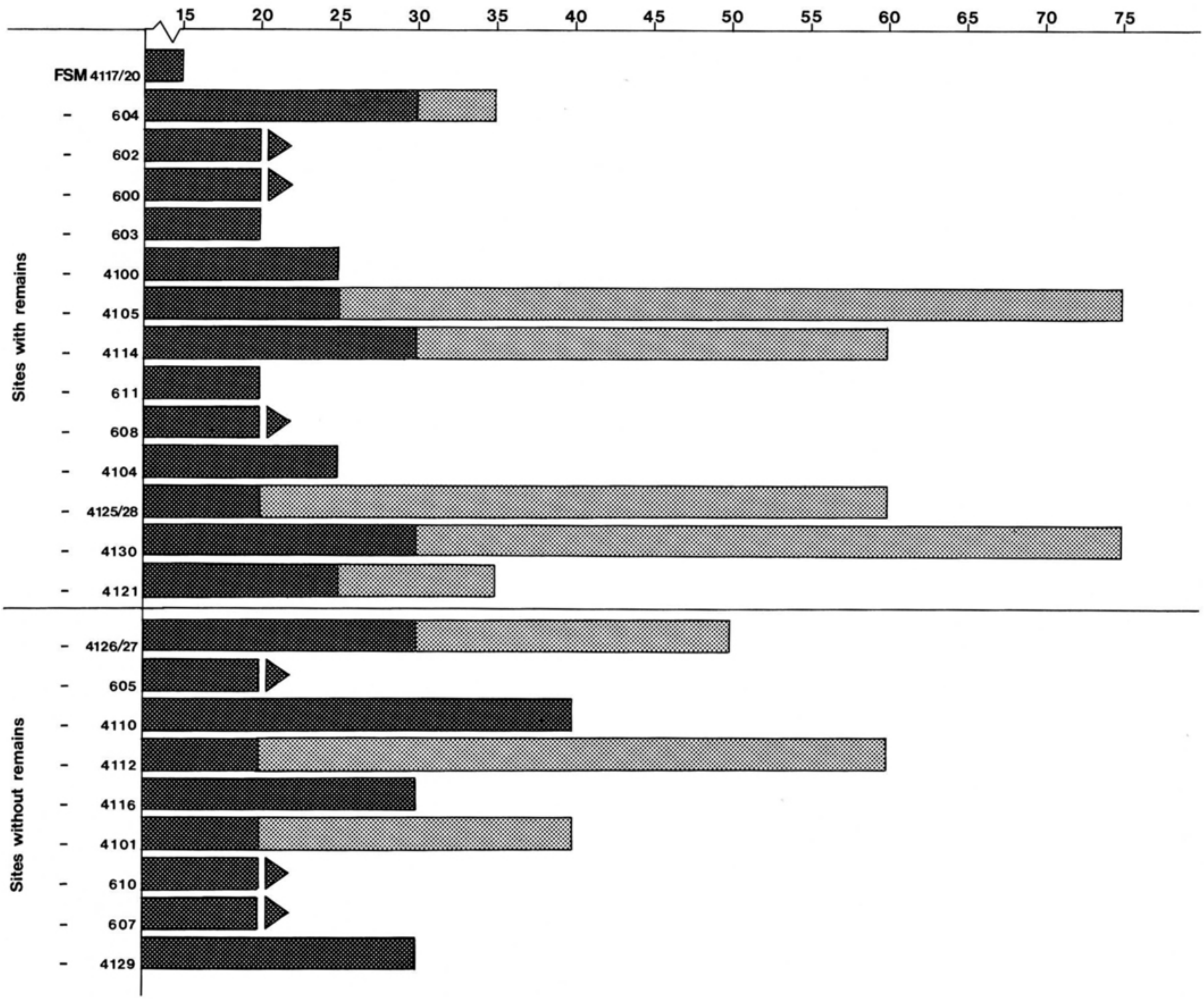


Fig. 4. Topsoil depth at 23 trial-excavated sites. The sites are ranked in decreasing degrees of positive S/E-ratio. Pia Vallø *del.*

Age sites (Andersen S.H. 1973, p. 15, 1975, p. 13, 1979, p. 8–16).

Prehistoric sherds possess a locational stability because of their rapid decomposition; through their very presence they must be indications of archaeological remains in the process of destruction. For that reason sites discovered by field-surveys must be accurately localized and positively estimated. The depth of ploughing is closely connected with the erosive phenomena mentioned, and it is an essential factor if representative survey results are to be correlated. An increase in normal depth, for instance in connection with a change of crops, might totally alter the possibilities of observation (See Andersen S.H. 1979, p. 8). In several instances this has been demonstrated in the Southwest Funen area, where re-surveying forms a methodical part of the archaeological mapping of the region.

## 3. THE DATING OF SURFACE MATERIAL

In table 3 a number of dated surface localities are shown (datings according to the survey reports). The unequal representation is evident. It is obvious that in the flint dominated periods the majority of datings possess a tolerance making them unfit for settlement studies (a few sites from the Ebberup road being the exception). A total of 7 sites are dated within the Late Neolithic. For this period however, as shown in the table, datings on the basis of surface material are deceptive, as only one dating out of four tested has been (partly) verified (FSM 4100).

In the case of the Neolithic, pottery clearly exceeds flint. Yet for this period surface finds of pottery seem the most problematic, owing to their apparently rapid destruction (e.g. see Thrane 1974, p. 317). It could well be worth testing to see if autumn surveys would yield more acceptable dating material. The tolerance in the dating of the Iron Age material is considered to be within acceptable limits, and fully applicable to settlement studies. Obviously, the basis for these datings is the physically resistant pottery with its few and often quite distinct chronological characteristics.

The well known problem: an absence of settlement material from the Late Iron Age also makes itself felt in the survey material treated here. In the two cases in which settlement remains were revealed during excavations they had not been detected previously from the surface finds (FHM 1832, FHM 1833). On Funen the Early Iron Age pottery is succeeded by the medium hard-fired, socalled Baltic ware, which was produced from the early 11th century (Jeppesen T.G. 1979, p. 104). An extremely thin scattering of this ware occurs on Late Viking/Early Medieval sites. This could be explained from the fact that sherds – like other settlement refuse – were spread over the fields during manuring (Liversage 1977, p. 24). If a similar practice is presumed for the Late Roman and Germanic Iron Age, when pottery in all probability was far less resistant, the solution of the Late Iron Age problem might be, as proposed by Jeppesen, to pay particular attention to soil colouring phenomena (Jeppesen 1977, p. 85).

*Trial excavations as a verification of surface observations.* An analysis of trial excavations as a mean of isolating factors influencing survey results is impeded by a test material which is numerically well below the minimum limits for statistical treatment – at least if a meaningful distinction between the variables involved is to be maintained. For that reason, the data are shown in a table – table 1 – ranked in a descending degree of positive relations between surface observations and excavation results, henceforth called the S/E ratio.

*Terrain and topsoil depth.* As previously mentioned, recent cultivation has a permanent erosive effect on more hilly landscapes, like those treated here. Thus it could be expected that localities in sloping terrain would tend to a greater extent towards negative S/E ratios, than would sites in flat areas. To test this, the slope of excavated sites has been calculated and divided into four classes, on the basis of map material (4). The limit of 4° between slight and heavy slope is fixed in consideration of the relief of the test areas. On the soil classification maps, 6° is used as the critical value for cultivated areas. All 6 sites on level ground yielded constructions. The ratios between the number of sites with constructions and the number of surface indications on terrain of slight and heavy slope were 11:19 and 6:8 respectively. Thus these few observations do not show any distinct trend. However, as four of the sites (detected by flint) were on level ground with a comparatively shallow topsoil (FSM 4117/20. 4100, 4130, 602), this might be seen as an indication – as already suggested – that later cultivation has only a slightly destructive effect on remains/constructions in level areas not perceptibly exposed to erosion.

Could this possibly partly explain the preponderance of extensive and well preserved settlement finds from the Bronze- and Iron Age west of the borderline of the last glaciation, where the terrain is generally less hilly? How is the terrain and what are topsoil depths at those few places where habitations have been detected in East Denmark, – otherwise characterized by settlement finds with pits as the only constructions? Regrettably specifications of the present cultivation layer have been given for only 23 sites, though it is a factor presumably influencing the chances of making surface observations, as well as of finding preserved constructions below (see Thrane 1978, p. 115). In fig. 4, depths of topsoil are arranged according to table 2. As seen, no perceptible difference is found between the average topsoil depth at the 14 sites containing remains of constructions and the 9 without. At all localities the shallow parts of the topsoil layers are within full reach of the plough, normally running to a depth of 20–25 cm.

As expected, soil types do not show any influence on the S/E ratio. Apart from the chemically determined ability to preserve different types of material – an effect not concerning survey conditions – soil types are not to be included among the critical factors in the evaluation of survey results. The key to the areas investigated is still the terrain.

*Differences in the S/E ratio between the periods.* Finding that Stone Age finds were dominant among the surface finds, it could be expected that finds from this main period contributed to most of the results of trial excavations. According to table 2, this is obviously not the case. Out of a total of 39 observed sites dated within the limits of the Stone Age, 18 were excavated, yielding only 7 sites with positive results. The remaining tested sites gave 3 finds of undatable pits, while a single locality displayed affirmative artefacts in the topsoil layer, but no remains of constructions.

In contrast to this, the Iron Age sites display far more positive S/E ratios: of 23 observations, 12 were examined, yielding 11 sites containing constructions. The marked difference between the S/E ratios in the two periods might be due to substantial differences in construction depths. Pits from the Early Iron Age can hardly be destroyed by cultivation, regardless of how long they are exposed to it, whereas the depths of Stone Age constructions under tillage are not apparently always sufficient to avoid ruination. In this connection solely settlement finds are referred to. It seems that in studies of Stone Age settlement conditions, investigators mostly have to rely on surface observations as regards dating, however unsatisfactory this may be.

## 4. DATING OF SURFACE- AND SUBSURFACE FINDS

During the discussion of the dating limits of surface finds, a large discrepancy was pointed out between the mainly flint-dated Stone Age finds and the Iron Age localities with more exact datings due to pottery. 19 trial excavations with datable remains of constructions have not invalidated this statement. For the majority of Iron Age sites, the datings are well within the limits of the already acceptable surface datings, whereas the same narrow coincidence is found only for a few Neolithic sites from Funen (FSM 602, 603, 604). Faced with a total of 10 negative test excavations of supposed Neolithic sites, it seems as if the future dating of Stone Age sites will mainly have to rely on surface observations alone. Therefore, if operative datings are to be obtained, particularly intensive samplings are necessary at the sites, in order to procure a sufficiently representative material with a narrow chronological margin (see Strömberg 1978, p. 9).

Five sites with an otherwise positive S/E ratio in the datings, turned out to contain constructions dated to periods not indicated by the survey (FHM 1857, 1814, FSM 602, 504, 4100). Unexpected additional gains of that kind lead to the question of how far is it practicable to estimate the extent and type of the prehistoric remains hidden under the surface. The excavated material reveals several cases of misjudgement as to the extent of the sites, especially a tendency to underestimation. This is hardly surprising, considering that chances of discovery are dependent on factors like terrain and later cultivation. However, the unreliability implies some unfortunate consequences to the applicability of survey material to spatial analyses, for instance in relation to prospecting projects, in which survey observations are not verified by excavation: does a number of neighbouring artefact concentrations reflect one single extensive site or several minor sites from discordant chronological phases? How did the sites function? And so on.

## 5. ALTERNATIVES TO RECONNAISSANCE

A number of possible alternatives to conventional reconnaissance for rescue operations could be mentioned. The question is, however, how far they would really be able to replace perambulation.

Test pit sampling could be one of the alternatives, either as systematic sampling by means of digging test pits at regular intervals, or according to a procedure ensuring a random distribution (as to provisional experience of the first procedure, see Jeppesen T.G. 1978). To undertake sample testing of sufficient scope in a given area of investigation would clearly exceed the costs of a conventional survey.

The same objection applies to an extensive mechanical removal of the topsoil layer, besides being a problem as regards working capacity, even when using the most qualified equipment, experience from road-works has shown that the maximum of cleared area is about 950 square metres per day – or 450 metres of trial ditches 2.1 m across. A procedure like this would imply daily costs, which at the 1980 level would be equivalent to a staff of at least 3 field-workers. For economic reasons this method is hardly practicable.

Finally, any kind of subsurface investigations would come up against practical problems of every conceivable kind: compensation for damaged fields, varying ownership of the different parts of the area, general antipathy, accessibility and weather problems etc.

The pedestrian field-worker, on the other hand, is able to operate almost free of the difficulties mentioned, at a far earlier phase in the planning of engineering projects. For that reason it is difficult to point out any real alternative to walking along furrows – even when considering all the weak points of the method, mentioned in this paper.

## 6. CONCLUSION

Using rather heterogeneous archaeological data from three larger engineering projects, supplemented with interim results from a regional survey still in progress, it is not possible to give a conclusive evaluation of archaeological field-survey as a method. Given the limitations of the sources, the object of this essay has been to extract experiences based on existing data, leaving their validity to be tested by future investigations.

Thus reliable survey results are obtainable only by optimal field conditions: ploughed and exposed to precipitation for a period. Further, it was found that flint was predominant among the categories of surface finds, resulting in a preponderance of Stone Age Finds. Prehistoric pottery was observable from the start of the survey season until its termination in spring, but with a gradual shifting between the proportion of pottery from the different periods, which prejudiced the more fragile ware of the Neolithic and the Bronze Age. Settlement finds predominated according to expectation by virtue of their more conspicuous indicators. In areas under more constant supervision it was also possible to detect graves by reconnaissance: mainly mounds and megalithic barrows, but in level ground even cremation graves.

From the number of supposed critical factors influencing surveys, soil-type differences could apparently be omitted. The geomorphology of the landscape was picked out as the most substantial concealing or revealing factor. Even a relatively slight gradient of slope was found to bias survey results, partly by the gradual removal of highly situated sites, partly by covering up the low-lying ones. The distortion was apparently a consequence of terrain levelling due to cultivation, an erosion probably accelerated by increased ploughing depth since the mechanization of farming. In the immediate vicinity of present farmsteads, attention should be paid to the concealing effect caused by a thickening of the top soil layer due to manuring and cultivation. In spite of these negative effects, cultivation does not seem to be dislocating artefacts. Finds from the topsoil still remain safe indicators of location, regardless of the possible destruction of underlying constructions. Datings based on surface finds were not found to be equally satisfactory for all prehistoric periods. For example, dating intervals for flint producing sites usually exceeded limits acceptable for settlement analyses. Neolithic sites seemed triply handicapped: firstly, through the predominance of flint difficult to date with any degree of exactness; secondly, the considerable fragility of pottery material, and lastly, the apparently shallow depth of other traces. The presence of pottery was found to be an essential condition for reliable and sufficiently narrow datings, a fact evidently favouring sites from the Early Iron Age, further supported by substantial traces of habitation. Evidence of the problematical Late Iron Age was – as usual – absent, and surface survey alone did not seem to be the solution.

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## NOTES

The present report was written in 1980. – The English manuscript was corrected by Jean Olsen.

1. The East Jutland Motorway: Forhistorisk Museum, file no. 1550. The investigations were undertaken by Niels H. Andersen, Forhistorisk Museum, during 1973–1977.

   Motorway on Funen: The reconnaissance, carried out from December 1977 until March 1978, was led by M.A. Henning Nielsen. The trial excavations from March until April 1978 were conducted by Finn Frederiksen and Preben Rønne, both students of archaeology. Further investigations were carried out April – August by the author.

   Road extension by Ebberup: Fyns Stiftsmuseum Journal no. 600–611. The reconnaissance and initial excavations were led by Eigil Nikolaisen, assistant at Fyns Stiftsmuseum. Cand. mag. Torben Grøngaard Jeppesen terminated the investigations.

2. The East Jutland Motorway: 2.1 sq.km. Approx. 65 surface observations.

   Motorway on Funen: Approx. 0.350 sq.km. Approx. 40 surface observations.

   The Ebberup extension: 0.01125 sq.km. Approx. 11 surface observations.
3. For test 1 and 2 the Chi-squared test has been applied. The formula for the Chi-squared test is as follows

$$X^2 = \frac{(O - E)^2}{E}$$

   where O means the observed values, and E means the expected values.

   For the applicability and limitations of the method see e.g. Dalton, Garlick a.o. 1972, in which a probability table for the distribution of Chi-squared values is found.
4. For the calculation of slope gradient see Monkhouse and Wilkinson 1973, p. 131:

   VI/HE = tg° to the angle of slope

   where HE is the horizontal equivalent and VI the vertical interval. In the present calculations the available map material, usually in the scale of 1:1,000, has been used.

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| | | Surface observations: Indicators on the surface | | | | | | | | Surface observations: Soil type | | | | Surface observations: Slope gradient | | | | Excavation results | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flint | Flint and sherds | Flint and soil colourings | Flint, sherds and soil colourings | Sherds | Sherds and soil colourings | Soil colourings | Features in the terrain | Clay | Sand/clay | Sand | Sand/gravel | Flat surface | Slight slope <4° | Steep slope ≥4° | Hilltop | Finds of datable remains | Stray finds = surface observations | Finds of undatable remains | Dating = surface observations | Dating approximately as surface observations | Dating ≠ surface observations |
| FSM | 601 | | | | | | ● | | | ● | | | | | | ● | | ● | ● | | ● | | |
| FHM | 1859 | | | | | | ● | | | ● | | | | | | ● | | ● | ● | | ● | | |
| FHM | 1834 | | | | | | ● | | | ● | | | | | ● | | | ● | ● | | ● | | |
| FHM | 1833 | | | | | | ● | | | ● | | | | | ● | | | ● | ● | | ● | | |
| FHM | 1817 | | | | | | ● | | | ● | | | | | ● | | | ● | ● | | ● | | |
| FHM | 1856 | | | | | | ● | | | ● | | | | ● | | | | ● | ● | | ● | | |
| FHM | 1898 | | | | | ● | | | | ● | | | | | | ● | | ● | ● | | ● | | |
| FSM | 4117/20 | | | ● | | | | | | | ● | | | ● | | | | ● | ● | | ● | | |
| FHM | 1780 | | | | | | | | ● | | | ● | | | | | ● | ● | ● | | ● | | |
| FHM | 1831 | | | | | | | | ● | | | ● | | | | | ● | ● | ● | | ● | | |
| FHM | 1857 | | | | | | ● | | | ● | | | | | | ● | | ● | ● | | ● | ● | |
| FHM | 1814 | | | | | | ● | | | | ● | | | | | | ● | ● | ● | | ● | ● | |
| FSM | 604 | | | ● | | | | | | ● | | | | | ● | | | ● | ● | | ● | | ● |
| FSM | 602 | ● | | | | | | | | ● | | | | ● | | | | ● | ● | | ● | | ● |
| FSM | 600 | | | ● | | | | | | | ● | | | | ● | | | ● | ● | | | ● | |
| FHM | 1832 | | | | | | ● | | | | | ● | | ● | | | | ● | | | | ● | |
| FSM | 603 | | | | ● | | | | | | | ● | | | ● | | | ● | | | | ● | |
| FSM | 4100 | ● | | | | | | | | | | | ● | ● | | | | ● | | | | ● | ● |
| FSM | 4122 | ● | | | | | | | | ● | | | | | ● | | | ● | | | | ● | ● |
| FSM | 4105 | | | ● | | | | | | | | | ● | | | ● | | ● | | | | | ● |
| FSM | 4114 | | | | ● | | | | | ● | | | | | | | ● | ● | | | | | ● |
| FSM | 611 | | | | | | | ● | | | | ● | | | | ● | | ● | | | | | ● |
| FSM | 608 | | | | | | | ● | | | ● | | | | ● | | | | | ● | | | |
| FSM | 4104 | ● | | | | | | | | | | ● | | | | | ● | | | ● | | | |
| FSM | 4125/28 | ● | | | | | | | | | | ● | | | ● | | | | | ● | | | |
| FSM | 4130 | ● | | | | | | | | | | ● | | ● | | | | | | ● | | | |
| FHM | 1957 | ● | | | | | | | | ● | | | | | ● | | | | | ● | | | |
| FSM | 4121 | | | | | | | ● | | | | ● | | | ● | | | | | ● | | | |
| FSM | 4126/27 | ● | | | | | | | | | ● | | | | ● | | | | ● | | | | |
| FSM | 605 | | | ● | | | | | | ● | | | | | | ● | | | | | | | |
| FSM | 4110 | | | ● | | | | | | | ● | | | | ● | | | | | | | | |
| FSM | 4112 | | | ● | | | | | | | ● | | | | | | ● | | | | | | |
| FSM | 4116 | | | ● | | | | | | | | ● | | | ● | | | | | | | | |
| FSM | 4101 | ● | | | | | | | | | | ● | | | ● | | | | | | | | |
| FSM | 609 | | | | ● | | | | | ● | | | | | ● | | | | | | | | |
| FHM | 1858 | | | | | ● | | | | ● | | | | | ● | | | | | | | | |
| FSM | 610 | | | | | | ● | | | ● | | | | | ● | | | | | | | | |
| FSM | 607 | | | | | | | ● | | ● | | | | | | ● | | | | | | | |
| FSM | 4129 | | | | | | | ● | | ● | | | | | ● | | | | | | | | |
| FHM | 1794 | | | | | | | | ● | | | | ● | | | | ● | | | | | | |
| FHM | 1793 | | | | | | | | ● | ● | | | | | | | ● | | | | | | |
| ∑41 | | 9 | 0 | 8 | 3 | 2 | 10 | 5 | 4 | 20 | 7 | 11 | 3 | 6 | 19 | 8 | 8 | 22 | 16 | 6 | 14 | 7 | 7 |

Full coincidence ▲ ↕ ▼ No coincidence

Table 1. Pia Vallø *del.*

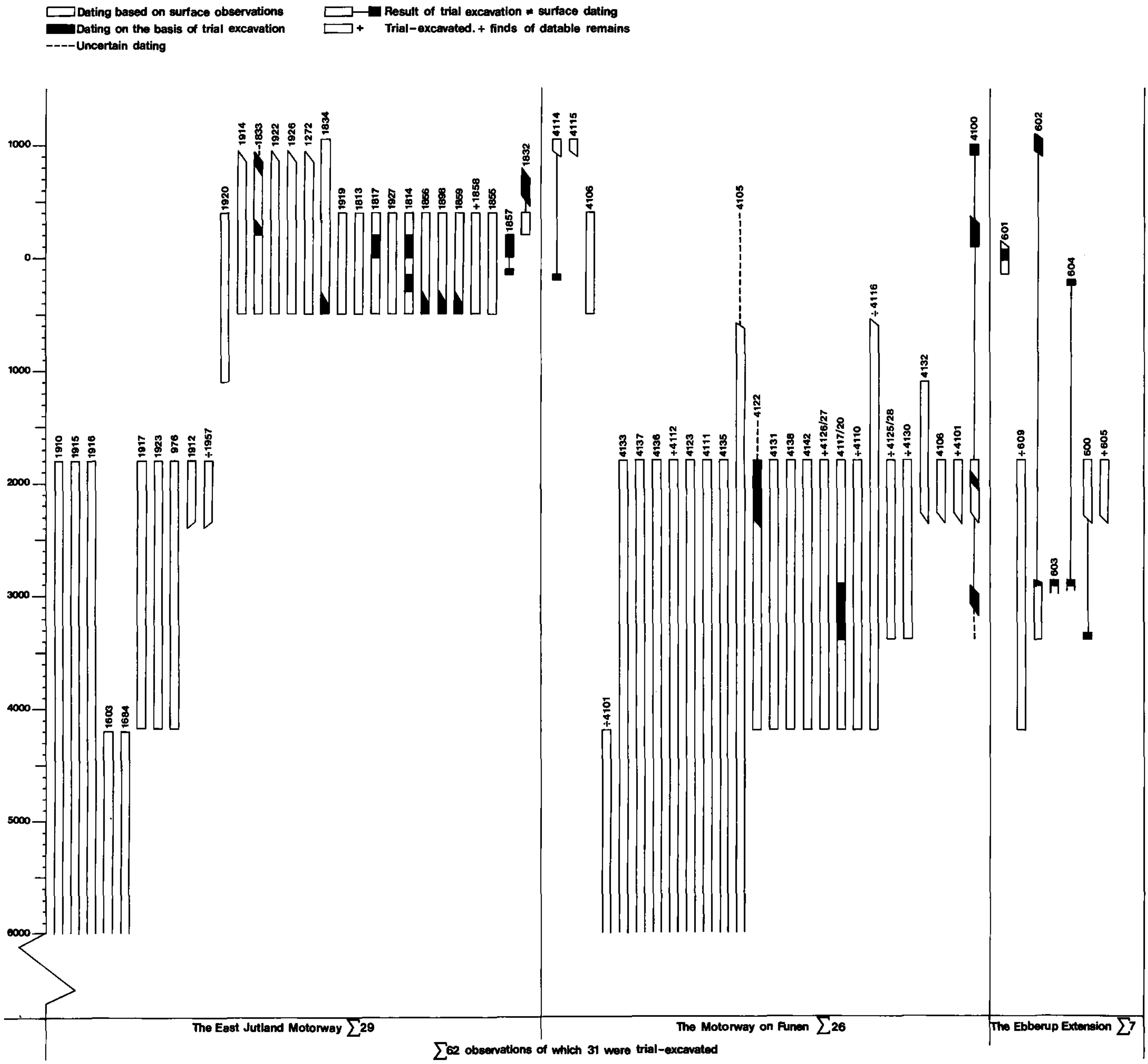


Table 2. Pia Vallø *del.*