

European
journal of

Archaeology



Volume 2 Number 3 December 1999



SAGE Publications

ISSN 1461 9571

European journal of Archaeology

General Editor

John Chapman *University of Durham, UK*

Editorial Board

Teresa Chapa Brunet

Felipe Criado Boado *University of Santiago de Compostela, Spain*

Kostas Kotsakis *University of Thessaloniki, Greece*

Viktor Trifunov *Institute for History of Material Culture, St Petersburg, Russia*

Natalie Venclová *Institute of Archaeology, Prague, Czech Republic*

Paul Wagner *Landschaftsverband Rheinland Amt für Bodendenkmalpflege, Germany*

Reviews Editor

Peter Biehl *University of California, Berkeley, USA*

Assistant Reviews Editor

Alexander Gramsch, *Germany Free University of Berlin*

AIMS AND SCOPE

The publication organ of the European Association of Archaeologists, the *European Journal of Archaeology* (published from 1993 to 1997 as the *Journal of European Archaeology*, vols 1–5) seeks to promote open debate amongst archaeologists committed to a new idea of Europe in which there is more communication across national frontiers and more interest in interpretation. The journal accepts not only new empirical data and new interpretations of the past but also encourages debate about the role archaeology plays in society, how it should be organized in a changing Europe, and the ethics of archaeological practice. All periods are covered; papers, review articles, interviews and short 'debate' pieces are all sought.

European Journal of Archaeology (ISSN 1461-9571) is published three times a year in April, August and December by Sage Publications (London, Thousand Oaks, CA and New Delhi) in association with the European Association of Archaeologists.

Institutional rate (1999): £110/US\$176; Regular individual rate (1999): £35/US\$56. Further subscription details and advertising details are available from the Marketing Department, Sage Publications Ltd, 6 Bonhill Street, London EC2A 4PU, UK [email: subscription@sagepub.co.uk]; and in North America from Sage Publications Ltd, PO Box 5096, Thousand Oaks, CA 91359, USA.

Individual subscription is included as part of the annual membership fees of the European Association of Archaeologists. For further details of membership categories and benefits, including reduced rates for students and Eastern European countries, please contact the EAA Secretariat, c/o MoLAS, Walker House, 87 Queen Victoria Street, London EC4V 4AB, UK [email: eea@molass.org.uk]. The Secretariat also deals with back numbers of the *Journal of European Archaeology*.

Copyright © 1999 Editorial Board of the *European Journal of Archaeology* and Sage Publications. Apart from fair dealing for the purposes of research or private study, or criticism or review, and only as permitted under the Copyright, Designs and Patents Act, 1988, this publication may only be reproduced, stored or transmitted in any form or by any means, with the prior permission in writing of the Publishers.

See the inside back cover for information for contributors.

Typeset in Palatino by BC Typesetting, Keynsham, Bristol, UK.

Printed in Great Britain by The Alden Press, Oxford, on acid-free paper.

Cover: Detail of a ground penetrating radar profile from a survey in Carlisle, Cumbria, carried out by the Clark Laboratory at the Museum of London Archaeology Service.

Cover designed by Tracy Wellman, MoLAS.

STONE AGE SETTLEMENT IN THE LEGA VALLEY MICROREGION OF NORTH-EAST POLAND

Jerzy Siemaszko

Muzeum Okręgowe w Suwałkach, Suwałki, Poland

Abstract: Over a period of 14 years, and as part of the Polish Archaeological Record research project, the author directed a field survey of the whole of the Lega river basin (NE Poland) – an area of over 850 km². As a result of the survey of this hitherto poorly investigated area, almost 1100 archaeological sites were discovered, 748 of which contained lithic materials. The most interesting sites were initially studied by detailed mapping of surface-find distribution and later by excavation. A complete study of the whole drainage basin was very important for settlement research. The large number of the surface lithic assemblages enables reliable statistical analyses and accurate cartographic studies supported by palaeo-environmental reconstructions. Lithic assemblages were analysed from the point of production techniques and typology, dispelling some doubts about chronological-cultural affiliations of flint inventories from north-east Poland and neighbouring countries, but also raising new questions. It was possible to observe clear and changing settlement preferences in the late Palaeolithic and Mesolithic in the zone of late Glacial lakes and their adjacent outwash territories to the south. Six concentrations of sites were discovered, associated with communication routes and zones of economic activity.

Keywords: late Paleolithic and Mesolithic, methodology, north-east Poland, settlement

INTRODUCTION

A prehistorian would not include Poland amongst those well-known parts of Europe. Linguistic and political barriers hindered international contacts and literature exchange was limited. Nonetheless, Polish archaeology has many achievements, including the Polish Archaeological Record research project, the innovative programme of nation-wide fieldwalking (known as 'PAR'), the results of which constitute the basis of the current research programme into Stone Age settlements in the most northern part of Poland. The author would like to present to the reader the experience gained during the study as well as the methods involved, some

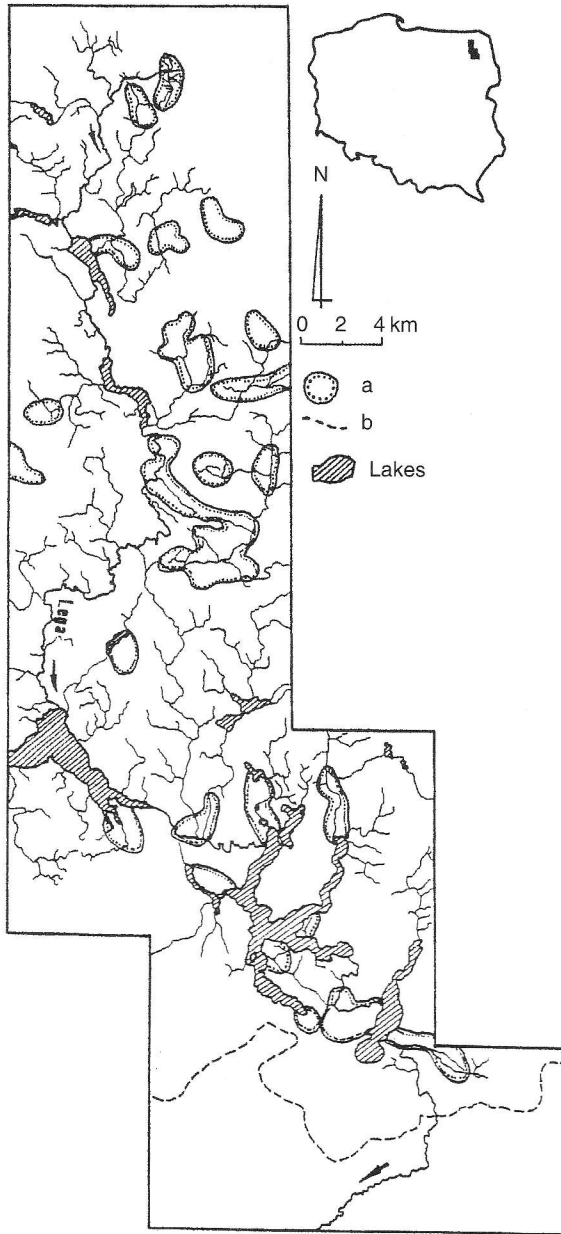


Figure 1. The investigated area in the Lega basin and its hydrographic network: *a.* peatbogs, *b.* the edge of Biebrza proglacial valley.

aspects of which are of broader application for different periods and regions in Europe.

North-east Poland differs from the rest of the country in topography, climate and natural environment (Starkel 1991). According to palaeo-environmental studies, these differences existed even at the end of the last glaciation (Stasiak 1971; Ralska-Jasiewiczowa 1989). In comparison with other regions in Poland, the north-eastern corner has only recently attracted the interest of Stone Age specialists. The first studies of human occupation during the late Pleistocene and early Holocene were undertaken in the second half of the 1960s, gathering impetus only during the last two decades. In 1983, when I started work on late Palaeolithic and Mesolithic settlement in eastern Masuria, I had little relevant evidence at hand. My object was to identify the largest possible number of the Stone Age sites and subsequently investigate the most striking ones in detail. This was to be achieved by intensive field investigation. Unlike earlier such investigations, which typically focused on valleys of larger streams and on basins of lakes, it

was decided to study the entire drainage basin of the Lega river, one of the larger tributaries of the Biebrza river. That research covered the main river valley together with the majority of its tributaries, as well as former streams, peatlands and water-sheds (Fig. 1). The investigation omitted only those headwater sections of small streams in the eastern part of the study area, for the number of sites in the vicinity was low and the area abutted the Rospuda river basin. The area of PAR containing the western bay of lake Selment Wielki, excluded on the map, underwent investigations in April 1998. As the detailed studies of the area have not yet been prepared, this article does not include this region.

The Lega basin lies in the Elk Lake region, the easternmost part of the Masurian Lake District (Kondracki 1978). It may be divided into three sections. The upstream section is an area of substantially folded frontal moraine elevations, formed during the final stadials of the Vistulian (Würm) glaciation. It is characterized by a well-developed drainage network and by the presence of scarce, mainly tunnel-valley, lakes. The middle section stretches along a line of lower moraine elevations; it features larger tunnel-valley lakes and basal moraine reservoirs. Most of this zone is lined with tills and boulder clays; sands and gravels encountered in river valleys and lake depressions are buried under Holocene peat and gyttja deposits. Numerous large peatlands (Fig. 1) mark the remains of former lakes or shallow arms of existing reservoirs. The eroded moraine hills and an outwash plain lying in the valley of the Biebrza river form the downstream section of the Lega basin.

Even though this project is still in progress, I would like to present some ideas on fieldwork methodology and finds processing. Field research proceeded in three stages – fieldwalking survey, intra-site survey and site excavation. Given the extended duration of the project (over 10 years), there is some overlap between these stages of the fieldwork and the processing of evidence.

OUTLINE OF RESEARCH

Field survey

Such wide-scale survey of an entire drainage basin was possible under the PAR research project launched in 1980 (Zdjęcie Archeologiczne Polski 1981). Since this programme was presented at numerous conferences and was published in widely available monographs and magazines (Fish and Kowalewski 1990; Jaskanis 1992, 1996), I shall not present the scheme in detail.

In summary, under this programme small teams of field researchers investigate rectangular PAR survey areas, each about 37 km² in area. All archaeological sites identified are recorded on 1:25,000 and 1:10,000 maps. Surface finds are collected as well. Outstanding sites are additionally recorded on more detailed plots. All the data concerning the site's administrative status, topography and geomorphology are entered on a special PAR form. The analysis of the function, chronology, cultural affiliation and typology of surface finds furnishes additional information. Finally the data are entered into a PAR System computer program. The primary objective of the

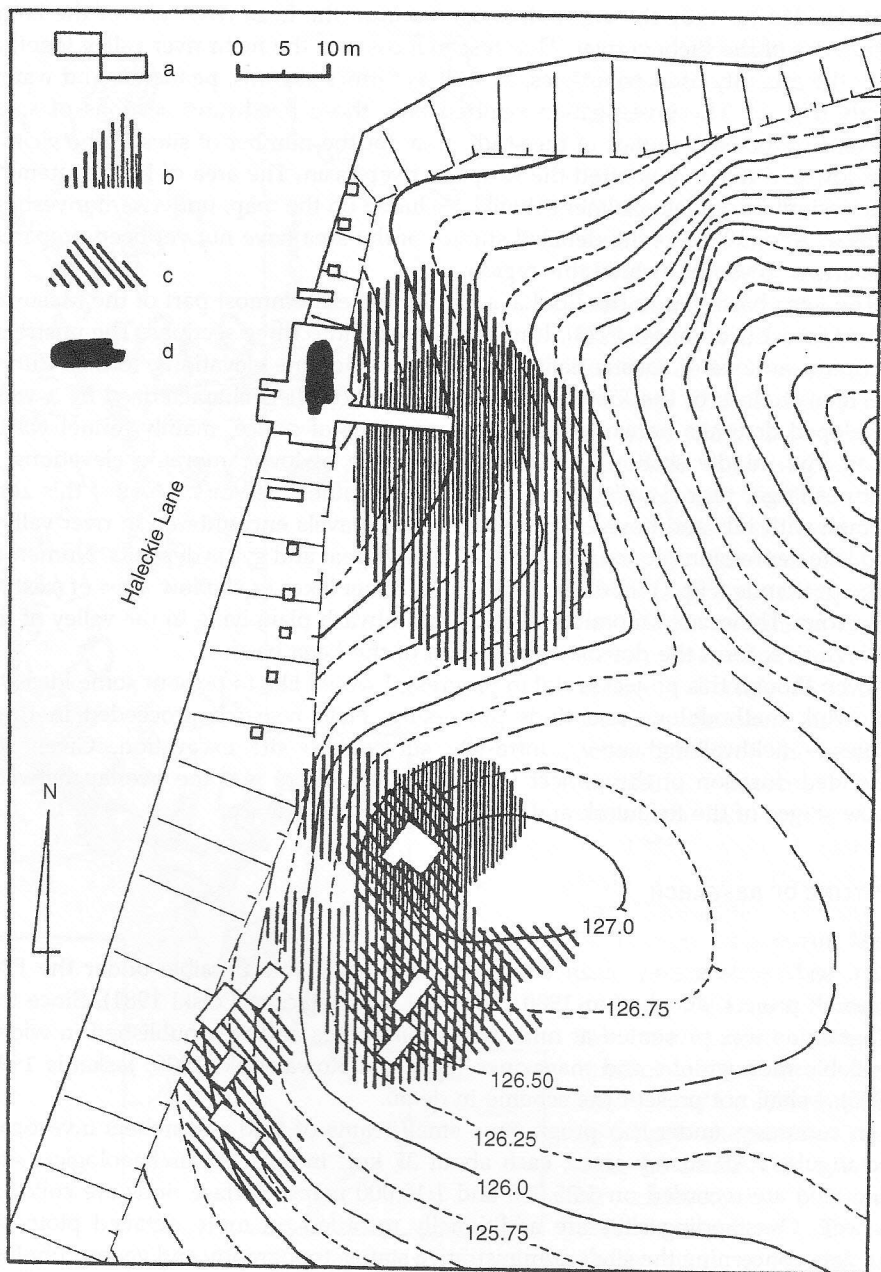


Figure 2. Plan of site 4 at Miłuki: *a.* excavations, *b.* concentrations of Mesolithic finds on the surface of the ground, *c.* Roman and Migration periods artifact concentrations of the Bogaczewo culture, *d.* traces of the dwelling structure of the early Mesolithic Kunda culture.

PAR project is a comprehensive registration of the Polish archaeological heritage. The data produced by the project form an invaluable input for the Archaeological Heritage Preservation Service (Jaskanis 1996). According to the author, they are also useful for research into Stone Age settlement. There is no question that the data on finds collected from the ground surface have their limitations (Rogge and Fuller 1977; Lewarch and O'Brien 1981); nonetheless, the data set provided by field survey is sufficiently large and robust for statistical analysis. The results obtained and combined with cartographic survey may be used for identifying settlement concentrations and possible migration routes, as well as the modelling of the uses of distinct topographic microregions by hunter-fisher-gatherer populations during the late Palaeolithic and Mesolithic.

In the Lega river drainage basin, a total of over 850 km² was investigated by fieldwalking, which led to the identification of almost 1100 archaeological sites, dating from the late Palaeolithic up to the modern period.

Intra-site surveys

This stage of fieldwork covered the detailed mapping of surface finds distribution. Ten of the most significant sites in the Lega basin discovered earlier during PAR fieldwalking were studied at the intra-site level. The site measurements were carried out by the grid and point method, known since the 1950s (Kenyon 1952; Żurowski 1955). The author and his colleagues have recently modified the method, yielding valuable new data for intra-site investigation (Bitner-Wróblewska et al. 1996). These methods were also used in planning and carrying out excavation work.

The adopted approach is well exemplified by the case of the multi-period site 4 of Miłuki (Suwałki Province) (Fig. 2). This site, lying in the basin of the neighbouring Elk river but only 7 km from the Lega, is typical of this area. It was investigated twice by means of intra-site survey – in 1988 and 1989. In 1988, angular intersection was used. In fieldwork lasting 8 hours, 139 points were measured and 263 artifacts located. In 1989, the polar method was used, based on the points established by the first survey. The work lasted 6 hours, with 137 points registered yielding 333 finds. The finds distribution was subsequently mapped and superimposed on a contour site plan. The data from the analysis of artifact chronology, cultural affiliation and period were then added on to the finds distribution. While originally the distribution of all finds (Stone Age to post-Medieval) recovered at Miłuki was mapped, partitive analysis was subsequently used to generate a site plan which would show only concentrations of artifacts dated to the Stone and Bronze Age, Roman and Migration periods. Those periods were of particular interest to the research team.

The Miłuki site 4 was subsequently excavated (1989–1995), with trench location guided by the results of the intra-site survey. The principal objects of exploration were the Stone Age and Roman-period archaeological features. In general, excavation confirmed the findings of the intra-site survey. Trenches located on the beach slope close to the largest concentration of the Stone Age artifacts proved to be of the

most interest. They revealed the well-preserved multi-period remains suggested by the survey. Finds included finely preserved organic materials and a uniform flint inventory of the Kunda culture discovered inside the remains of a dwelling-structure (Fig. 2d) dated to the end of the Preboreal period. While the value of the intra-site survey has been confirmed on many other sites, it obviously cannot replace excavations.

Site excavation

Eight sites in the Lega basin were excavated during the project, furnishing a remarkable body of evidence (Siemaszko 1991). Since the fundamental objective of the project was to identify the cultural situation and provide information about long-term changes in settlement in a poorly examined area, the excavation sites were chosen to reflect both ecological and chronological diversity. Two of them were large multi-period sites (Puchówka 9 and 10). Since they were located at particularly favourable places, a succession of short-term camps were occupied over a period of thousands of years – often overlapping one another. In modern times, they have been destroyed to a large degree by ploughing, which made the chronological-cultural interpretation of such mixed inventories extremely difficult. For that reason, subsequent excavations focused on smaller sites featuring the remains of moderately extensive settlements (Skomętno 11, Dręstwo 9 and 35, Stacze 6), as well as of a flint workshop (Lenarty 5) and a small Stone Age cemetery (Dręstwo 10). The results have proved extremely interesting and the finds are currently under thorough examination as a part of the author's doctoral thesis.

Processing of evidence

Out of 1086 archaeological sites identified by fieldwalking in the Lega basin, 748 contained lithic finds. Based on the typology and technological features of flint inventories, it was possible to distinguish 840 episodes of occupation: campsites, settlements or traces of human occupation. The latter category includes very small assemblages or isolated finds, presumably traces of brief stops, and accounts for over 80 per cent of all the identified settlement sites. Further investigation is needed to determine whether the settlement sites in this group are mainly intact sites containing artifacts still buried under humus or sites damaged by post-medieval cultivation. At the beginning of the sixteenth century, the territory in question was intensively cultivated; excavation carried out on the sandy sites fully confirmed destruction of potential occupation features by ploughing and erosion. Other factors, such as ground surface visibility, may also have affected the number of finds recovered during fieldwalking. The importance of this factor has been tested statistically: in only 32 per cent of cases, the scantiness of artifacts found during investigations has resulted from poor surface visibility. The remaining sites appear to be largely undisturbed, producing either a small number of buried finds or traces of a brief human presence. From the point of view of the settlement study, this is a very important conclusion. Almost 70 per cent of the single finds and the small

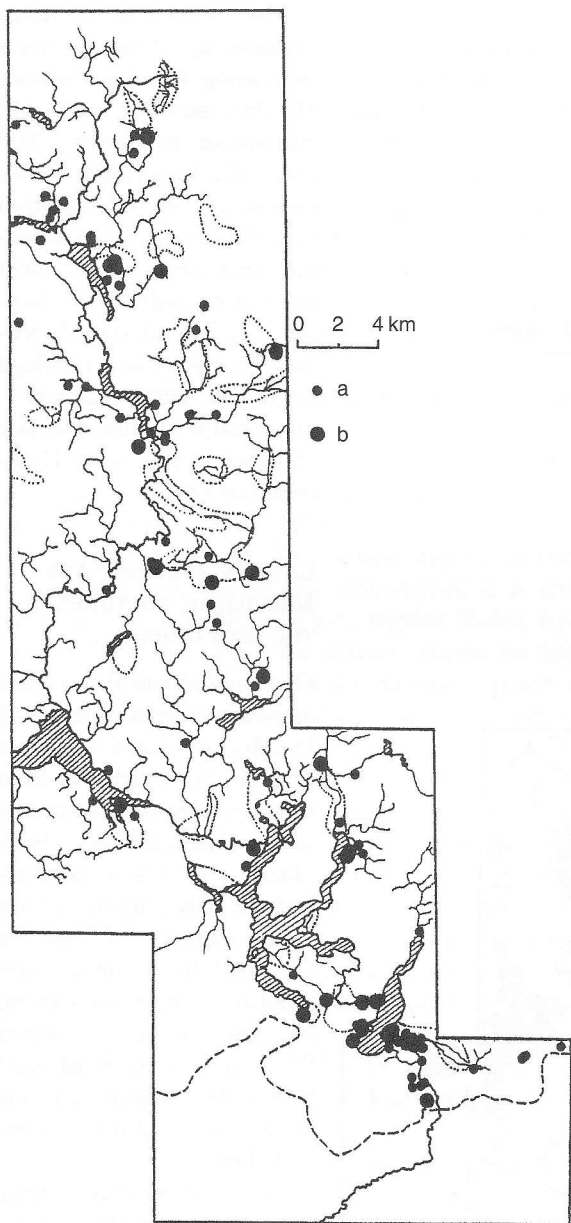


Figure 3. The late Palaeolithic sites in the Lega river drainage basin: *a.* scanty traces of human occupation, *b.* campsites.

assemblages can be interpreted as the evidence of sporadic human presence and economic activity around more or less permanently occupied camps (Figs. 3 and 4).

An analysis of chronological and cultural affiliation helped to distinguish Stone Age settlement changes as follows: late Palaeolithic (87 settlements – Fig. 3), late Palaeolithic-Mesolithic (11 settlements) and Mesolithic (130 settlements – Fig. 4). A group of 125 'late Stone Age' settlement sites includes flint finds which can be dated only very generally to the ceramic phase of the Mesolithic/Neolithic/early Bronze Age. At the present stage, a sizeable sample of sites fell outside the author's scope of interest, namely late Bronze and Iron Age lithics (127 sites). Out of 348 inventories broadly dated to the Stone Age, a substantial number are probably late Palaeolithic or Mesolithic assemblages but a more specific classification is impeded by the limited size of the assemblages. While it was possible to date no less than 60 per cent of all flint inventories, only 10 per cent could be identified according to their cultural affiliation.

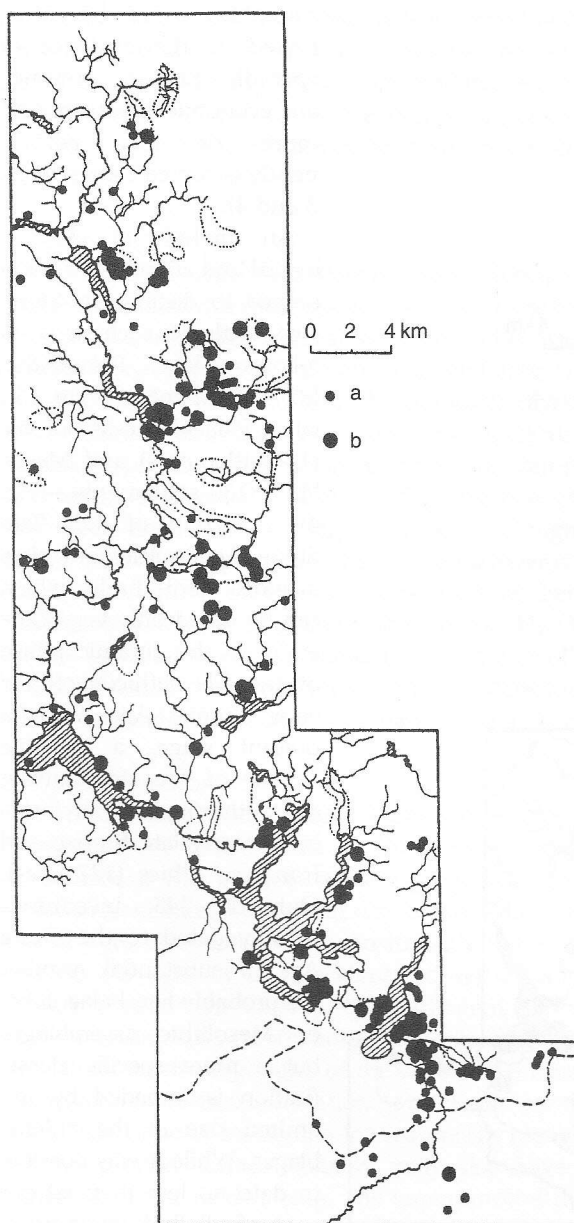


Figure 4. Mesolithic settlement in the Lega basin: *a.* single or not numerous finds, *b.* encampments and complexes of campsites.

The next, and time-consuming, stage of finds processing was the analysis of the surface materials, amounting to almost 2000 cores, blanks and flint implements. All were measured and classified by raw material category, while most were prepared for publication. The analysis of production stages and typology helped to differentiate several groups within the late Pleistocene and early Holocene inventories.

LATE PALAEOLITHIC AND MESOLITHIC CULTURES IN THE LEGA BASIN

One type of late Palaeolithic assemblage was defined by Lyngby tanged points (Fig. 5: 1), which occurred together with chunky burins and end-scrapers, large blades and flakes, all typically heavily patinated. Flint inventories of this type are classified by some archaeologists as the Vilnius group of the Lyngby culture (Kozłowski and Kozłowski 1979), by others, as the Perstunian culture (Szymczak 1987).

The next relatively large group of assemblages contains Ahrensburgian tanged points (Fig. 5: 2–4), sometimes associated with small

tanged Lyngby points, numerous burins (mainly dihedral) and end-scrapers. At the present stage of research, the cultural affiliation of these inventories is still unresolved, but new evidence from Poland, Lithuania (Rimantiené 1996) and Latvia (Zagorska 1996) indicates that we are dealing with a large cultural unit. In the author's opinion, its connection with the 'classic' Ahrensburgian culture is also possible, especially in the light of the new discoveries from Pomerania (north-west Poland), through the agency of migration of hunters, or close contacts between such groups, along the southern coast of the Baltic Sea.

The list of late Pleistocene inventories is completed by finds associated with the Swiderian culture, widespread in central Europe. Its standard assemblages contained tanged (Fig. 5: 5) or leaf-shaped points, associated with the sporadic presence of Desna elements (Fig. 5: 6).

Mesolithic cultures are represented by the two groups of inventories. A smaller group is defined by the presence of Post-Swiderian points (Fig. 5: 7) and the utilization of double-platform cores. The Post-Swiderian culture has recently been interpreted as evidence for the survival of Palaeolithic hunters in an early Holocene environment (Kozłowski 1989).

A much larger group of the inventories is, for the most part, associated with the north-eastern, or Kunda, technocomplex. It is characterized by pressure-flaking techniques used to produce very regular blades, frequently transversely broken for unretouched and retouched inserts, burins on broken blades and slender end-scrapers on blades. Not many Kunda tanged points were registered (Fig. 5: 8–9) but this is not surprising given their low proportion in classic Kunda assemblages – usually no higher than 1–15 percent (Koltsov 1989).

According to S. K. Kozłowski and the author, typological analysis indicates a later Mesolithic date for the majority of surface Mesolithic flints. Out of 130 sites, no more than 7 produced tools dated to the Preboreal and early Boreal period. One possible explanation for this may be the higher water levels in the Masurian lakes. In the Preboreal, Boreal and early Atlantic periods, it was as much as 5 m below the present-day level (Stasiak 1971). Given that Mesolithic campsites were typically located beside lakes or streams, it is likely that many early Mesolithic sites are buried under a thick layer of solifluxion or peat, or are actually submerged. This is supported by the investigation of five sites in NE Poland (for instance Miłuki, Tłokowo, Dudka) and, by analogy, the discovery of stray early Mesolithic finds from rivers and lake bottoms from the Mecklenburg Lake Region in Germany (Gramsch 1983).

In the Lega river drainage basin, no pure Komornica culture assemblages have been found, namely the characteristic Stawinoga and lanceolate backed pieces, triangles, and segments which occasionally accompany Kunda inventories. Flints attributed to the Janisławice technocomplex commonly encountered in central Poland, western Belorussia and southern Lithuania, with cores, scrapers, microliths and trapezes, were registered only in a small number of sites on the southern edge of the Lega river drainage basin.

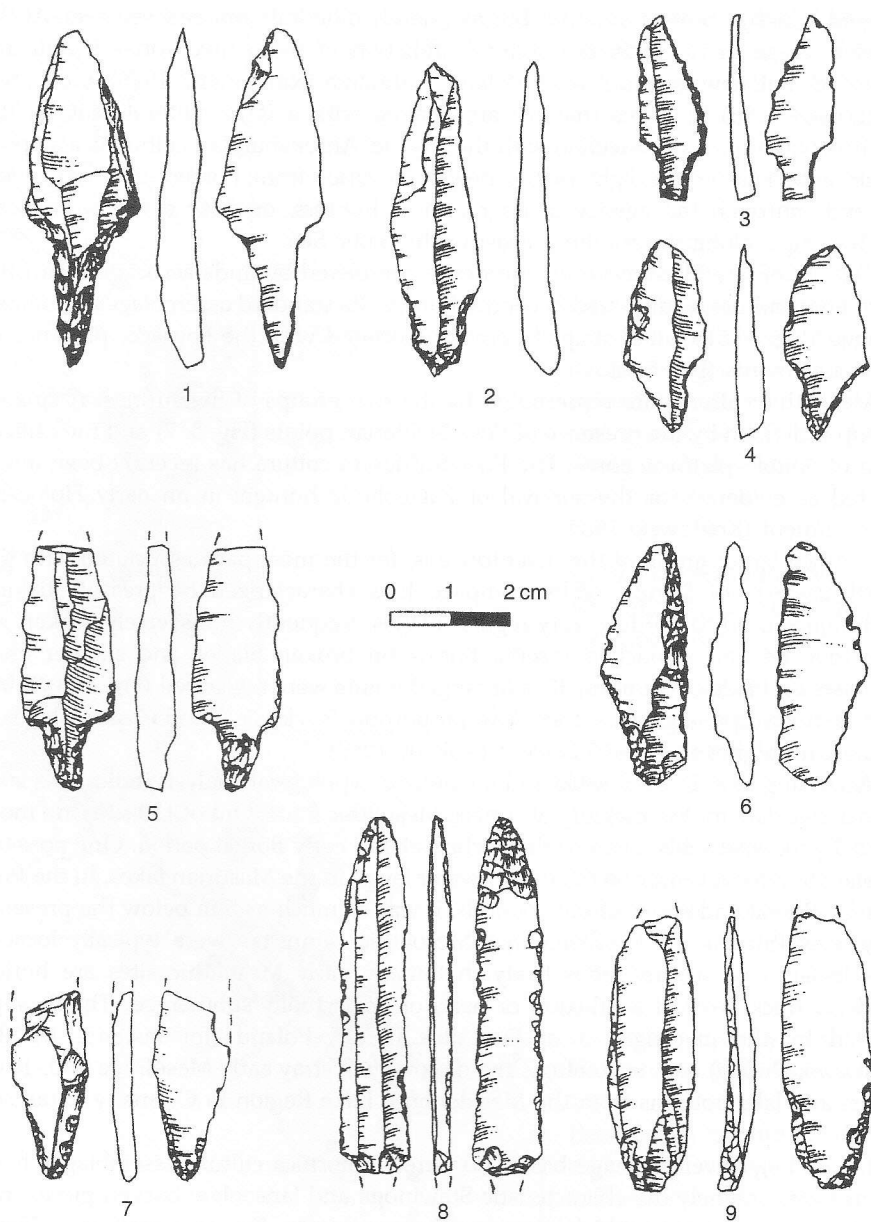


Figure 5. Tanged points as an example of cultural differentiation of the investigated area during the late Palaeolithic and Mesolithic: 1. Lyngby tanged point, Rajgród 25; 2-4. Ahrensburgian points (2. Sedranki 14; 3. Golubki 3, 4. Puchówka 9-10); 5. Swiderian tanged point, Tajenko 1; 6. Desna point, Nowe Raczek 3; 7. post-Swiderian leaf-shaped point, Stożne 6; 8. Early Kunda tanged point of the Pulli type, Stacze 6; 9. Kunda leaf-shaped point, Puchówka 9-10.

HUMAN PRESENCE IN THE LEGA BASIN IN THE LATE PALAEOLITHIC AND THE MESOLITHIC

Much valuable insight on settlement location was provided by ecological mapping. All sites with late Palaeolithic and Mesolithic finds were plotted on a map of the Lega basin (Fig. 6). It was found that they formed six concentrations associated with communication routes and zones of economic activity. Concentrations in the southern and northern parts of the river course are clearly differentiated in shape and dimensions. Three of them lie along the Lega and its major tributary, the Przepiórka. The distribution along the water network suggests that the campsites were spread along the routes of periodic migrations. However, three other centres in the northern zone are more extensive, while intra-site patterning is more diffuse. A dense network of the short-term sites surrounds the main permanent bases (Figs 3 and 4). It is highly probable that, both in the Palaeolithic and Mesolithic periods, these clusters formed the core of hunting-gathering activity. In economic and demographic terms, the late Palaeolithic settlement is more dispersed (Fig. 3). During the Mesolithic, the tendency was to settle near lakes as a rich source of food (Fig. 4), especially the shallower lakes now transformed into peatland.

The mapping of flint tool types and assemblages characteristic of different cultures furnished further interesting conclusions, despite the relatively small size of the Lega basin. So far the late Palaeolithic assemblages with Lyngby and Ahrensburgian points may be said to group primarily in the upper course of Lega river, in the zone of high moraines of the last glaciation intersected by a dense network of small streams. On the other hand, they also occur on the margin of the Biebrza river basin. Typically, Swiderian finds had a more southwards oriented distribution, and are concentrated on the lower Lega. Mesolithic assemblages associated with the north-eastern technocomplex are clearly concentrated in the middle section of the basin; areas to the north and to the south had a much less dense settlement network. On the periphery of the Biebrza basin, three sites of the Janisławice culture are registered. Farther north, its elements become more sporadic and occur there as single finds. It is highly probable that this basin marks the northern margin of this culture in north-eastern Poland.

The link between the Stone Age settlement and the hydrographic network is unmistakable. All sites from this period are situated near lakes, streams and their tributaries. A good example is the concentration of settlements around Lake Dręstwo. Hydrological and geomorphological study of the area, combined with evidence from palaeobotany, helped to reconstruct its primeval landscape (Fig. 7). In its NE corner lies the limit of the morainic hills, formed of Vistulian boulder clay (Fig. 7: 1). The rest of the area is formed by outwash deposits. SE of Lake Dręstwo, there is a large sandy island with a strip of dunes formed during the younger Dryas (Fig. 7: 2). Another small tract of outwash fans occurs on the opposite bank of the Lega river. Low peatbogs (Fig. 7: 5), east of the present-day lake developed in the former lake's 5 m-deep shallow extension. The relatively wide river valley drained towards the

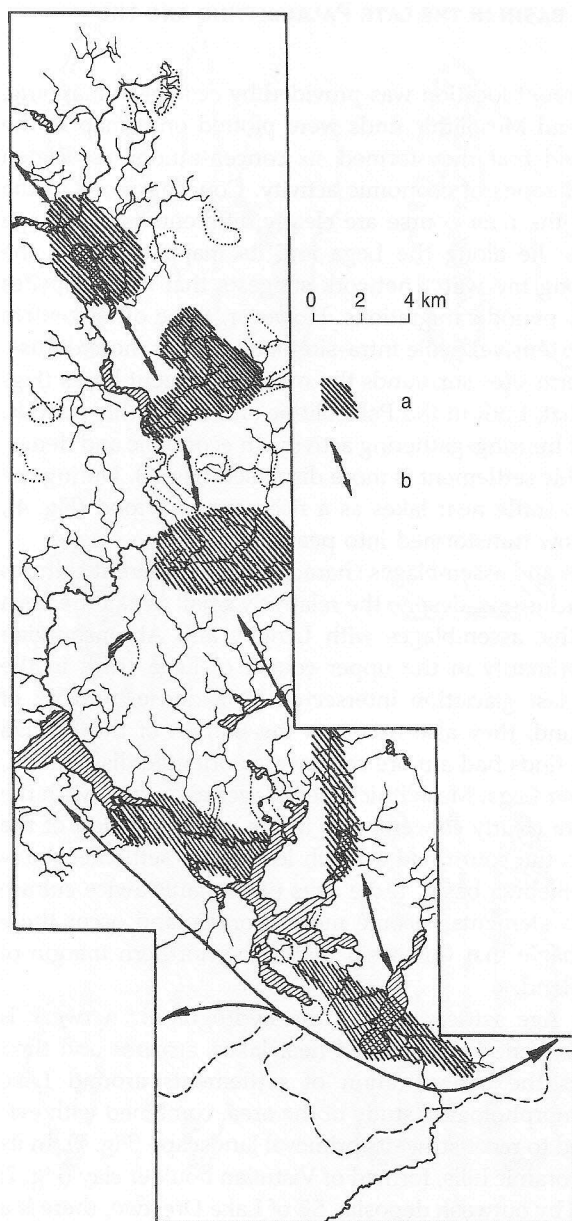


Figure 6. Stone Age settlement in the Lega basin: *a.* concentrations of sites, *b.* possible communication or migration routes.

Biebrza proglacial valley (SE corner of map). In the early Holocene, the Biebrza valley was transformed into an inaccessible bog, which explains the small number of sites located there.

There was little settlement on those dune formations which were common in the valleys of larger lowland rivers. Occupation sites occurred on the lake margin, on former lake islands and along the river. Again, there was hardly any overlapping lithic distributions of Palaeolithic and Mesolithic campsites. The richest Mesolithic sites were identified on islands and peninsulas jutting into the lake. Palaeobotanical evidence suggests that, until the end of the Atlantic period, the water level in the lake was 2–2.5 m lower than today (Oświt and Żurek 1991). It is highly probable therefore that many early Mesolithic sites are now submerged. For example, an entire flint workshop dated to the end of younger Dryas or Pre-boreal period was found on the river bottom at a location originally situated on the lake margin. Recently, during the spring of 1997, the water level in Lake Dęstwo was about 60 cm lower than normal. For the

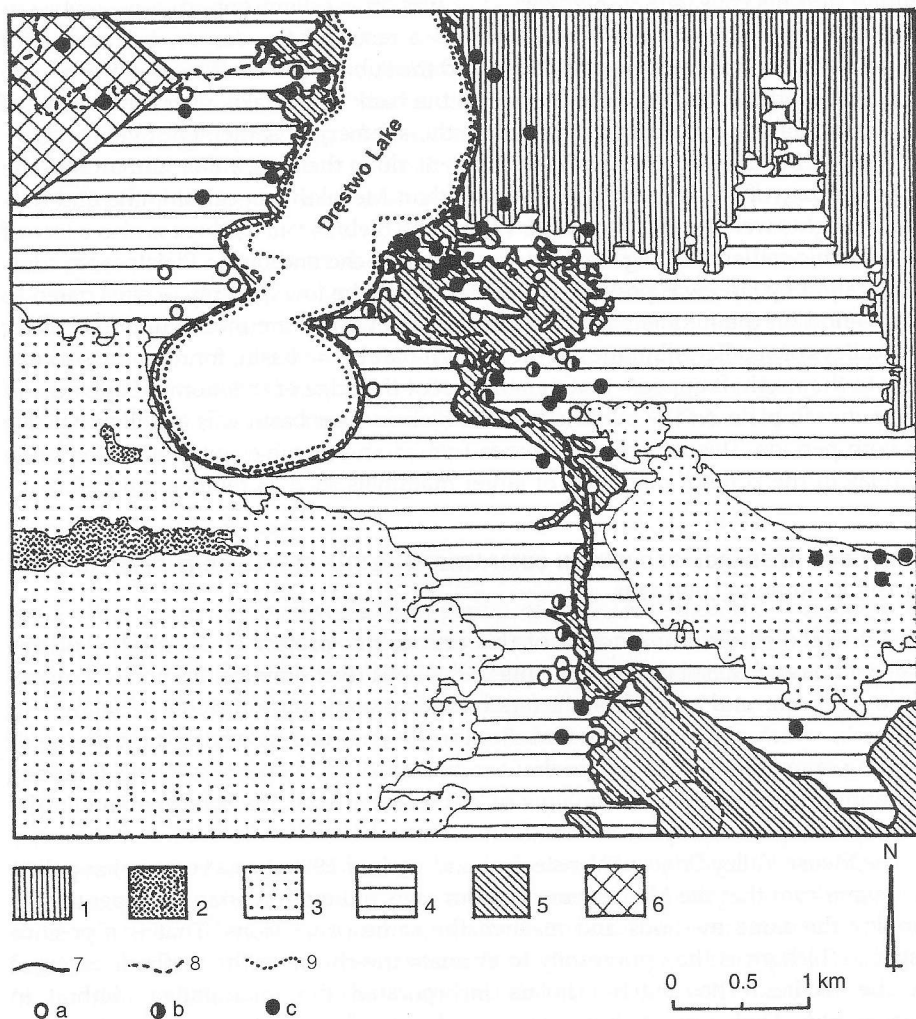


Figure 7. Reconstruction of the original landscape and Palaeolithic–Mesolithic settlement around southern part of Drestwo Lake: 1. Leszno phase of Vistulian glaciation moraines, up to 130 m above sea level, 2. dunes, 3. outwash upland, 4. outwash depression partially covered by peat, 5. peat-bogs filling former shallow lake extension, Lega valley and Biebrza proglacial valley, below 115 m above sea level, 6. territory transformed in modern times (nursery ponds), 7. original coasts of river valley and lakes, 8. contemporary bank of lake and river (114.8 m above sea level), 9. the reconstruction of a shoreline during maximal regression in the early Holocene; a: the late Palaeolithic sites, b: sites with both Palaeolithic and Mesolithic materials, c: Mesolithic sites.

author and his colleague, J. Brzozowski, it was an excellent opportunity to investigate the exposed part of the lake beds. As a result of the survey, two new sites dated to the Stone Age were discovered and the submerged continuation was recognized of another one, previously noted on the bank of the lake, near the outflow of the river. This evidence strongly supports the submerged settlement hypothesis.

The late Palaeolithic sites are more frequent along the Lega valley and around the southern bay of the lake, definitely higher than Mesolithic ones. Moraine and outwash heights were carefully avoided. Within the Biebrza valley, there is also a lack of Palaeolithic settlement (Fig. 3). It suggests that, at the end of the Pleistocene, communication by land was preferred. It explains also the low quantity of sites dated to this period on the middle course of the Lega river. They are more numerous along the valleys of smaller tributaries in the eastern part of the basin, forming the shortest way to the north. It appears that penetration of the edge of the moraine upland and the outwash plain on the periphery of the Biebrza river basin was equally intensive in both periods. This is because the area formed an attractive communication route and lay in the zone of migration of larger mammals such as reindeer and elk.

THE LEGA RESEARCH PROJECT IN COMPARISON TO THE SETTLEMENT STUDIES IN THE EUROPEAN LOWLAND

As I stressed in the introduction of this article, this project of the studies on the Palaeolithic and Mesolithic settlements in the Lega river drainage basin has a micro-regional scope and a local character. I concentrated my effort on detailing this research, which appeared to be beneficial in determining to what extent the field-walking examination allows us to draw any conclusions. Nevertheless, it is tempting to confront the results and the aims of the research with the achievements in the other parts of the European lowland.

The Meuse Valley Project (Wansleebe and Verhart 1990) has a very similar policy. It is significant that the Meuse team and our own, although working independently, employ the same methods and reached the same conclusions. That is a positive aspect, which gives the opportunity to evaluate the choice of the methods engaged in the studies. The Dutch scholars incorporated the quantitative method in cartography. Their project, however, considered subsequent periods, such as the Mesolithic and the Neolithic, highlighting the period of neolithization. Neolithization is of major importance in the Lega drainage basin, but in a very different sense. In contrast to the Dutch case, the transformation of the economy took place much later. The populations inhabiting this area continued in hunting, fishing, and gathering, especially since the natural environment was more conducive to this form of economy than to agriculture.

A comparison of the landscape, environment, and the form of the settlement in the late Pleistocene and the late Holocene shows how much Poland resembles Scandinavia and the northern part of Germany. The strategy of settlement location from the late Palaeolithic onwards was based on hunting reindeer. The Scandinavian

scholars are capable of reconstructing yearly routes of migrations of these animals. It is evident that they determined the nature and the structure of the hunter populations' settlements (Bratlund 1996; Eriksen 1996; Petersen and Johansen 1996). In the Lega basin project, we detected the traces of a similar migration along the northern edge of the Biebrza valley (Fig. 6). The remains of this type of game so far have been rare. Nevertheless the location of the late Palaeolithic settlements is very similar in nature to the hunting settlement structure situated along the reindeer's migration route.

In general, the lake district and the Baltic coastline, once itself a large lake, were densely populated in the Palaeolithic and the Mesolithic. This territory was favourable for hunting, fishing and gathering. It is only by means of the detailed and systematic examination of the vast area that a large number of new sites can be obtained. Unfortunately, the eastern Baltic States and Russia have been only partially scrutinized (Rimantiené 1996; Zagorska 1996; Zhilin 1996), which hinders the comparison of data on the settlement structure.

SOME DIRECTIONS FOR FUTURE RESEARCH

Any settlement study involves a long period of work, and thus the completion of research takes many years. For this reason, it seems to be necessary to establish research aims and priorities for the following decades. First and foremost, the progress of fieldwalking examination will provide the possibility of extending the scope of the territory investigated. In addition to advancing from micro to macroscale, more thorough data would be collected. Let us use the example of Poland again, where half of the country has been scrutinized by the system of the PAR fieldwalking examinations. Half a million new archaeological sites have been registered so far. One can imagine how archaeological knowledge could be enlarged. It would be very advantageous to launch similar programmes in the neighbouring countries, namely in Ukraine and White Russia and especially in the Baltic States: Lithuania, Latvia, Estonia, and Russia. In that way, the study of the territory surrounding the Baltic Sea could be completed and the assembled data compared with the Scandinavian area.

The next aspect is the verification of the fieldwalking examination by excavations. Rescue excavations, conducted on a large scale during enterprises such as the building of motorways or gas pipelines, cover large territories, and thus provide great opportunities. This type of exploration makes it possible to determine to what degree the fieldwalking investigation is compatible with the reality.

The next step is to develop the middle stage of working, which involves detailed intra-site surveys. Technological progress is of crucial importance here. The use of an electronic Total Station makes intra-site work more efficient. Moreover, the automatic electronic processing of data shortens the time necessary for measurements

and creating a map. In that way a scholar is given the opportunity of scrutinizing the largest number of sites.

Vital advances and changes should also incorporate the final stage of interpreting the data obtained during the field examinations. GIS exerts an important influence here. Connecting a database together with a map produced by a computer accelerates the work and makes it more efficient. The statistical data obtained through computerized records should also be made a more prominent aim. In relation to the flint artifacts, it would be beneficial to conduct petrographic analysis on a larger scale. With this method, main centres of flint extraction, as well as mechanisms of distribution, can be defined. Many types of flint, for instance Cretaceous flint, do not indicate any macroscopic differences. It is only during petrographic analysis that the determination of its variation is possible.

The most crucial task, especially from the processual point of view, is the constant development of interdisciplinary research. Incorporation of palaeoenvironmental or geological investigation will let us reconstruct the primeval landscape and the history of its changes. That would explain the motivations of our ancestors, who in a large degree adapted themselves to the natural environment. These tendencies are reflected in the form of the settlement. In addition, we should also focus on the search for, and examination of, wet sites, since they convey a large quantity of otherwise irrecoverable data.

CONCLUSIONS

Fieldwalking survey assisted by detailed intra-site survey and excavation of exceptional sites can be of major help in researching prehistoric settlement patterns. This is amply demonstrated when one compares the state of knowledge on the

Table 1. The Lega valley microregion: before and after the recent survey

<i>Before 1983</i>	
Results of sporadic penetrations and excavation	<ol style="list-style-type: none"> 1. Lyngby single elements 2. Swiderian culture 3. Undefined elements of NE technocomplex 4. Janisławice single elements
<i>1983–1995</i>	
Results of PAR survey, planigraphy and excavation	<ol style="list-style-type: none"> 1. Vilnius group of Lyngby culture = Perstunian culture 2. Assemblages with Ahrensburgian tanged points 3. Swiderian culture 4. Desna elements 5. Post-Swiderian culture 6. Kunda cultural circle (NE technocomplex), also early Pulli type 7. Komornica elements (Maglemosian) 8. Not numerous Janisławice elements

late Palaeolithic and Mesolithic archaeological cultures in north-east Poland prior to and following the investigation of the Lega basin outlined in the present paper (Table 1). I believe that these methods of investigation are also suitable for settlement research of later prehistory in different countries.

ACKNOWLEDGEMENTS

It is difficult to mention all the people taking part in the investigation works. I am greatly indebted to all of them, particularly to Jerzy Brzozowski and Krzysztof Terepko, without whose assistance I should not have been able to carry out such large-scale field investigations, and to Professor Stefan Karol Kozłowski, project consultant. I should also like cordially to thank the Editorial Board of the *Journal of European Archaeology*, who found my paper (given in Riga in 1996) of general interest.

REFERENCES

- BITNER-WRÓBLEWSKA, ANNA, JERZY BRZOZOWSKI and JERZY SIEMASZKO, 1996. Nowe możliwości wykorzystania metody planigraficznej w badaniach archeologicznych. *Archeologia Polski* 41 (1-2):7-38.
- BRATLUND, BODIL, 1996. Archaeozoological comments on final Palaeolithic frontiers in south Scandinavia. *Acta Archaeologica Lundensia*, Series in 8o (24):23-33.
- ERIKSEN, BERIT VALENTIN, 1996. Regional variation in late Pleistocene subsistence strategies. Southern Scandinavian reindeer hunters in a European context. *Acta Archaeologica Lundensia*, Series in 8o (24):7-21.
- FISH, SUZANNE K. and STEPHEN A. KOWALEWSKI (eds), 1990. *The Archaeology of Regions: a Case for Full-coverage Survey*. Washington, DC/London: Smithsonian Institution Press.
- GRAMSCH, BERNHARD, 1983. Bemerkungen zur Palökologie und zur Besiedlung während des jüngeren Boreals und des älteren Atlantikums im nördlichen Mitteleuropa. In Janusz K. Kozłowski and Stefan K. Kozłowski (eds), *Les changements, leurs mécanismes, leurs causes dans la culture du 7e au 6e millénaire av. J-C. en Europe*. *Archeologia Interregionalis*: 263-270. Warszawa: Wydawnictwa Uniwersytetu Warszawskiego.
- JASKANIS, DANUTA, 1992. Polish National Record of Archaeological Sites - general outline. In Carsten U. Larsen (ed.), *Sites and Monuments. National Archaeological Records*: 81-87. Copenhagen: National Museum of Denmark.
- JASKANIS, DANUTA (ed.), 1996. *Archeologiczne Zdjęcie Polski - metoda i doświadczenia. Próba oceny*. (Polish Archaeological Record - Method and Experiences. An Attempted Assessment). Biblioteka Muzealnictwa i Ochrony Zabytków Series B vol. 95. Warszawa: Ośrodek Dokumentacji Zabytków.
- KENYON, KATHLEEN M., 1952. *Beginning in Archaeology*. London: Phoenix House.
- KOLTISOV, L. V. (ed.), 1989. *Mezolit SSSR*. Moskva: Izdatelstvo Nauka.
- KONDRACKI, JERZY, 1978. *Geografia fizyczna Polski*. Warszawa: Państwowe Wydawnictwo Naukowe.

- KOZŁOWSKI, JANUSZ K. and STEFAN K. KOZŁOWSKI, 1979. *Upper Palaeolithic and Mesolithic in Europe. Taxonomy and Palaeohistory*. Polska Akademia Nauk – Oddział w Krakowie. Prace Komisji Archeologicznej 18. Wrocław/Warszawa/Kraków/Gdańsk: Ossolineum.
- KOZŁOWSKI, STEFAN K. (ed.), 1989. *Mesolithic in Poland. A New Approach*. Warszawa: Wydawnictwa Uniwersytetu Warszawskiego.
- LEWARCH, D. E. and M. J. O'BRIEN, 1981. The expanding role of surface assemblages in archaeological research. *Advances in Archaeological Method and Theory* 4:297–342.
- OŚZWIT, JAN and SŁAWOMIR ŻUREK, 1991. Geneza i rozwój w holocenie torfowiska Woźna Wieś (rejon stanowiska archeologicznego). In Elżbieta Kempisty and Zofia Sulgostowska (eds) *Osadnictwo paleolityczne, mezolityczne i paraneolityczne w rejonie Woźnej Wsi, woj. łomżyńskie*: 105–110. Warszawa: Semper.
- PETERSEN, PETER VANG and LYKKE JOHANSEN, 1996. Tracking late glacial reindeer hunters in eastern Denmark. *Acta Archaeologica Lundensia*, Series in 80 (24):75–88.
- RALSKA-JASIEWICZOWA, MAGDALENA, 1989. History of Poland's vegetation cover and climate in the early Holocene (up to 7000 BC). In Stefan K. Kozłowski (ed.), *Mesolithic in Poland. A New Approach*: 227–241. Warszawa: Wydawnictwa Uniwersytetu Warszawskiego.
- RIMANTIENĖ, RIMUTĖ, 1996. *Akmens amžius Lietuvoje*. Vilnius: Žiburio leidykla.
- ROGGE, A. E. and S. L. FULLER, 1977. Probabilistic survey sampling: making parameter estimates. In M. B. Schiffer and G. J. Gumerman (eds), *Conservation Archaeology: Guide to Cultural Resource Management Studies*: 227–238. New York.
- SIEMASZKO, JERZY, 1991. Archeologiczne badania wykopaliskowe w woj. suwalskim w latach 1981–1989. *Rocznik Suwalsko-Mazurski* 1:57–89. Suwałki: Suwańskie Towarzystwo Kultury.
- STARKEL, LESZEK (ed.), 1991. *Geografia Polski. środowisko przyrodnicze*. Warszawa: Wydawnictwo Naukowe PWN.
- STASIAK, JADWIGA, 1971. Holocen Polski północno-wschodniej. *Dissertationes Universitatis Varsoviensis* 47. Warszawa.
- SZYMCZAK, KAROL, 1987. Perstunian culture – the eastern equivalent of the Lyngby culture in the Neman basin. In Jan M. Burdukiewicz and Michał Kobusiewicz (eds), *Late Glacial in Central Europe. Culture and Environment*. Wrocław/Warszawa/Kraków/Gdańsk/Łódź: Ossolineum.
- WANSLEEBEN, MILCO and LEO B. M. VERHART, 1990. Meuse Valley Project: the transition from the Mesolithic to the Neolithic in the Dutch Meuse Valley. In Pierre M. Vermeersch and Philip Van Peer (eds), *Contributions to the Mesolithic in Europe*: 389–402. Leuven: Leuven University Press.
- ZAGORSKA, ILGA, 1996. The late Palaeolithic finds in the Daugava River Valley. *Acta Archaeologica Lundensia*, Series in 80 (24):263–272.
- ZDJĘCIE ARCHEOLOGICZNE POLSKI, 1981. *Biblioteka Muzealnictwa i Ochrony Zabytków*, Series B 66. Warszawa: Ośrodek Dokumentacji Zabytków.
- ZHILIN, MIKHAIL G., 1996. The western part of Russia in the late Palaeolithic – early Mesolithic. *Acta Archaeologica Lundensia*, Series in 80 (24):273–284.
- ŻUROWSKI, TADEUSZ, 1955. Pomiar archeologicznych stanowisk naziemnych. *Światowit* 21:350–378.

BIOGRAPHICAL NOTE

Jerzy Siemaszko is a senior curator and head of the Archaeological Section at the Suwałki Province Museum. From 1995 to 1998 he has been leader of the international Miłuki project, an interdisciplinary social and environmental study of the early Mesolithic campsite of the Kunda culture (which has now been prepared for publication). His main research interests are the Palaeolithic and Mesolithic, especially of north-eastern Europe, also methodology. He is author and co-author of many articles on the Stone Age in Poland and methodological aspects of the investigation.

Address: Muzeum Okręgowe w Suwałkach, ul. Kościuszki 81, PL 16-400 Suwałki, Poland [email: jsiemaszko@poczta.onet.pl or jwsiem@box43.gnet.pl]

ABSTRACTS

Étude d'une occupation de l'Age de la Pierre dans le bassin de la Lega (Pologne du nord-est) en tant qu'exemple de l'étude de sites archéologiques à l'échelle microrégionale

Jerzy Siemaszko

Pendant quatorze ans et sous l'égide du Projet de Recherches Archéologiques Polonaises, l'auteur a dirigé l'exploration de la totalité du bassin de la rivière Lega (Pologne du nord-est), une région de quelques 850 km². Cette région jusqu'ici peu connue a révélé près de 1100 sites archéologiques dont 748 ont livré du matériel lithique. Les sites les plus intéressants ont tout d'abord été étudiés au moyen de plans détaillés de la distribution du matériel de surface et ensuite par des fouilles. L'étude de la totalité du bassin hydrographique a été très importante pour les recherches sur la distribution des sites. Le grand nombre de sites lithiques de surface a permis des analyses statistiques dignes de confiance ainsi qu'une étude cartographique précise qui confirme les reconstructions du paléo-environnement. Les assemblages lithiques ont été étudiés du point de vue typologique ainsi que de la technique de production utilisée, permettant ainsi de clarifier leur relation chronologique et culturelle aux inventaires de silex de la Pologne du nord-est ainsi qu'à ceux des pays limitrophes, mais qui débouche sur de nouvelles questions. On a pu observer des changements dans la localisation préférentielle des sites du Epipaléolithique supérieur et de Mésolithique dans la zone des lacs de la dernière glaciation et des bassins adjacents au sud. Un total de 6 concentrations de sites avec routes de communication et zones d'activités économique ont été découvertes.

Die Untersuchung der steinzeitlichen Besiedlung im Lega Becken (Nordostpolen) als ein Beispiel für kleinräumige Siedlungsuntersuchung

Jerzy Siemaszko

Über einen Zeitraum von vierzehn Jahren und als Teil des polnischen Archäologie-Aufnahme Forschungsprojekts, leitete Verfasser eine Feldbegehung des gesamten Lega Flussbeckens (Nordostpolen) – ein Gebiet von über 850 km². Fast 1100 archäologische Fundstellen, von denen 748 lithisches Material erbrachten wurden als Ergebnis der Begehung dieses bisher schlecht untersuchten Gebietes entdeckt. Die interessantesten Fundstellen wurden anfänglich durch genaue Aufnahme der Fundverteilung an der Oberfläche und später durch Ausgrabung untersucht.

Eine vollständige Untersuchung der gesamten Entwässerungsbeckens war äusserst wichtig für die Siedlungsuntersuchung. Die grosse Anzahl der lithischen Oberflächenfundkomplexe ermöglicht

verlässliche statistische Analysen und genaue kartographische Studien unterstützt durch paläobotanische Umweltrekonstruktionen. Die lithischen Fundkomplexe wurden vom produktionstechnischen und typologischen Gesichtspunkt aus analysiert, wobei einige Zweifel an chronologisch-kulturellen Verwandtschaften von Flintinventaren aus dem nordöstlichen Polen und benachbarten Ländern beseitigt werden könnten, sich aber auch neue Fragen ergaben. Es wurde möglich klare Vorlieben im Siedlungsverhalten aber auch Änderungen desselben während des späten Paläo- und Mesolithikums im Gebiet der spätglazialen Seen und ihren angrenzenden ausgewaschenen Gebieten im Süden zu beobachten. Sechs Konzentrationen von Fundplätzen die mit Kommunikationswegen und Gebieten wirtschaftlicher Aktivität verbunden waren, wurden entdeckt.