LATE PLEISTOCENE AND EARLY HOLOCENE HUNTING AND FISHING SOCIETIES IN NORTH-WESTERN POLAND

Research on the Palaeolithic and Mesolithic Age in Poland’s north-western area had been conducted on a minor scale practically during all of the 20th century. The results of some early studies and those of quite recent ones have disclosed certain new, so far unknown events in the history of the Palaeolithic and Mesolithic populations inhabiting the Lowland of Central Europe and on their contacts with neighbouring regions. The present article is a summing up of these discoveries.

We shall display only general phenomena and observations, avoiding a more detailed specification of materials that have mostly been published in particular monographs.¹

North-western Poland is understood to be the area limited from the west by the Odra valley, from the north by the Baltic coast, by the Vistula valley to the east, and touching the Warsaw-Berlin Ice-Marginal Valley along the south (fig. 1).

The present work is chronologically concerned with almost all of the Late Glacial period from the beginning of the Oldest Dryas to the end of the Younger Dryas, and the three early Holocene periods: Preboreal, Boreal, and Atlantic. It is a long stretch of time, remarkable on account of its many and very serious alterations in the natural environment. These have certainly largely influenced the culture of human groups inhabiting at that time the area under discussion.

The first part of this article presents the characteristic of the territory’s morphology and its important palaeogeographic features, essential to the understanding of culture events occurring here. We shall further discuss some basic types of archaeological assemblages, drawing in turn a picture of archaeological cultures that we shall treat from the point of view of a typological and cultural classification; the summing up will treat general problems concerning these cultures, their economy, their mutual contacts, development, exchange, etc.
Fig. 1. The course of chief Ice Marginal Valleys and halting lines of Inland Ice in north-western Poland

1: Ice Marginal Valleys; 2: halting line of Inland Ice; Pz: Poznań Stadium; Pm: Pomeranian Stadium
All the area discussed in this article lies within the Lowland of Central Europe, that is one of the large physiographic units of Western Europe. The territory of Poland covers two small units of it the stretch of land along the south Baltic coast and lying to the south of it the south Baltic Lakeland. We are here interested in Pomerania and the Great Poland-Kujawy plain (fig. 1).

At the time of human settlement appearing here all the area of Central Europe’s Lowland had been covered by moraine deposits. Its sculpture is of a Late Glacial character. The depth of Quaternary deposits reaches here down to 200 m, their average will be some 100 m.

Along the southern middle part of the area we are interested in, runs latitudinally a belt of terminal moraines, which belongs to the Poznań Stadium of Würm Glaciation. In its northern part another belt of Pomeranian Stadium moraines runs also latitudinally, but with a certain deviation to the north-east.

Besides stadial moraines, the territory displays sections of other latitudinal moraines, belonging to minor regression phases and halts of inland ice. The youngest are terminal moraines on the Isle of Wolin along the Baltic coast. They probably belong already to the Langeland Stadium, following the Pomeranian one.

To the south of the belt of terminal moraines marking the chief stages of Inland Ice and along the adhering outwash plains, run here, also in the latitudinal sense, three great Ice-Marginal Valleys: Warsaw-Berlin, Toruń-Eberswalde, and the Pomeranian Valley, that had occurred at the time of the Langeland Stadium. They were formed owing to the flow towards the west of waters melting out of the withdrawing glacier; their width is from several up to 30 km (the Gorzów Hollow). The territory is here characteristic by long latitudinally sculptured belts, where tremendous Ice-Marginal Valleys run like wide corridors along the Central Europe Lowland from west to east. This is a fact essential to further considerations. Next to fluvioglacial deposits a very characteristic form of territory appearing in north-western Poland are eolian deposits occurring in the last cold stadials of the Late Pleistocene. In the Older Dryas and still more in the Younger Dryas, strong winds blowing from the west, sometimes swerving to the north or south, formed spacious dune fields out of fine sand, swept off from the surface of outwash plains and moraines. Dune fields are most frequent in great valleys or near them, owing to large quantities of sand brought here by rivers or coming from the denudation of moraine deposits.

Both phases of dune formation are separated from one another by the warm Alleröd oscillation that had checked the process of fast growing dunes, thanks to an abundant development of vegetation.
The growth of Holocene vegetation thickly covering dunes that had accumulated in the Late Pleistocene, fixed their permanent forms. There were certainly cases of dunes being blown away again, caused by the interference of man ready to destroy their vegetation dress. Such events are known to have occurred in prehistorical and historical periods. They may, however, also have happened in the Early Holocene.

Another typical eolian form are covering sands. Their age and origin is probably the same as the age and origin of dunes. They are not of particular interest in this work, as they only very seldom contain archaeological sites.

A characteristic feature of primitive landscape important in this picture is the great quantity of lakes and water retentions formed in this territory after the regression of the glacier. Rich rivers, fed by many tributaries, initially filled the Ice-Marginal Valleys; these had broken in the Bölling period through natural moraine dams to feed the great Baltic glacial lake, after the disappearance of ice from the southern Baltic Basin, causing a number of lakes of various types to occur here from the end of the Pleistocene. Lumps of dead ice stuck into the moraine had started to melt over north-western Poland in the Alleröd period. The process of dead ice melting lasted probably up to the Preboreal period and its consequence are many water reservoirs known here.

The beginning of the Holocene brought further, perhaps not so distinct changes in the geomorphology of north-western Poland. Following the depression of the erosive basis, there occurred already at the end of the Pleistocene a strong erosion of river valleys that resulted in the forming of river terraces on various levels and built up at different times.

Another important factor of morphological changes in the Early Holocene was the sedimentation of gyttia and peats growing into water retentions. Peat bogs started to form at the same time as lakes did, reaching a maximum of development in the Atlantic Period. The development of lake sedimentations played an important role in the shaping of a primitive Holocene landscape. In north-western Poland there occur sites with a layer of gyttia more than 1–5 m thick, over which lie heaps of later peats.

An essential matter to the consideration of Mesolithic Cultures in north-western Poland is drawing attention to changes evident in the shaping and shifting of the Baltic coast. Very important alterations occurred owing to isostatic movements of the earth’s crust, freed from the pression of ice and to the oscillation of sea level. After the Late Pleistocene regression of the Baltic Sea that was relatively small and took place in Bölling, the Older Dryas, Alleröd and the Younger Dryas, there followed the great Holocene transgression of the sea to the south. It lasted from the turn of Pleistocene to Holocene up to the end of the Litorina Period,
slightly overlapping the Atlantic climatic period. This transgression pushed the southern Baltic coastline in some places 80–100 km to the south, changing particularly the northern border of the areas under discussion. Territories that were situated at the beginning of the Holocene on the Baltic shore and may then have been inhabited by early Mesolithic human groups, are today 40–60 m deep under water and practically inaccessible to archaeological research. This fact may be the cause of a certain gap in our knowledge about Mesolithic Cultures in north-western Poland, particularly those whose economy was connected with exploitation of the sea, inducing early settlement on the very sea shore.

When speaking of late Pleistocene and Early Holocene Cultures in north-western Poland, one cannot disregard, were it only a rough estimate, the climatic alterations occurring then and changes of vegetation dress depending on them. Here they are most generally presented: after the cold arctic period of the Oldest Dryas, when July had only an average temperature of 10°C and the area under discussion was covered by tundra, there followed a somewhat warmer but still cool and damp Bölling Oscillation, with average July temperature about 15°C. At that time there appeared the first samples of forest with pine-tree, birch and larch. After that there occurred again a cold stepping in of the Older Dryas with a dry, subarctic climate and medium July temperature 10–12°C, and tundra or park tundra covering the ground. Towards the end of that period the weather became distinctly milder and the longlasting warmer climate bears the name of Allerod Oscillation. It was remarkably moderate, rather damp, with medium July temperature about 16°C. Poland’s north-western area was then grown over by birch and later by birch-and-pine tree. Finally, the subarctic Younger Dryas stepped for the last time into the country, bringing a dry subarctic climate of continental type. Medium July temperature falls again to about 12°C, forests retreated to the south and park tundra covered the ground for the last time.

With the beginning of the Holocene, i.e. about 8100 B.C., the weather began to get steadily warmer. The Preboreal and Boreal Periods had a remarkably dry climate, getting more damp only in the warmest Atlantic Period. Forests grew to be dense, their vegetation dress was differentiated first by pine-and-birch in the Preboreal, pine- and hazel-tree in the Boreal, up to mixed leaftree forests composed of oak, lime, ash, clone and elm in the Atlantic Period, when the mentioned trees were noticed to have reached further north than they do today.

It is clear that corresponding remarkable changes of fauna accompanied those of flora.

The above, very cursory description of most essential features concerning the palaeogeography of the area under discussion, shows the large
and omnilateral dimensions of changes occurring in the primitive landscape of north-western Poland inhabited in prehistorical ages by human groups of the Late Palaeolithic and Mesolithic various Cultures.

The natural conditions and intensity of the said changes were decisive in the concentration of settlement, migration currents and types of economy among the oldest inhabitants of these territories.

The oldest archaeological culture known in this part of the country is the Hamburgian Culture, represented so far by a single site in the locality Liny, Wolsztyn district, situated in the southern edge of the area discussed above (fig. 2). It was known already in 1938 from surface research, and was investigated by excavation works in 1969, 1970 and 1971. It yielded 932 flint artefacts, among them 17 cores, 62 tools, not counting blades, flakes and implements with retouched edge, of which 67 pieces were found in this site.

The typological composition of the Liny site assemblage wholly corresponds to the typology of classical Hamburgian assemblages. No elements characteristic of this culture are missing here, beginning with the presence of Hamburgian shouldered points, "Zinker" type perforators and other typical artefacts (fig. 3: 1–9) and ending with traces of polishing on the edges of flint flakes. In comparison with Hamburgian sites from north-western Europe, the Liny site is relatively poor. It can be assumed that it may have contained some 2,000 flint artefacts according to archive records, half of which had been gathered from the surface in the years between World War I and II. The mentioned site seems to have been half so rich as those from the countryside of Hamburg. However, the number and assortment of artefacts dug out by regular exploration, prove perfect typological and statistical accordance of this assemblage with inventories of north-western Europe, known as Hamburgian sites.

The location of the Hamburgian site at Liny is also analogous to the situation of sites in the neighbourhood of Hamburg. It lies on a lake terrace on the edge of a subglacial channel, built out of sands and fluvioglacial gravels, on the shore of a lake that occurred thanks to the melting of lumps of dead ice.

As to the chronology of the Hamburgian culture assemblage, we are obliged to rest on its typology. There are no premises authorizing us to establish its time on natural sciences methods, and the only premises of geological standard give us terminus ante quem, i.e., the occurrence of the fluvioglacial bed on which the site is situated indicates the Poznanian Würm phase. This is a hardly essential index as compared with a far more precise possibility of dating phenomena by typological methods. Judging after the close analogy of the Liny assemblage to Hamburgian assemblages from north-western Europe, dated by natural sciences methods, we can
Fig. 2. Late Palaeolithic sites in north-western Poland


Tanged points, Lyngby type: 1: Pomorsko 1, Sulechów distr.; 2: Potrzanowo 5, Wągrowiec distr.; 3: Smolno Wielkie Sulechów distr.

Hoe, Lyngby type: Murowana Goślinia, Oborniki distr.;
Hoe, Lyngby type: Murowana Goślinia, Oborniki distr.;
Bone point type 12 B (Havel type) — Lachmirowice, Inowrocław distr.
Assemblages with backed blades: 1: Kargowa b; 2: Kargowa d; 3: Kargowa e; 4: Kargowa h; 5: Wojnowo a, all in the Sulechów distr.

determine the age of the Liny assemblage to the Oldest Dryas, or more exactly to the Meiendorf Interstadial, that is about 11600-11100 B.C. In Holland Hamburgian assemblages are known to belong to the turn of the Oldest Dryas (Durs voude I) and to the beginning of Bölling (Durs voude IV). Should we moreover accept A. Bohmer's hypothesis claiming that the
Hamburgian originates from western Europe’s Magdalenian, we could perhaps place our site at the turn of the Oldest Dryas and Bölling, that is about 10400 B.C., or at the beginning of Bölling, as the shifting of Ham-

Fig. 4. Federmesser assemblages (1–9); Post-Magdalenian elements (10–16)
burgian groups at least 400 km to the east, may have delayed its appearance at Liny.

After the extinction of settlement of Hamburgian culture up to at least the middle of Alleröd, we do not know any archaeological sites from north-western Poland's territory. Rather than being absent, they may perhaps be too difficult to find.

The warm Alleröd Oscillation opened wide spaces of Europe's Lowland to settlement. The territories of northern Germany, Holland and eastern Belgium are now occupied by groups of Federmesser culture of Magdalenian origin.

Out of the three groups distinguished by H. Schwabedissen in the framework of Federmesser Culture, the one lying nearest to the area under discussion is the Wehlen Group, spreading over the neighbourhood of today's Schleswig-Holstein, where the greatest concentration of sites belonging to this group is found. Traces left by the population of the Wehlen group are relatively rare in the countryside of Meklemburg and Brandenburg, but in the neighbourhood of Szczecin, i.e. Poland's north-western corner, a flint assemblage very closely typologically related to the Federmesser assemblages of the Wehlen Group has been found in Wolczkowo. The finding of Wolczkowo may be considered to have been a site of this culture farthest advanced to the east. It contained relatively numerous elongated end-scrapers, among them specimens with retouched edge and distinct tang, a single dihedral burin and characteristic backed blades (fig. 4: 1–9).

Besides Wolczkowo we know in this territory numerous typological elements of Post-Magdalenian Alleröd Cultures. They are various types of backed blades and truncations (fig. 4: 10–16, fig. 5: 1–5), which appear frequently in assemblages known from site concentrations in the territories of the Obra Depression (fig. 2). The mentioned assemblages had, however, been collected from the surface in a way lacking all proper method, due to which it is now difficult to state whether and to what a degree are they simply a mixture of elements of various cultures (Ahrensburg, Sviderian and one of the latest Post-Magdalenian Cultures with backed blades), or should they present traces of the passing of late Palaeolithic groups that had joined elements of the three mentioned cultures and so created a new one. At any rate, the appearance of backed forms would evidence the penetration, if not of Post-Magdalenian Cultures in persona, it would certainly prove the “Magdalenian idea” apparent in the typology of flint artefacts.

Near the southern border of the territory under discussion lies also the eponymous site of Tarnowa Culture in the Warsaw-Berlin Ice-Marginal Valley. It is the latest culture with Post-Magdalenian traditions known
Fig. 5. Post-Magdalenian elements (1–5); artefacts of Tarnowa Culture (6–17)

in north-western Poland. Also the Tarnowa assemblages are characteristic
owing to the appearance of a small number of backed blades, many quite
short, circular or semi-circular end-scrapers, a few burins, massive cores
with striking platform placed at a right angle to the striking surface, op-
opposed double platform cores, and single platform cores for blades and for
flakes. Bulbs hewn off the demi-product are wide, flatly spread on a large
part of the bulber side, which would indicate the use of a very hard
hammer stone (fig. 5: 6–14). A specimen pointe à crane is also known from
the Tarnowa site.

A number of sites clearly representing that culture are known through-
out Poland, concentrated rather in the country’s middle part. Some
surface collections display elements of Tarnowa Culture, they are, however,
rare. Also in north-western Poland we know, besides the eponymous site
of Tarnowa, two other poor assemblages (fig. 2), referring to that culture
thanks to their characteristic Tarnowa type backed blades (fig. 5: 15–17).

There are now two hypotheses concerning the origin of Tarnowa Cul-
ture. The first of them assumes that Tarnowa is simply a fourth group
of Federmesser Culture, advanced farthest to the east.9 The second claims
its occurrence to have been the result of survivors of Federmesser Culture
groups driven out of north Germany, owing to an expansion of the
Ahrensburgian Culture population.10 Both these theories are close to each
other. The second seems better substantiated by the fact that the Tarnowa
Culture assemblages are well dated to the beginning of the Younger
Dryas, and therefore later than Federmesser Culture.

Amid the cultures of the Late Palaeolithic, most numerous and the
richest in north-western Poland are the assemblages of Sviderian Culture
(fig. 2). Several scores of them have been stated in this territory, chiefly
Great-Poland and Kujawy, with some of them reaching out to the north-
era area of West Pomerania.11

The Świdry or Sviderian Culture, also known to be the Mazovian In-
dustrial Cycle, belongs to the large complex of cultures with tanged points.
They had occurred over the European Lowland in its middle-east and also
middle-western part, overtaking the position of populations of backed
blade cultures, living here formerly. The complex of cultures with tanged
points, comprising Bromme-Lyngby, Ahrensburg and Świdry Cultures,
is the last complex of Palaeolithic Cultures in Europe.

The most characteristic typological feature of Sviderian Culture is the
occurrence of tanged points with more or less distinct tang retouched on
bulber side. The retouching may have been generous, covering a large
part of the tang’s bulber side, or was it scarce, evident only owing to a
few negatives of weak touches (fig. 6: 2–6). The Sviderian assemblages
contain also frequent cores, called Mazovian type cores. They are opposed
double platform cores for blades, situated at sharp angles to a common flaking surface. They are generally carefully prepared for processing (fig. 6: 1). The Sviderian assemblages contain many burins, endscrapers on the blade, in later inventories end-scrapers on the flake, relatively rare

Fig. 6. Artefacts of Sviderian Culture
groovers, noches and other tools. The enclosed map (fig. 2) shows the
disposition of the Šwidry Culture sites known so far in the territories
of north-western Poland.

The period of Šwidry Culture's lasting was till recently understood
to have occurred in the period from the Oldest Dryas till the end of the
Pleistocene, while a gap could be noticed between sites dated to the Oldest
Dryas and those dated to the Alleröd and later periods. Recently W. Taute
connects non-obligingly the oldest sites of this culture with the Oldest
Dryas and presumes the possibility of its having lasted up to the begin-
nning of the Preboreal.¹² We read a similar assumption also in the paper
of S. K. Kozłowski.¹³ The results of latest excavations conducted by
R. Schild on a multi-cultures site in dunes of the locality Całownanie, the
Otwock distr. in Mazovia, clearly indicate that the lasting of Šwidry
Culture should be limited to the Youngest Dryas period and perhaps to
the very beginning of the Preboreal.¹⁴

The withdrawal of the Šwidry Culture population to the north-east,
moving together with reindeer herds that were following the retreating
Inland Ice, marks the term of the Palaeolithic settlement population in
north-western Poland. It should be assumed that this had occurred in the
area under discussion nearly exactly at the time accepted for the end of
the Pleistocene, i.e. 8100 B.C. Assumptions concerning the Palaeolithic
cultures having existed up to the beginning of the Preboreal are valid
only in north-eastern Poland. Considering the direction taken by the pop-
ulation groups of Sviderian Culture, we assume that if their remains
still roamed about in a north-eastern corner of our land, the rest of it,
particularly north-western Poland, was already occupied then by set-
tlement of Mesolithic cultures.

When reviewing the Palaeolithic Cultures whose representants had
certainly dwelt in the area under discussion, leaving assemblages of char-
acteristic artefacts that evidence their traces, we feel obliged to briefly
describe a few findings referring to two late Palaeolithic Cultures, that
had inhabited territories close to north-western Poland. They are singly
occurring Lyngby type tanged points (fig. 7: 1–3) and Ahrensburgian
tanged points. The first appear sporadically (fig. 2), they are known to
have occurred very far from territories inhabited by Lyngby Culture.¹⁵
It can be assumed that they are proof of a distant industrial influence of
this culture, or else of intercultural phenomena, owing to which they ap-
ppear at the same time in the assemblages of different cultures, forming the
tanged point culture cycle.¹⁶ In any case, on the basis of flint assemblages
from north-western Poland, no traces of population groups of the Lyngby
Culture having dwelt here, can be stated.

Neither do we have any assemblage of Ahrensburgian Culture in the
Fig. 7. Tanged points, Lyngby type (1–3); Ahrensburgian type (4–7, 10–12); Hintersee type (8–9)
area under discussion. In its western part, however, only slightly so far investigated, Ahrensburgian tanged points prevail in quantity over Sviderian ones (fig. 2). As the typological differentiation of assemblages in both cultures is evident only owing to a typological difference of tanged points, it should be accepted that elements of Ahrensburgian Culture played here at least an equal role. An example of the quantitative prevalence of tanged points typologically connected with cultures of the tanged point circle dwelling in north Germany, is the recently excavated dune site in Pomorsko, Sulechów distr., where in a total number of 46 tanged points with preserved tang, 18 pieces have retouched bulber side in the Sviderian fashion, while the remaining 28 pieces with tang not retouched on bulber side, are rather of the Hintersee (fig. 7: 8–9) or Ahrensburg (fig. 7: 4–7, 10–12) type. One of the tanged points in this site belongs to the Lyngby tanged points group.

We shall certainly turn once more to the subject of western culture elements met in the described area.

Besides the late Pleistocene flint assemblages we know in northwestern Poland a Lyngby type hoe, made out of reindeer horn. It was found in the locality Murowana Goślina, Oborniki distr. (fig. 11: 5) and a double-row Havel type bone point from Lachmirowice, Inowrocław distr. (fig. 11: 6).

Both these specimens are found singly, not connected with any assemblage of flint artefacts. Both hoe and bone point may be referred either to Ahrensburg or Sviderian Culture. They should be dated to the Younger Dryas.

In so far as sketching a characteristic of the Late Pleistocene in northwestern Poland did not raise serious difficulties, drawing a detailed picture of the cultural and chronological division of these territories in the Early Holocene is no easy matter.

Although we have now investigated nearly 200 Mesolithic sites in the area under discussion, most of them offer material for many reasons difficult to determine in respect to culture and chronology.

Owing to the intense development of research on the Mesolithic Age in the last 10 years, it has been stated that the cultures of that period discerned in Poland belong, it is true, to a vast circle of microlithic cultures in Europe, they are, however, considerably different from the Tardenoisian Culture, with which they had formerly been connected, on the basis of an apparent general likeness of forms. The territories of Central Europe’s Lowland were in the Mesolithic Age a mosaic of cultures, whose flint assemblages differ not only from the Tardenoisian ones, but are also singly much diversified. The recently proposed systems of cultural and chronological division for Mesolithic groups of Polish and other parts of
Fig. 8. Microliths characteristic of the assemblages of the Older Mesolithic of north-western Poland (1–11); of the Younger Mesolithic of north-western Poland (12–24) and Proto-axe (25)

the European Lowland, based in the case of Poland on pure assemblages obtained by excavation, refer however, to regions rather distant from those we are discussing here. Neither have the latter been sufficiently proved yet by archaeological material.

We shall therefore characterize here generally the Mesolithic Age in north-western Poland, not breaking it into cultures still not definitely distinguished.

Owing to so far acquired typological criteria we may discern older and younger Mesolithic flint assemblages in north-western Poland.

Typological characteristics of flint assemblages belonging to the Older Mesolithic Age, is the occurrence of such microliths as Stawinoga type backed bladelets (fig. 8: 1–3), obliquely truncated bladelets Komornica type (fig. 8: 4–6), double truncated bladelets (fig. 8: 7–8) and isosceles triangles (fig. 8: 9–11).

Besides this for older assemblages there is a typical occurrence of all sorts of burins and end-scrappers, and a complete, or nearly so, lack of irregular scrapers and trapezes. In assemblages of the Older Mesolithic of north-western Poland there occurs a double amount of proto-axe type tools as compared with the younger ones.

In the great number of sites generally determined to be Mesolithic, only over a dozen display a sufficiently rich inventory to include them into the Older Mesolithic (fig. 9). In accordance with the nomenclature of culture division proposed by Polish investigators, these sites could be ranged among the Komornica Culture as proposed by S. K. Kozłowski (the H. Więckowska Narew Cycle). Chronologically they should be placed in the Preboreal and Boreal Periods, eliminating perhaps the latter's final phase.

The inventories of north-western Poland's Older Mesolithic refer typologically very distinctly to north-western Europe's Mesolithic sites in England, south Sweden, Denmark and north Germany (Star Carr, Pinnew, Klosterlund, Duvensee, Ageröd). These references are particularly distinct in the analysis of proto-axe family tools. Here belong core and flake proto-axes of various types, picks, chisels, etc. (fig. 8: 25, fig. 10: 1–3). It appeared that these artefacts, so very characteristic for north-western Europe's Mesolithic circle, occur relatively frequently in north-western Poland, in the Odra Basin, where some 87 per cent of their number known now in Poland are to be found, whereas their number distinctly declines to the east in the Vistula Basin, where only about 13 per cent of their total amount has been stated. This is an essential proof of resemblances having existed between the cultures of the mentioned areas.

Assemblages of the Younger Mesolithic are characterized by the occurrence of many trapezes (fig. 8: 12–14 and 24), Wieliszew type points
(fig. 8: 15–27) elongated triangles (fig. 8: 18–20) and microliths with retouched basis (fig. 8: 21–23).

Another very characteristic feature in the younger assemblages is substituting end-scrapers by irregular scrapers; it is also possible to observe here a certain regularity, for the index of a growing quantity of irregular scrapers in relation to end-scrapers seems to indicate that we have to deal with an ever younger assemblage, up to a complete disappearance of end-scrapers in the youngest ones.

Contrary to the assemblages of the Older Mesolithic, burins are nearly or quite absent in the younger ones.

Also in the group of chronologically younger assemblages in northwestern Poland, only a few of them are sufficiently rich to be certainly determined as groups representing the Younger Mesolithic phase (fig. 9). They refer to assemblages named by S. K. Kozłowski the Janiszlawice Culture (H. Więckowska's Vistula Cycle). The assemblages of our territory should be dated to the time marking more or less the turn of the Boreal and the Atlantic Period, may be up to the end of the latter. Similarly as the older assemblages they refer, although not so distinctly, to chronologically parallel western Europe's Maglemose and Gudenaas-Oldesloe Cultures.

A certain amount of bone and horn artefacts from north-western Poland should probably be dated to the Early Holocene. None of them have, however, been found in assemblages that could be dated by natural sciences methods.

Bone points with one jag J. G. D. Clark's type 5, such as those of Gniewino, Wejcherowo distr. (fig. 12: 5) and Szczecin-Police (fig. 12: 1), and others with several jags, type 7, such as probably is the broken bone point from Biskupin, Żnin distr., can presumably be connected with Maglemose Culture.

Bone points of type 13, such as the specimen of Marzenin, Września distr. (fig. 11: 4) appear most frequently in north-eastern Poland and further to the east in the Late Mesolithic group of Kunda-Borki assemblages.

Horn hoes with apertures, called also chief's or wizzard's sceptres, ornamented by geometric and figurative motives, found in Podjuchy near Szczecin (fig. 11: 2) and in Szczecin-Grabowo (fig. 11: 3) may also be connected with Maglemose Culture.

Bone daggers from Stolec, Szczecin-Wieś distr. and Niziębszewo, Bytów distr. (fig. 12: 2–4) can be dated to different Mesolithic periods, or can also be later. The same concerns a certain number of fishing hooks (fig. 12: 3) and horn axes (fig. 11: 1) known in Poland's north-western areas.

We have just now very little to say about Mesolithic Cultures of
Fig. 9. Most important Mesolithic sites in north-western Poland


Bone point, type 7: Biskupin, Znin distr.
Bone point type 7: Biskupin, Znin distr.
Bone point, type 13: Marzenin, Wresznia distr.
Perforated antlers (ornamented horn “hoes”): 1: Szczecin-Grabów, 2: Szczecin-Podjuchy
Fig. 10. Proto-axe family tools
1: Smolno Wielkie 1, Sulechów distr.; 2: Pomorsko 1, Sulechów distr.; 3: Wyto-
myśl 2, Nowy Tomyśl distr.
Poland in general and particularly north-western Poland. Their origin should most probably be connected with Late Palaeolithic Magdalenian Cultures. Certain typological elements very characteristic of assemblages of Poland’s Older Mesolithic, occur in late- Magdalenian and Asilian sites of France and also in assemblages of Late Magdalenian Federmesser Culture in Germany. The genesis of the Older Mesolithic is, according to S. K. Kozłowski, close to the genesis of Duvensee Culture, whose origin is known to reach back to western Europe’s Palaeolithic. Besides flint inventories this is also confirmed by the typology of bone points.

W. Chmielewski have noticed that in the Early Holocene the migration of population groups living at the end of the Pleistocene in southern Poland’s wooded areas, should perhaps be taken into account. In the Early Holocene, while growing forests were invading this region, groups of population coming in from the south may have expanded over new hunting grounds opening in the north.

Quite surprising is the lack of connection of Sviderian Culture with the Mesolithic in Polish territories. L. Zotz’s theory telling the existence of a so-called Sviderio-Tardenoisien has so far not been confirmed in unmixed archaeological assemblages. Recently in Mesolithic assemblages of Kunda-Borki type, known in north-eastern Poland, certain typological references to Sviderian have been stated. But no such references are evident in the areas discussed in this article.

An interesting problem is the interrelation of Late Mesolithic Cultures with some early agricultural and livestock breeding Neolithic Cultures. We are till now short of determined materials able to clear the point. Oldest traces of soil cultivation in north-western Poland appear in pollen diagrams in the neighbourhood of Poznań and Szczecin. They should fall chronologically to the Younger Atlantic Period. Otherwise it is known that Late Mesolithic groups of populations living on fishing and hunting were further existing here. It seems certain that some personal contacts may have linked the latter with earliest settlers cultivating the soil. Such contacts may be proved by finding microliths made in semi-product, chipped off smoothed Neolithic axes, and moreover may be the fact of finding in Mesolithic assemblages poor — sort of fragmentary — Neolithic inventories, in the form of random pottery fragments and flint artefacts typical of Neolithic Cultures. Both these events have occurred in Mesolithic inventories of Smolno Wielkie 1, Sulechów distr.

The meeting of Late Mesolithic with Early Neolithic Cultures is sure to have occurred also in the area of north-western Poland. It must have been sudden and sharp, due to the differentiated character of the environment in those areas at that time. Natural conditions favoured the long-lasting stay of populations making their living on hunting and
Fig. 11. Mesolithic horn artefacts (1-4); Palaeolithic artefacts in horn and bone (5-6)

gathering, due to the thick forests, broken only by lots of rivers and lakes. But towards the east (Kujawy) the kind of soil favoured the growth of park-like forests and general advantageous conditions prompted the early development of agriculture. This was also the case in the land of today’s Pyrzyce, near Szczecin. A site of Linear Pottery Culture in Strzelce (Kujawy) suggests the date C14-4310 ± 60 B. C., which would mean a period
shortly after the middle of the Atlantic. Also a growing influence of groups cultivating the soil kept infiltrating at that time from the southern east, the south and from Central Poland.

In the Atlantic period a gathering Culture Ertebølle-Ellerbek developed in Denmark and north Germany. Neolithic elements are distinct here towards the end of the Atlantic period. The Ertebølle Culture finds a close correspondent in Lietzow Culture on the Island Rügen. There are

Fig. 12. Mesolithic artefacts in horn and bone
suppositions of its existence also farther to the east along the south Baltic coast. A discovery of sites belonging to this culture could clear some problems concerning the passing of Mesolithic peoples living on hunting and gathering in north-western Poland, to the new Neolithic model of agricultural economy. Unfortunately, the fact of large parts of the Baltic coast having sunken, due to the shifting of the sea mentioned at the beginning of this paper, caused that possible traces of that culture are today buried deep under water and inaccessible to investigation.

It can be assumed that the development of research in the territories of north-western Poland will provide archaeological information, presenting the course, time and character of historical processes marking the meeting of two culture models that led to the forming of Neolithic Cultures in the Lowland of Central Europe.

After giving a brief characteristic of Late Palaeolithic and Mesolithic Cultures in north-western Poland, we shall try to discuss shortly the so far acquired observations concerning inter-cultural contacts and certain facts from the field of economy, namely the ways of obtaining raw material and the question of exchange.

All the studies we can make use of today seem to indicate that the territories of north-western Poland, similarly as all the western parts of our country, were a field of mutual contacts between cultures lying to the west and east of these areas (fig. 13) in prehistorical times.

There is not much to say in this matter about periods earlier than the Younger Dryas. We know about culture waves drifting in here from the west, therefore Hamburgian and Post-Magdalenian Cultures with backed blades known in Poland, whose origin certainly was in western Europe. We do not, however, know any different cultures in the territories of central Poland (there is nothing to prove their existence) between the end of the Oldest Dryas up to Alleröd, that could have exerted their influence westward. The situation appears to have changed in the Younger Dryas. Culture influences from the west continue to be distinct here, but archaeological material certainly evidences also some activities spreading in the opposite direction.

The former are easily legible in the sites of Tarnowa Culture and also in sites having a high percent, or quite a majority of Ahrensburgian elements, as was said above. On the contrary, influences acting westward reach far out, to Brandenburg and even further. They are evident thanks to tanged points of Świder type, occurring in assemblages lying deep inside the geographical range of Ahrensburg Culture. Classical examples of these events are the sites of Münchenhofe, Kr. Strausberg and Berlin-Tegel in the Brandenburg countryside.

In Poland's north-western territories we have many sites containing
elements of western and eastern cultures from the Younger Dryas. Most interesting are the above mentioned Pomorsko 1, Sulechów distr., and a range of nearby situated sites, with the richest among them Wojnowo, or Januszkowo, Inowrocław distr., and others.

Influences of cultures inhabiting the West-European Lowland are also in the Mesolithic distinctly remarkable in north-western Poland’s archaeological material. A particular example of their occurrence are proto-axe family tools, proving the influence of a north-western European cycle of Mesolithic Culture, and Zonhoven type points that appear here, but are hardly known to the east of the area we are interested in.

The Mesolithic Cultures of north-western Poland are, despite their western elements, certainly typologically closest to middle Poland’s cultures of that time. They were there a zone of mutual cultural influence, acting in both directions — east and west.

This distinctly transient character of cultures in north-western Poland may be largely explained by palaeogeographic conditions. We have already mentioned that the area is latitudinally crossed by three Ice Marginal Valleys, linking north Germany and Denmark with the Vistula basin, therefore the whole of the middle and eastern Poland. The corridors of the Ice Marginal Valleys were not only beds of rivers offering convenient ways of communication, but were also an attractive field of economic activity for population groups living on hunting and gathering, with the exception of regions too damp for settlement only at the turn of Pleistocene and Holocene.

The advantage of settling in the valleys was due to the abundance of waters, rich in mineral substances, running down from the eminences forming ridges between the rivers. They assured exuberant vegetation and an intense growth of fauna resulting from the latter. The valleys certainly attracted primitive human groups and their shape and direction could also have suggested latitudinal migrations even at long distances.

The described phenomenon of waters bringing such profit to lower lying territories, is not the only advantage attracting settlement. We moreover note other reasons observed recently among peoples of the Late Palaeolithic and Mesolithic, in the areas of north-western Poland.

It has namely been stated 86 that settlements, particularly those of the Mesolitithic, were inclined to concentrate in certain places allured by the favourable environment, and in some cases because of additional natural advantages, one of which was the occurrence of an extremely necessary raw material — flint.

The most important so far discovered settlement concentrations are Poznań 1 and Mosina 2, situated to the south of Poznań, and to its west: Międzychód 3 and Wojnowo 4 (fig. 13). The concentrations 2 and 4 had
Fig. 13. Chief directions of cultural influence acting on the north-western areas of Poland in the Late Palaeolithic and Mesolithic. Concentrations of sites and the range of “chocolate” flint imports have been pointed out on the map.

probably chosen their sites attracted by favourable environment — items 1 and 3 had besides the first factor also flint.

May be that in the occurrence of concentrations certain changes in the type of settlement had played a role in the Mesolithic. Reindeer hunters of the Palaeolithic had to lead a completely nomad way of life, following the herds at long distances. Mesolithic peoples directed their migrations to limited regions, enclosing the basins of rivers and a few lakes. It seems possible that such was the region of the site concentration near Wojnowo.

In contradistinction to Ice Marginal Valleys, river beds and small lakelands, all eminences, ridges, outwash plains and very damp parts of land were carefully avoided by earliest settlement.

The four mentioned concentrations of settlement do not certainly give
their total number. Further field research is sure to discover dense settlement in the northern areas, till now only superficially investigated.

Recent research in north-western Poland has provided information concerning the manner of furnishing flint raw material among Palaeolithic and Mesolithic peoples.

The territories discussed here do not possess natural layers of flint known in prehistory. The only raw material accessible was the so-called Baltic cretaceous flint, occurring only as an erratic product, brought by ice transgressions from Scandinavia. Its lumps seldom reach a diameter of 20 cm. They lie in glacial clay, in layers a few meters thick. Providing lumps of flint in territories covered by exuberant vegetation, must have been very difficult.

Research carried out in the terraces of the Warta, several kilometers to the south of Poznań, allow to elucidate, to a certain degree, the origin of flint raw material used by the Stone Age population.

The investigated area lies in a section of the river Warta's valley, that crosses here the Poznań plateau. Geomorphological research indicated that the waters of the Warta had cut — during the river's forcing the gate — through the surface of the morainic plateau, therefore the sand-and-gravel submorainic series and the upper morainic clay. In the residues of the surface part of the morainic plateau washed out by the water, there was a certain percent of concretions of erratic flint. The concretions, too heavy to be washed out by the waters, remained in large quantities, together with other huge erratic rocks, on the surface of the highest river terrace visible till today and easy to find.

The described process had occurred during the Pomeranian Würm Stadial and ended the latest before the Younger Dryas, for we know archaeological sites of that period situated on the surface of a river terrace, shaped by the Warta and covered by erratic stones.

The particular abundance of lumps of erratic flint in this neighbourhood can be explained by the fact that the Warta, making here a sharp bend, had destroyed and sifted the material of a relatively big area of morainic territories.

In a section of the Warta's gate, about 7 km long, 47 sites of the Late Palaeolithic, the Mesolithic and the Neolithic have been found. No other section of the Warta's course in this countryside has shown a similar concentration of settlement. All the sites are exceptionally rich in flint materials and their considerable percent shows characteristics of "extracting" sites or flint workshops. Their inventories display such typical products as tools known from the "extracting" sites, numerous initial forms of pre-cores and cores in the first phase of processing; there is also a striking majority of cores and debitage over tools. It should be surmised
that the initial shaping of discovered lumps of flint had been accomplished in these sites and that they might also have been workshops producing blades, so as was the site of Poznań-Starołęka.32

This region rich in flint material had been exploited in prehistorical ages beginning with the end of the Late Palaeolithic, during the Mesolithic, Neolithic, and probably still at the beginning of the Bronze Age.

A similar, but by far not so well investigated region containing flint was probably the countryside of Międzychód, to the north-west of Poznań. Here also occur many lumps of erratic flint, washed out of the moraine and consequently archaeological sites, characteristic by their abundance of flint.

The quantity of flint lying on the surface is easily explained by the history of this region at the decline of the glacial period. Namely, in the Poznań Würm Stadium, subglacial rivers tearing underneath, had cut across the bottom of the deep Warta bed, that was existing already before the last glaciation. Their traces are the gutters of today's lakes, perpendicular to the river's valley. The active power of subglacial rivers is illustrated by the fact that, emerging out of the bottom of the Warta valley to the south, they could master an eminence up to 30 m high. The rivers broke through the moraine of the Poznań Stadium cutting it through and sifting the material. Lumps of erratic flint lying in great quantities on the surface together with other erratic rocks, often reach a diameter of 20 cm and are even today considered to be a good flint material.

Both the above examples indicate the sources from which the Palaeolithic and Mesolithic populations had drawn their valuable raw material in territories lacking natural deposits. It can be supposed that over the Lowland of north-western Poland there may have been more such sites, not investigated, however, yet.

But it was not only local erratic flint that the Late Palaeolithic and Mesolithic populations had exploited in the area under discussion. From the site of Tarnowa Culture, in the locality of the same name and from a few Sviderian sites, we know imports of "chocolate" flint, brought from the massive of the Upper Jura, lying along the northern border of the Świętokrzyskie Mountains.

Quarries of this perfect raw material occur here in a narrow belt, several scores of kilometers long and are nowhere else to be met.33

Imports of "chocolate" flint very rare in the Late Palaeolithic become frequent in the Mesolithic. In both cases, however, do they comprise only the eastern part of the area described in this article (fig. 13). To the west of the meridian running through Poznań we know till now only a single case of import of "chocolate" flint, and this is surprisingly far to the west, in Pomorsko 1, Sulechów distr., some 400 km from its natural
quarry. It is a blade from an opposed double platform core, typologically Palaeolithic. The import was found on the surface of a dune containing Younger Dryas as well as Early Holocene materials, so that its dating cannot be absolutely exact. It is certainly not later than the Mesolithic.

We do not, unfortunately have till now archaeological materials from the territories of north-western Poland that might throw light on social and ethnic relations among humans of the Late Palaeolithic and Mesolithic. The materials so far acquired certainly confirm theories known from territories of the vast European Lowland, that have been more thoroughly investigated.

The disposition and dimensions of floor-plans indicate a family consisting of several members that may have been the basic social structure unit. The concentration of sites in certain regions supports H. Schwabe-dissen's theory about the half-settled and trapper-like character of Mesolithic settlement, whose economic activity used to be limited to one middle-size region.

A certain novelty, helpful in the knowledge of economic bases of hunting and gathering societies are, it would seem, the results obtained in the research carried out in north-western Poland, on the manners and sources of acquiring flint raw material.

Poznań 1972.

NOTES

* In the present article as well as in all the others published in this volume the words "district" and "voivodship" pertain to administrative units existing before the Administration Reform of July 1974 in result of which districts were abolished. All the articles had been written and based on research carried out before the Reform. Since the former district capitals are greater towns the finding of a site would be easy.


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