ANTHROPOLOGIE • LIV/1 • pp. 21–28 • 2016

JACEK LECH, DAGMARA H. WERRA

ON ARTEFACTS FROM THE PREHISTORIC MINING FIELDS

ABSTRACT: A flint artefact acquires cognitive meaning both in view of the context in which it was discovered and recorded, and in view of the knowledge possessed by the researcher who is studying it. Therefore artefacts associated with prehistoric flint mines are also worth noting as they have meaning both as one of the categories of archaeological records and as an object of prehistoric explanation. Prehistoric mining fields have survived to the present day in various states of preservation. Kshemenisko and kshemenitsa are useful categories for characterising the ways in which flint specimens occur in prehistoric mining fields. Determining the nature of particular kshemeniskos and clusters (kshemenitsas) when carrying out a morphological analysis of the flint material they contain, provides the possibility of attributing them to one of the categories distinguished in the functional typology of mine features.

KEY WORDS: Flint mine – Workshops – Chipping floors – Poland

For many years now archaeology has been using the term artefact to denote all things that have in any way been transformed as a result of human activity (among others: Clarke 1968: 19, 665, Dunnell 1971: 117–118, 201, Binford 1972: 74–75). Drawing on this enormous stock of material, we only intend here to discuss chosen aspects of artefact occurrence within the space of prehistoric mining fields.

A flint artefact acquires cognitive meaning both in view of the context in which it was discovered and recorded, and in view of the knowledge possessed by the researcher who is studying it (see Dzieduszycka-Machnikowa, Lech 1976: 17–19). The significance of the same or similar flint products differs depending on whether they were found as an element of grave furnishings, as, for instance, in the grave from Janisławice, Skierniewice district (Chmielewska 1954, Cyrek 1978), or as part of a household assemblage (see Grygiel 1986), or else in the features and structures of a mining field (Lech 1981: 98–168, 1983). Therefore artefacts associated with prehistoric flint mines are also worth noting as they have meaning both as one of the categories of archaeological records and as an object of prehistoric explanations. Here we will only be discussing flint artefacts in the sense of archaeological records.

Received 17 November 2014; accepted 29 September 2015.

FLINT MINES AND ARTEFACTS

Prehistoric mining fields have survived to the present day in various states of preservation. Only a few are well or very well preserved – Grimes Graves (England), Krzemionki Opatowskie and Borownia (Poland), or Krumlovský les (The Czech Republic). The original prehistoric surface of most has been destroyed – Spiennes (Belgium), Polany, Tomaszów, Wierzbica "Zele" (Poland). Careful field surveys of the Wierzbica "Zele" site (*Figures 1, 2*), when confronted with analyses of flint material from excavations, indicate that even artefacts which occur on the surface of mining fields that have been ploughed for a long time remain in tangible relationships with the prehistoric structures located beneath the ploughed land (Młynarczyk 1983, Lech, Lech 1984, 1997). Precise documentation of flint artefacts occurring within the area of the Polany, site 2, mine of chocolate flint (*Figure 3*), directly under the ploughed layer, show similar correlations (Chmielewska 1988). The relationship between artefacts occurring directly under the ploughed layer, in the ploughed soil and on the surface of archaeological sites seem evident. In light of such observations, the precise recording of flint artefacts collected on the surface of mining sites is a useful, non-invasive method of initial identification and can be recommended for constant use.

In the case of the "Zele" mining field, recording the registered artefacts, that is those which were considered to be important bearers of archaeological information, on a plan (*Figure 1*), and then their analysis in an archaeological study, made it possible, among other things, to correctly differentiate the mining field and its surroundings according to the different types of flint knapping activities (*Figure 2*). This allowed us to immediately distinguish between the area of the site where flint workshops were located, and where axes had been produced in the early Bronze Age, and the area devoted to the production of a specific type of blade tool (*Figure 2: 1, 2*). The latter area was initially erroneously dated to the Neolithic but excavations and radiocarbon dating of the shafts later showed that the blade roughouts had been produced in the Late Bronze Age (Lech 1983: 64–66, Młynarczyk 1983: 90, 106–111, Lech, Lech 1984: 190–191, Lech *et al*. 2011).

FEATURES AND STRUCTURES

A characteristic feature of some mining fields is the occurrence of spatially separated aggregations of flint artefacts, whose origin is related to post-depositional processes, often to the last phase of filling up shaft depressions. Such aggregations were observed and recorded at Polany II, Sąspów (*Figures 3, 4b*) and elsewhere.

Kshemenisko and kshemenitsa

Excavations of the Sąspów and Bębło mines, Krakow district, carried out at the beginning of the 1970s, also revealed another, previously unknown type of spatially separated aggregations of flint artefacts. They were given the term ***krzemienisko*** - *kshemenisko* (Lech 1972: 39). These are concentrations of flints occurring usually just under the soil or, more rarely, lower down – in the fillings of features and forming a kind of tightly fitted "paving" of flint nodules and fragments of varying thickness, usually from over ten to about 30–40 centimetres (*Figure 4 a*). Depending on the type of feature, of which the *kshemenisko* is the remains, it consists mostly of natural nodules and fragments of artefacts which are the remains of flint knapping. The *kshemeniskos* vary in size from small (*Figure 4*: *kshemenisko* no. 5, 9) to extremely large (*Figure 4*: *kshemenisko* no. 1, 3, 4). *Kshemeniskos* lying in a thin layer are the remains of flint workshops in which there is a considerable share of nodules at various stages of preparation and large cores. This type of *kshemenisko* has usually preserved the unchanged, or only slightly changed, structure of the original workshop. Often these were workshops located in natural depressions of the terrain or in partially filled shafts. The *kshemenisko* of this type is usually small in area. Workshops on mining fields and nearby can also occur in the form of spatially separated, less compact aggregations of flint artefacts, containing a smaller proportion of large specimens. In Polish archaeological terminology they are referred to as ***krzemienica*** – *kshemenitsa* (see Schild *et al*. 1975: 208). In Poland such features dated to the Upper Palaeolithic occur at Piekary, Krakow district, and many dated to the Final Palaeolithic have been excavated and recorded in the central part of the Polish Jura (Morawski 1970, 1973, 1992, Ginter 1974).

Most *kshemeniskos* are the remains of the slow, lasting thousands of years, natural process of levelling of waste dumps lying at the mouths of shafts. The flint mined from open shafts and shallower exploitation pits in the Ojców Jura came from deposits of karstic clays which have been compared to *terra rosa*. Waste dumps near to the shafts consisted of this type of material, extracted from the shafts, and of flint nodules, natural flint rubble and flint artefacts. In the mines of the Ojców

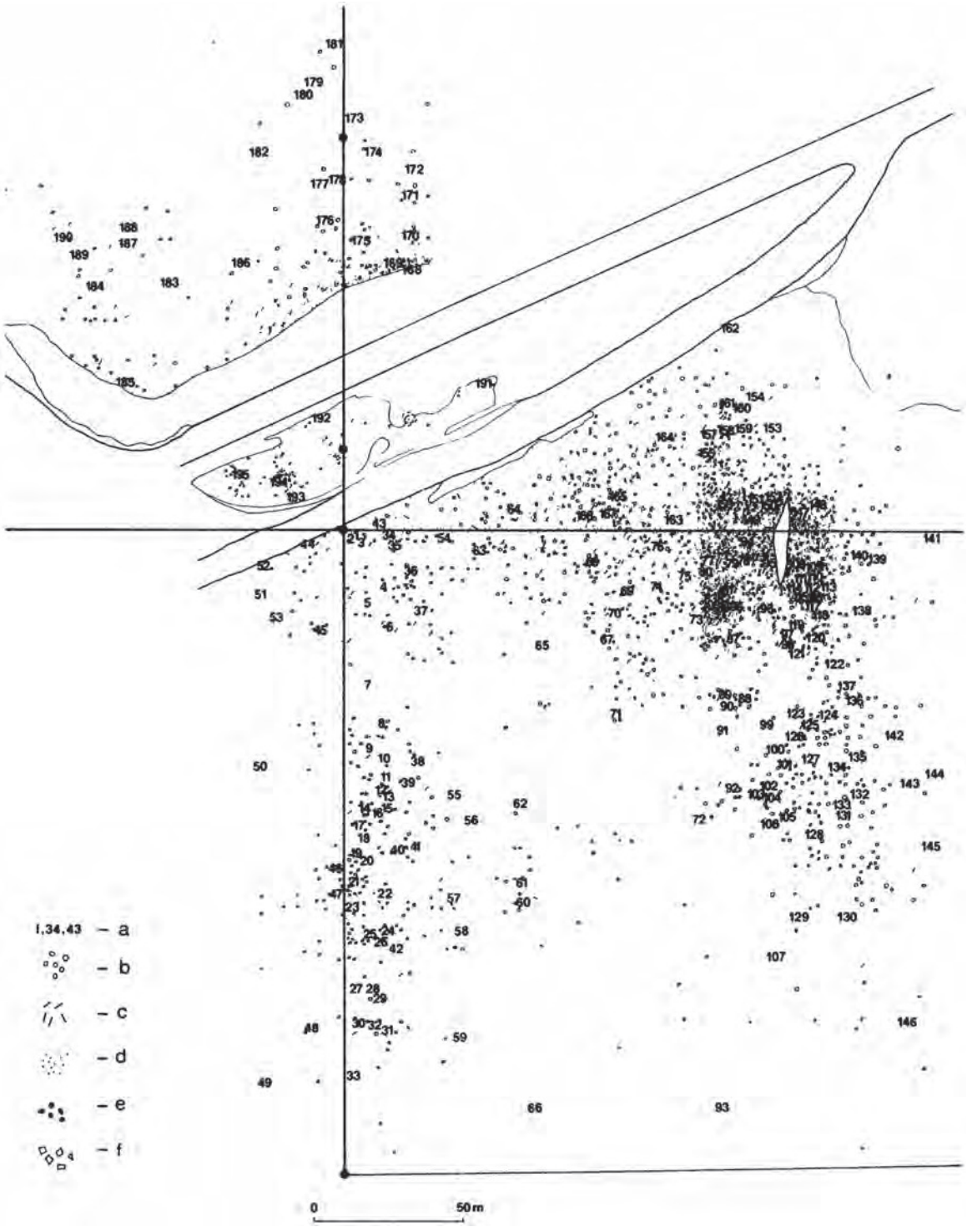

FIGURE 1. Wierzbica "Zele", Radom district. Flint mine. Distribution of archaeological founds on the surface of the site in autumn 1979: a, small finds; b, nodules and fragments with traces of initial treatment, pre-cores and early tool roughouts; c, blades and blade fragments; d, flakes and industrial waste; e, natural flint nodules and large fragments; f, limestone. After Lech, Lech (1984).

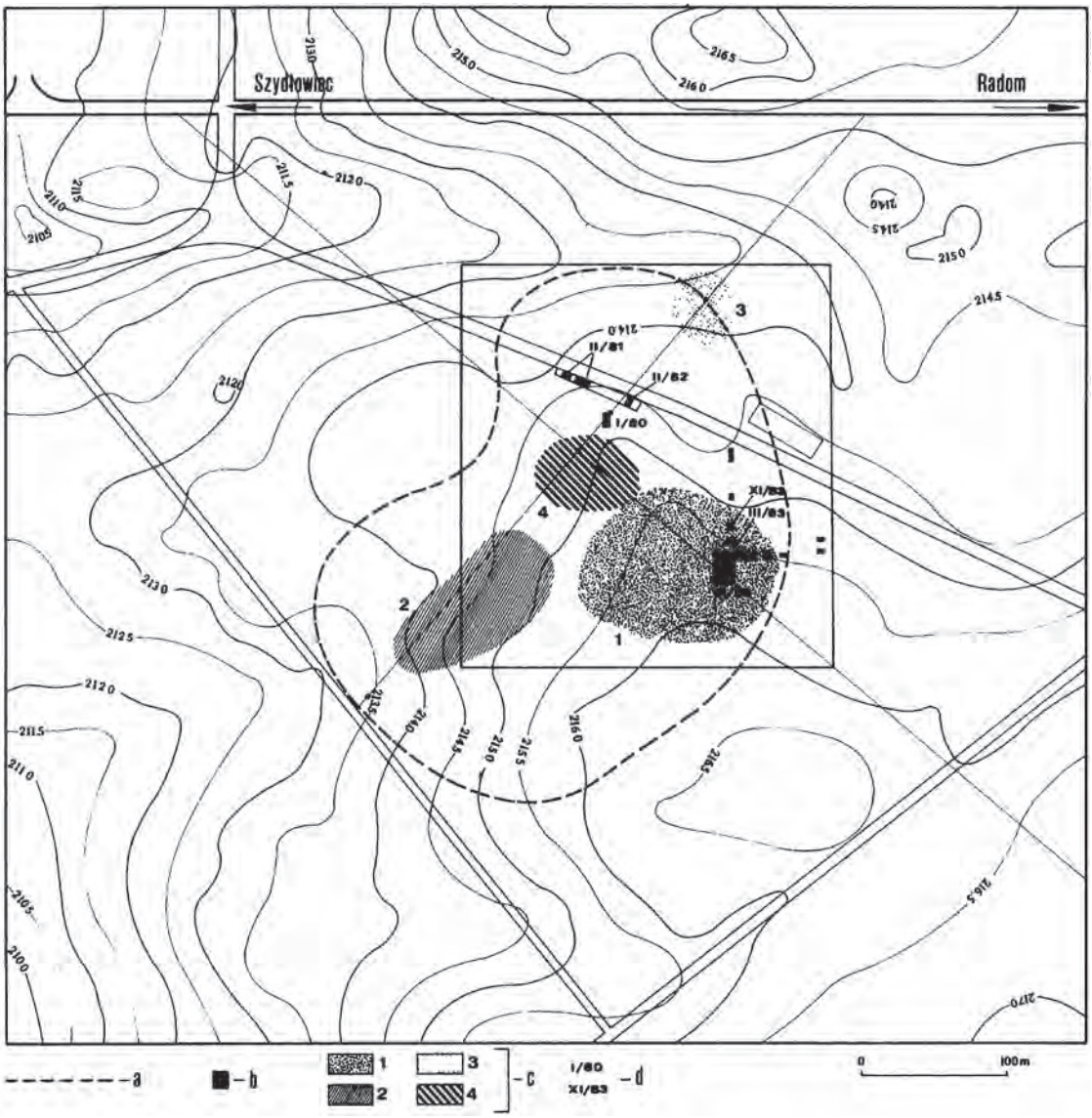

FIGURE 2. Wierzbica "Zele", Radom District. Flint mine. Map showing: a, the extent of the site; b, archaeological cuttings 1980–1983; c, differentiation of the surface material: area of frequent occurrence of cores, pre- cores, blades and fragments (1), area dominated by bifacial tool roughouts (2), Mesolithic finds unconnected with the mine (3), area with pieces flaked by bipolar technique (4); d, cuttings mentioned in the text. After Lech, Lech (1984)

Jura, in the waste dumps there was very little limestone gravel. Clay washed out over thousands of years from the dumps resulted in the formation of compact concentrations of flint nodules, pre-cores, cores and flakes appearing in archaeological excavations as a *kshemenisko*.

Kshemeniskos which were formed as a result of long-term levelling processes of the mine area are large, even several tens of square metres in area, and the largest – found at Sąspów – were over 100 m² (*Figure 4*: *kshemenisko* no. 3 and 4). Exploration of a layer 10 cm thick provided, from 1 m², as many as several thousand flint specimens, without chips, either mostly industrial or mostly natural, depending on the character of the whole *kshemenisko* or its part.

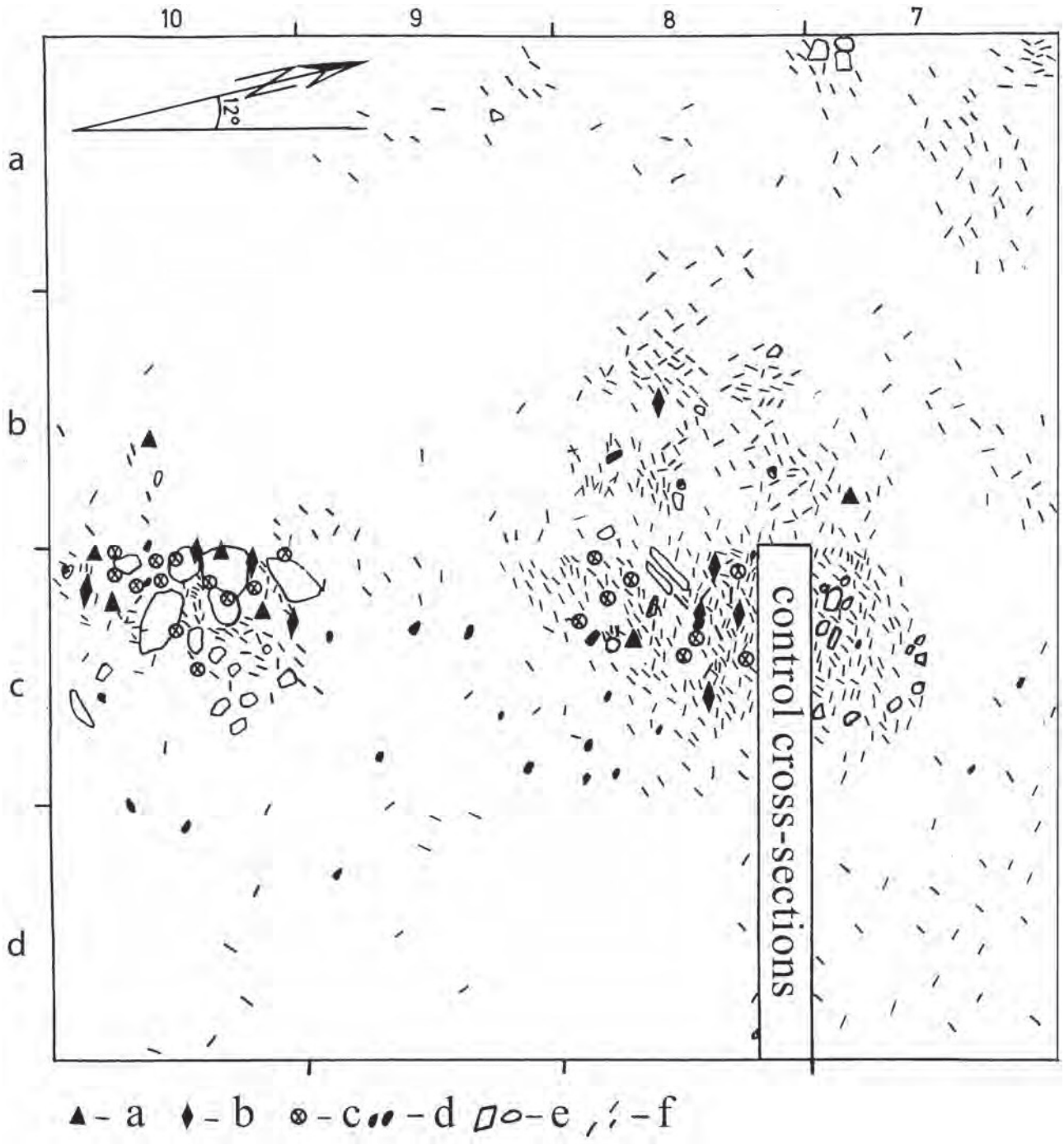

FIGURE 3. Polany, Radom district, Site II. Flint mine. A fragment of cut I/71 and I/72: a, initial worked bifacial forms; b, worked nodules; c, broken and natural nodules; d, erratic pebbles; e, fragments of limestone plates; f, flakes and small waste (also obtained by sieving). After M. Chmielewska (1988, Fig. 13) with changes.

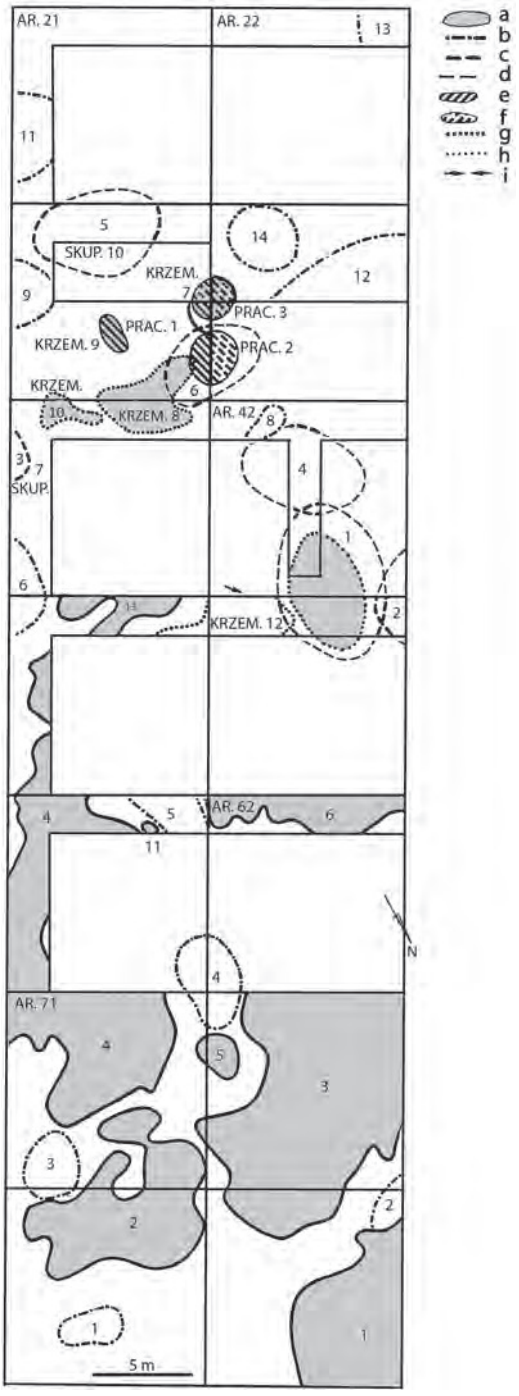

FIGURE 4. Sąspów, Cracow district, Site 1. Flint mine. Cutting I/1970: a, principal areas of concentration of flints (*kshemeniskos*); b, clusters (*kshemenitsas*); c, shaft walls; d, reconstructed shaft walls; e, flint processing workshops; f, reconstructed extent of flint processing workshops; g, shaft-head waste-heaps; h, reconstructed limits of shaft-head waste-heaps; I, location of cross-section of shaft no. 1 and portion of shaft no. 2. After Lech (1972) with changes.

Kshemenec

It should be stressed that a *kshemenisko* is not necessarily a concrete type of prehistoric feature. It is a category describing the manner in which flint material occurs and not a prehistoric category informing about the the place in culture of a prehistoric community. In spite of secondary transformation by natural factors, its origin is always related to the activity of human beings. This is what differentiates *kshemeniskos* from aggregations of the **krzemieniec** – *kshemenec* type, only seemingly identical to a *kshemenisko* (see Lech 1980: 178–181). **Krzemieniec** – *kshemenec* is a compact concentration of natural flint specimens in weathered clay, often occurring in the highest lying part of the Ojców Jura. In an archaeological trench or geological borehole they do not differ visually from a *kshemenisko*, but the structure is different. In the case of a *kshemenisko*, apart from the sometimes dominating proportion of debitage, its characteristic feature is that its occurrence is stratigrafically inconsistent with the source of the flint (deposit), e.g. occurrence of kshemenisko in loess. While outcrops of *kshemenec* are associated with carstic clays and other products of limestone weathering.

FINAL REMARKS

We can also observe clusters of individually occuring flint specimens which can be distinguished in spatial analysis (*Figure 4b*). In fact, such clusters correspond to what is understood under the term *kshemenitsa* (*Figure 4*: clusters 1, 3, 10, 14). The differentiation was imposed by practical needs during excavations of the mine at Sąspów in 1970 and is useful in the case of mine sites excavated in the Ojców Jura. *Kshemeniskos* were later found in Bębło and typical clusters or *kshemenitsa* were discovered during excavations of a raw material exploitation point in Czajowice, Krakow district, site I – on the border of the Ojców National Park. In the case of the *kshemenisko* at Bębło and the *kshemenitsa* at Czajowice, we are dealing with flint workshops which differ considerably in the amounts of accumulated artefacts. In Czajowice, the workshop material is accompanied by some scant remains of a camp, while at Bębło, by flint material from a levelled waste heap formed during extraction of raw material.

It appears that *kshemenisko, kshemenitsa,* and *kshemenec* are useful categories for characterising the ways in which flint specimens occur in prehistoric mining fields. Concentrations of flint material in the form of a *kshemenisko* were discovered at Spiennes in

2005 and widespread concentrations of artefacts in the form of *kshemenitsa* – chipping floors are known from Grimes Graves. At Grimes Graves the largest explored *kshemenitsa* (chipping floor 1972–1974) covered an area of over 70 m². It comprised over 250 thousand flint artefacts weighing over one ton, of which about half were chips of about 5–10 mm in size, obtained by sieving. At its thickest point, the layer of flint artefacts contained over eight thousand specimens (together with chips) from 1m². Floatation of the flint material from the *Camp-à-Cayaux* site at Spiennes revealed, for the first time, numerous fragments of tiny chips 2 mm in diameter, sand (1 mm in diameter) and flint dust (0.5 mm in diameter). They are characteristic for flint workshops explored *in situ* or almost *in situ* (Lech, Longworth 2000: 40–59, Collet *et al*. 2008: 62–65, Longworth *et al*. 2012: 86–91).

Determining the nature of particular *kshemeniskos* and clusters (*kshemenitsas*) when carrying out a morphological analysis of the flint material they contain, makes it possible to attribute them to one of the categories distinguished in the functional typology of mine features. In this type of research, comparative analysis of the structure of the examined assemblages and inventories plays an important role, while refits serve to study the techniques of flint knapping (Schild 1980, Lech 1981: 100–147, 1983, Fiedorczuk 2006, Lech, Longworth 2006, Longworth *et al*. 2012: 90–118). Contrary to doubts expressed in discussions taking place at the VII Flint Workshop SKAM in Poznań, in 2010, use of traseological analysis in the study of artefacts from mine sites is also helpful (Małecka-Kukawka, Werra 2011).

ACKNOWLEDGEMENT

The investigations were partly funded by the National Science Centre in Poland (PRELUDIUM 2; UMO-2011/03/N/HS3/03973).

REFERENCES

BINFORD L. R., 1972: *An Archaeological Perspective*. New York.

CHMIELEWSKA M., 1954: Grób kultury tardenoaskiej w Janisławicach, pow. Skierniewice. *Wiadomości Archeologiczne* 20, 1: 23–48.

CHMIELEWSKA M., 1988: The Early Bronze Age flint mine at site II, Polany, Radom district. *Przegląd Archeologiczny* 35: 139–181.

CLARKE D. L., 1968: *Analytical Archaeology*. London.

COLLET H., HAUZEUR A., LECH J., 2008: The prehistoric flint mining complex at Spiennes (Belgium) on the occasion of its discovery 140 years ago. In: P. Allard, F. Bostyn, F. Giligny, J. Lech (Eds.): *Flint Mining in Prehistoric Europe. Interpreting the archaeological records*. Pp. 41–77. BAR International Series 1891, Oxford.

CYREK K., 1978: Nieznane zabytki z grobu z Janisławic, woj. skierniewickie i nowe obserwacje nad tym zespołem. *Wiadomości Archeologiczne* 43, 2: 13–25.

DUNNELL R. C., 1971: *Systematics in Prehistory*. New York.

DZIEDUSZYCKA-MACHNIKOWA A., LECH J., 1976: *Neolityczne zespoły pracowniane z kopalni krzemienia w Sąspowie*. Polskie Badania Archeologiczne 19, Wrocław.

FIEDORCZUK J., 2006: *Final Paleolithic camp organization as seen from the perspective of lithic artifacts refitting*. Warszawa.

GINTER B., 1974: Wydobywanie, przetwórstwo i dystrybucja surowców krzemiennych w schyłkowym paleolicie północnej części Europy Środkowej. *Przegląd Archeologiczny* 22: 5–122.

GRYGIEL R., 1986: The household cluster as a fundamental social unit of the Lengyel culture in the Polish Lowlands. *Prace i Materiały Muzeum Archeologicznego i Etnograficznego w Łodzi. Seria Archeologiczna* 31(1984): 43–270.

LECH J., 1972: Odkrycie kopalni krzemienia na stanowisku I w Sąspowie, pow. Olkusz. *Sprawozdania Archeologiczne* 24: 37–47.

LECH J., 1980: Geologia krzemienia jurajskiego-podkrakowskiego na tle innych skał krzemionkowych. Wprowadzenie do badań z perspektywy archeologicznej. *Acta Archaeologica Carpathica* 20: 165–230.

LECH J., 1981: *Górnictwo krzemienia społeczności wczesnorolniczych na Wyżynie Krakowskiej. Koniec VI tysiąclecia – 1 połowa IV tysiąclecia p.n.e*. Wrocław.

LECH J., 1983: Flint mining among the early farming communities of Central Europe. Part II – The Basis of research into flint workshops. *Przegląd Archeologiczny* 30: 47–80.

LECH H., LECH J., 1984: The prehistoric flint mine at Wierzbica "Zele": a case study from Poland. *World Archaeology* 16, 2: 190–208.

LECH H., LECH J., 1997: Górnictwo krzemienia w epoce brązu i wczesnej epoce żelaza. Badania uroczyska "Zele" w Wierzbicy, woj. radomskie. In: J. Lech, D. Piotrowska (Eds.): *Z badań nad krzemieniarstwem epoki brązu i wczesnej epoki żelaza*. Pp. 95–113. Komitet Nauk Pra- i Protohistorycznych. Prace, t. 2, Warszawa.

LECH H., LECH J., ADAMCZAK K., WERRA D., 2011: Extraction methods in the Bronze Age at the Wierzbica "Zele" flint mine site (Central Poland): a model. In: M. Capote, S. Consuegra, P. Díaz-del-Río, X. Terradas (Eds.): *Proceedings of the 2nd Conference of the UISPP Commission on Flint Mining in Pre- and Protohistoric Times (Madrid, 14–17 October 2009)*. Pp. 109–116. BAR International Series 2260, Oxford.

LECH J., LONGWORTH I., 2000: Kopalnia krzemienia Grimes Graves w świetle nowych badań. *Przegląd Archeologiczny* 48: 19–73.

LECH J., LONGWORTH I., 2006: The Grimes Graves flint mine site in the light of two Late Neolithic workshop assemblages: a second approach. In. G. Körlin, G. Weisgerber (Eds.): *Stone Age - Mining Age*. Pp. 413–422. Bochum.

LONGWORTH I., VARNDELL G., LECH J., 2012: *Excavations at Grimes Graves, Norfolk 1972–1976. Fascicule 6: Exploration and excavation beyond the deep mines*. London.

MAŁECKA-KUKAWKA J., WERRA D. H., 2011: O możliwościach i ograniczeniach metody traseologicznej w badaniach masowych materiałów archeologicznych z kopalń krzemienia. *Archeologia Polski* 56: 135–164.

MŁYNARCZYK H., 1983: Wstępne wyniki badań kopalni krzemienia czekoladowego Wierzbica "Zele", woj. Radom, w latach 1979–1981. *Sprawozdania Archeologiczne* 35: 87–115.

MORAWSKI W., 1970: Piekary, pow. Kraków. Stanowisko II i IIa. *Informator Archeologiczny. Badania 1969 r.* Pp. 19–22. Warszawa.

MORAWSKI W., 1973: Piekary, pow. Kraków. *Informator Archeologiczny. Badania 1972 r.* Pp. 13–14. Warszawa.

MORAWSKI W., 1992: Kompleks stanowisk paleolitycznych w Piekarach. In. J. Lech, J. Partyka (Eds.): *Prof. Stefan Krukowski (1890–1982) – działalność archeologiczna i jej znaczenie dla nauki polskiej*. Pp. 163–172. Ojców.

SCHILD R., 1980: Introduction to dynamic technological analysis of chipped stone assemblages. In. R. Schild (Ed.): *Unconventional Archaeology. New approaches and goals in Polish archaeology*. Pp. 57–85. Wrocław.

SCHILD R., KRÓLIK H., MARCZAK M., 1975: *Późny mezolit. Próba wieloaspektowej analizy otwartych stanowisk piaskowych*. Wrocław.

Jacek Lech
Cardinal Stefan Wyszyński University in Warsaw
Institute of Archaeology
1/3, Wójcickiego Street, bud. 23
01-938 Warszawa
Poland
E-mail: flint.lech2@gmail.com

Dagmara H. Werra
Polish Academy of Sciences
Institute of Archaeology and Ethnology
105, Solidarności Avenue
00-140 Warszawa
Poland
E-mail: dagmarawerra@yahoo.com