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Between stronghold and village
Studies on plant economy of the Early Medieval Poznań

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The early medieval stronghold complex in Poznań closely connected with the beginnings of the Polish state, belonged to the main economic, military and cultural centers of an extra-regional importance in the territorial structure of the Early Piasts Monarchy (Fig. 1) (Kara 1998, 26). It was composed of multiplex settlement unit, surrounded by high earth-and-wooden defensive rampart structures, built in the first half of the 10th century (Kóčka-Krenz et al. 2004, 132) on a sandy island (Kaniecki 2005, 80) in the fork of Warta and Cybina rivers (Fig. 2). The settlement complex was favourably located in a defensive natural environmental setting as well as in relation to long-distance land and water transportation routes connecting the lands of Wielkopolska (Great Poland) with the neighbouring regions (Kurnatowscy 1996, 117 ff.; Kurnatowscy 1997, 69; Kurnatowska 2004, 78; Przybył 2005, 113). Within the stronghold's walls, wooden houses with accompanied economic constructions and monumental stone architecture which emphasized a special role of the stronghold (Józefowiczówna 1963; Kóčka-Krenz 2004b, Kóčka-Krenz 2005a; Kurnatowska et al. 2004) were built. The stone architecture was represented by the pre-Romanesque cathedra and the prince residence with a chapel funded by Dąbrówka. The stronghold itself was inhabited by wealthy people associated with a sovereign. The inhabitants dealt with military and administrative matters and participated in control of trade routs (Kara 1998, 27; Kara 2004, 297). Subsequent changes in system of defensive structures and configuration of the settlement complex made the Poznań stronghold the most powerful military center of the Wielkopolska region. The end of its military and economic role occurred in the second half of the 13th century due to shift of settlements and foundation of Poznań town on the left bank of Warta river.

Appearance of the Poznań stronghold and initiated by its ruler a purposeful colonization campaign (Kurnatowska 2004, 79) led to development of a broad settlement network (Fig. 3, 4) as its economic hinterland (Kurnatowska 1994, 63 ff.; Kurnatowska 1995, 136; Kurnatowska 1999, 55). The settlement pattern of the area was initially remarkably influenced by system of water transportation routs connected with Warta river and its tributaries. Later on, land routs became more important in shaping of the settlement pattern of the area (Kurnatowska 2004, 79). So far, 46 settlements, 6 graveyards, and 8 finds of treasure dated from mid 10th to mid 11th century were found in the settlement complex of the Poznań stronghold (Kaczmarek 2005, 46; Kurnatowska 2004, 78). The nearest villages were located at Śródka, Ostrówek, Komandoria, and Berdychów. Other villages as those discovered at Dominikańska street, Wszystkich Świętych street, and probably at Góra Przemysła (Przemysł Hill), were situated on the left bank of Warta river in the area of later location of the Poznań town. Some villages were located in the areas along the smaller Bogdanka river and on nearby lakes, along the stream Kopla and Warta river (settlements at Luboń, Umułtowo and Naramowice), in the area around Spławie, on Spławka river at Krzesinki and Spławie, as well as in areas along Główna river at Janikowo. For the period between second half of the 11th century to the mid of the 13th century, 121 settlement spots have been confirmed by archaeological survey.

The emerging territorial network enabled an efficient functioning and development of the early medieval stronghold complex at Ostrów Tumski in Poznań. The essential part of the economic hinterland formed open settlements of agricultural and handicraft character, obliged to participate in tribute and services for the stronghold. Due to non-agricultural character of the stronghold itself (Kurnatowska 1994, 63 ff.; Kurnatowska 1995, 133), of special importance were agriculture villages which peasants were responsible for maintenance and supply of food products (Kurnatowska 1994, 63 ff.; Kurnatowska 1999, 55) for inhabitants of the stronghold belonged to the social elite (Kara 1998, 27; Kara 2004, 297; Kurnatowska 2000, 106). Crop cultivation was the main source of

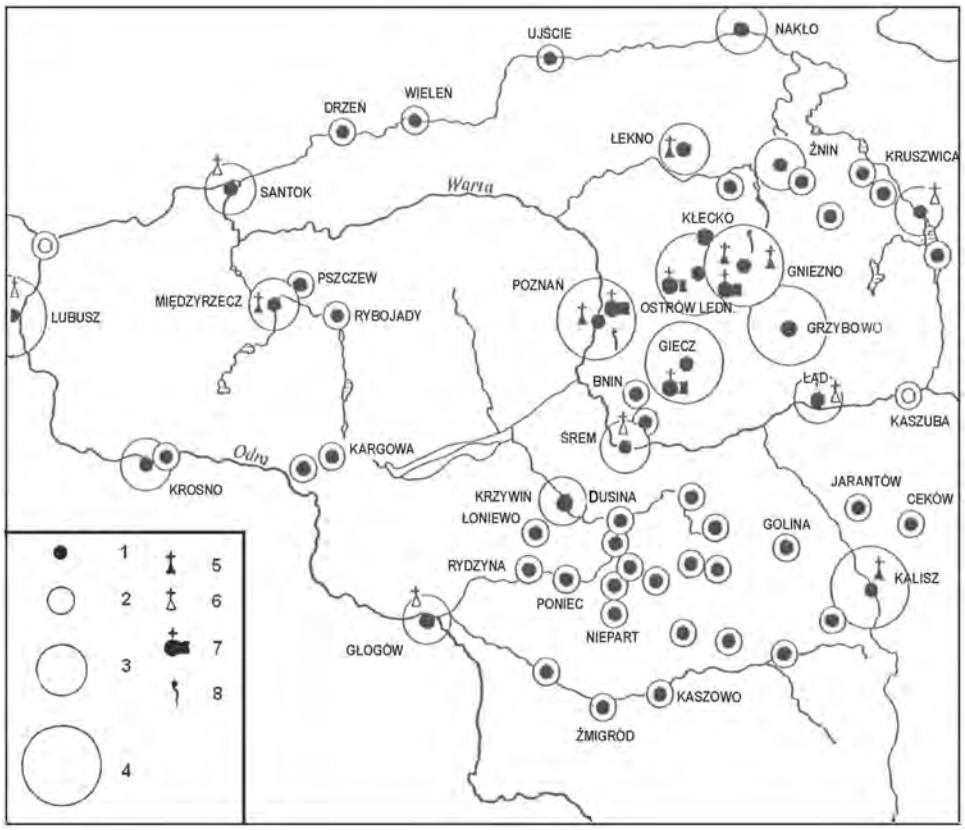

Fig. 1. Poznań in comparison with the other strongholds governed by the Piast dynasty. 1 – strongholds dated to the Piast dynasty times, 2 – minor local strongholds, 3 – strongholds of strategic importance, 4 – the most important strongholds in the state, 5 – existing or recovered remains of sacral architecture, 6 – suspected relicts of sacral architecture, 7 – existing or recovered palatial-sacral complex, 8 – archbishop or bishop capital (acc. to KURNATOWSKA 1994).

subsistence. Highly productive agricultural lands around Poznań must have been very suitable for husbandry development (BARTKOWSKI 1977, 23 ff.). In early settlement phase light wet alluvial soils predominantly occurred at low river terrace of Warta and its tributaries were utilized for agriculture practices. In later phase, heavier clay soils of morainic uplands were occupied, due to increasing needs for further field areas and restricted lands in river valleys (KURANTOWSKI 2000, 340). The farm products were delivered to the stronghold by local peasants as a tribute. The overall income from the tribute served for prince, members of church organization, and the military and administrative apparatus of the center (see MODZELEWSKI 2000, 81 ff.; MOŹDZIOCH 1990, 46 ff.).

The present paper provides a characteristic of plant husbandry in the early mediaeval Poznań settlement complex on the base of the subfossil macroscopic plant remains recovered during excavations carried out in the area of the stronghold. Due to poor recognition of rural settlements in the hinterland of the Poznań stronghold (KARA 2004, 279) palaeobotanical finds from those areas could not be taken into consideration.

Macroscopic plant remains have been used as basic source of evidence in studies on the early medieval economic structure of the Poznań settlement complex (KOSZAŁKA 2005c). Archaeobotanical analyses in the region (MOLDENHAWER 1939 – see fig. 5; KLICHOWSKA 1960, 1961, 1964, 1969, 1974; MOLDENHAWER & KLICHOWSKA table in: NIESIOŁOWSKA et al. 1960, 194 ff.; MOLDENHAWER & KLICHOWSKA table in: DYMACZEWSKI 1961, 200; KOSZAŁKA 2000, 2005a, 2005b), regularly carried out for many years along with archaeological excavations (DYMACZEWSKI 1961; HENSEL et al. 1959; KÓČKA-KRENZ 2000, 2001, 2002, 2003a, 2003b, 2004a, 2005a, 2005b; MALINOWSKA 1974; NIESIOŁOWSKA et al 1960; NOWAK 1974; PIECZYŃSKI 1963; WAWRZYNIAK 2002), provided a rich set of botanical finds from various parts of the stronghold. A substantial part of the recovered macroscopic botanic remains was associated with economic activity of the inhabitants and represented such groups as cultivated plants, wild plants gathered for economic purpose, plants used within the stronghold for consumption, medical treatment, handicraft and magic practices. The recovered diasporas represented mainly remains of agricultural products originated from villages in the economic hinterland of

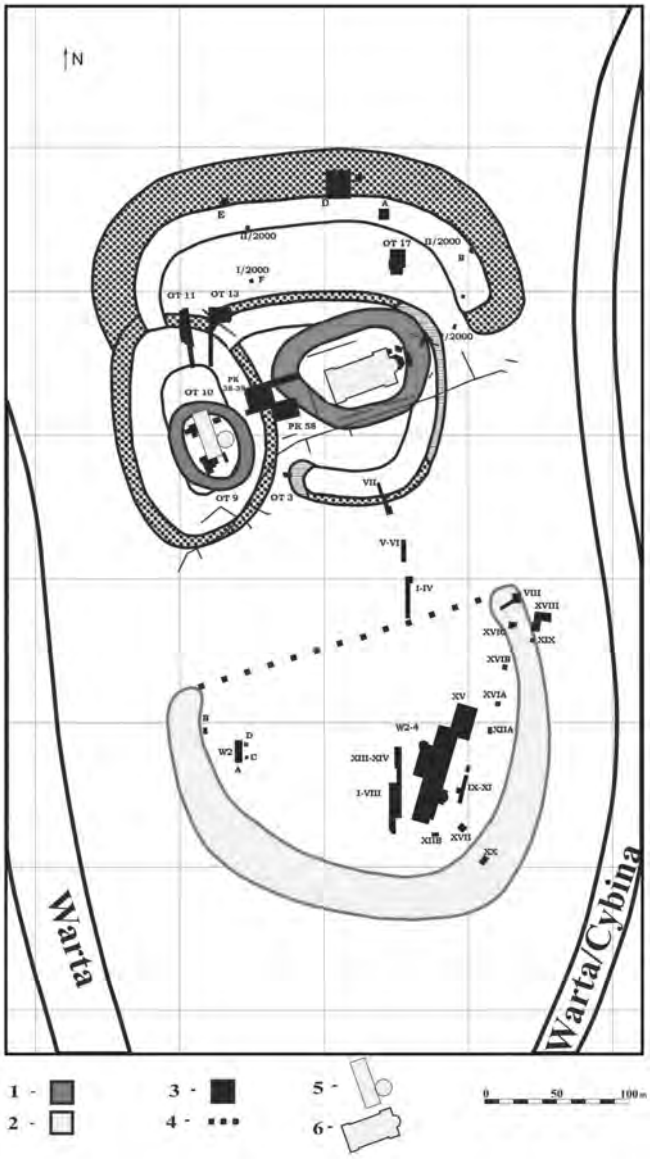

Fig. 2. Early medieval stronghold complex in Ostrów Tumski in Poznań. Explanations: 1 – stronghold, beginnig of the 10th cent. – third quarter of the 10th cent.; 2 – stronghold, second half of the 10th cent. to first half of the 11th cent.; 3 – excavated areas; 4 – hypothetical palisade; 5 – palatium; 6 – cathedral. Abbreviations: K 51-56 – cathedral; OA – Archbishop's Garden; OT 9/10, 13, 17 – Ostrów Tumski; PK 38-39, 58 – Cathedral Square; W2-4 – Wieżowa street (by Kurnatowska/Kara 2004).

the center at Ostrów Tumski. A part of plant resources might have been used for trade (see Kóčka-Krenz at al. 2004, 152). The analyzed botanical sources were recovered from various cultural layers and archaeological features. Their chronology and localization represent subsequent development phases of the stronghold (see Fig. 2).

Palaeobotanical studies showed out that cereal cultivation was decisively most important part of plant husbandry of the settlement complex. All of cultivated cereal genera of the early medieval times (Kiersnowski 1954; Wasylikowa et al. 1991) were recorded within the stronghold i.e. millet (*Panicum milliceum*), wheat (*Triticum aestivum, Triticum compactum, Triticum* sp.), rye (*Secale cereale*), barley (*Hordeum vulgare*) and oat (*Avena sativa*). The most abundant finds were represented by millet (*Panicum miliaceum*). The presence of cereals proved the knowledge of local societies on their cultivation. However, the archaeobotanical finds can be also used for some considerations on economic practices connected with cereal cultivation (Lityńska-Zając 2005; Wasylikowa 1983; 1994). Remains of cereals were found as charred deposits stored in wooden containers, storage pits, probably also in sacks and in a form of single scattered finds recovered from cultural layers.

The oldest and the richest cereal deposit discovered so far within the Poznań stronghold was that of millet excavated from the relicts of the former hut located at the estate Ostrów Tumski 9 (OT 9) (Koszałka

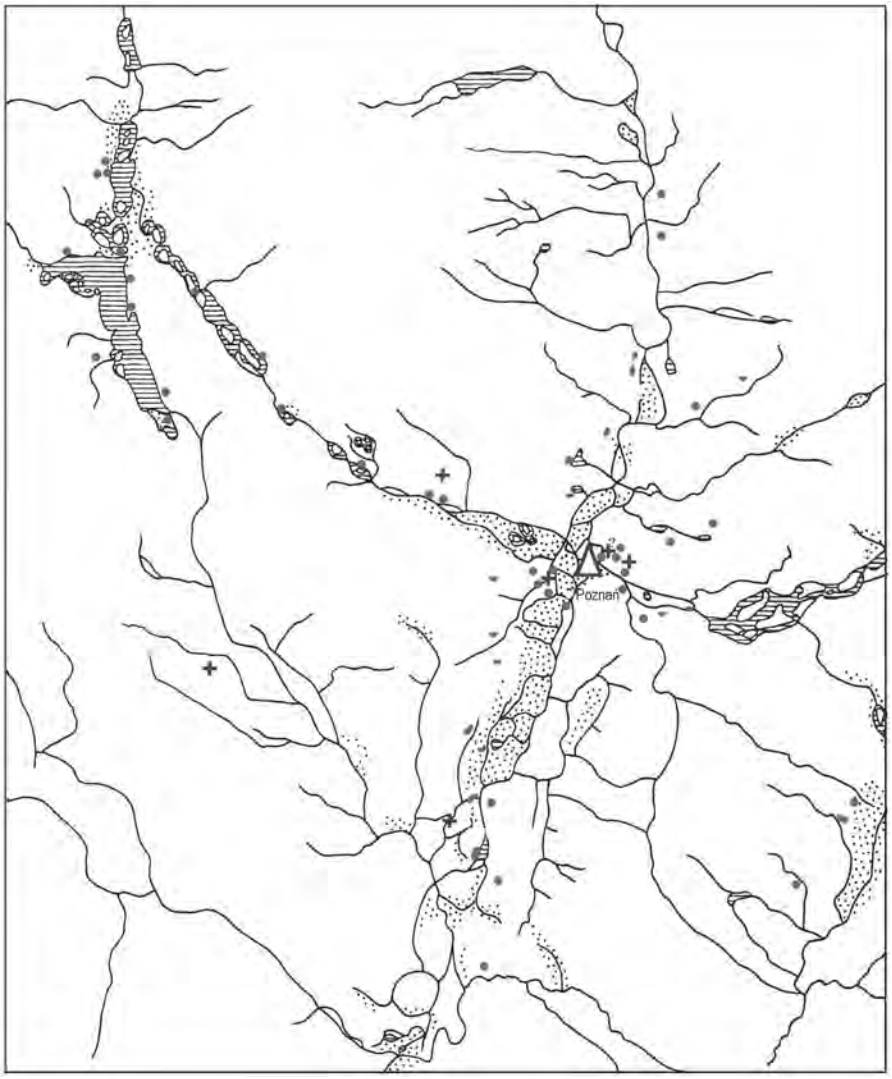

Fig. 3. Settlements around Poznań from about the middle of the 10th century till the middle of the 11th century (KACZMAREK 2005).

2005b, 83 ff.). The plant remains were deposited in a wooden container preserved in the sediments owing to catastrophic fire. Besides millet (*Panicum miliceum*) some cereals (Fig. 6) and numerous vegetal weeds were found. On the base of weed flora characteristic for the cultivated fields, it was possible to deduce about local conditions and methods of past cultivation. The results of macroscopic plant analyses showed that most of the recorded weeds were characteristic for fresh soils, rich or moderately poor. The soils can be classified as sandy-clayey or clayey-sandy soils of more or less neutral reaction. The presence such species as *Polygonum hydropiper* may indicate temporal wetter conditions on cultivated fields probably due to flooding.

Analysis of biological spectrum of the identified weed species showed out predominance of summer forms. Assuming that the discovered material represents monocultural deposit, a vast majority of the recorded species would accompany the millet cultivation. The following taxa have been attributed to summer forms: *Echinochloa crus-galli, Galeopsis ladanum*, *Polygonum persicaria*, *P. hydropiper*, *P. lapathifolium*, *P. minus*, *Setaria pumila*, *S. viridis/verticillata, Fallopia convolvulus*, *Lolium temulentum,* and *Chenopodium album*. These weeds represent predominantly high growing forms which may indirectly indicate cutting the millet higher above the ground. The presence of diaspores of perennial weeds as *Stachys palusris, Rumex acetosella*, *Plantago lanceolata* or *Plantago major* may indicate the use of fallow lands for millet cultivation (WASYLIKOWA 1983, 70).

A lump of charred barley grains *Hordeum vulgare* with a small admixture of millet *Panicum milliaceum* and weeds was recovered from a wooden hut remains of framework construction excavated in the basement of the cathedral church at Ostrów Tumski (K 51-56) with other numerous traces of a precedent settlement phase (JÓZEFOWICZÓWNA 1963, 195; PIECZYŃSKI 1963, 259). Nearby, in the same level of so called presacral layers, remains of wheat (*Triticum* sp.) were found (KLICHOWSKA 1964, 419 ff.).

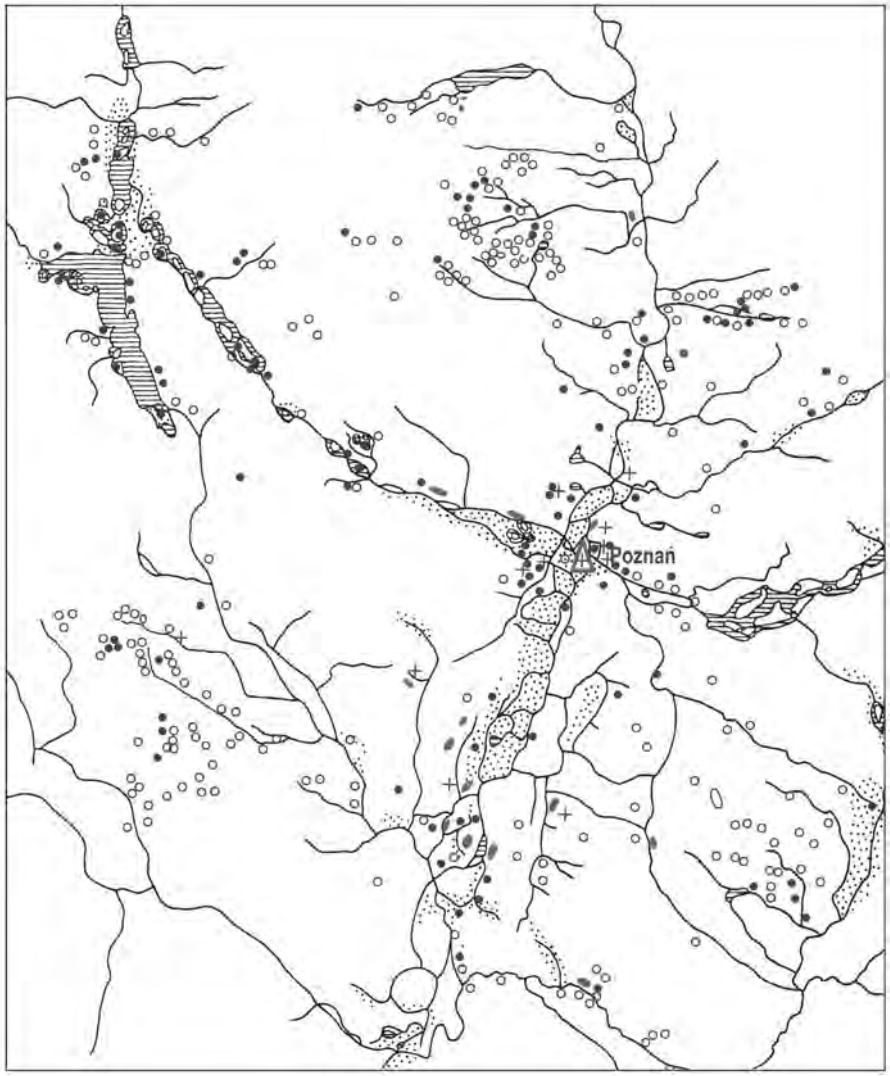

Fig. 4. Settlements around Poznań from the middle of the 11th century till the middle of the 13th century (Kaczmarek 2005).

Cereal crops were stored also beyond the walls of the stronghold at the spot of present Plac Katedralny (Cathedral Square) (PK 38-39; Hensel et al. 1959, 21). Archaeological excavations revealed in this place several oval pits (containers) of various size with walls covered with braiding (Fig. 7), used for storage of grain. In one case the pit was used for storage of peas. Similar storage features were discovered during later archaeological excavations (Malinowska 1974, 19 ff.). In one of the storage pits, covered with a layer of stones and interpreted as a container for cereals were grains of millet *Panicum miliaceum*, while in a flat-bottomed pit the seeds of broad bean *Vicia faba* were found (Klichowska 1960, 118; Klichowska 1974, 47 ff.). During the excavations at Cathedral Square (PK 38-39), numerous finds of millet grains *Panicum miliaceum* were discovered also inside a wooden hut. In this hut, around the stone hearth, charred remains of wheat *Triticum* sp. were recovered as well (Hensel et al. 1959, 32).

Many a time, the context of recovered cereals indicated their processing to obtain such products as flour, groats, flakes, fermented drinks and fodder. The most spectacular example was a find of millet grains scattered around a utensil for groats (Fig. 8, 9) processing excavated at Cathedral Square (PK 38-39). The utensil of remarkable size was firmly connected with wall of a hut (Fig. 10) and so, most probably used for mass production of millet products (Hensel et al. 1959, 32). The prepared in that way groats were used for cooking dense muck on an open fire or backing after previous boiling of groats. Late medieval written sources inform that boiled and dried in a own groats served for preparation of a simple semi-product for pouring water or milk over it to obtain nutritious soup, quick to prepare and useful especially during times of warfare (Dembińska 1978a, 291) .

Traces of cereal grains processing were also found in the southern part of the stronghold called Zagórze (Dymaczewski 1961, 141 ff.). Two excavated storage

Fig. 5. Macrofossil remains found on the site Cathedral Square 38-39 (PK 38-39) (MOLDENHAWER 1939).

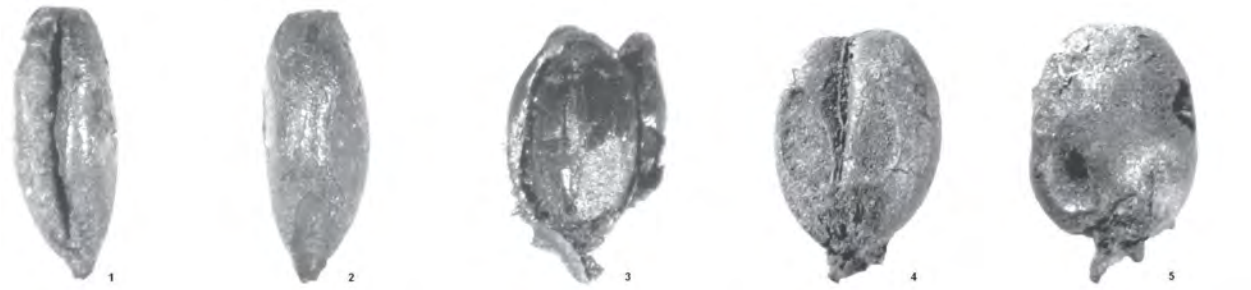

Fig. 6. Macrofossil remains found on the site OT 9/10 (KOSZAŁKA 2005b).

pits were interpreted by ethnographical analogies as oven (KARA 2000, 14). The context of this discovery and macroscopic plant remains suggest that the spot was used for cleaning and roasting cereal grains and for preparation of cereal meals as for instance baking cakes. One of the storage pits contained a fragment of clay roaster (Fig. 11) for roasting cake (possibly bread), cleaning cereal grains on a hearth and for roasting peas and cereal grains. This clay utensil was probably a large rectangular container around 7 cm deep with a flat bottom. The container was hand-made of ferruginous clay with admixture of coarse sand and plant debris, shaped by pressing technique. Along with the fragment of the utensil, seeds of *Galium spurium*, a common weed of cultivated fields, were found.

In the same part of the stronghold used for habitation and economic purposes, near the rampart constructions, accumulated remains of charred grains of wheat were found on a stone pavement covered with burnt organic remains (KARA 2000, 122 ff.). This archaeological feature was probably used for some economic purpose. Fragments of artifacts (Fig. 12) suggested that it was used as a spot for milling, cleaning and roasting of cereal grains. Presumably also for roasting fish and meat.

Stone-clay ovens, so called bread-ovens, were excavated at Zagórze (KARA 2000, 123). Probably constructed above the ground, the ovens had one domed chamber of oval shape. They were located inside the huts or close to exit of chambers placed extra to the corners of two neighboring houses of framework construction. The both houses had an adjacent damaged stone pavement. Between its stones, close to the houses, two used querns were found. By context, they resembled the former fragments of artifacts found near the rampart construction. What more, on the stone pavement, remains of charred grains of rye, peas and broad bean (as well as animal bone fragments and fish remains) were found.

The domed ovens become common along with improvement of breadstuff preparation with the use of starter (Dembińska 1978a, 289 ff.). Bread was most often made of mixed flour (rye, wheat and barley), rye flour or more refined of clear wheat flour. Ovens were also used for backing thinner cakes, prepared also in traditional way directly in open hearth. During periods of famine, the cereal flour was mixed with that made of vetch (*Vicia* sp.), millet (*Panicum miliaceum*), broad bean (*Vicia faba*) and even milled bark of trees.

An essential role in the early medieval economy of the stronghold played also vegetables, spices and technical plants, delivered most probably from nearby gardens. The use of these plants is documented by numerous remains of peas *Pisum sativum*, broad bean *Vicia faba*, turnip rape *Brassica rapa,* cabbage *Brassica* sp. and cucumber *Cucumis sativus*, as well as flax *Linum usitatissimum*, poppy *Papaver somniferum*, common hop *Humulus lupulus* and hemp *Cannabis sativa*. Their macroscopic remains were found in storage and processing spots. Containers for storage the seeds of leguminous plants, of analogue form as that for storage cereals, were found at Cathedral Square (PK 38-39; Hensel at al. 1959, 21; Malinowska 1974, 23). One of the pits contained remains of peas while in a braided container the remains of broad bean were recorded (Klichowska 1960, 118; Klichowska 1974, 47 ff.). Leguminous plants were the second staple food of those times beside cereals. Their seeds, often encountered in archaeobotanical materials, were valuable for the inhabitants for their high caloric and proteinous quality, and so for the high nourishing. From late medieval written sources and ethnographical analogues it can be deduced that one of the ways of their processing was, as in the case of peas *Pisum sativum*, crumbling or milling with the use of quern and storied in sacks. The prepared in that way powder was used afterwards with hot water to make in a quick time a dense soup (Dembińska 1978a, 291 ff.). Among the mentioned vegetable remains, a special attention should be devoted to the seeds of cucumber. These archaeobotanical finds indicate that *Cucumis sativus* was already in that time cultivated by local agriculturalists, what demanded a relatively high level of knowledge. Cucumbers were surely eaten as fresh vegetables, but also probably as pickled products. Probably also turnip (*Brassica rapa*), carrot (*Daucus carrota*) and parsnip (*Pastinaca sativa*) were consumed. These plants could have been planted as well as gathered from natural habitats.

Among technical plants, flax *Linum usitatissimum*, common hop *Humulus lupulus*, hemp *Cannabis sativa* and poppy *Papaver somniferum* were found. The recorded macroscopic remains of hop indicate presumably its

Fig. 7. Pit (container) covered with braiding used for storage of grain (Hensel at al. 1959).

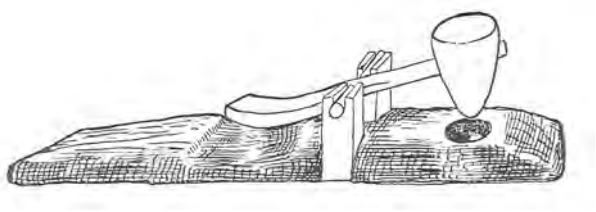

Fig. 8. Reconstruction of a wooden grain-crushing mill (Hensel 1958).

Fig. 9 and 10. Remains of a wooden grain-crushing mill propelled by foot used to produce groats (archive of IAE in Poznań).

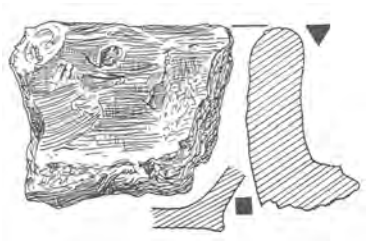

Fig. 11. Fragment of clay roaster (KARA 2000).

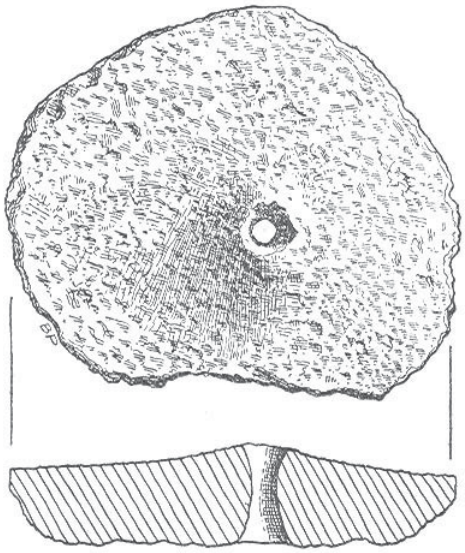

Fig. 12. Quern-stone (NIESIOŁOWSKA et al. 1960)

use as row material in brewing, and admixture for the production of mead and wine (MOSZYŃSKI 1967, 30).

Processing of flax and its use as a technical plant for textile production was confirmed by finds of harl of flax (KLICHOWSKA 1969, 457). They were discovered near a hut in the area of present Bishop's garden (OA; NOWAK 1974, 88 ff.). For the same purpose might have been used hemp (*Cannabis sativa*) which remains were found within the stronghold. Besides their use in textile production, the both plants served as a source of oil. Storage of the flax seeds most probably just for that purpose can be inferred from their presence in a wooden container, used subsequently for storage of millet (KOSZAŁKA 2005b, 83 ff.). Flax could have been used as well as an addition to another food or as a medicament (HENSEL 1987, 90 ff.; BONENBERG 1988, 97). Another oliferous plant was poppy. Its seed were used as well for consumption, to enrich flavor (DEMBIŃSKA 1963, 65) and especially for baked goods.

Very important components of the inhabitants' diet were fruits of trees and shrubs. High knowledge on orcharding can be deduced from the presence of pips of sour cherry (*Cerasus vulgaris*, *Cerasus fruticosa*), bird cherry (*Cerasus avium*), grapevine (*Vitis vinifera*), peach (*Persica vulgaris*) and plum (*Prunus domestica*, *Prunus domestica subsp. insititia*, *Prunus cerasifera*) (see Fig. 5). The presence of plant remains of peach and grapevine in the territories of Poland have special meaning as these two taxa need presently very careful cultivation due to high climatic demands. The early medieval period was however warmer and drier than it is presently (MARUSZCZAK 1999, 185). The grapevine cultivation was initiated in Poland along with the process of Christianization of the state. Vineyards were located mostly close to cloisters, churches and in princes' properties. The fruits were used for the production of sacramental wine and as a refined alcoholic beverage for wealthy elite. At first, the wine production was in hands of foreign specialists (see KURNATOWSKA 1999, 56) and relatively soon the knowledge on wine production was handed over to local inhabitants (HENSEL 1987, 96). Cultivation of grapevine in Poznań and activity of a group of people specializing in work in vineyard is the name of former servant village Winiary. Archaeobotanical finds of *Vitis vinifera* were reported from the early medieval Gniezno (JAROŃ 1939, 284) and Ostrów Lednicki (SCHUBERT 2000).

Gathering of wild plants during the early medieval times had already only a supplementary character, practiced to diversify the diet based on cultivated plants and farm animals (DEMBIŃSKA 1967, 88; TWARDOWSKA 1983, 219). Thus, the gathering had minor importance and its practicing was selective. Some most valuable wild plants were used commonly while during times of famine and disasters all the edible plants were probably gathered. Gathering was still yet a very important source of medical and technical plants as well as fodder for domesticated animals. In daily life, the gathering was practiced by women and children using knives, diggers, baskets and bags (HENSEL 1987, 159; MOSZYŃSKI 1967, 25, 36). In archaeobotanical materials from the Poznań stronghold, many species of gathering plants were registered. Not all of them where however found in quantities and context that could directly suggest their purposeful use. The nut of hazel (*Corylus avellana*) were encountered especially often as well as remains of such fruits as – red raspberry *Rubus idaeus*, dewberry *Rubus caesius* and wild strawberry *Fragaria vesca*. Numerous seeds of goosefoot *Chenopodium album* and various species of knotweed as *Fallopia convolvulus, Polygonum lapathifolium ssp. lapathifolium, Polygonum lapathifolium ssp. pallidum, Polygonum aviculare* were also noted. Ethnographical sources inform about use of knotweed species for preparing various kinds of groats (DEMBIŃSKA 1978c, 97). These groats of wild plants diversified daily diet and increased amount of plant food for the growing number of population. The leaves of goosefoot *Chenopodium album* served also

for preparation of meals as green soups. Plants used as flavor were also commonly gathered in natural habitats, for instance mustard *Sinapis arvensis*, mint *Mentha arvensis*, or oregano *Origanum vulgare*. Some plants might have been used as a substitute of salt – as plantain *Plantago* sp. or black nightshade *Solanum nigrum*.

The plants gathered from natural habitats served as well as important source of medicaments and raw materials for handicraft. As medical plants were presumably used *Achillea millefolium*, *Chelidonium majus*, *Plantago media*, *Plantago lanceolata*, *Prunella vulgaris* or *Valerianella dentata*. Among the plants of technical application as dyer's plants were reported *Centaurea cyanus, Hyoscyamus niger, Bidens tripartita, Sambucus nigra. Typha* sp. and *Phragmites australis* were used as building material for thatched roofs while mosses *Drepanocladus polycarpos* and *Drepanocladus sendtneri* as caulking for wooden walls of huts.

Numerous carpologic finds typical for meadows and pasturelands indicate that kind of habitats was intensively utilized in animal husbandry. In the analyzed fossil material, the following taxa had a remarkable representation: common yarrow *Achillea millefolium*, marsh thistle *Cirsium palustre*, meadowsweet *Filipendula ulmaria*, imperforate St John's-wort *Hypericum maculatum*, oxeye daisy *Leucanthemum vulgare*, ragged robin *Lychnis flos-cuculi*, common selfheal *Prunella vulgaris*, yellow-rattle *Rhinanthus minor*, common sorrel *Rumex acetosa,* wood club-rush *Scirpus sylvaticus*, marsh woundwort *Stachys palustris*, lesser stitchwort *Stellaria graminea*, marsh stitchwort *Stellaria palustris*, common meadow rue *Thalictrum flavum*, meadow rue *Thalictrum lucidum*.

Reconstruction of the plant economy of the Poznań settlement complex was based on plant macrofossil remains of cultivated species and used plants gathered in natural habitats, recovered from cultural layers and archaeological features of the stronghold at Ostrów Tumski in Poznań. Analyses of the material allowed drawing a preliminary evaluation of the agricultural areas around the stronghold. The subsistence of the local societies was based on cereals. Within the stronghold, the all known early medieval species were recorded: millet, wheat, rye, barley and oat. Their remains where found as numerous charred grains deposits, stored in wooden containers, pits and probably in sacks. Single scattered grains were also found in cultural layers. Context of their deposition indicated in some cases the processing of cereals (for instance, finds of cereal grains deposited around a wooden grain crushing mill propelled by foot and quern). The cereals were used mainly for flour products, groats, fermented drinks and fodder. Important role in the early medieval economy and consumption of the stronghold played as well vegetables, spices and technical plants derived most probably from local horticulture. The use pea, broad bean, cabbage and cucumber, as well as flax, poppy, hop and hemp. They were often found in a storage or processing spots. Important components of diet of the stronghold inhabitants were fruits of trees and shrubs. Developed knowledge on orcharding can be deduced from finds of pips of sour cheery, bird cheery, grapevine, peach and plum.

The main food products were supplemented by gathered wild plants. Especially common finds within the stronghold were those of hazel nuts, and fleshy fruits as red raspberry, dewberry and wild strawberry. The plants gathered from natural habitats were also an important source of medicaments and plant raw-materials used in handicraft. Numerous carpological finds of species associated with meadows and pastures proved intensive use of that kind of habitats for animal husbandry.

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