

BOŻENA and WOJCIECH DZIEDUSZYCKI (Poznań)

## SOCIO-ECONOMIC AND DEMOGRAPHIC TRANSFORMATIONS OF EARLY-URBAN KRUSZWICA AND ITS SUBSIDIARIES

We present — in the form of a thesis — the results of many-years of archaeological studies, conducted in some dozens of sites in Kruszwica and in the 200 sq. km belt around the Gopło lake. Archaeologic studies consisted of systematic, spatial excavations in Kruszwica and several rural settlements in the subsidiaries, as well as of precise surface penetration of these 200 sq. km. The intensity of these studies was prompted by the role played by Kuiavia, particularly Kruszwica, in the organizational system of the early Piast Monarchy. It was one of the several State centres fulfilling the role of *sedes regni principales*, the capital of the province, the seat of the Castellany, etc. With varying changes the centre existed in a region marked by intensive settlement in various periods, as a result of the specificity of the natural environment of Kuiavia. The factor attracting settlers were the fertile black soil, the deposits of salt and the well-developed hydrologic conditions of an interregional character. The axis around which the settlement concentrated was the Gopło lake, marked by numerous transgressions, noted already in archaeological stratifications from the 10th, 11th, and 13th centuries. The early-urban Kruszwica grew from older settling traditions. In the 6th to the 8th centuries several, mostly small, non-defensive settlements already existed here. The situation was analogous in the southern part of the Gopło shores.

The settlement potential of Kruszwica considerably increased in the 9th and first half of the 10th centuries, when a network of settlements arose, chiefly situated in the regions of passages, with a spacious, non-defensive central settlement. In the southern part of the area, around Mietlica, a more numerous settlement concentration developed, playing — presumably — a considerable role in the then contemporaneous tribal organization. In this period concentrations appeared in the central part of the region, consisting of two or three settlements. The population in the region under examination can be estimated at 710 people, living in 22 settlements. The sources at our disposal show that they were chiefly small settlements with only several homesteads.

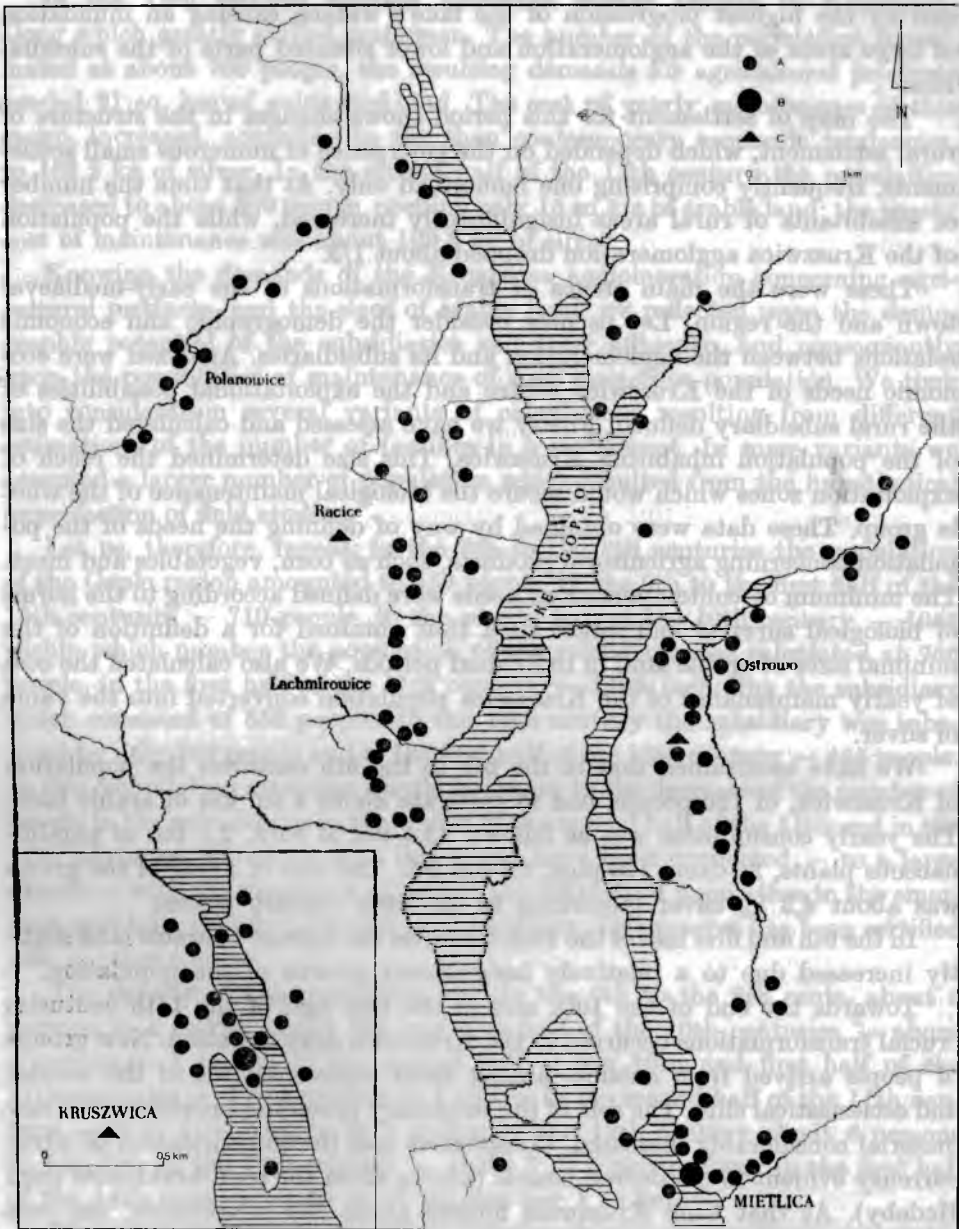
The period between on second half of the 10th century and beginning of the 11th, reveals a hitherto unheard of settling activization, manifested in

doubling of the number of settlements in relation to the previous phase. Only then the leading role of the Kruszwica concentration became evident. It was composed of a large, single-segmental stronghold, built in the 10th century in the area of the former, 9th century settlement. Alongside the stronghold four new settlements emerged. The Kruszwica agglomeration numbered then an estimated 550 people, and together with the other examined areas on the shores of the Gopło lake, the number of the population consisted of about 1405 individuals in 34 settlements. The map of settlements points out that in the course of the 10th and first half of the 11th centuries changes occurred in the structure of settling, with the arising of new, small settlement units, localized in smallish, isolated physiographic forms.

In the second half of the 11th century the ready-shaped Kruszwica agglomeration had nine open settlements and a stronghold, and was inhabited by about 800 people, which was about 60% of the whole population in the given area. It was a period of prosperity of Kruszwica, differing from other State centres, which rose up only slowly after some disturbances and a crisis of the Monarchy.

The Kruszwica centre was marked by planned and stable building, and within the agglomeration there existed three churches, among them the Cathedral. This period ended tragically due to dynastic struggles towards the end of the 11th century, the stronghold was devastated, and in its place an unfortified town arose. Despite considerable destruction Kruszwica rapidly rose again and in the 12th and the first half of the 13th centuries was an important productional, trade and administrative centre, with connections with western Europe, Pomerania and Ruthenia. In this period two churches were built, one of which was the Benedictine church. We estimate that in the 12th century the Kruszwica population amounted to about 700 people, inhabiting the town and six settlements.

In the second half of the 11th and in the 12th centuries the Gopło region was marked by other settlement regularities. Whereas in the first half of the 11th century 26 settlements existed here and 11 traces of short-lasting human penetration, in the second half of this century only 16 settlements and 10 such traces were found. In the 12th century the number of settlements dropped to 10. Simultaneously the number of population in the region considerably decreased, reaching estimations from the second half of the 10th century. A characteristic feature of rural settlement at that time was the short duration of human abodes and their lability. Also a characteristic phenomenon was the integration of settlements which formed large territorial concentrations. This was particularly evident in local communities of younger traditions, while the older communities distinctly decreased in number or even yielded to full decline in the course of the second half of the 11th century. This process particularly affected the Mietlica community which so far had shown substantial settlement resilience stressing the considerable significance of this centre towards the decline of the tribal era.



Settlement map from the early Middle Ages in the Goplo lake region

Further transformations in the Kruszwica agglomeration can be noticed in the second half of the 13th, and first half of the 14th centuries. In place of a non-defensive town a small stronghold arose burnt down at the end of the 13th century during dynastic struggles. The urban settlement moved to the western shores of the Goplo lake, which was — presumably — conditio-

ned by the highest progression of the lake's waters, causing an inundation of large areas of the agglomeration and lower situated parts of the subsidiaries.

The map of settlement for this period shows changes in the structure of rural settlement, which depended on the emergence of numerous small settlements, frequently comprising one homestead only. At that time the number of inhabitants of rural areas insignificantly increased, while the population of the Kruszwica agglomeration dropped about 1/3.

These were the main stages of transformations of the early-mediaeval town and the region. Let us now consider the demographic and economic relations between the agglomeration and its subsidiaries. Analysed were economic needs of the Kruszwica centre and the exploitative possibilities of the rural subsidiary defined. Firstly we have assessed and calculated the size of the population inhabiting Kruszwica. This size determined the reach of exploitation zones which would secure the biological maintenance of the whole group. These data were obtained by way of defining the needs of the population concerning agricultural products, such as corn, vegetables and meat. The minimum of contemporaneous needs were defined according to the norms of biological survival and initial data thus obtained for a definition of the minimal sizes of arable land in individual periods. We also calculated the cost of yearly maintenance of the Kruszwica population converted into the value of silver.

We have ascertained that in the 6th to the 8th centuries the population of Kruszwica, of 120 people, had to cultivate about 4 sq. km of arable land. The yearly consumption was as follows: 33,4 ton of corn, 2,1 ton of papilionaceous plants, 25 oxen, 120 pigs, 1,2 ton fish. The cost of living of the group was about 4,3 kg silver (according to the 10th century prices).

In the 9th and first half of the 10th centuries the acreage of arable land slightly increased due to a relatively insignificant growth of the population.

Towards the end of the 10th and in the first half of the 11th centuries crucial transformations occurred in the Kruszwica agglomeration. New groups of people arrived from outside, among them representatives of the secular and ecclesiastical elite. The role of the subsidiary providing provisions and raw material considerably increased. Conspicuous was the thesaurization of silver currency evident in discovered hoards (among them the semi-brakteates from Hedeby). At that time Kruszwica housed about 550 inhabitants, the cost of maintenance increased to 20 kg of silver, and 16,5 sq. km of arable land.

The demographic culminating point of the Kruszwica centre falls to the second half of the 11th century, the number of inhabitants being then about 800. Several factors influenced the increase of the population, among them the significant position of the centre, due to favourable political and economic circumstances. The maintenance of the population demanded an increase of the permanent arable land to 24 sq. km and the yearly value of the consumed goods rose to about 60 kg of silver.

In the 12th century western European monks arrived in Kruszwica, along which greatly skilled craftsmen. The number of the population is estimated at about 700 people, the resulting demands for agricultural products needed 21 sq. km of cultivated land. The cost of yearly maintenance of this group, increased, according to the then contemporary economic tendencies, to 102,2 kg of silver. In the second half of the 13th century the population decreased to about 500 people, needing only 15 sq.km of arable land; the yearly cost of maintenance was about 109,5 kg of silver.

Knowing the demands of the Kruszwica agglomeration concerning agricultural products, and the sizes of arable land, we reflected upon the demographic potential of the subsidiaries and their affluence, and consequently upon the possibilities of maintenance of such numerous population. We took into consideration several variants of calculations resulting from different estimations of the number of families in a settlement. In some variants we accepted a larger number of population which resulted from the hypothetical imperfection of field studies.

Let us, therefore, repeat; in the 6th to the 8th centuries the population of the Goplo region amounted to 450 people, in the 9th to the first half of the 10th centuries — 710 people, in the second half of the 10th century — 1050 within which number the population of the subsidiary was calculated at 750 people, in the first half of the 11th century — 1405, including the subsidiary which consisted of 855 people. In the 12th century the subsidiary was inhabited by only 360 people and in the first half of the 13th century — 455 people. In this compilation attention should be drawn to the decrease of the number of people in the subsidiaries in the course of the second half of the 11th and in the 12th centuries. We think that this might have been connected — to a large extent — with the migration of part of the hinterland population to the emerging, and later on reconstructed agglomeration. This process has been certified also in other sources.

The density of the population was: in the 6th to the 8th cents. about 3 persons to 1 sq.km; in the 9th and first half of the 10th centuries — about 4 persons to 1 sq.km; in the second half of the 10th and first half of the 11th centuries — 7 to 8 persons to 1 sq.km; in the second half of the 11th century — 6 to 7 — persons to 1 sq.km; in the 12th century about 6 persons to 1 sq.km; in the 13th century — about 7 — 8 persons; and in the first half of the 14th century — 10 to 11 persons per 1 sq.km.

The calculation of the size of exploitational zones in the Kruszwica region has proved that in the 6th to the 8th centuries it must have amounted — at the minimum — to 14 — 16 sq.km i.e. about 17% of land suitable for cultivation. In the second half of the 10th century the acreage of arable land increased to about 36%, one fourth of which provided for the demands of the emerging Kruszwica agglomeration. In the first half of the 11th century a further increase was noticed, reaching about 42 — 50%. That much should be cultivated in the second half of 11th century but a significant increase of

needs occurred and the cultivated land amounted to about 60%. Hence the demands of the Kruszwica agglomeration was a dominant element in the economy of the region. A similar direction of exploitation of the subsidiaries was perceptible also in the 12th century, when in the total sum of 32 — 34 sq.km, already about 67% served the Kruszwica inhabitants. In the first half of the 13th century the acreage of cultivation is estimated at about 50 sq.km, — 47% of which were designed for the Kruszwica centre. This tendency to a decrease of the amount of exploited fields in favour of the centre, was marked especially in the second half of the 13th century when cultivation covered about 70 sq.km of which 15 sq.km very necessary to provide for the Kruszwica inhabitants. It should be stressed here, that the potential arable area at that time was close to the maximal amount of land fit for farming.

In the context of the above given data we would like to consider the role of the subsidiary in the maintenance of early-Piast centres. Already in the second half of the 10th century settlements included into the Kruszwica agglomeration were not able to provide the indispensable amount of agricultural products and the overpressure of the subsidiary in favour of the centre was so extensive that we have accepted an earlier perfection of the agrotechnical methods, contrariwise to that mentioned in literature on the subject. We assume that in the first half of the 11th century, in Kujavia, the yield amounted to 6 q per hectare in the three-field system. Crops achieved at that time by the Kruszwica inhabitants, deducting the corn for sowing, amounted to 120 t, and the missing 100 t were provided by the subsidiary. For example, the load per person, from the subsidiary was 142 kg, and per homestead 900 kg, which was the yield from about 1,5 ha. Our calculations show that there was — already then — a certain surplus of corn, which might have been the foundation for the shaping local markets. Settlement analysis as well as demographic estimations of the Kruszwica region have shown the increase of the number of the population in the oldest phases of the early Middle Ages, and the increase ran relatively gradual. However, taking into consideration large sections of time in the older phases, and smaller ones in the younger, it can be ascertained that the process of increase of population in the second half of the 10th and first half of the 11th centuries, was characterized by considerably stronger dynamics than the simple statistic calculations shown. The first tendency to a decrease of the Kruszwica population was registered in the second half of the 11th century, and it was distinctly perceptible in the course of the 12th century. Increase of the population in the older phases of the early Middle Ages up to the mid-10th century, can be linked with natural demographic tendencies, while the increase, particularly in the first half of the 11th century, can be interpreted as the effect of conscious shifting of human groups in connection with the emerging State. Two phenomena might have occurred here: the first — of a greater significance — might be linked with the presumably purposeful transfer of population from the abo-

ve-mentioned concentration in the southern part of the region, which played a particularly important role in the 9th and 10th centuries. We know that in the period of emergence of the State frequent modifications occurred in older settlement structures, and the newly arisen centres were strengthened at the cost of older units. The second cause of demographic progress was a voluntary or compulsory colonization from more remote regions with a surplus of population. Of certain significans was also the arrival in Kruszwica of groups of people connected with the apparatus of secular and ecclesiastical authority.

The decrease in the population of the subsidiary in the 12th century can be linked with the arrival of part of the subsidiary inhabitants to the devastated agglomeration. We postulate — for the 13th century settlements — an increase of the population from 50 to 80 persons. Characteristic of this period is the progressive demographic trend approximately corresponding to processes occurring in the second half of the 10th and first half of the 11th centuries. For the second half of the 13th and first half of the 14th centuries we consider — in all probability — the estimation of the density of population at about 10 people per sq.km. This populational level was conditioned by the exploitational possibilities of the region, determined — at that time — by the productiveness of the applied agrotechnical systems and by the capacity of the hitherto occupied zones of the hinterland. We think — therefore — that older demographic estimations refering to Kuiavia — do not find any confirmation in the materials.

Demographic tendencies characterized above, were of considerable significance in the shaping of the economic image of the region. Its economic affluence was also determined by transformations in agrotechnics which conditioned a better output in agricultural production. It was only this factor which facilitated the maintenance of a great metropolies such as Kruszwica of the 11th and 12th centuries; smaller crops were such a great burden to the rural population of the subsidiary that agricultural production would not pay. These remarks do not exclude a partial provisioning of Kruszwica by more remote areas in the 13th century Castellany, they merely stress the potential agricultural possibilities of the subsidiary. Its exploitation, particularly in the youngest phases of the early Middle Ages were close to the maximal agricultural possibilities. An enlargement of the surface of arable land, especially in the second half of the 13th century was no more possible. The contemporaneous demographic progress asked therefore for an increase of agrarian productivity which could be achieved by way of socio-economic changes.

It should therefore be stated that the foundation of the existence of newly established Piast metropolies, was an efficient administration of the territories within the frames of administrative units which secured provisions for the inhabitants of the centres according to autarkical economy. The efficiency would depend — among other factors — on modifications of older demographic structures directed towards populating regions of particular importance in order to strengthen the economy. Stressed here should be the —

frequently underestimated — role of the subsidiary in shaping of the early-urban centres. Their existence and the more and more complex organizational stages depended — to a large extent — on the subsidiary. It should, therefore, be assumed that the decline of some centres, particularly those newly arisen on virgin lands, was connected — among other causes — with the weakness of the existing subsidiary and the lack of possibilities towards its modification within the frames of the existing structures of the establishment.

#### BIBLIOGRAPHY

- Chmielewski S., Dąbrowski H. 1964, *Rozwój gospodarstwa wiejskiego od połowy XII do XV w.*, in: *Zarys historii gospodarstwa wiejskiego w Polsce*, 1, Warszawa.
- Demińska M. 1963, *Konsumpcja żywnościowa w Polsce średniowiecznej (X - XIV w.)*, Wrocław.
- Dzieduszycka B. 1977, *Rejestr stanowisk w rejonie jeziora Gopla (woj. Bydgoszcz)*, Fontes Arch. Posn., 24, pp. 150 - 158.
- 1986, *Demographic and economic transformations in the area surrounding the Early Medieval Kruszwica*, Arch. Polona, 24, pp. 73 - 103.
- Dzieduszycki W. 1977, *Eksploatacja zasobów leśnych w rejonie wczesnośredniowiecznej Kruszwy*, Arch. Polski, 12/1, s. 137 - 169.
- 1982, *Wczesnomiejska ceramika kruszwicka w okresie od 2 połowy X w. do połowy XIV w.*, Wrocław — Warszawa — Kraków — Gdańsk — Łódź.
- 1984, *Socjotopograficzne przeobrażenia wczesnośredniowiecznych miast polskich (model kruszwicki)*, Kw. HKM, 32/1, pp. 3 - 21.
- Dzieduszycey B. W. 1985, *Osadnictwo wczesnośredniowieczne w rejonie Niecki Jezior Bnińskich*, in: *Materiały do studiów nad osadnictwem bnińskim*, 4, Poznań, pp. 141 - 197.
- Gieysztorowa I. 1963, *Badania nad historią zaludnienia Polski*, Kw. HKM, 11/3 - 4, pp. 523 - 562.
- Hensel W. 1960, *Najdawniejsze stolice Polski. Gniezno — Kruszwica — Poznań*, Warszawa.
- 1963, *Archeologia o początkach miast słowiańskich*, Wrocław.
- 1968, *W sprawie metody mikrogeograficznej w archeologii*, Spr. z posiedz. Kom. Nauk. PAN, 11/3, pp. 27 - 29.
- Hilczerówna Z. 1967, *Drzewce górnej i środkowej Obry od VI do początków XI w.*, Wrocław — Warszawa — Kraków.
- 1968, *Z badań nad zasiedleniem południowej Wielkopolski i Dolnego Śląska w starszych fazach wczesnego średniowiecza*, St. z dziejów osadn., 6, pp. 221 - 229.
- Jankowska D. 1980, *Szata roślinna okolic Gopla w późnym glacie i holocenie oraz wpływ osadnictwa na jej rozwój w świetle badań paleobotanicznych*, Prz. Arch., 27, pp. 5 - 41.
- Kowalska-Lewicka A. 1965, *Pożywienie chłopskie w średniowieczu i przydatność badań źródeł etnograficznych*, Kw. HKM., 13/4, pp. 755 - 766.
- Kurnatowski S. 1968, *Osadnictwo i jego rola w kształtowaniu się krajobrazu*, Folia Quaternaria, 29, pp. 183 - 197.
- 1971, *Rozwój zaludnienia Wielkopolski zachodniej we wczesnym średniowieczu i jego aspekty gospodarcze*, Arch. Polski, 16/2, pp. 465 - 482.
- 1975, *Wczesnośredniowieczny przełom gospodarczy w Wielkopolsce oraz jego konsekwencje krajobrazowe i demograficzne*, Arch. Polski, 20/1, pp. 145 - 160.

- Leśny J. 1976, *Ze studiów nad osadnictwem i dziejami Ziemi Pałuckiej we wczesnym średniowieczu*, Sl. Ant., 22, pp. 123 - 176.
- Ładogórski T. 1958, *Studia nad zabudnieniem Polski XIV wieku*, Wrocław.
- Łowmiański H. 1953, *Podstawy gospodarcze formowania się państw słowiańskich*, Warszawa.
- 1967, 1970, 1973, *Początki Polski*, 3, 4, 5, Warszawa.
- Maurizio A. 1926, *Pożywienie roślinne i rolnictwo w rozwoju dziejowym*, Warszawa.
- Modzelewski K. 1975, *Organizacja gospodarcza państwa piastowskiego X - XIII wiek*, Wrocław — Warszawa — Kraków — Gdańsk.
- Podwińska Z. 1964, *Gospodarstwo wiejskie w okresie wczesnofeudalnym (V w. — początek XIX w.)*, in: *Zarys historii gospodarstwa wiejskiego w Polsce*, 1, Warszawa.
- 1971, *Zmiany form osadnictwa wiejskiego na ziemiach polskich we wczesnym średniowieczu. Żreb, wieś, opole*. Wrocław — Warszawa — Kraków — Gdańsk.
- Trawkowski S. 1959, *Gospodarka wielkiej własności cysterskiej na Dolnym Śląsku w XIII wieku*, Warszawa.
- Tymieniecki K. 1956, *Majętność książęca w Zagościu i pierwotne uposażenie klasztoru Joannitów na tle osadnictwa w dorzeczu Dolnej Nidy, Studium z dziejów gospodarczych XII w.*, in: *Pisma wybrane*, Warszawa, pp. 37 - 126.
- Żabiński Z. 1959, *Biologiczny wskaźnik siły nabywczej pieniądza*, Roczniki Dziejów Społ. i Gosp., 20, pp. 147 - 196.
- 1981, *Systemy pieniężne na ziemiach polskich*, Wrocław — Warszawa — Kraków — Łódź — Gdańsk.