

ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN—POLONIA

VOL. XXXIX, 7

SECTIO B

1984

Rzecznańska Stacja Naukowa, Zakład Geografii Fizycznej Wydziału Biologii i Nauk o Ziemi
UMCS w Lublinie
Instytut Geologiczny w Warszawie

Jan BURACZYŃSKI, Jerzy BUTRYM,
Jan RZECHOWSKI, Józef WOJTANOWICZ

**Loess Stratigraphy of the Wożuczyn Profile on the Grzęda Sokalska
Based on Thermoluminescence Method Data**

Stratygrafia lessów profilu Wożuczyn na Grzędzie Sokalskiej
na podstawie datowań metodą termoluminescencji

Стратиграфия лессов профиля Вожучин на Сокальской гряде
датированная методом термолуминисценции

INTRODUCTION

Using of thermoluminescence method (TL) in the direct dating of the loess profiles accomplish more exact definition of their stratigraphy and chronology. Such studies were undertaken for the loess covers of the Lublin Upland. Based on TL dating loess chronology of the Niele dew profile was elaborated (Butrym, Maruszczak 1983). This profile, considered as typical (Mojski 1965), gains a peculiar significance in the light of these studies.

Eight TL datings were performed for the Wożuczyn profile in Thermoluminescence Laboratory of the Department of Physical Geography of Maria Skłodowska-Curie University in Lublin. The data were obtained in the range of 308,800—17,500 years B.P., for the loesses of Saalian and Vistulian glaciations.

There are many interesting from stratigraphic point of view profiles, elaborated for the Grzęda Sokalska region, such as Ratyczów, Steniatyn, Tyszowce (Buraczyński, Wojtanowicz 1975, Buraczyński, Rzechowski, Wojtanowicz 1978, Wojtanowicz, Buraczyński 1978), Komarów (Maruszczak 1974). For the Wołyń

Upland region, extending to the West from the Grzęda Sokalska, Bogucki described some important profiles i.e. Horochów and Korszów (Bogucki 1972, Bogucki, Morozowa 1981, Bogucki et al. 1975).

PROFILE LOCALIZATION

The Wozuczyn profile is localized in the western part of the Grzęda Sokalska, 5 km from its northern border, within the Wozuczyn Hummock. The profile is exposed in a brick-yard, on the left slope of paralleled dry valley in the Huczwa basin (Fig. 1). Actually exploited and investigated brick-yard wall lies on the southern slope of the dry valley. In its upper part of profile has a height of 233 m a.s.l. The neighbouring plateaus reach up to 250 m a.s.l. There are three descriptions of the profile (Fig. 2): from 1970—71 (Buraczyński, Wojtanowicz 1975), 1977 and 1980. The localization of these profiles within the brick-yard is presented in the Fig. 1c. The synthetic litho-stratigraphical profile was constructed (Fig. 3).

STRATIGRAPHY AND CHRONOLOGY

The loesses lie on the clay decomposed cretaceous rock, at the top of which the soil of rendzina type appears (52% CaCO_3). It is characterized by a large contents Al_2O_3 (15.2%) and Fe_2O_3 (4.5%), higher than for decomposed rock and overlaying loesses.

The loesses of the Wozuczyn profile originate from the last two glacial periods; the older loess from the Middle Polish Glaciation (Saalian) and the younger loess from the North Polish Glaciation (Vistulian).

THE OLDER LOESS (SAALIAN)

For the older loess four TL data in the range of 308,800 to 131,000 years B.P. were obtained. These data however do not define the beginning nor the end of the sedimentation because studied sediments do not originate from the base nor from the top. At the average rate of sedimentation of the aeolian dust 0.5—0.25 mm/year, the beginning of the older loess sedimentation should be withdrawn to 315,000—321,000 years B.P. The end of the sedimentation ought to be moved to 128,000—125,000 years B.P., to the beginning of the Eemian Interglacial. Distinguished from the Nieledeu profile, for which the top of the older loess was dated

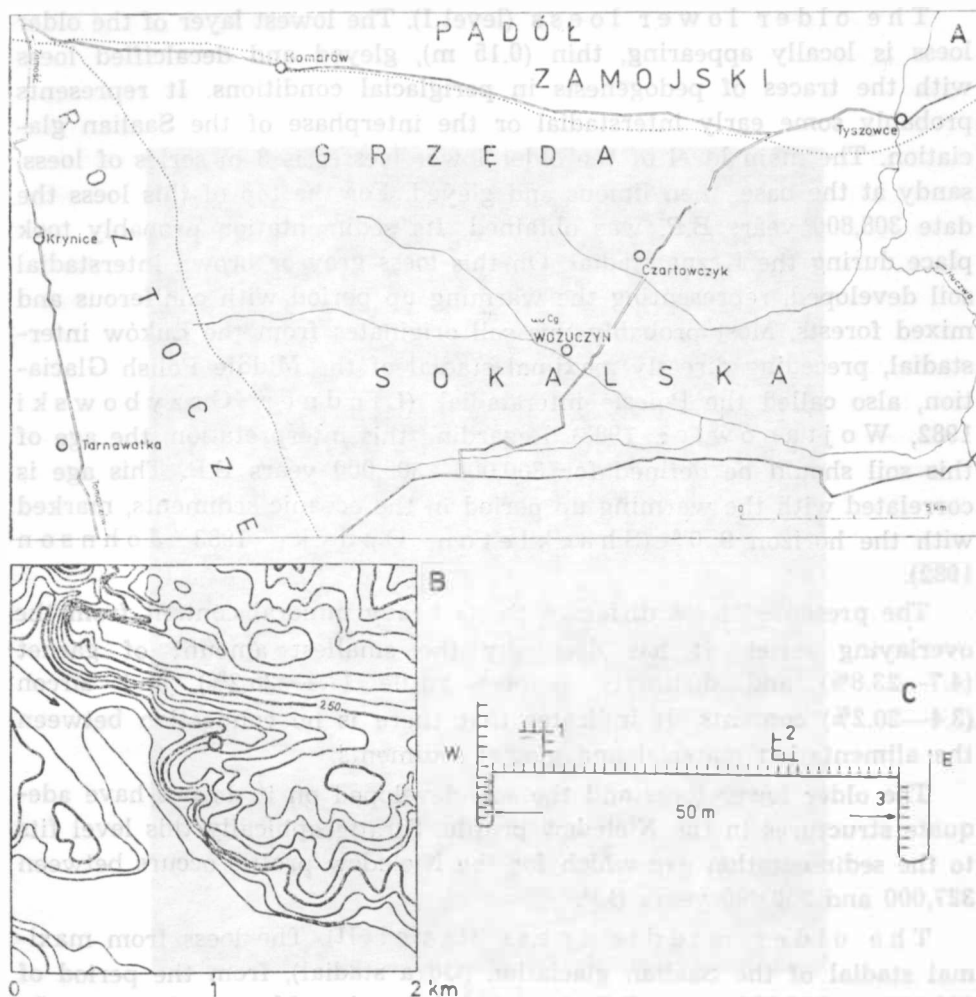


Fig. 1. Localization of Woźuczyn brick-yard: A — situation sketch, B — hipsometry, contour interval 5 m, C — localization of examined profiles in the wall: 1 — profile from 1970—71, 2 — profile from 1977, 3 — profile from 1980

Położenie cegielni Woźuczyn: A — szkic sytuacyjny, B — hipsometria, poziomice co 5 m, C — położenie profili dokumentowanych: 1 — profil z 1970—71 r., 2 — profil z 1977 r., 3 — profil z 1980 r.

for 148,000 years B.P. (Butrym, Maruszczak 1983), the older upper loess in the Woźuczyn profile seems to have a full profile.

The older loess of the Woźuczyn profile can be divided into at least five levels with four soil horizons in different evolution stages and of different stratigraphic rank. With reference to Jersak's (1973) and Maruszczak's (1980) stratigraphic schemes, the older loess can be divided into three parts: lower, middle and upper.

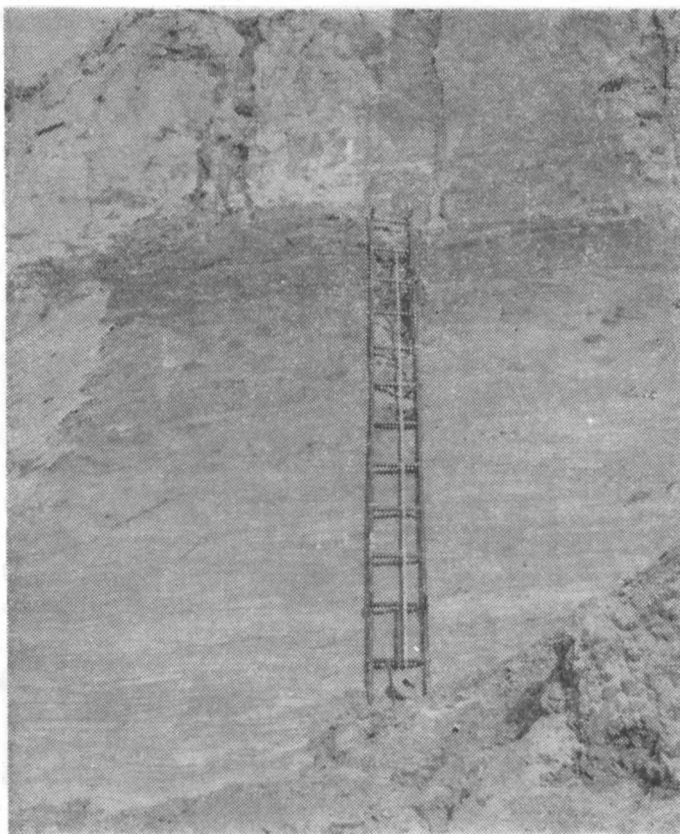
The older lower loess (level I). The lowest layer of the older loess is locally appearing, thin (0.15 m), gleyed and decalcified loess with the traces of pedogenesis in periglacial conditions. It represents probably some early interstadial or the interphase of the Saalian glaciation. The main level of the older lower loesses is 3 m series of loess, sandy at the base, then limous and gleyed. For the top of this loess the date 308,800 years B.P. was obtained. Its sedimentation probably took place during the Krzna stadial. On this loess gray or brown interstadial soil developed, representing the warming up period with coniferous and mixed forests. Most probably this soil originates from the Łuków interstadial, preceding directly maximal stadial of the Middle Polish Glaciation, also called the Polesie interstadial (Lindner, Grzybowski 1982, Wojtanowicz 1983). Regarding this interpretation, the age of this soil should be defined for 300,000—305,000 years B.P. This age is correlated with the warming up period in the oceanic sediments, marked with the horizon 9 0¹⁸ (Shackleton, Opdyke 1983, Johnson 1982).

The presented loess differs with its heavy mineral content from the overlaying series. It has decidedly the smallest amount of garnet (4.7—23.8%) and distinctly highest rutile (7.4—25.2%) and zircon (3.4—20.2%) contents. It indicates that there is no connection between the alimantation material and glacial sediments.

The older lower loess and the soil developed on it do not have adequate structures in the Niele dew profile. Stratigraphically this level fits to the sedimentation gap which for the Niele dew profile occurs between 327,000 and 300,000 years B.P.

The older middle loess (level II). The loess from maximal stadial of the Saalian glaciation (Odra stadial), from the period of 300,000 to 230,000 years B.P. is counted for the older middle loess. In Wózuczyn, differently from Odonów, Niele dew and Ratyczów profiles, the older middle loess is strongly reduced, to 0.8—1.4 m. There appears only the upper part of the series, dated for 232,700 years B.P. In the Niele dew profile this loess has a full series of 4.1 m thickness, from the period of 300,000 to 234,000 years B.P. (Butrym, Maruszczak 1983).

The complex of two soils is developed on the older middle loess in Wózuczyn. Those are: lower thicker, brown forest soil and upper very thin steppe soil, degraded chernozem. The age of this complex is exactly the same as for upper chernozem soil in the Niele dew profile. It originated on the loess dated for 232,700 years B.P., and before 197,000 years B.P., during the Lublin interstadial. The lower chernozem soil in Nie-

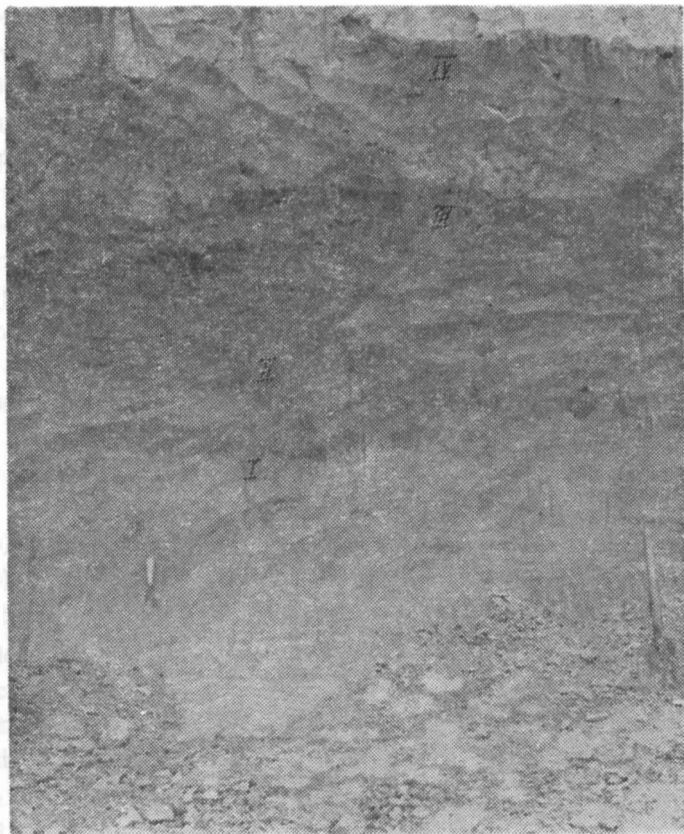


Fot. 1

In the Wierzyty profile the older upper zone which is mostly a sandstone, was divided into three units. They are well separated by horizontal structures between the levels. The upper part of the Wierzyty profile can be compared to the clay shales and sandstones with a lot of calcareous concretions (1971, pages 12-14) and Baryczka of the same age. These profiles are fundamental for the stratigraphy of the Miocene in the area of the Wierzyty.

The lower level (III) is the clay shales and sandstones. It is consistent with Jurek's (1971) opinion about

J. Buraczyński, J. Butrym, J. Rzechowski, J. Wojtanowicz



Fot. 2

ledew is about 260,000 years B.P. (Butrym, Maruszczak 1983). Similar soils were found in the Korszów profile on the Wołyń Upland, where well formed soil complex was observed. It was composed of lower brown forest soil and upper chernozem soil (Bogucki et al. 1980). Bone dating suggests that upper soil in Korszów has the same age as Nielelew and Woźuczyn soils (Wysoczański—Minkowicz, personal information). The Korszów soil complex can be compared with the Tomaszów soil complex in Poland (Jersak 1976). From our point of view it includes also the upper chernozem which according to Jersak belongs to the Warta stadial.

Soil complex in Komarów, the chernozem in Nielelew and the similar structures in Korszów and Tomaszów soil complexes appeared in the interstadial warming up period, called in Poland 'Lublin interstadial' (Środoń 1969, Jersak 1973, 1977, Lindner, Grzybowski 1982). The existence of the Lublin interstadial is confirmed not only by loess profiles but also by the profiles of the fossil lake sediments within the area of the Middle Polish Glaciation. They developed in the Polichna profile in the period between 239,600 and 207,000 years B.P. (Buraczyński, Butrym, Wojtanowicz, in press) and in the Marianka profile from 237,000 to 204,000 years B.P. (Wojtanowicz 1983). In the oceanic sediments, the horizon 7 0¹⁸ with maximum at 220,000 to 230,000 years B.P. is adequate to this warming up period (Johnson 1982).

The older upper loess (levels III, IV, V). It is the same age as a long Warta stadial. For the top of this series the dates 197,000 years B.P. in Woźuczyn and 221,300 years B.P. in Nielelew were obtained. For the profiles of the lake sediments from lower Warta the following dates were obtained: in Polichna 207,000 years B.P. (Buraczyński, Butrym, Wojtanowicz 1982) and in Marianka 204,000 years B.P. (Wojtanowicz 1983). The upper border of these loesses, dated on 128,000—125,000 years B.P. was discussed in the introduction to this chapter.

In the Woźuczyn profile the older upper loess which is mostly carbonated, can be divided into three levels. There are soil horizons and periglacial structures between the levels. The older loess of the Woźuczyn profile can be compared as for the shape and thickness with some parts of Odonów (Jersak 1977, layers 11—16) and Ratyczów (Buraczyński, Rzechowski, Wojtanowicz 1978, series IV) profiles. These profiles are fundamental for the stratigraphy of the Warta stadial.

The lower level (III) is the clay, gleyed loess representing wet loess facies. It is consistent with Jersak's (1973) opinion about the conditions of the older loess' sedimentation in the Małopolska Upland

and the Lublin Upland. At the top of this loess the tundra, pseudogley soil developed with humus traces, which was the subjects of the solifluction process. With regard to typology it can be compared with Ratyczów type soil (Komorniki) although it represents more severe conditions (humid and cold) and probably also the shorter development period. Similar type of soil occurs also in the Małopolska Upland (in Odonów layer 13, Jersak 1977) and on the Wołyń Upland (Bogucki, personal information).

The middle level (IV) is the loess with wavy bands, slightly wet at the bottom with numerous halobolites. Its surface is erosive with a big frost wedges. At the top of the level IV the loess is gleyed and it has numerous roots canals filled up with carbonate. These facts indicate the gap in the sedimentation, the short erosion period with weakly marked soil process. The gleyed soil can be compared to layer 15 in the Odonów profile (Jersak 1977).

The upper level (V) is represented by the loess with distinct bands, at the lower part carbonated with the calcareous concretion. At the upper part it is considerably changed by pedogenesis, related to the interglacial soil.

More precise definition of the Warta stadial chronology needs more dense distribution of absolute datings in the described key profiles. For now we can present comparative chronology, regarding a great conformity of the climatic rhythms in the loess profiles with the rhythms in the oceanic sediments. Within a big cooling down period during the Warta stadial, represented by phase 6 in the oceanic sediments profiles, two distinct coolness minima are confirmed. According to Johnson's O^{18} curve, they occurred at 195,000 and 155,000 years B.P. There was a warming up period between them, with two maxima at 170,000 and 180,000 B.P. years.

NIETULISKO SOIL COMPLEX (EEMIAN-BRČRUP)

Well identified Eemian soil, characteristic for European loess areas, in the Wozuczyn profile can be placed between the dates 131,000 and 53,000 years B.P. It confirms the connection of the main fossil with Nietulisko type soils (Horochow, Mezin). In the Wozuczyn brick-yard it is erosively cut down. In some of the profile walls one can observe only the reduced illuvium with humus delluvia (Fig. 2). In the exposition 2 from 1977 (Fig. 2) almost full profile of the soil complex was found. Appearing in a few levels the frost wedges accomplish penetration into the structure and stratigraphy of this soil. The oldest generation of the periglacial structures (a) is a crack frost contraction, filled up with hu-

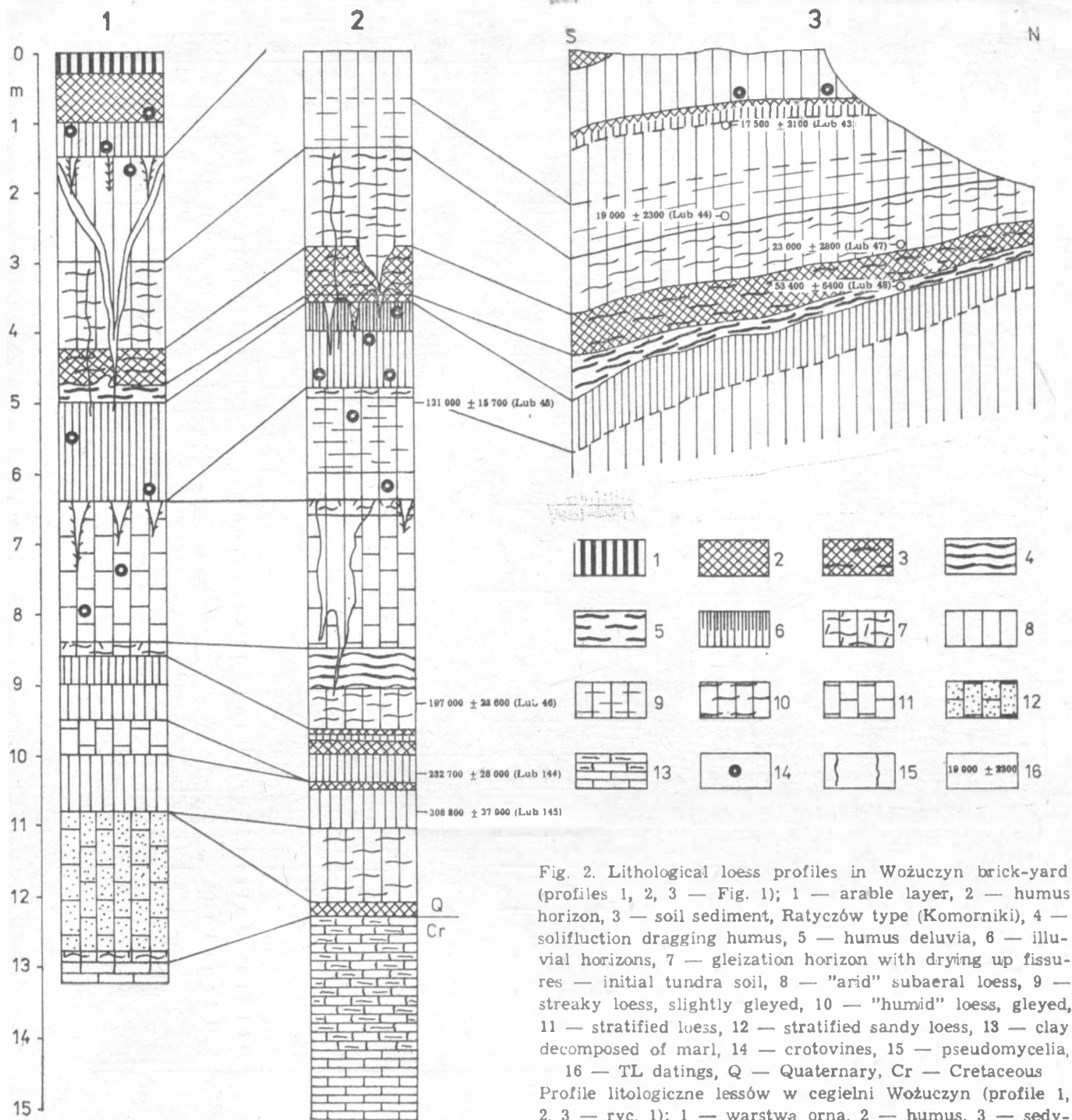


Fig. 2. Lithological loess profiles in Woźuczyn brick-yard (profiles 1, 2, 3 — Fig. 1); 1 — arable layer, 2 — humus horizon, 3 — soil sediment, Ratyczów type (Komorniki), 4 — solifluction dragging humus, 5 — humus deluvia, 6 — illuvial horizons, 7 — gleization horizon with drying up fissures — initial tundra soil, 8 — "arid" subaeral loess, 9 — streaky loess, slightly gleyed, 10 — "humid" loess, gleyed, 11 — stratified loess, 12 — stratified sandy loess, 13 — clay decomposed of marl, 14 — crotovines, 15 — pseudomycelia, 16 — TL datings, Q — Quaternary, Cr — Cretaceous

Profile litologiczne lessów w cegielni Woźuczyn (profile 1, 2, 3 — ryc. 1); 1 — warstwa orna, 2 — humus, 3 — sedyment glebowy, gleba typu Ratyczów (Komorniki), 4 — rozwleczony soliflukcyjnie humus, 5 — deluwia humusowe, 6 — iluwium, 7 — poziom oglejenia ze szczelinami wysychania — inicjalna gleba tundrowa, 8 — less „suchy” subaeralny, 9 — less smugowany, lekko oglejony, 10 — less „wilgotny” oglejony, 11 — less warstwowany, 12 — less warstwowany piaszczysty, 13 — zwietrzelina ilasta margli, 14 — kretowiny, 15 — pseudomycelia, 16 — daty TL, Q — czwartorzęd, Cr — kreda

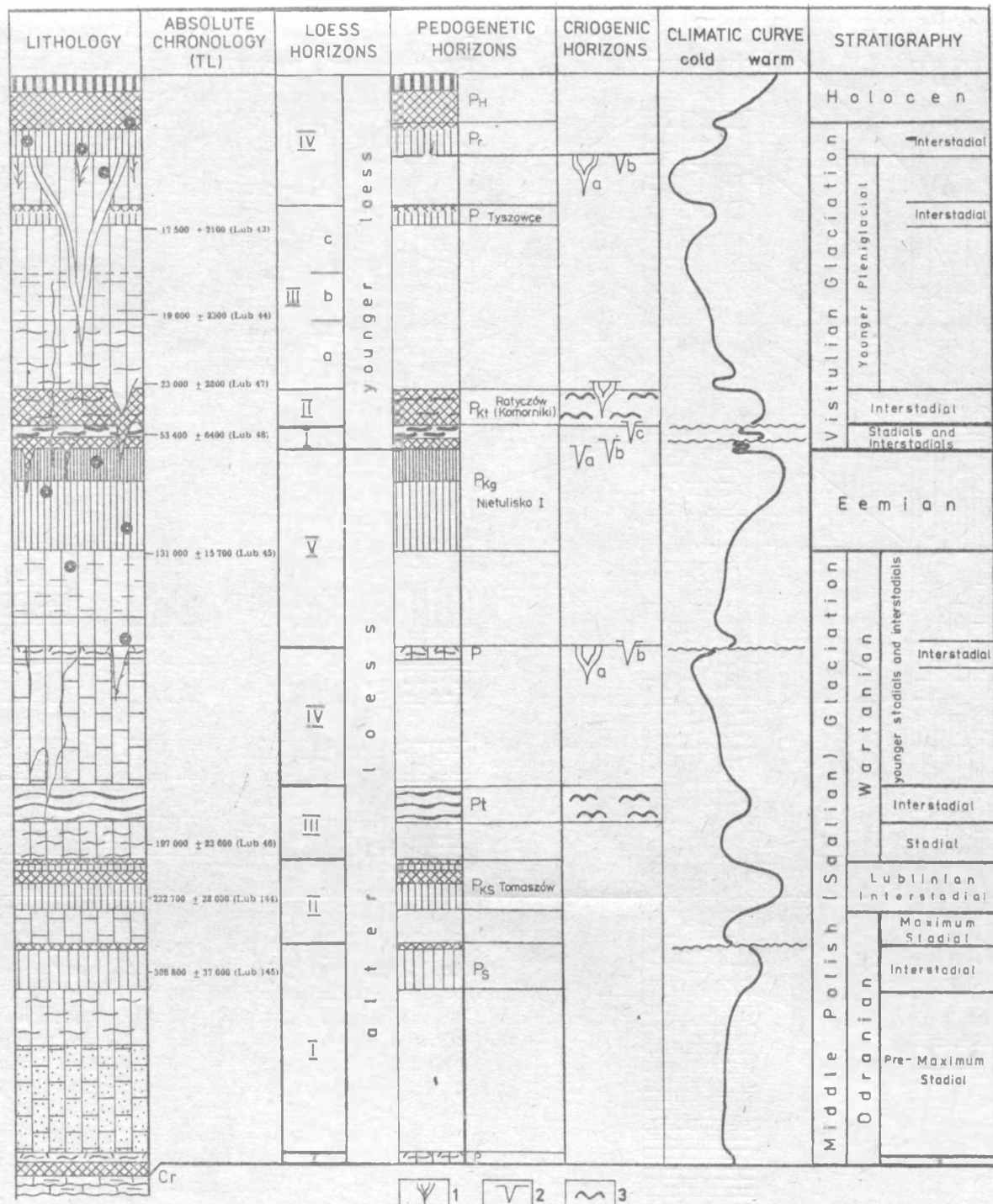


Fig. 3. Loess chronology and stratigraphy in the Woźuczyn profile; 1 — ice wedges, 2 — frost cracks, 3 — cryogenic involutions, P_k — soil complex, P_r — relict soils, P — soil sediment, g — interglacial soils, s — interstadial soil, t — cryogenic interstadial soil, P_H — recent soil

Chronologia i stratygrafia lessów profilu Woźuczyn; 1 — kliny lodowe, 2 — pseudomorfozy klinów mrozowych, 3 — zaburzenia kriogeniczne, P_k — kompleks glebowy, P_r — gleba reliktoowa, P — pedosedymnt, g — gleba interglacjalna, s — gleba interstadialna, t — gleba interstadialna kriogeniczna, P_H — gleba współczesna

mus from eemian forest soil originated from the first cold phase of Vistulian. The second generation of the wedges (b), filled up with the humus of the steppe soil, comes from the periglacial condition phase, dividing the longer interstadial phase (Brörup?), in which the chernozem developed. The third generation of wedges (c) developed after chernozem soil, the upper one in the Nietulisko complex and before the Ratyczów type soil. The fourth generation (d), considerably younger is not connected with the Nietulisko soil complex. The distinguished generations of the frost phenomena are in the agreement with the observations in the other profiles of this soil (Jersak 1973, Bogucki et al. 1980, Wojtanowicz, Buraczyński 1978).

THE YOUNGER LOESS (VISTULIAN)

The Wożuczyn profile is not representative for the younger loesses. On the typically shaped interstadial soil of Ratyczów type (Komorniki, Dubno, Brjansk), there lies the younger upper loess (levels III and IV) for which beginning of the sedimentation was at 23,000 years B.P. In the youngest cover two loess levels were distinguished, which can be divided into smaller lithostratigraphic units — sublevels. In the level III sublevel A between 23,000 and 19,000 years B.P. can be distinguished. During the cold, humid phase streaky, gleyed loess developed with distinct signs of the soil processes development in the tundra conditions. At the top of this loess the pseudomycelia network appears with the slots of 2—3 m depth. The sublevel III B — younger than 19,000 years B.P. contains the streaky loess what indicates to the relatively humid sedimentation conditions. It goes over to sublevel III C, containing the subaerial, dry and continental loess. For the upper part of this sublevel the age of 17,500 years B.P. was obtained. On the III C loess the Tyszowce type soil developed, with levels A—B of 0.2 m thickness. This soil, corresponding to the Mazurian interstadial in the Wąchock profile (Lindner, Prószyński 1979) and to the Trubczew horizon on the Eastern European Plain (Maruszczak et al. 1982), is related to the Lauge-rie — Lascaux interstadial in the Western Europe, dated for 15,500 to 16,500 years B.P. (Wojtanowicz, Buraczyński 1978).

The level IV can be divided into a few sublevels without distinct borders though, effaced in the contemporary soil. Above the Tyszowce type soil the paleocryogenic phase is marked, called on the Wołyń Upland Krasilow phase (Bogucki et al. 1980) and on the Eastern European Plain — the Jarosław cryogenic level (Maruszczak et al. 1982). In this level the large frost wedges developed (Fig. 2 and 3) what indicates severe continental conditions. The younger cryogenic phase was also

noticed type. Above the cryogenic level there is a relic humus level in the fossil basin with no ebbs. This level was distinguished in Poland (Jersak 1977) and on the Eastern European Plain (Maruszczak et al. 1982). Its origin can be connected with the permafrost if the fossil basins in the loess are thermocarst forms. Taking such a conception into consideration, the beginning of this soil development could be related to Bölling and the full development period would be related to Alleröd. This point of view, supported with experimental data, represent also Welitchko and Morozova (1976).

CONCLUSIONS

1. The loesses of the Wozuczyn profile developed during the last two glacial periods: the older loess during the Saalian glaciation, and the younger loess during the Vistulian glaciation. These two loess covers of different age are divided with the soil complex of the Nietulisko type (Eemian—Brörup).

2. The best arranged loess series are the older upper loess and the younger upper loess, having a standard importance for the loess stratigraphy. They do need more of absolute datings.

3. For the loess profile a great conformity of the rhytm of cold and warm phases with adequate phases from the studies of the oceanic sediments was confirmed.

REFERENCES

- Bogucki A. B. 1972, Stratygrafia lessów Wyżyny Wołyńskiej. Przewodnik symposium Litologia i stratygrafia Lessów w Polsce, Warszawa, 59—61.
- Bogucki A. B. 1980, Wołyńska Wozwyszennost'. In: Opornyje razriezy i kraewyje obrazowanija matierikowych oledienienij zapadnoj czasti Ukrainy. Kijew, 16—32.
- Bogucki A. B., Wieliczko A. A., Nieczajew W. P. 1975, Paleokriogienyje processy na zapadzie Ukrainy w wierchniem i sriedniem plejstocenie. In: Problemy paleogeografii liossowych i pieriglacyalnych oblastiej. Moskwa, 80—90.
- Bogucki A. B., Morozowa T. D. 1981, O staniennii gorochowskogo uskopajemogo poczwiennogo kompleksa na Wołyńskiej wozwyszennosti i ego wozrastnych analogow w Polsce. In: Woprosy paleogeografii plejstocena lednikowych i pieriglacyalnych oblastiej. Moskwa, 128—151.
- Buraczyński J., Wojtanowicz J. 1975, Nowe profile lessowe Grzędy Sokalskiej (sum. New loess profiles on the Sokal Range). Ann. Univ. Mariae Curie-Skłodowska, sectio B, vol. 28, Lublin, 1—37.
- Buraczyński J., Rzechowski J., Wojtanowicz J. 1978, Studium sedimentologiczne i stratygrafia lessów w Ratyczowie na Grzędzie Sokalskiej

- (sum. On sedimentation and stratigraphy of loess at Ratyczów on the Grzęda Sokalska — Sokalska Range). *Biuletyn IG*, 300, Warszawa, 235—302.
- Buraczyński J., Wojtanowicz J. 1981, Typy rzeźby południowo-wschodniej części Wyżyny Lubelskiej (sum. Types of the relief in the south-eastern part of the Lublin Upland). *Ann. Univ. Mariae Curie-Skłodowska, sectio B*, vol. 34, Lublin, 159—172.
- Buraczyński J., Butrym J., Wojtanowicz J. 1982, „Interglacja lubelska” w Polichnie na Wyżynie Lubelskiej (sum. „Lublin Interglacial” in Polichna on the Lublin Upland). *Ann. Univ. Mariae Curie-Skłodowska, sectio B*, vol. 37, Lublin, 43—60.
- Butrym J., Maruszczak H. 1983, Termoluminescencyjna chronologia lessów z profilu Nielew. Sprawozdanie z badań naukowych Komitetu Badań Czwartorzędu PAN, 5, Warszawa, 114—117.
- Dolecki L. 1981, Litologia i stratygrafia lessów Grzędy Horodelskiej (sum. Lithology and stratigraphy of the loesses of the Grzęda Horodelska). *Ann. Univ. Mariae Curie Skłodowska, sectio B*, vol. 32/33, Lublin, 151—187.
- Jersak J. 1973, Litologia i stratygrafia lessu wyżyn południowej Polski (sum. Lithology and stratigraphy of loess in the southern Polish Uplands). *Acta Geograph. Lodz.*, 32, Łódź.
- Jersak J. 1977, Cyclic development of the loess cover in Poland. *Biuletyn IG*, 305, Warszawa, 83—96.
- Johnson R. G. 1982, Brunhes—Matuyama Magnetic Reversal Dated at 790,000 yr B.P. by Marine — Astronomical Correlations. *Quatern. Res.* 17, 135—147.
- Lindner L., Grzybowski H. 1982, Middle-Polish glaciations (Odranian, Wartanian) in southern Central Poland. *Acta Geol. Polon.* 32, Warszawa, 191—206.
- Lindner L., Prószyński M. 1979, Geochronology of the Pleistocene deposits exposed at Wąchock northern part of the Holy Cross Mts. *Acta Geol. Polon.* 29, Warszawa, 121—132.
- Maruszczak H. 1974, Gleby kopalne i stratygrafia lessów Grzędy Sokalskiej (sum. Fossil soil and the Sokal Range loess stratigraphy). *Ann. Univ. Mariae Curie-Skłodowska, sectio B*, vol. 26, Lublin, 27—66.
- Maruszczak H. 1980, Stratygrafia i chronologia lessów w Polsce (sum. Stratigraphy and Chronology of the Loesses in Poland). *Przewodnik Stratygrafia i chronologia lessów oraz utworów glacialnych dolnego i środkowego plejstoenu w Polsce SE*. Lublin, 43—54.
- Maruszczak H. 1980, Stratigraphy and Chronology of the Vistulian loesses in Poland. *Quatern. Stud. in Poland*, 2, Warszawa, 57—76.
- Maruszczak H., Wieliczko A. A., Morozowa T. D., Chałczewa T. A., Gubonina Z. P. 1982, Paleogeograficzna analiza młodoplejstocenskich zjawisk peryglacialnych w Polsce i europejskiej części ZSSR (sum. Paleogeographical analysis of Young Pleistocene periglacial phenomena in Poland and the European part of the U.S.S.R.). *Przegl. Geogr.* 54, Warszawa, 23—48.
- Mojski J. E. 1965, Stratygrafia lessów w dorzeczu Huczwy na Wyżynie Lubelskiej (sum. Loesses stratigraphy in the drainage basin of the lower Huczwa river in the Lublin Upland). *Biuletyn IG*, 187, Warszawa, 135—216.
- Shackleton N. J., Opdyke N. D. 1973, Oxygen Isotope and Paleomagnetic Stratigraphy of Equatorial Pacific Core V 28—238: Oxygen Isotope Temperatures and Ice Volumes on a 105 Year and 106 Year Scale. *Quatern. Res.* 3, New York, 39—55.
- Srodoń A. 1969, Pozycja stratygraficzna flor kopalnych Lubelszczyzny, zaliczanych do interglacjału mazowieckiego (sum. Stratigraphic position of fossil floras

- in the Lublin region referable to Mazovian Interglacial). *Biuletyn IG*, 220, Warszawa, 5—12.
- Welitchko A. A., Morozova T. D. 1976, Stages of development and paleogeographical inheritance of the recent soils features in the center of the Russian Plains. *Catena* 3, 169—189.
- Wojtanowicz J. 1983, Stratygrafia czwartorzędu LZW. [In:] *Kenozoik Lubelskiego Zagłębia Węglowego*, Lublin, 73—91.
- Wojtanowicz J., Buraczyński J. 1978, Materiały dla absolutnej chronologii lessów Grzędy Sokalskiej (sum. Materials to the absolute chronology of the loess of Grzęda Sokalska). *Ann. Univ. Mariae Curie-Skłodowska, sectio B*, vol. 30/31, Lublin, 37—54.

EXPLANATION OF PHOTOGRAPHS

Photo 1. Loess profile 2 of Woźuczyn brick-yard. The upper older loess (level V), interglacial soil (P_{kg}) of Nietulisko I complex, and interstadial soil (P_{kl}) of Ratyczów type (Komorniki). Ladder — steps every 0.3 m.

Photo 2. Loess profile 2, Woźuczyn brick-yard, Nietulisko I soil complex with four generations of wedges. I — the oldest generation wedge, filled up with Eemian soil humus, II — wedge filled up with Brörup soil humus, III — wedge developed on Nietulisko I soil complex, IV — wedge developed in Ratyczów type soil (Komorniki).

STRESZCZENIE

W profilu Woźuczyn stwierdzono lessy starsze ze zlodowacenia Saalian oraz lessy młodsze ze zlodowacenia Vistulian. W oparciu o datowanie TL wyodrębniono w lessach starszych trzy serie lessów przedzielone dwoma glebami kopalnymi: less starszy dolny 330 000 do 305 000 lat BP, interstadialna gleba kopalna 305 000 do 300 000 lat BP, less starszy środkowy (stadiał Odry 300 000 do 230 000 lat BP, interstadialna gleba kopalna (interstadiał lubelski) 230 000 do 220 000 lat BP, less starszy górny (stadiał Warty) 220 000 do 125 000 lat BP. Na lessie starszym rozwinięty jest kompleks glebowy Nietulisko I — starszy od daty 53 000 lat BP.

Less młodszy jest silnie zredukowany. Ze starszych ogniw lessu młodszego występuje cienki poziom lessu młodszego środkowego, w całości objęty glebą interstadialną Ratyczów (Komorniki). Pełny profil natomiast ma less młodszy górny, który w spągu datowano na 23 000 lat BP. Wydzielono w nim trzy poziomy lessowe oraz dwie gleby kopalne: glebę typu Tyszowce odpowiadającą interstadiałowi Laugerie-Lascaux, na lessie datowanym na 17 500 lat BP oraz reliktowy poziom humusowy, przypadający na okres Bölling-Alleröd. Pomiędzy tymi dwoma glebami występuje złożony poziom kriogeniczny, w którego pierwszej fazie rozwinęły się duże klify lodowe.

OBJAŚNIENIA FOTOGRAFII

Fot. 1. Profil lessowy 2, cegielnia Wożuczyn. Less starszy górny (poziom V), gleba interglacialna (P_{IG}) kompleksu Nietulisko I i gleba interstadialna (P_{KI}) typu Ratyczów (Komorniki). Drabina — szczebelki co 0,3 m.

Fot. 2. Profil lessowy 2, cegielnia Wożuczyn. Kompleks glebowy typu Nietulisko I z czterema generacjami klinów; I — klin najstarszej generacji, wypełniony humusem gleby eemskiej, II — klin wypełniony humusem gleby Brörup, III — klin rozwinięty na kompleksie glebowym Nietulisko I, IV — klin rozwinięty na glebie Ratyczów (Komorniki).

РЕЗЮМЕ

В профиле Вожучин обнаружены древние лессы времени оледенения Saalian и молодые лессы времени оледенения Vistulian. Опираясь на датировки TL в древних лессах выделены три серии лессов разделенных двумя ископаемыми почвами: лес древний нижний 330000—305000 лет BP, межстадиальная ископаемая почва 305000—300000 лет BP, лесс древний средний (стадиал Одры) 300000—230000 лет BP, межстадиальная ископаемая почва (люблинский межстадиал 230000—220000 лет BP, лесс древний верхний (стадиал Варты) — 220000—125000 лет BP. На древнем лессе развит почвенный комплекс Нетулиско I — древнейшей даты 53000 лет BP.

Лесс молодой сильно редуцирован. Из более ранних звеньев сохранился слой среднего пояса полностью обнятый межстадиальной почвой Ратычув (Коморники). Молодой верхний лесс представлен полным профилем, который датирован у подошвы на 23000 лет BP. В нем выделены три лессовых горизонта и древние ископаемые почвы: почву типа Тышовце соответствующую межстадиалу Langerie-Lascaux на лессе датированном на 17500 лет BP и реликтовый гумусовый горизонт, датированный временем Bölling-Alleröd. Между этими двумя почвами наблюдается сложный криогенный горизонт, в первой фазе которого развились младшие ледяные клинья.

