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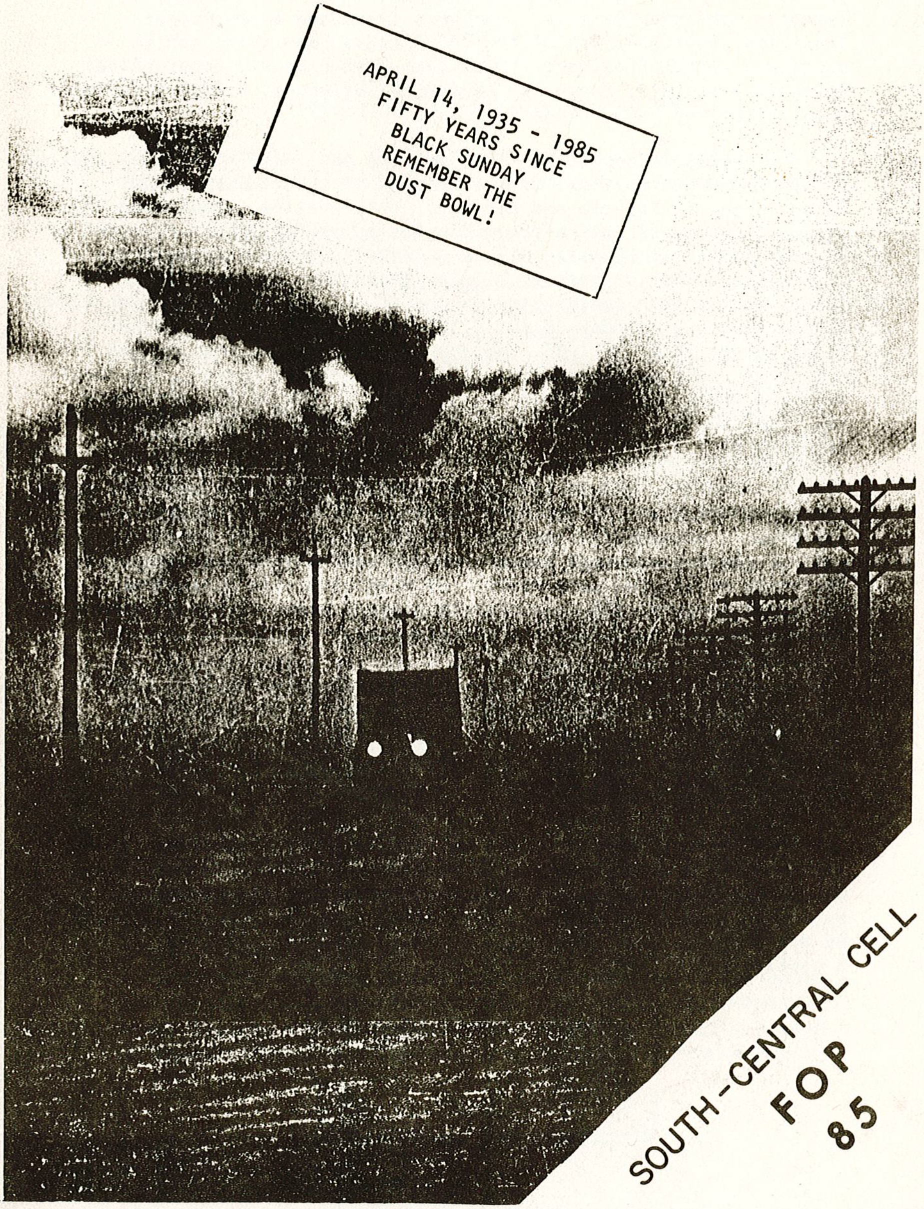
La LETTRE du LOESS

LOESS LETTER 13



LL13: APRIL 1985

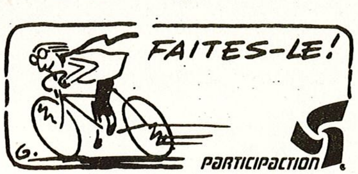
Loess Letter is published by the Quaternary Research and Geological Engineering Groups of the University of Waterloo; it is the newsletter of the INQUA Loess Commission. LL appears twice a year, normally in April and October. Requests for copies, and material for publication, should be sent to Professor Ian Smalley, Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. Brief research papers are published, also reviews of recently published material, and news items and announcements. Inquiries about the work of the INQUA Loess Commission can be addressed to the President: President Marton Pecsi, Geographical Research Institute, Hungarian Academy of Sciences, H 1112 Budapest, Budaorsi ut. 43 - 45, Hungary.

LL13 is a special issue for the April (12 - 14) 1985 meeting of the South-Central Cell of the Friends of the Pleistocene at Baton Rouge, La fayette and Natchez. This meeting, devoted to the study of the loess in the Lower Mississippi Valley, was organized by Dr. Bob Miller of Louisiana State University and Dr. Scott Burns of of Louisiana Tech University. By a remarkable chance the meeting occurs on the 50th anniversary of one of the worst wind erosion events of the century. Sunday 14 April 1985 is exactly 50 years after Black Sunday 14 April 1935. We should all remember what caused the dust-bowl - and make sure that it does not happen again. The loess soils of North America (from Saskatchewan to Louisiana) blew into position, to our great advantage - and if neglected and mistreated can blow away again.

LL13 is a memorial issue for Jerzy Cegła. News has reached LL from Wrocław of the untimely death of Dr. Cegła. He made some significant advances in the study of the Polish loess, and he was the head of the Experimental Geomorphology Section of the Geographical Institute of Wroclaw University. He died at Castle Ksiaz near Walbrzych in late 1984. We reprint a short piece of his to honour the memory of a notable loess investigator.

The feature article in LL13 is the paper by Drs. Souster, St. Arnaud and Huang of the Saskatchewan Institute of Pedology on "Mineral Sorting through Aeolian Processes". We are also pleased to print an essay review by Dr. Yaalon of the Hebrew University of Jerusalem; he reviews "Lithology and Stratigraphy of Loess and Paleosols" edited by M. Pecsi.

All LL readers should be sure to see the September 1984 issue of the National Geographic Magazine. Read the Article "Do we treat our soil like dirt?" by Boyd Gibbons, with photographs by Steven C. Wilson; and take particular note of the quote (shout) by Bob Ruhe (p. 377) "Everybody ought to thank God for loess!" A sentiment with which we all agree.



BULLETIN DE L'ACADÉMIE
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GEOLOGY

Influence of Capillary Ground Moisture on Eolian Accumulation of Loess

by

J. CEGŁA

Presented by M. KSIĄŻKIEWICZ on February 7, 1969

The present paper deals with loess deposits which blanket the uplands and elevated topographical elements. The eolian origin of such loess may be accepted without reservation.

There exists a vast literature on the subject of eolian loess. The questions discussed, however, are mostly those pertaining to the source and transportation of loess particles whereas but few articles have been published on the subject of vertical accumulation of loess. The statement is frequently made that loess particles are trapped by vegetation, for instance, by grass or arctic moss [2], [5], [6]. The dry grassland, however, is not particularly apt to intercept considerable amounts of fine dust. The movements of grass induce turbulence of the air, and fine particles are being swept away and prevented from permanent settling. Assuming that under certain conditions the grassland is buried under loess, one should expect to find beneath it the corresponding soil horizons. In fact, such soil horizons do exist under loess deposits of eastern and southeastern Europe. They are clearly recognizable in the eastern part of the Lublin Upland and in the Roztocze area [8]. However, west of the Bug—Wieprz water-shed [7], the soil horizons tend to disappear, and the loess deposits extending over the southwestern part of Poland are practically devoid of them.

It is known that loess accumulations are not necessarily associated with steppes, though the significance of grass for the preservation of loess is unquestionable.

The rather common occurrence of loess blanketing bare rock surfaces, indicates that some other explanation is needed to show how loess could accumulate on flat rocky surfaces devoid of vegetation. The explanation suggested in this paper is that the loess particles were primarily deposited on surfaces wetted by capillary waters, i.e. they were laid down in places where the capillary fringe rises to the ground--air interface. This possibility has been overlooked by many authors, when discussing the origin of loess deposits. To the author's knowledge, the only reference relevant to this question is the publication by Hörner — 1933 [4] on recent geomorphic processes in the Gobi desert, from which the following quotation is taken: "Fine wind—blown dust settles inside as well as outside the arid region, but remains only where there is moisture enough in the ground or the atmosphere to bind, directly or through chemical action, the particles that have settled" (l.c., p. 734).

Rocky surfaces wetted by capillary waters act as adhesive tape for dust particles that may settle upon them, and the capillary forces prevent such particles from being swept away. Once a thin coating of dust is formed, further accumulation proceeds in much the same manner. Concomitantly with deposition of loess the capillary meniscus rises so that the ascending loess-air interface contains enough moisture to intercept more dust particles. For the grain-size of loess (0.05—0.02 mm.), the capillary forces are relatively high, and consequently the particles deposited are precluded from further transportation. It shoud be emphasized that loess is particularly suitable for transmitting water by capillarity, and that the height of capillary rise in such sediments is about 20 m. [1]. It is conceivable that under such conditions considerable blankets of loess may form upon bare rock surfaces.

The concept of capillary forces as a decisive factor in loess accumulation explains the occurrence of isolated patches of loess or "loess islands" [5], [7], [9]. In the light of the above remarks these patches may be regarded as determined by the distribution of moisture in the ground. The concept may also help to clarify some of the confusing questions which present themselves in connection with the widely discussed problem of the origin of loess deposits. One of such questions is that raised by Fisk — [3], p. 354, namely: "how loess formations could be laid down on steep eroded slopes as parallel layers unaffected by mass movements". The other is the objection invoked by Russel — 1944 [10], who pointed out that "against eolian origin of loess it may be urged that no actual or hypothetical wind directions could account for its distiribution. It covers slopes leading in all possible directions [...]" (l.c., p. 23).

The introduction of capillary waters as the main factor determining the distribution of loess, renders such objections pointless. This does mean, however, that all deposits described as loess are necessarily of eolian origin.

In view of the above considerations it is suggested that the presence of moisture in the ground is of primary importance for the accumulation of loess on elevated topographical elements. In many instances this only rendered such an accumulation possible. It should be borne in mind, however, that the presence of capillary moisture as postulated here, applies to the areas of accumulation, and not necessarily to the zones of deflation. The hypothesis outlined above does not invalidate the widely accepted view that the climatic conditions attending the accumulation of loess were cold and relatively dry [9]. As shown by Hörner [4], in cold regions even desert ground may contain a considerable amount of moisture.

The problems discussed in this paper are now being investigated experimentally by the present author in the Institute of Geography of the University of Wrocław. The results of these experiments will be presented in a forthcoming publication.

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MINERAL SORTING THROUGH AEOLIAN PROCESSES

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Abstract

Mineralogical analyses provide evidence of a sorting action during deposition of loess which is controlled by particle shape. Quartz and potassium feldspars, both 3 - dimensional tektosilicates remain constant in very fine sand and silt fractions across the loess transect. In contrast, a marked concentration of platy micaceous minerals occurs in coarser fractions and their depletion is noted in finer fractions.

* * *

For the most part, sources of loess deposits can be directly related to materials left by continental glaciers of the Pleistocene Epoch. The major emphasis in loess studies has been to trace the origin of loess materials, to establish particle size and mineralogical trends, and to evaluate weathering of mineral components in soils developed from loess. Mineralogical variations noted in such deposits have been variously attributed to varying wind velocities over time (1), differences in specific gravity of transported minerals (2) or due to weathering processes since deposition (3, 4). In 1973, one issue of Soil Science (5) was devoted to a series of papers on loess distribution and soil development sequences.

Several models describing loess distribution in terms of thickness and distance from the source have been postulated (6, 7, 8). The general thinning trend of loess can be attributed to sedimentation of particles from the atmosphere as governed by Stokes' Law (8) and to their mode of transport. Also, the characteristic decrease of coarser particle size fractions and increase of finer fractions as a function of distance has been well documented (7, 8, 9). While sedimentation according to Stokes' Law is based upon particle size and particle density, differences in particle shape which are ignored by assuming an "equivalent spherical diameter" may be much more important than previously assumed, particularly in the deposition of air-borne particles. The present study indicates that a different type of sorting which affects the mineralogical composition of loess is dependent upon the habit or shape of component minerals: platy micaceous minerals are transported preferentially to other equi-dimensional (rounded or block-like) mineral grains.

The loess of the Swift Current area of Southwestern Saskatchewan, Canada, exhibits the properties characteristic of such wind-blown deposits: a high silt content; a thinning trend and a decrease in average particle size as a function of distance from the source; a lack of any layering or evidence of sedimentation which typified adjacent alluvial and lacustrine deposits; and an increasing degree of roundness of sand particles over the transect studied (10). Over a southeasterly transect of approximately 50 km, the loess blanket decreases from a thickness of about 1 m to about 0.5 m. Particle size distribution analyses show distinct trends over the transects studied.

The major particle size fractions of the loess material include very fine sand (50 - 125 µm dia.), coarse silt (20 - 50 µm) and fine silt (2 - 20 µm). The schematic presentation of distribution trends of these fractions (Figure 1) is based upon values calculated from the regression equations obtained for the 17 sites sampled along the transect. There is a distinct decrease in very fine sand an an increase in the fine silt fractions as a function of distance from the source; in contrast, the coarse silt content of the loess decreases only slightly over the transect.

Mineralogical composition of the individual fractions indicates a uniform content of quartz and potassium feldspars within each fraction across the transect (Figure 1). However, the mica contents increase significantly in the very fine sand coarse silt fractions and decrease in the fine silt fraction as a function of distance. This suggests that a sorting of micaceous minerals has occurred during the sedimentation process. An explanation of such sorting and evidence to corroborate it follow.

The total-K contents of the very fine sand, coarse silt and fine silt fractions followed the same trends as observed for micas in these fractions. The mica-K content of the very fine sand and coarse silt fractions increased, whereas it decreased in the fine silt fraction with distance. This is in contrast to Caldwell and White's work (3) which attributed the decrease in total-K of the 5 - 20 µm silt of loess in Indiana to a decrease in feldspar-K with distance. Wells and Riecken (4) showed a decrease in total-K for all fractions with distance over 813 km, a much longer transect than was used in this study. They attributed the decrease in total-K in the coarser fractions to the weathering of micas; they observed no change in amount of feldspar-K with distance.

Figure 1

Distribution trends of major particle size fractions in loess and of their quartz, K-feldspar and mica contents as a function of distance from the source area. The various size fractions of the soils studied were obtained by sedimentation after removal of soluble salts, carbonates, organic matter and sesquioxides. The sodium pyrosulfate fusion method (11) was used for differentiation of mica from K-feldspar. Quantitative x-ray diffraction analysis (12) was used to determine the amount of quartz present.

The distribution of quartz, K-feldspar and micas as a function of distance can be explained on the basis of particle shape rather than by weathering of principal minerals since deposition (13). The uniform distribution of quartz and feldspars with distance substantiate the observations of Wells and Riecken (4) and those of Johnson and Beavers (14) who found no significant change in the quartz and feldspar content of the coarse silt fraction in the Peorian loess as a function of distance. The fact that these minerals are both three - dimensional tektosilicates with similar densities suggests that they would behave differently from platy micaceous minerals.

As seen in Figure 1, while the very fine sand fraction decreases by 50 percent over the transect, there is at the same time a 4 to 5 - fold increase in the mica component of this fraction. Also, while the coarse silt decreases only slightly with distance, there is still a marked increase in the mica component. Since the proportion of finer particles increases with increasing distance from the source, and since micas behave as finer particles, they are concentrated at further distances in the coarser very fine sand and coarse silt fractions.

A reverse trend is observed for the fine silt fraction. The fine silt content of the loess increases with distance but the mica component of this fraction decreases. According to Frazee et al (8) particle sorting by wind follows Stokes' Law until a mean particle size of approximately 25 μm is reached. This size corresponds closely to the 20 μm split between the coarse and fine silts used in this study. The fine silt which is smaller than this critical size shows a decrease in mica content indicating that mica particles below 20 μm are being carried farther and thus deplete the fraction with respect to mica.

According to Franzmeier (15) the slope of the cumulative particle size curves of loess material decrease rapidly around 10 μm. This is observed in cumulative curves of the Swift Current loess (10). This size corresponds to the upper limit of aerosolic dust which is carried very large distances in the troposphere (16). Rex et al (16) report appreciable amounts of mica in the 2 - 10 μm fraction of tropospheric dusts, a fact which was borne out in later publications (17). Results in this study confirm the fact that mica particles in the fine silt fraction can be deflated from the loess area and explains why mica-K in the fine silt fraction decreases with distance from the source.

The above findings provide a further insight into the mechanisms involved in the deposition of loessial deposits. The sorting of K-bearing minerals because of their mineral habit or structure has not previously been reported. Such segregation is distinctly different from the density separation which is responsible for the trend observed for a heavy mineral such as zircon. In this

study as well as others (2), the zirconium content of the coarse silt fraction of the loess is shown to decrease rapidly and markedly away from the source. The segregation of K-bearing minerals explains the apparent anamalous trends in total-K content of loess deposits reported previously by other workers. The development of more refined mineralogical techniques such as those used in this study (11, 12) has made possible the further elaboration of the aeolian processes. Such information is also significant in terms of soil nutrient status since it involves potassium, which is one of the major nutrient elements required for plant growth. The data presented indicate that further work would be required to explore the trends of mineral distribution over more extensive areas of loess.

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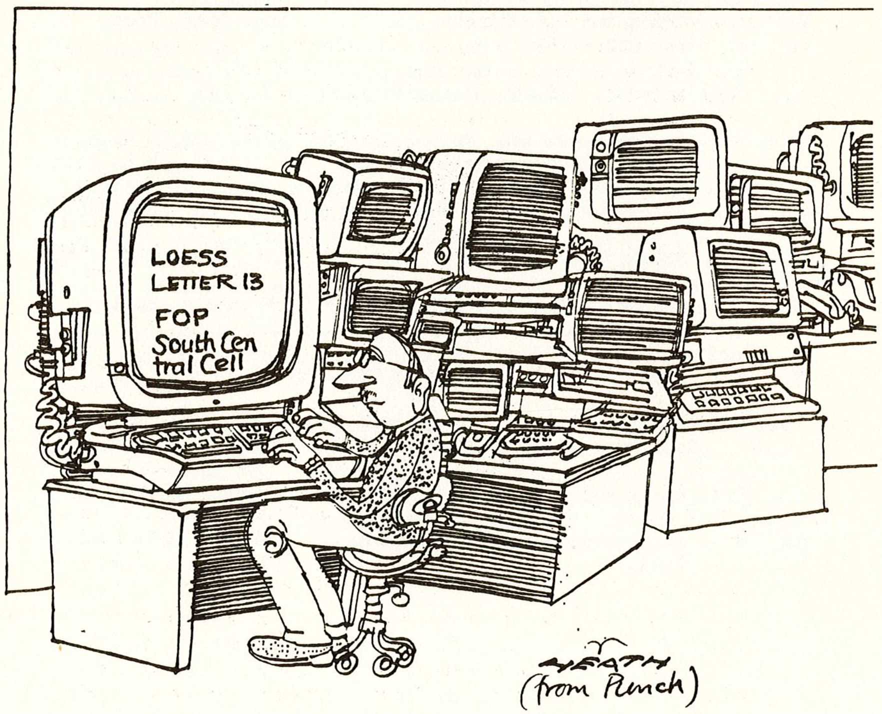

ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
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Jan BURACZYŃSKI

Étude lithostratigraphique des loess d'Alsace (France)

Badania litostratygraficzne lessów Alzacji (Francja)

Литостратиграфические исследования лессов Эльзаса (Франция)

INTRODUCTION

L'étude concerne des loess d'Alsace et présente leur différenciation typologique et stratigraphique dans les profils d'Achenheim 1, 2 et 3, de Blaesheim 4, de Griesheim 5, de Bischoffsheim 6, de Niederbetschdorf 7, d'Equisheim 9 et 10, ainsi que dans celui d'Allschwil 11.

Les recherches des loess d'Alsace ont une longue histoire comptant 100 ans (Andreae 1884). L'étude de Schumacher (1890, 1900, 1914) a établi que les loess dans le Fossé rhénan forment deux grandes séries qu'il a caractérisées selon leur aspect lithologique, archéologique et faunique. Commont (1912) a présenté une classification des loess en se fondant sur leur aspect extérieur.

Au cours des dernières années, nous observons une animation dans les recherches de loess en Alsace. Blanck et Vacquant (1971) ont étudié la lithologie des loess dans le profil d'Equisheim et Rassai (1971) dans celui de Hangenbieten. Buraczyński (1978) a présenté une caractéristique lithologique et des résultats des analyses de la composition minéralogique et chimique des loess d'Alsace. Fouquoire (1978), en se fondant sur les critères lithostratigraphiques et sur l'étude de l'évolution des sol dans le profil d'Achenheim, a reconstruit l'évolution géomorphologique du versant et a présenté la stratigraphie des loess. Les études archéologiques de Thévenin (1972 a, b, 1976) visent à reconnaître la stratigraphie des loess d'Achenheim.

LES TRAITS CARACTÉRISTIQUES DU TERRAIN D'ÉTUDE

Le Fossé rhénan occupe un territoire allongé méridien de Mainz à Bâle, entre les Vosges et la Forêt-Noire, dont la longueur égale 300 km et la largeur 30 km.

Juillard (1949), dans une régionalisation géomorphologique de la partie méridionale du Fossé rhénan, a distingué trois régions suivantes: 1. collines de piémont de l'Alsace, 2. plaine du Rhin moyen et 3. collines de piémont du pays Bade. D'autres travaux (Juillard 1949, Théobald 1955, Galluser 1967 et Vogt 1978) présentent une régionalisation plus détaillée, précisant des unités de l'ordre inférieur.

Les unités géomorphologiques de premier ordre s'étendent dans le sens nord-sud. Les collines de piémont de l'Alsace se composent du plateau d'Alsace, des collines sous-vosgiennes et du plateau de Sundgau. Le plateau d'Alsace accompagnent les Vosges, jusqu'au nord de la Bruche.

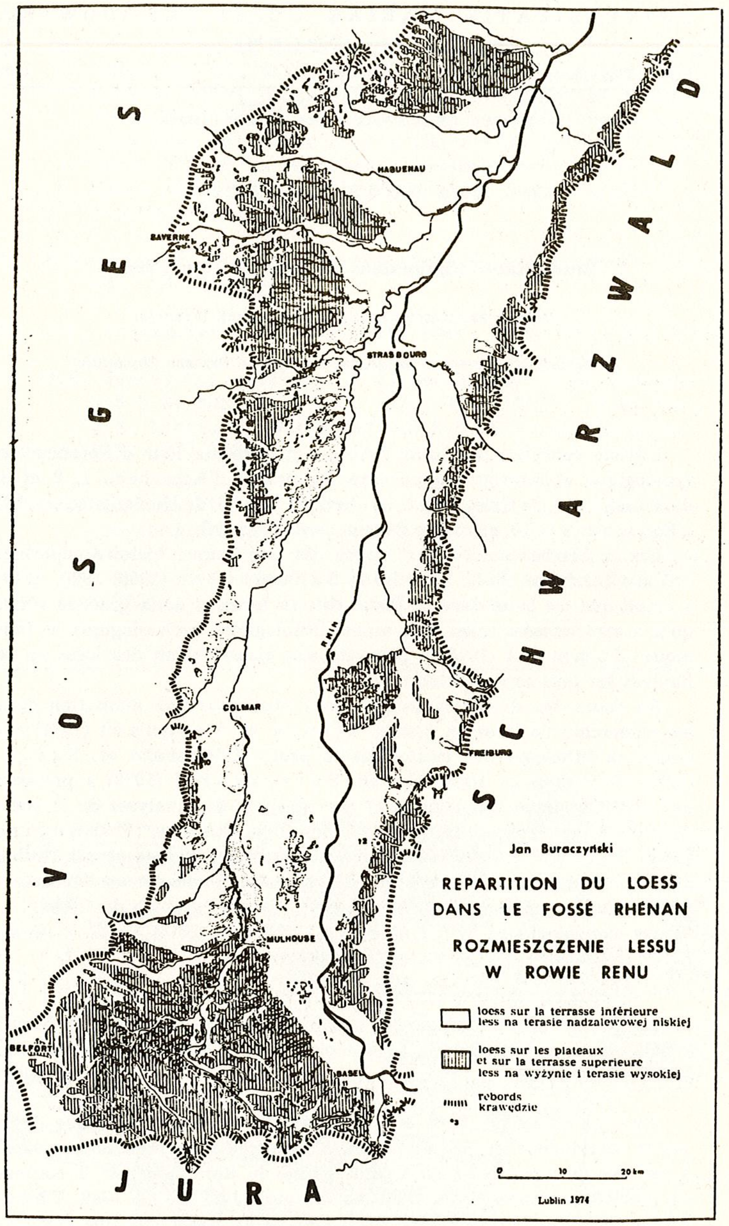

Fig. 1. Répartition du loess dans le Fossé rhénan
Rozmieszczenie lessu w rowie Renu

Les deux niveaux distincts, l'inférieur, situé entre 180 et 200 m et, supérieur, entre 250 et 280 m d'altitude, présentent le trait principal du relief. Les collines sous-vosgiennes forment une mosaïque des blocs et des bosses allongés perpendiculairement à la bordure des Vosges, qu'ils suivent par une zone étroite (jusqu'à 2 km) de Molsheim à Than. Le plateau de Sundgau est situé dans la partie méridionale du Fossé rhénan, entre les Vosges et le Jura, à l'altitude 350 à 400 m.

La plaine du Rhin moyen est une région la plus étendue, se composant de tout un système des terrasses quaternaires. La terrasse supérieure de Hangenbieten-Mundolsheim (20—30 m) forme des bosses et des replanissements recouverts par le loess dont l'épaisseur atteint 20 à 30 m. La terrasse inférieure est mieux développée et elle s'allonge à deux rives du Rhin sous la forme d'une bande de plusieurs à 10 km du large, limitée par un escarpement atteignant 5 à 10 m en hauteur. La terrasse se divise en plusieurs parties, et notamment à la rive ouest en celles de Haguenau, de Hoert, de Schiltigheim, de Lingolsheim et de Valff, tandis que du côté est on distigue la terrasse de Harth (de Bâle à Erstein), de Markgraffler, de Freiburg et d'Offenburg (de Kinzig à Murg).

Les collines de piémont dans le pays de Bade se composent des côteaux de Markgraffler atteignant 350 à 400 m d'altitude, de Kaiserstuhl — une colline isolée de 450 à 500 m d'altitude, aux environs de Freiburg — et des sous-montagnes de Lahr—Emmendinger—Offenburg qui forment une zone étroite suivant la Forêt-Noire et située entre 250 et 300 m au-dessus du niveau de la mer.

LA RÉPARTITION DES LOESS ET L'ANALYSE DES PROFILS CHOISIS DU LOESS

LA RÉPARTITION DES LOESS

Les loess dans le Fossé rhénan accompagnent les deux rives du Rhin. Ils s'étendent sous la forme de deux zones allongées dans la direction SSW—NNE. Du côté occidental, où la zone de loess suit les Vosges: elle y dépasse une dizaine de kilomètres en largeur aux environs de Strasbourg et s'élargit jusqu'à 20 km environ, près de Wissembourg. Entre Selestate et Mulhouse, elle se rétrécit jusqu'aux plusieurs kilomètres. Du côté est du Fossé rhénan, le long de la Forêt-Noire, la largeur de la zone de loess atteint plusieurs kilomètres. Dans la partie méridionale du Fossé, sur le plateau de Sundgau, les deux zones loessiques s'approchent l'une à l'autre, en recouvrant le plateau complètement. En se fondant sur la carte de la „Répartition des loess dans le Fossé rhénan" (élaborée à la base de la carte géologique de la France à 1:80 000), on a calculé que les loess dans le Fossé rhénan occupent une surface de 2 576 km^2, dont 45% se trouve en Alsace et 21% dans le pays de Bade (fig. 1).

Les zones de loess mentionnées se composent d'une série de nappes plus ou moins larges, morcelées par les rivières. Dans le Fossé rhénan il y a plus d'une dizaine de grandes nappes. Sur le territoire de l'Alsace, en commençant du nord, ce sont: 1. la nappe de Wissembourg, située entre les rivières Lauteur et Sauer, 2. la nappe de Brumath, entre la Moder et le Zorn, 3. la nappe de Mundolsheim entre le Zorn et la Bruche, 4. la nappe de Schiltigheim, 5. la nappe de Griesheim, 6. la nappe de Valff, 7. la nappe d'Equisheim, 8. la nappe de Colmar-Mulhouse, 9. la nappe de Sundgau. Dans le pays Bade, en commençant du sud, on distingue: 10. la nappe de Heitersheim, 11. la nappe de Kaiserstuhl (de Bötzingen), 12. la nappe d'Ettenheim, entre la rivière Elz et Kinzig, 13. la nappe d'Achern entre Kinzig et Murg.

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Thermoluminescence dating of periods of loess deposition and soil formation in Normandy

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The least incomplete records of Pleistocene climate change come from the study of deep-sea sediments in which the stratigraphic record of oxygen isotope variations, reflecting terrestrial ice volume, is the primary correlation medium. On continents, the available record is far less complete because many of the characteristics of glaciation are erosional rather than depositional. The areas of loess deposition may provide the best deposits in which to develop relatively complete regional stratigraphies that may be compared with the deep-sea record[1,2]. In this study we use thermoluminescence (TL) dating of loess, and of soil developed on loess, to test this model. We have confined ourselves to the last complete glacial cycle within which the reproducibility of the age determinations is similar to the time resolution of most deep-sea core records.

Western Kansas, 14 April 1935—Black Sunday. (*Kansas State Historical Society*)

M. PECSI (editor), 1984. Lithology and Stratigraphy of Loess and Paleosols. Geographical Research Inst., Hungarian Academy of Sciences, Budapest. 325 pp, paperback $23.00

Reviewed by D.H. Yaalon (Hebrew University of Jerusalem)

Marton Pecsi and his collaborators have assemled in this volume 30 papers on Loess and Paleosols from symposia of the Moscow INQUA Congress in 1982. The quality of the papers varies and the range of topics is considerable. They are grouped into four broad categories dealing with processes, properties, stratigraphy and dating, but only the few papers on applied subjects and one on dust are really a separate group.

I would like to review this important book not only in the usual way of listing its content, but also by offering some comments, both laudatory and critical, pointing out some of the papers and making comparisons on their format.

Over half of the papers are from Soviet and East European workers who only rarely publish in English. These translated papers fill a definite gap and will be welcomed by many who have no regular access to East European publications. A group of six papers on loesses and paleosols of China (four by Chinese authors) is a most welcome contribution for those wishing to know more about these famous but, in the western literature, little documented loess sections. The data presented are substantial and a good harbinger for much more to come. Two papers listing results of pollen studies (Urban, Central Europe, and Bolikhovskaya, USSR) are significant as they are more than usually optimistic about the possibilities of pollen studies in loess and soil sequences.

Of outstanding interest are the brief data on the long loess sections from Asia. Both Dodonov (Central Asia) and Zheng and colleagues (China) recognize on paleomagnetically dated sections 20 stages (10 cycles) for the Middle and Upper Pleistocene (0.7 million years) or 26 stages (13 cycles) for the about one million years during which loess deposition is recognized. By comparison, Sirenko and Veklich claim for several composite sections over 1000 km long transects from the Ukraine in the north to the Crimea in the south, only 16 stages (8 cycles) for the whole of the 1 million years of the Quaternary. The method of dating the stages is not given, but it seems probable from the apparent increasing duration of the listed stages, from 10 to 30K years in the upper half and to over 100 K years in the lower half of the sections, that the lower, older loesses could include stratigraphic hiatuses. This would also ensue from accepting the astronomical (Milankovitch) theory of climatic cycles, which receives additional support from some Chinese data (Wen et al) by reflecting especially the periodicity of 40 to 50 K years in chemical and clay mineralogical compositions. Since all regional syntheses claim their sequences to be complete and support the notion of global synchronous deposition/weathering of the loesses, either adjustment of the dates or recognition of hiatuses could resolve the serious discrepancy.

In a thought-provoking essay the editor (Pecsi, p. 213) reaches the conclusion that true or typical loess formations in the Euroasian provinces are no older than one million years. The underlain older subaerial formations are "loess-like", i.e. pale pink, reddish, reddish brown, sometime gleyed, silty clays and paleosols. This interpretation should however, be seen in conjunction with evidence documented in at least three other papers, showing that the degree of weathering, as shown by a decrease in the heavy mineral content (Shaevich, p. 24), especially of the less stable heavy minerals (Khalcheva, p. 116), and increase in the Fe^{3+}/Fe^{2+} ratio (Wen et al, p. 162), is gradual with depth (age) already in the Middle Pleistocene true loesses. The increased redness and clay content with age, as also documented by paleosols (Veklich and Sirenko, Smolikova, Zheng), may thus be a function of the duration of burial and due to intrastratal weathering (diagenesis) releasing free Fe_2O_3, as documented in other subaerial sediments. This may enhance the possible change in ecological conditions, from wetter to drier Quaternary climates, but we should not yet dismiss the "loess-like" older red clay complexes as not being derived from true eolian loess. Clayey loess and loessic clays have been documented from several unglaciated regions (South Australia, Negev), and increased redness with age is known from many red beds.

With regard to the quality and format of the presentation, there is a considerable variation and difference especially between the papers originating in eastern Europe and the rest. While some of the papers present new and substantial facts and are prepared in the usual way common in the western scientific literature - listing location, materials, methods and results, and only then a discussion with appropriate documentation - over half of the papers do not follow this outline but are essentially no more than extended abstracts, leaving much to be desired in their presentation.

Our Soviet colleagues do not consider international meetings as a forum for presenting the most recent advances and results of research, but rather as a means to summarize their group's or their own work of many years. It is nearly impossible to do so in 15 minutes' lecture and equally difficult to prepare a substantiated summary or state-of-art report in ten brief pages, including figures and references.

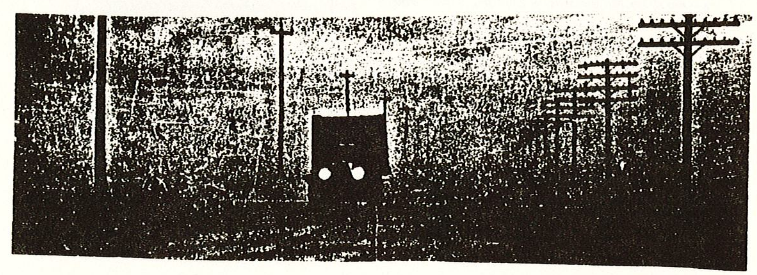
Though valuable as a state-of-art overview, most of these extended summaries are lacking the finishing touch. The tables and illustrations are frequently with sketchy or unclear legends,

the references are incomplete and not mentioned in the appropriate places in the text, thus leaving most statements essentially unsubstantiated. Methods used and locations are rarely mentioned. For example, two different tables (p. 21 and p. 156) list the physical properties of loesses and paleosols, including density, in several separate columns as volumetric mass (density) and volumetric mass of skeleton (skeleton density). Since the values are similar (1.3 to 2.0) and differ from a third column listing the mineral density (2.6 to 2.8), I just cannot find out what kind of bulk density was measured. While this may annoy only a couple of readers, there are others and more substantial examples.

Many papers mention the significant contribution of paleosols both to stratigraphic correlation and interpretation. Their typology is often designated by such names as pseudochernozems, cinnamon steppe-like, loess red-clay formation, drab brown earth, etc. without referring in any of these cases to a specific classification system or soil handbook where the properties of such soils are given. Soil recognition is very subjective and for some reason considered to be a simple matter (e.g., on p. 249: "Each soil series [pedocomplex] has its own structure [pattern], so it is not very difficult to define the age of its stratigraphic horizon"). Most readers will be able to visualize what is meant by podsol, chernozem and possibly cinnamon soil, but probably need to be advised where to find detailed information about the various sub-types. A greater accuracy and consistency in classifying and typing the soils, though not necessarily by a single value granulometric, mineralogical or chemical characteristic is thus needed. Even the climatic interpretation of each soil type is taken as commonly known and no references to any climatic or other pedogenic functions are ever mentioned. Only rarely is the importance of the relief factor (or duration of soil information) mentioned or considered.

Unfortunately, many of the translations also leave much to be desired, using some awkward terms and expressions which a subject and language specialist would not pass. For example, the Russian writers are fond of the term "peculiarities" when describing certain characteristics. It appears many times in the texts and even twice in the title, though "characteristics" would be much nearer to the desired meaning.

Notwithstanding the critical remarks voiced, the book is a significant milestone in loess and paleosol research which will frequently referred to. We are grateful to Prof. Pecsi and his collaborators and the Hungarian Academy of Sciences for having undertaken this publication.



SOIL GROUPS OF NEW ZEALAND

PART 7

YELLOW-GREY EARTHS

Edited by J.G. Bruce

NEW ZEALAND SOCIETY OF SOIL SCIENCE 1984

DISTRIBUTION AND DESCRIPTION OF YELLOW-GREY EARTHS IN THE WAIRARAPA

K.W. Vincent, Soil Bureau, D.S.I.R., Lower Hutt

(Received January 1983)

INTRODUCTION

Regions of the Wairarapa where yellow-grey earths occur have been scantily covered by soil survey publications. Apart from the 'General Survey of the Soils of North Island, New Zealand' (N.Z. Soil Bureau 1954) and 'Soils of New Zealand' (N.Z. Soil Bureau 1968b), the only publications are the 'Soil Map of Whareama Catchment' (Gibbs 1965) which covers an area of steepland soils, and the 'Interim Report on Soils of Wairarapa Valley' (Heine 1975).

CLIMATE OF THE WAIRARAPA (summarised from Thompson 1982)

The Wairarapa is notable both for its windiness, especially in summer when dry north-west winds become Föhn-like and induce drought, and also for its rainfall, most of which tends to occur when the surface winds are southerly.

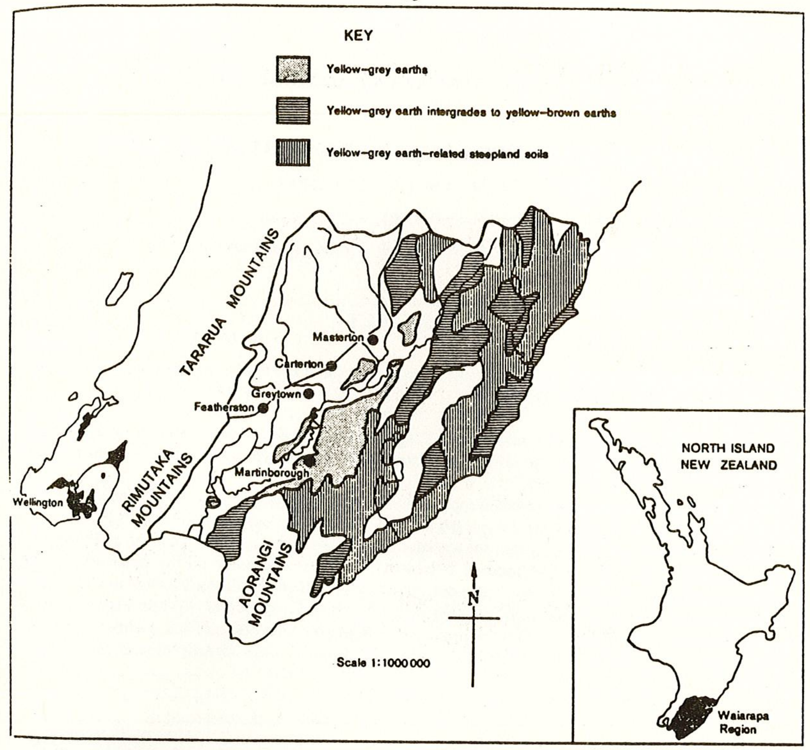
The prevailing winds of the Wairarapa are south-westerlies and north-westerlies which occur as a result of deflection of the westerly airstream around the mountain ranges. Hence there is a strong orographic effect and the rainfall distribution shows some steep gradients.

On the peaks of the Tararua Range the annual rainfall is probably as high as 6000 mm. To the east of the ranges the annual rainfall falls somewhat suddenly to a lowest value of 706 mm near Martinborough, but increases again to about 1200 mm towards the east coast.

DISTRIBUTION OF YELLOW-GREY EARTHS IN THE WAIRARAPA

The yellow-grey earths, together with the intergrades between yellow-grey earths and yellow-brown earths, and associated steepland soils, occur on the eastern side of the main valley and on the eastern hill country (Fig. 1). This distribution corresponds to the area of low annual rainfall (750–1200 mm).

Heine (1975) refers to two main areas of distribution of yellow-grey earths: (1) The Central Plain and (2) the Eastern Hills. Yellow-grey earths of the Central Plain occur on river terraces and undulat-



igure 1 Map showing distribution of yellow-grey earths and related soils in the Wairarapa Region (from 'Soil Map of the North land, New Zealand', N.Z. Soil Bureau 1968b)

ing land, to the east. These land forms are considered to represent remnants of erosion cycles of probable late Pleistocene age. The soils are developed dominantly in loess and are between 1 m and 2 m deep. On the Eastern Hills, however, the soils tend to be 'more like yellow-grey earths if they have sandy parent materials and occur on rolling slopes'. The distribution of yellow-grey earths throughout the Eastern Hills therefore tends to be patchy.

SUMMARIES OF FOUR REPRESENTATIVE SOIL PROFILES

Wharekaka silt loam. Yellow-grey earth developed in loess. Widespread on the eastern side of the main valley, on dissected river terraces and on undulating, rolling and hill land.

Description generalised from Pollok (1975).

20 cm	greyish brown and pale brown silt loam; fine crumb and medium nut structure,
25 cm	very pale brown silty clay loam with brownish yellow and light grey mottles; coarse prismatic and blocky structure,
20 cm	strong brown silty clay loam; coarse plates and blocky structure,
80+ cm	light brownish grey to light olive grey silt loam with yellowish red mottles; strongly developed very coarse polygonal structure (fragipan).

The following three descriptions are generalised from Heine (1975).

Pirinoa silt loam. Intergrade between yellow-grey earth and yellow-brown earth. Occurs on undulating, rolling and hilly land, and is formed in shallow loess over siltstone.

18 cm	dark greyish brown silt loam,
55 cm	pale yellowish brown heavy silt loam with orange mottling (slightly compact),
over	yellow siltstone.

Taihape steepland soils. Steepland soils related to intergrades between yellow-grey earths and yellow-brown earths. Formed in siltstone on steep slopes.

15 cm	dark greyish brown silt loam,
30 cm	pale yellow silty clay loam with orange mottling,
over	yellow siltstone.

Hururua steepland soils. Steepland soils related to intergrades between yellow-grey earths and yellow-brown earths. Formed in greywacke and argillite on steep slopes.

12 cm	greyish brown heavy silt loam,
on	dull greyish yellow stony clay loam, grading into pale yellow weathered argillite below 50 cm.

DESCRIPTION OF YELLOW-GREY EARTHS IN THE WAIRARAPA

Heine (1975) notes that yellow-grey earths are characterised by the presence of compact claypans in the subsoils, and continues 'In the Wairarapa, yellow-grey earths can be subdivided into soils with a less distinct claypan in areas receiving 1140–890 mm rain and soils with a distinct dense claypan in the 890–760 mm rainfall zone'.

THE SANGATTE RAISED BEACH

AND THE AGE OF THE OPENING OF THE STRAIT OF DOVER[1]

SANDA BALESCU[2] & PAUL HAESAERTS[3]

ABSTRACT

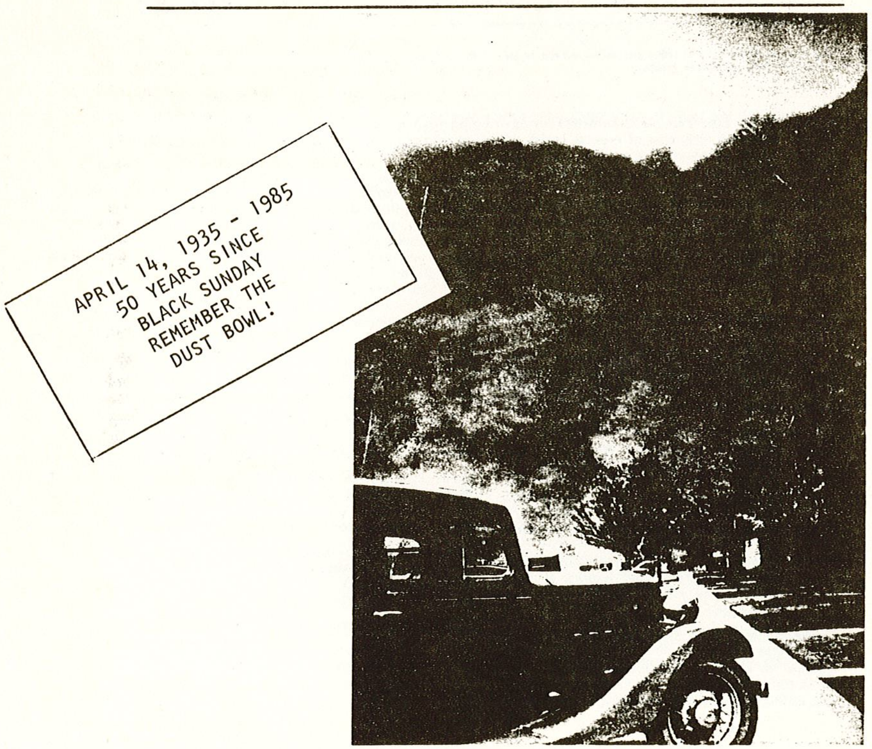
Balescu, S. & P. Haesaerts 1984 The Sangatte raised beach and the age of the opening of the Strait of Dover – Geol. Mijnbouw 63: 355-362.

This study is a pedological and mineralogical diagnosis of the loamy cover deposits of the Sangatte raised beach (Strait of Dover), presently at almost 10 m N.G.F.[4], to determine their chronostratigraphy.

The analytical data are compared with those obtained for the Cagny-la-Garenne (Somme, Picardie) section, which is considered a stratotype for Middle Pleistocene loesses of Northern France.

Our results support the notion that formation of the Sangatte raised beach can be attributed to a high sea level of the Middle Pleistocene. This provides further evidence on the paleogeographical evolution of the Southern North Sea Basin during the latter half of the Middle Pleistocene. It confirms the previous assumption of an early opening of the Strait of Dover in the Middle Pleistocene.

Furthermore, it demonstrates that the loesses with high green hornblende and garnet content, that were previously supposed to be restricted to the Weichselian, were already deposited during the Saalian.



Liberal, Kansas, 14 April 1935. (*Kansas State Historical Society*)

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Beijing, China

THE XIAN LABORATORY OF LOESS AND QUATERNARY GEOLOGY (XLLQG)

A LETTER TO LL FROM PROFESSOR LIU TUNGSHENG

Dear Dr. Ian Smalley:

A new research institute, the Xi'an Laboratory of Loess and Quaternary Geology, was set up in Xi'an, Shaanxi Province, China, in October, 1984. Xi'an is located in the peripheral zone of the Loess Plateau. It is well known not only as famous ancient captial of more than 2000 years, but also as a modern city with various industrial enterprises. So it is ideal for us to build a research centre for Loess and Quaternary geology studies. I was appointed as the director of the Laboratory, and Mr. An Zhisheng as vice director.

In the past few years, encouraged by open policy of our government, international cooperations are carried out vigorously in various aspects in industry, agriculture and scientific research all over China. In this case, scientific and technical cooperation between China and other countries should not be limited only to the exchange of research workers, but a certain kind of "Joint Venture" should also be considered.

This idea is fully supported by Academia Sinica. Thus, I am willing to cooperate with scientific institutions or scientific societies from abroad in establishing the XLLQG. I expect the XLLQG to be a laboratory of international character. In order to realize what I mentioned above, we need some laboratory equipments and research facilities from abroad. The newly built laboratory should provide a chance for both chinese and foreign scientists to do their research work side by side in China. Meanwhile, the Laboratory will offer necessary accommodation and research convenience to those scientists who would like to work in China.

The brief introduction of the XLLQG is enclosed for your reference. Your advice and help will be very much appreciated.

With best regards.

Sincerely yours,
Professor Liu Tungsheng
Geological Institute
Academia Sinica
P.O. Box 634
Beijing, China

THE INTRODUCTION OF THE XI'AN LABORATORY OF LOESS AND QUATERNARY GEOLOGY, ACADEMIA SINICA

The Xi'an Laboratory of Loess and Quaternary Geology, an independent unit attached to Academia Sinica, is situated in Xi'an, Shaanxi Province, China.

Xi'an is located at the middle reaches of the Yellow River, with the grand Loess Plateau and widely distributed desert lying to its north and west; to its east, Xi'an connects with the great plain of northern China; to its south, across the Qin Ling Mountain, the Red Basin of Sichuan Province with temperate and subtropical landscape occur to your eyes, also, the Quaternary geology here is rich in various aspects. The continuous loess-paleosol series of deposited since 2.4 m.y. ago has been extremely well developed. Relics of human fossils of one million, 600 thousand and 200 thousand years old have been discovered in this region.

The Laboratory is engaged in the study of the characteristics and forming processes of loess and quaternary sediments in China. On the base of the geological and biological records of the quaternary, it is possible for us to reconstruct the history of the environmental changes of the Quaternary and to understand the effect of human activities to the future development.

1. The Research Projects

The projects of the Laboratory are as follows:

(1) The composition, physical characteristics and micromorphology of loess and paleosol, and their relation to environment changes and engineering construction.

(2) Process and mechanism of recent dust fall and loess sedimentation and the relation of loess accumulation and loess erosion.

(3) The evolution history of human fossils on the Loess Plateau and the migration of the fauna and flora during Quaternary.

(4) Loess-paleosol sequences and their meaning to paleoclimate since 2.4 m.y. ago; the pattern and its development in northern China.

(5) The shorter time climatic change since 2000 years and its relevence to human activities on the Loess Plateau and in northern China.

2. The Laboratory

(1) Micromorphology laboratory of loess and Quaternary sediments, physical and mechanical tests.

(2) The dating laboratory, including ^{14}C, paleomagnetism Thermoluminesence and other methods.

(3) The laboratory of environmental changes, including dendrochronological and palynological studies, as well as the determination of oxygen isotope.

(4) A data-bank of the information of the Quaternary environmental change.

* * *

REMINDERS

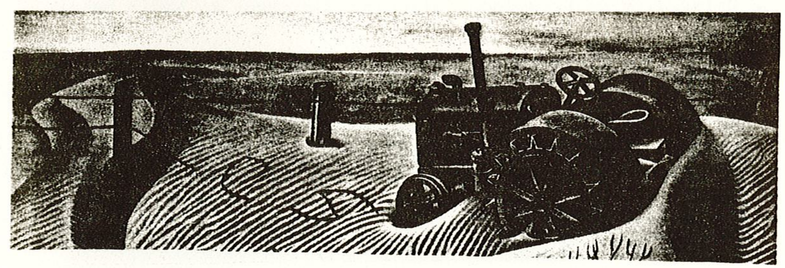
Poland '85: "Problems of the Stratigraphy and Paleogeography of Loesses" - an international symposium Lublin 6 - 10 September 1985. Details from Professor Henryk Maruszczak, Department of Physcial Geography, University Marie Curie - Sklodowska, Akademicka 19, 20 - 033 Lublin, Poland (see LL12 p 3).

China '85: "International Symposium on Loess Research" Xian 5 - 16 October 1985 (note the change of date from that announced in LL12) Details from Institute of Geology, Academia Sinica, P.O. Box 634 Beijing, China.

1st International Conference on Geomorphology; Manchester, England 15 - 21 September 1985 (see LL11 pp 26 - 27 & LL12 p 9). There will be a Joint Session with the INQUA Loess Commission. This is Conference Session 21, convened by Edward Derbyshire. LL14 will be a special issue for the Geomorphology Conference, and should be available for distribution at the Conference.

12th International Sedimentological Congress; Canberra Australia, August 1986. It is hoped that there will be a Loess Workshop held in association with this congress.

Israel '86: "Desert Loess" meeting - proposed for Israel in the northern hemisphere summer of 1986. Contact Professor D.H. Yaalon, Department of Geology, Hebrew University, Jerusalem, Israel.



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