56

Danubian Loess
Special Issue

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LOESS LETTER 56

An INQUA Newsletter for Students of Loess Material, Loess Deposits, Loess Ground, Loess Soils & Loess as a 'Climate Register'. Founded in 1979 at the New Zealand Soil Bureau.

丸・穴など]を射ち込む，…をひっかける，とどめる ¶ He *lodged* an arrow *in* the bear's chest. 彼はくまの胸に矢を射ち込んだ **5**〔職権など〕を付与する，ゆだねる《... *in*, *with*》 **6** [風雨が]〔作物など〕を倒す (fell) **7**〔獲物〕を巣まで追跡する，追い込む ◇ lódgment *n.* [<OF *loge* hut *cf.* lobby]

lodge·ment [ládʒmənt/lɔ́dʒ-] *n.*《英》=lodgment

lodg·er [ládʒər/lɔ́dʒə] *n.* 宿泊者；下宿人 *cf.* boarder ¶ take in *lodgers* 下宿人を置く

:lodg·ing [ládʒiŋ/lɔ́dʒ-] *n.* **1** ⓒⓤ 宿泊；下宿 ¶ furnish board and *lodging* まかない付きで下宿させる **2** [一時的な]居住地，宿所 **3** (〜s) 貸間，下宿屋；《英》[大学構外の]学生宿舎 ¶ live in *lodgings* 間借りしている

lódging hòuse *n.* 下宿屋 ¶ a common *lodging house*《英》[まかないなしの]簡易宿泊所

lodg·ment,《英》**lodge-** [ládʒmənt/lɔ́dʒ-] *n.* **1** 宿泊[所] **2** 沈でん[物]，堆積(たいせき)[物] ¶ a *lodgment* of sand 砂の堆積 **3**〘軍〙占領；拠点，足がかり **4**〘法〙担保の供託；預金 **5** [抗議などの]申し入れ

Lódz [lu:ʒ] *n.* ルージ[ポーランド中部の都市]

lo·ess [lóuis, +米 les, +英 lə:s] *n.* ⓤ 黄土，レス [Rhine, Mississippi 川流域や中国北部にある風成層] [<G *Löss* <*lösen* loosen]

L of C《略》〘軍〙*l*ines *o*f *c*ommunication (兵站(へいたん)線)

lo-fi [lóufái] *adj.*, *n.* ハイファイ (hi-fi) でない[再生装置]

Ló·fo·ten Íslands [lóufo(u)t(ə)n-/loufóu-] *n. pl.* (the 〜) ローフォテン諸島[ノルウェー北西方にある同国領の諸島．その近海は漁場]

***loft** [lɔ:ft/lɔft] *n.* **1** 屋根裏；[納屋などの] 2 階；[教会・講堂などの]上階，さじき；[倉庫・商館などの] 最上階；[納屋などの屋根裏の]干し草置き場 (hayloft) **2**〘ゴルフ〙ロフト[クラブヘッドの傾斜度]，高打ち **3** はと小屋；はとの群れ —*vt.* **1** …を屋根裏に貯蔵する；《古》〔家〕に屋根裏部屋をつける **2**〔はと〕をはと小屋に入れる，飼う **3**〘ゴルフ〙〔クラブヘッド〕に傾斜をつける，〔ボール〕を高打ちする **4**〔宇宙船〕を打ち上げる —*vi.*〘ゴルフ〙ボールを高く打ち上げる；[ボールなどが]高く飛ぶ [<ON *lopt* sky, upper room : 同系語 *lift*]

loft·er [lɔ́:ftər/lɔ́ft-] *n.*〘ゴルフ〙ロフター[高打ち用のアイアンヘッドのクラブ] (lofting iron)

:loft·y [lɔ́:fti/lɔ́fti] *adj.* (**loft·i·er, loft·i·est**) **1** そびえ立つ，非常に高い ⇒HIGH 類語 ¶ a *lofty* tree 非常に高い木 / a *lofty* peak in the Alps アルプス山脈の高峰 **2** 高尚

LL56. Loess Letter is a newsletter for anyone interested in loess. Published for INQUA (the International Union for Quaternary Research) by the Waverley Materials Project at Nottingham Trent University; editor Ian Smalley (ian.smalley@ntu.ac.uk).

LL is published twice a year, usually April and October, and reference collections are kept at ISRIC in Wageningen, USDA and USGS Libraries, and the British Library. More details on INQUA at www.inqua.tcd.ie. LL looks forward to the 17th INQUA Congress, Cairns, Australia 28 July- 3 August 2007; details from www.inqua2007.net.au. LL also supports the Danubian Loess Conference, Novi Sad 29 September – 2 October 2006; for all matters relating to this meeting consult Slobodan Markovic at zbir@im.ns.ac.yu.

We celebrate INQUA becoming a full member of ICSU (the International Council of Science; www.icsu.org); we celebrated in 55 but this is an important event so we celebrate again. And, two new National Members to be recorded: the Serbian Academy of Sciences & Arts, and the Montenegrin Academy of Sciences- announced by ICSU on 7 July 2006; yet more celebration.

Anniversaries. In this issue we take note of several anniversaries. Forty years ago, in September 1966, the INQUA Loess SubCommission- led by Julius Fink, gathered in Yugoslavia, at a meeting organised by Jelena Markovic-Marjanovic. In September 2006 the INQUA Loess SubCommission returns; LL congratulates the organisers of the Danube Loess meeting.
We remember the birth, 130 years ago, of L.S.Berg, the most committed proponent of loessification. Lev Semenovich Berg 1876-1950, who proposed the idea of

loessification in 1916, was the subject of a memorial paper in New Zealand Soil News (vol.54, 71-74, 2006); we reprint in 56. (also reprinted in the Historical Newsletter of the IUSS- the International Union of Soil Science).

AFEQ 1969. For the 8th INQUA Congress in Paris the Association Francaise pour l'Etude du Quaternaire (aka AFEQ) published a key work on loess. With the benefit of hindsight we can see that this truly was an important work, a key publication in the history of the investigation of loess. 'La Stratigraphie des Loess d'Europe' was the statement of the scope and range of the work of the SubCommission for Loess Stratigraphy- which at the 8th Congress would be upgraded in status to full commission- the Loess Commission. The book listed 112 sections from UK to Ukraine; and many of these were in the Danube basin, and have relevance for the current Danubian activities. [sections 109 & 110 in particular].

But the real importance of the book was that it brought together all the early participants in the Loess Commission and defined the areas of interest and provided a focus for all of loess research in Europe. Of all the publications organised by Julius Fink to further loess research in Europe, this is probably the most important item, and will remain so until the INQUA Loess Map of Europe is eventually published. The cover of 56 shows the 8th Congress logo; we also reproduce parts of the map which shows the location of all the 1969 sections, and the paper by Jelena Markovic-Marjanovic, and a bit of the introduction by Fink.

QI. Moscow 2003. The INQUA Loess Commission meeting in Moscow in 2003 has generated a special issue of Quaternary International QI. This special issue 'Loess and Palaeoenvironments across Eurasia' comprises 21 papers in vols.152 & 153 and is edited by A.A.Velichko,

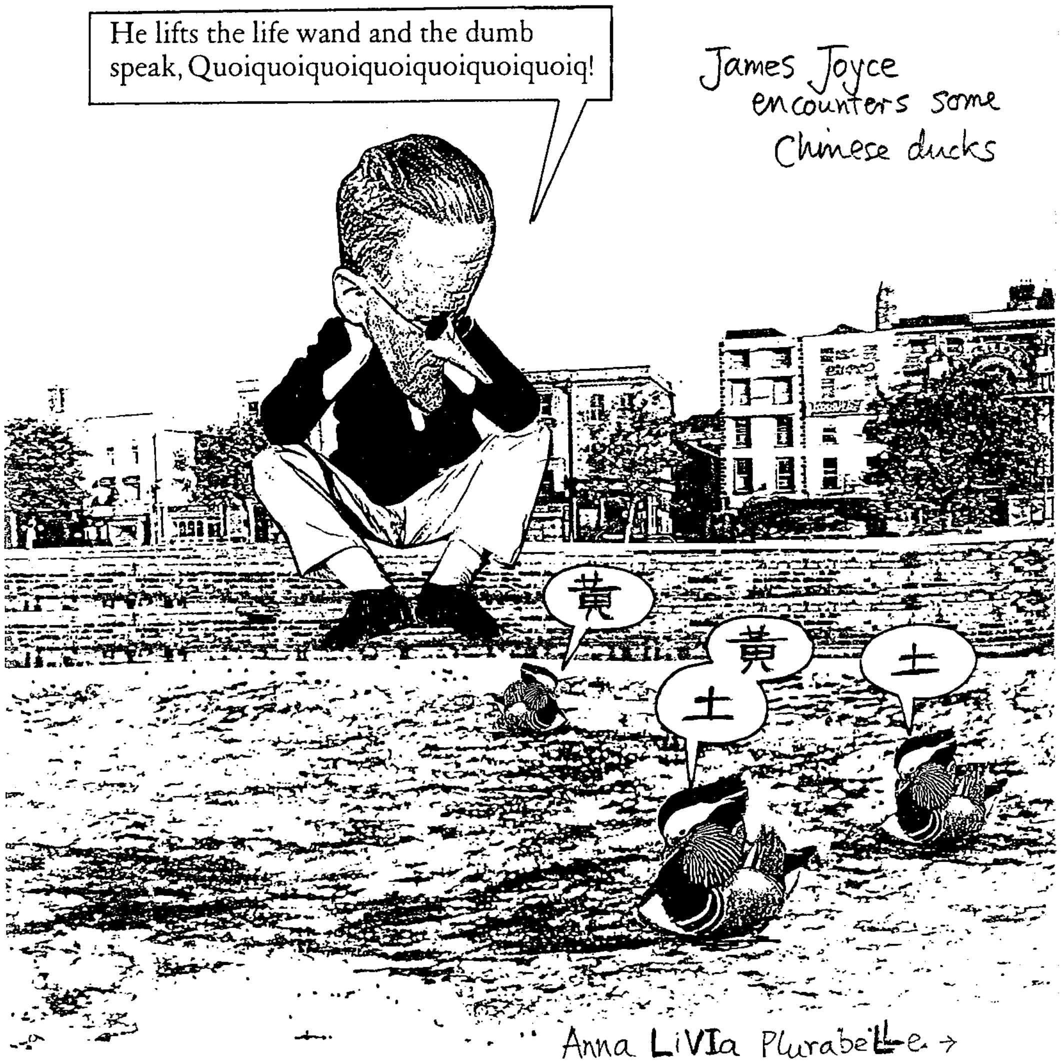
A.E.Dodonov & Norm Catto; it is dedicated to the memory of Marton Pecsi 1923-2003, President of the Loess Commission 1977-1991. We reprint some parts in 56 but this is a very important volume and it may be necessary to revisit it in 57. 57 is due to be a special issue for the 17th INQUA Congress in Cairns – which is approaching with startling rapidity; submit your loess proposals post haste.

Danubian Loess. The Danube basin is a major loess area. Julius Fink spent his entire career (as far as we know) at the University of Vienna- deep in the basin; and from here the Loess Commission was designed and implemented. The Danubian Loess Conference at Novi Sad 29 September- 2 October 2006 considers 5 major topics: Danube loess; Loess in the Vojvodina region; Eurasian loess; Recent dust deposition; and Loess and man.

At Novi Sad (or very close by) is the Petrovaradin Fortress (Festung Peterwardein) one of the great castles of the Austro-Hungarian empire, guarding the border with the Ottoman Empire- and famous for its tunnels, some of which are in the loess. Regular readers of LL will remember the SEQS (SubCommission on European Quaternary Stratigraphy) meeting in Kyiv in 2001. A fantastic meeting with some beautiful loess, and a visit to the Pecherskaya Lavra- the Monastery of the Caves, another wonderful set of loess caves.

It appears that the first description of loess was made in this Danubian region- by Luigi Ferdinando Marsigli in his famous 1726 book 'Danubius Pannonico Mysicus; another reason for having a celebratory Danube Loess Conference.

Covers. The front cover displays the logo of the 8th INQUA Congress (to extol the genesis of the Loess Commission- bursting into life from its home in the Danube basin)- and the back cover shows the logo for 17th INQUA Congress in Cairns in 2007; and the map of 1969 loess sections. Inside, to symbolise the current international nature of loess research two pages from Obunsha's Comprehensive English-Japanese Dictionary; read Loess Letter.



Bulletin de l'Association française pour l'étude du Quaternaire.
1969

LES PROGRES DE L'ETUDE DES LŒSS EN EUROPE

PAR

J. FINK, Vienne.

L'étude des lœss a fait des progrès considérables dans un passé récent. C'est pourquoi nos collègues polonais ont organisé, à Lublin en 1961, lors du VIe Congrès de l'Association internationale pour l'étude du Quaternaire, un colloque sur les lœss. L'intérêt suscité par les conférences et les excursions de ce colloque a mené à la fondation de la « Sous-Commission pour la stratigraphie du lœss en Europe », dénomination qui exprime ses activités spécialisées dans le cadre de la « Commission stratigraphique » de l'INQUA. En tant que président de cette Sous-Commission, m'échut l'honneur d'unir les chercheurs qui s'occupaient de la stratigraphie du lœss afin de préparer la corrélation des résultats de leurs travaux.

Le succès d'une telle coopération implique : 1° l'activité de collaborateurs dans tous les pays où il y a des dépôts lœssiques importants et 2° la corrélation des résultats, sur le plan international, ce qui ne peut se faire que sur le terrain dans le cadre d'excursions. Voici les raisons pour lesquelles la Sous-Commission du lœss compte tant de membres (plus que ne le permettent d'ailleurs les statuts soumis au présent Congrès de l'Union internationale pour l'étude du Quaternaire !). En outre, les mêmes raisons expliquent que seules des réunions annuelles donnent aux collaborateurs la connaissance approfondie, nécessaire, de la situation dans les pays étrangers. La Sous-Commission s'est réunie jusqu'à présent :

— du 31 mai au 3 juin 1962 en Autriche (avec peu de participants) ;
— du 22 août au 28 août 1963 en Tchécoslovaquie ;
— du 1er avril au 4 avril 1964 en République démocratique allemande ;
— du 21 avril au 24 avril 1965 en Hongrie ;
— du 6 septembre au 10 septembre 1966 en Yougoslavie ;
— du 29 août au 3 septembre 1967 en Belgique ;

La prochaine réunion se tiendra vraisemblablement en 1970 en Bulgarie. Il faut insister sur le fait que toutes ces réunions — qui constituent une véritable propagande pour l'étude internationale du Quaternaire — sont dues à la seule initiative des membres de notre Sous-Commission, tous les frais d'organisation scientifique et technique, y compris les frais de publications, étant à la charge des Académies des sciences, des Services ou Instituts géologiques, etc., des pays invitants. Je tiens à remercier vivement toutes ces institutions pour leur aide scientifique et matérielle si importante.

Les réunions, organisées sous forme d'excursions dans les pays visités, ont été décrites en détail dans les périodiques nationaux intéressés ainsi que par le président d'une manière plus sommaire dans *Eiszeitalter und Gegenwart, 15, 16* et *19*, dont le dernier volume est présenté aux participants du VIIIe Congrès de l'INQUA. La première description commune des résultats de notre travail fut préparée en vue du VIIe Congrès de l'INQUA tenu à Denver, U.S.A., mais ces dix-huit exposés incorporés au volume 12 des Proceedings du Congrès et intitulés

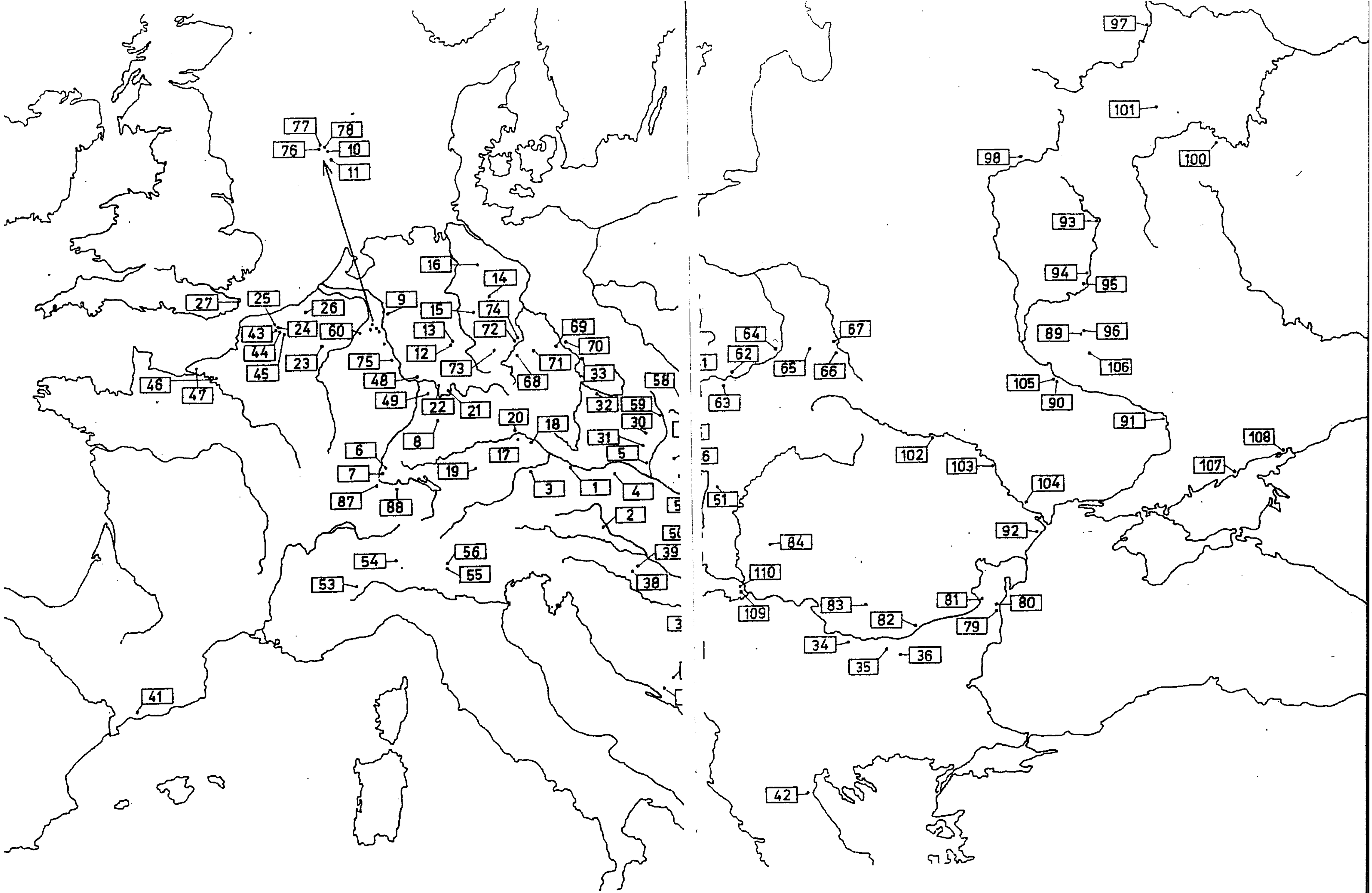


FIG. 1. — *Localisation des pro* *s décrits dans le présent travail.*

Bulletin de l'Association française pour l'étude du Quaternaire.
1969

LES PROFILS DE LŒSS DU BASSIN PANNONIQUE. REGION CLASSIQUE DU LŒSS DE YOUGOSLAVIE

PAR

J. MARKOVIC-MARJANOVIC.

Zusammenfassung. — *Es werden zwei nahe beisammenliegende Profile aus der klassischen Lößlandschaft Jugoslawiens, dem Südrand des Pannonischen Beckens, beschrieben, und zwar A) das Profil von Batajnički vinogradi und B) Stari Slankamen, welche bei einer Mächtigkeit bis zu 40 m 9 bis 10 Lösse und bis zu 10 begrabene Böden enthalten. Die Serie der äolischen Sedimente beginnt basal mit einer Roterde, welche Eisen- und Mangankrusten enthält (VIII); sie liegt an der Wende Plio / Pleistozän. Es folgen dann — als wesentliche Elemente — zwei Bodenkomplexe, und zwar PK VI, der Slankamen - Komplex und PK IV, der Nestin - Komplex. Letzterer wird vom Autor in das letzle Interglazial gestellt.*

I. — CARACTERES ET EXTENSION GEOGRAPHIQUE DU LŒSS

La situation géographique de la Yougoslavie, méridionale par excellence (entre les 41° et 46° degrés de latitude nord) et son grand éloignement de l'inlandsis de l'Europe du Nord pendant la période glaciaire laisseraient à peine soupçonner qu'on puisse y rencontrer des phénomènes périglaciaires et des lœss. Pour cette raison, on est étonné de voir qu'une part considérable de la superficie de ce pays est couverte de lœss, qui forme une couverture continue dont l'épaisseur atteint par endroit 30 m et qui montre un caractère polyphasé sur une distance de plus de 100 km. Le lœss y est, en outre, très bien conservé, sans changements chimiques, depuis les phases les plus anciennes jusqu'aux phases les plus récentes du Pléistocène et il renferme un nombre important de sols fossiles (jusqu'à 8), d'épaisseurs, couleurs et pédogenèses diverses.

La région de couverture ininterrompue et des couches puissantes de lœss, dite région classique du lœss en Yougoslavie, se trouve dans la partie septentrionale du pays — dans le Bassin Pannonien et à la bordure méridionale de celui-ci, autour des fleuves Danube, Tisa, Save, etc., où elle forme des plateaux de lœss. Cependant, le lœss est répandu également dans quelques autres parties de notre pays. Il apparaît là sous formes de petites *oasis* isolées, témoins de l'extension continue du lœss autrefois, à savoir : 1. dans les vallées fluviales au sud du Danube et de la Save (Grande Morava) comme lœss de terrasse ; 2. dans les bassins le long de la vallée de la Morava et du Vardar (bassins de Nis, de Skoplje et autres), et. 3. finalement, le long de la côte adriatique (Zadar, le Lac de Skadar) ainsi que dans certaines îles (Susak, Vrgada, Pasman, Hvar) accompagné de faune fossile (*Helix, Succinea, Equidae, Cervidae*, etc.).

Les problèmes du lœss en Yougoslavie ont été traités par : J. Cvijić (1920), D. Gorjanović (1921), V. Laskarev (1922-1954), B. Bukurov (1948), B. Milojević (1949), J. Marković-Marjanović (1931-1968), D. Aleksandrović (1961), etc.

Les caractéristiques du *lœss d'oasis* sont : moindre épaisseur (de 3 à 20 m), caractère polyphasé moins prononcé (de 1 à 4 lœss), le nombre de lœss augmentant

à partir de la terrasse fluviale la plus basse (1 lœss) jusqu'à la terrasse fluviale la plus élevée (4 lœss) ; composition granulométrique moins fine (grosses granules), avec présence de matériaux d'origine locale, mais aussi de la faune pléistocène correspondante (*Elephas primigenius, Elephas antiquus*, etc.). Il est également important de souligner que le lœss d'oasis pénètre de 457 km au sud de la bordure du Bassin Pannonien et qu'il atteint, dans la vallée du Vardar — région où règne à présent le climat méditerranéen modifié — sa limite méridionale en Yougoslavie et dans la Péninsule Balkanique.

II. — DESCRIPTION DES PROFILS.

Dans le présent travail, seront présentés deux profils de lœss voisins qui se complètent mutuellement, offrant un tableau de l'évolution des sédiments pléistocènes de la *région de lœss classique* des environs de Belgrade au sens le plus large. Ce sont les profils suivants : A) Batajnički vinogradi et B) Stari Slankamen. L'un et l'autre, sur le plateau de lœss de Srem sur la rive droite du Danube, sont éloignés d'environ 25 km.

A. — Profil pédologique de Batajnica (altitude 114 m).

Epaisseur d'environ 40 m, où nous rencontrons, en superposition, dix sols fossiles et neuf lœss. Les trois sols fossiles près du sommet (I, II, III) ont un caractère steppique. A la base, apparaissent deux puissants sols forestiers : VII, de type pseudogley et VIII rouge roux, tandis qu'au milieu du profil se trouvent deux ensembles pédologiques : en haut, PK IV, composé de trois horizons, et en bas, PK VI, composé de cinq horizons. Les sols fossiles apparaissent dans l'ordre suivant et montrent les propriétés suivantes :

Sol fossile I (couche 3), couleur châtain pâle avec taupinières, le moins prononcé de tous ,contient *Picea excelsa, Pinus montana* et *gramineae*. Il indique la forêt-steppe froide. Par sa position stratigraphique, il correspond à Stillfried B en Autriche et au PK I de Tchécoslovaquie.

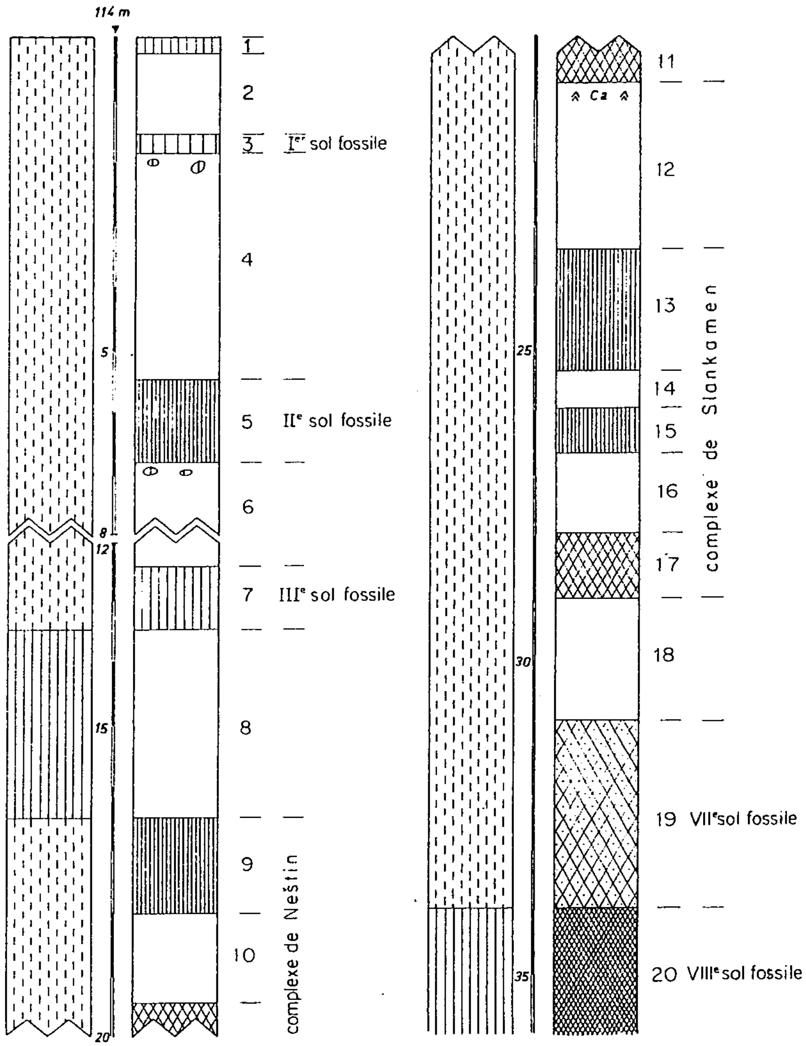
Sol fossile II (couche 5), chernozem brun, riche en humus (2,15 %) avec taupinières ; il contient un pollen d'herbes de la steppe, puis [1] *Quercus, Buxus, Carpinus, Ulmus*, indiquant une communauté thermophile. Il correspond à la partie supérieure du complexe de Stillfried en Autriche, et au PK II de Tchécoslovaquie.

Sol fossile III (couche 7), pauvre en humus (0,79 %), avec taupinières, de couleur rose, à caractère steppique. En Autriche et en Tchécoslovaquie, son équivalent indépendant n'a pas été observé, si ce n'est le II° horizon d'humus du complexe de Stillfried en Autriche, et du PK II de Tchécoslovaquie. Il correspond probablement à Amersfoort en Europe du Nord.

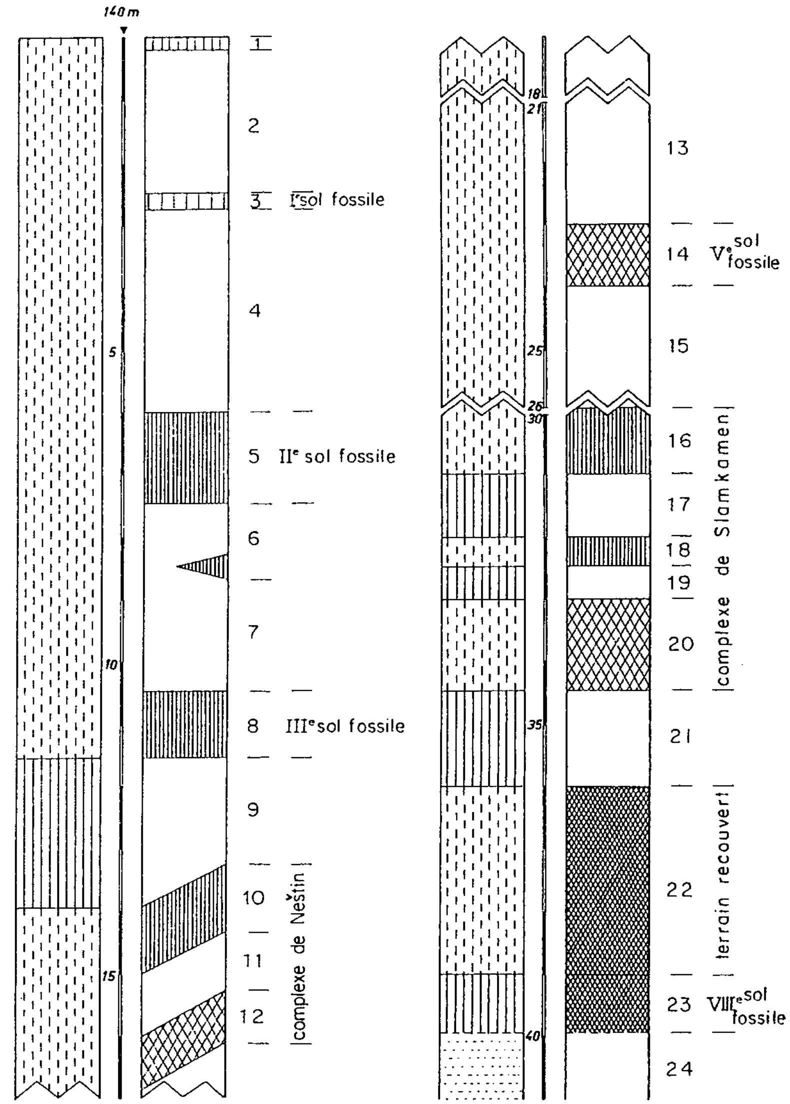
Sol fossile IV. Ce sol est l'ensemble pédologique, désigné en Yougoslavie comme PK IV (pédocomplexe de Nestinski)), tandis qu'en Autriche il forme l'horizon de base de l'ensemble de Stillfried A, et en Tchécoslovaquie le PK III. C'est donc, dans ces trois pays, un sol forestier qui correspond au dernier interglaciaire. Sur le profil de *Batajnica, PK IV* est un sol fossile double : à la surface, sol de steppe (couche 9) avec *Carpinus, Fagus, Salix*, à la base, sol de forêt (couche 11) avec taches de manganèse — séparés par une couche de lœss à concrétions (couche 10).

1. Analyses polliniques, par Dr A. Gigov, 1960, 1967.

109 - BATAJNICA



110 - ST. SLANKAMEN



Sol fossile V, n'est pas représenté sur ce profil. Il apparaît plus à l'ouest, le long du Danube, près de la localité de Slankamen.

Sol fossile triple PK VI nommé « ensemble pédologique de Slankamen », d'après la localité où il fut observé pour la première fois en 1948 (couches 13-17). Les deux sols du sommet sont des sols de steppe (13, 15), rougeâtres, avec *Helix pelasgica*, une espèce qui vit actuellement sous le climat méditerranéen du Pélopponèse, tandis que le sol de base est un sol forestier (couche 17), aussi rougeâtre. Ils sont séparés par le lœss. Selon ses propriétés et l'ordre de superposition, il correspond probablement à un interglaciaire ancien.

Sol fossile VIII (couche 19), indicateur de facteurs pédogénétiques humides. Il correspond au Pléistocène le plus ancien ,mais pour le moment, la documentation nécessaire est insuffisante.

Sol fossile VIII (couche 20), de couleur rouge rousse avec une masse de croûtes de fer et de manganèse, « plissées en poches » qui rappellent les croûtes de latérite. L'horizon rouge forme la limite entre le Pliocène et le Pléistocène, ce qu'on voit plus à l'Ouest (Slankamen) où il fut formé sur les sables pontiens. Il appartient probablement au faciès du Villafranchien. Par analogie avec la Roumanie voisine, où cette terre rouge la plus ancienne a été aussi précisée par la faune, il indique une région de savane.

B. — Profil pédologique de Slankamen Cot (altitude 140 m).

Epaisseur d'environ 45 m. Il ressemble au profil précédent : par le nombre de lœss et l'ordre des types de sols fossiles. Ce profil montre également dans l'ordre de superposition : sols fossiles I, II et III, ensuite PK IV, quatrième ensemble pédologique, tout comme dans la localité de Batajnički vinogradi. Il montre une nouveauté : le

Sol fossile V (couche 14), individualisé, sol de forêt de couleur rouge-rousse à concrétions de manganèse, développé entre deux lœss continentaux, puissants.

Au-dessous du sol fossile V, il y a à Slankamen :

Ensemble pédologique VI (PK VI, couches 16-20), exactement comme à Batajnica ; il est nommé « ensemble pédologique à plusieurs membres de Slankamen », avec *Helix pelasgica*, il est formé sur le lœss le plus ancien de cette région, le 7ᵉ lœss stadiaire (couche 21). Au-dessous du 7ᵉ lœss, le terrain est couvert (couche 22), tandis qu'à la base de ce profil apparait le

Sol fossile III de couleur rouge (couche 23), à caractère forestier.

Le *sol fossile VII* n'a pas été observé jusqu'à présent dans cette localité, sa place stratigraphique étant inaccessible à l'observation.

III. — GRANULOMETRIE ET COMPOSITION CHIMIQUE DES PROFILS.

L'étude granulométrique des deux profils, dont le tableau ne peut être présenté ici par manque de place, montre que les lœss 2, 3, 6 et 7 de Slankamen sont poudreux, tandis que les lœss 4, 8, 9 et 10 sont argileux. Le lœss 4 de Batajnica est aussi argileux, tandis que les lœss 2 et 3 sont poudreux.

Présence de $CaCO_3$ et d'humus dans les profils de Slankamen et de Batajnica[2] :

2. Analyses mécanique et chimique du Dʳ ALEKSANDROVIC, 1961.

Numéro d'ordre des lœss et des sols fossiles	*St. Slankamen-Cot*		*Batajnički vinogradi*	
	$CaCO_3$ %	Humus %	$CaCO_3$ %	Humus %
II. lœss poudreux	22,10		24,15	
II. sol fossile	9,55	1,51	12,14	2,15
III. lœss poudreux	21,50		25,22	
III. sol fossile	11,19	0,79	10,44	
IV. lœss argileux	8,64		32,18	
IV. sol fossile	14,39	0,79	5,43	
V. lœss	—			
V. sol fossile	—	—		
VI. lœss poudreux	19,60			
VI. sol fossile	8,16	0,72		
VII. lœss poudreux	21,97			
VII. sol fossile	2,86	0,51		
VIII. lœss argileux	21,56			
VIII. sol fossile	0,82	0,51		
IX. lœss argileux	16,37			
IX. sol fossile	8,36	0,48		
X. lœss argileux	10,66			

Les deux profils montrent la régularité de l'accroissement du pourcentage de $CaCO_3$ dans les lœss (jusqu'à 31,18 %) et la diminution dans les sols fossiles (jusqu'à 0,82 %), tandis que le pourcentage de l'humus dans tous les sols fossiles est au-dessous de 1 % (0,48-0,79) à l'exception du sol fossile II où il varie de 1,51 à 2,15 %.

IV. — CONCLUSION

De tous les pays de l'Europe centrale dans lesquels ont eu lieu les réunions de la sous-commission pour la stratigraphie du lœss, la Yougoslavie et la Tchécoslovaquie ont les espaces les plus vastes sous couverture continue de lœss. En outre, le nombre de profils de lœss complets, comprenant le Pléistocène entier, est grand et ils apparaissent fréquemment. Les profils s'étendent parfois sur plus de 100 km indiquant la régionalité des phénomènes et leur importance pour la stratigraphie et la détermination chronologique relative du Pléistocène du Sud de l'Europe. Ils indiquent :

— que l'horizon-limite pliocène-pléistocène se distinguait par un climat plus chaud que le climat méditerranéen (croûtes de fer et de manganèse du sol fossile VIII) ;

— que le puissant sol fossile VII, datant du Iᵉ interglaciaire, de type pseudogley indique la longue durée de celui-ci, mais aussi la présence de facteurs d'une pédogenèse humide, tandis que le sol rouge de l'ensemble pédologique VI aux gastropodes méditerranéens témoigne d'un climat plus chaud que le climat actuel ;

— que le sol fossile V, à caractère forestier prononcé, témoigne d'un interstade chaud au Sud de l'Europe, entre deux longues phases de steppes de lœss (Riss) ;

— que l'ensemble pédologique IV date du dernier interglaciaire (Riss-Wurm), en étant le dernier représentant du climat chaud et humide avec stabilisation de forêts d'arbres à feuilles caduques ;

— que les trois derniers sols dans la partie supérieure du profil (I-III) indiquent des climats de steppe (sol fossile III) et de forêt-steppe (sols fossiles II et I) qui s'étaient étendus sur nos régions vers la fin du Pléistocène, dans le Wurm, indiquant également une baisse considérable de température.

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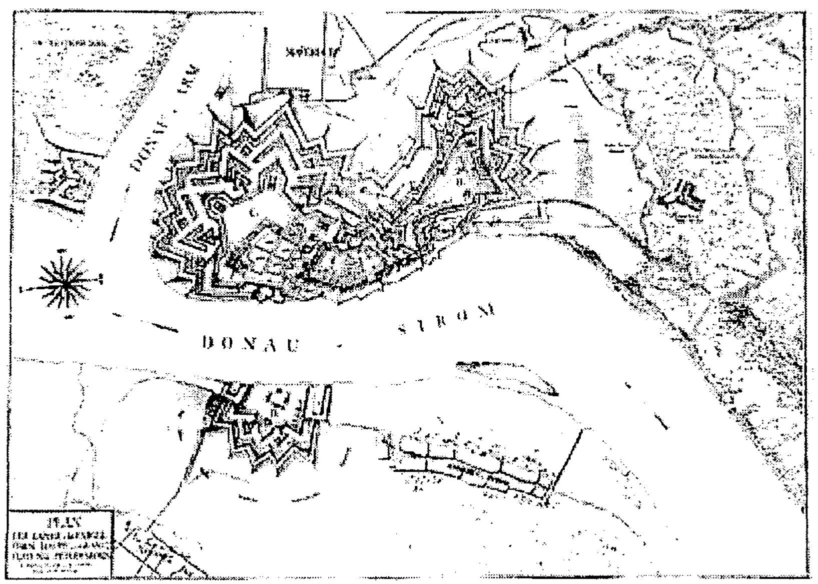
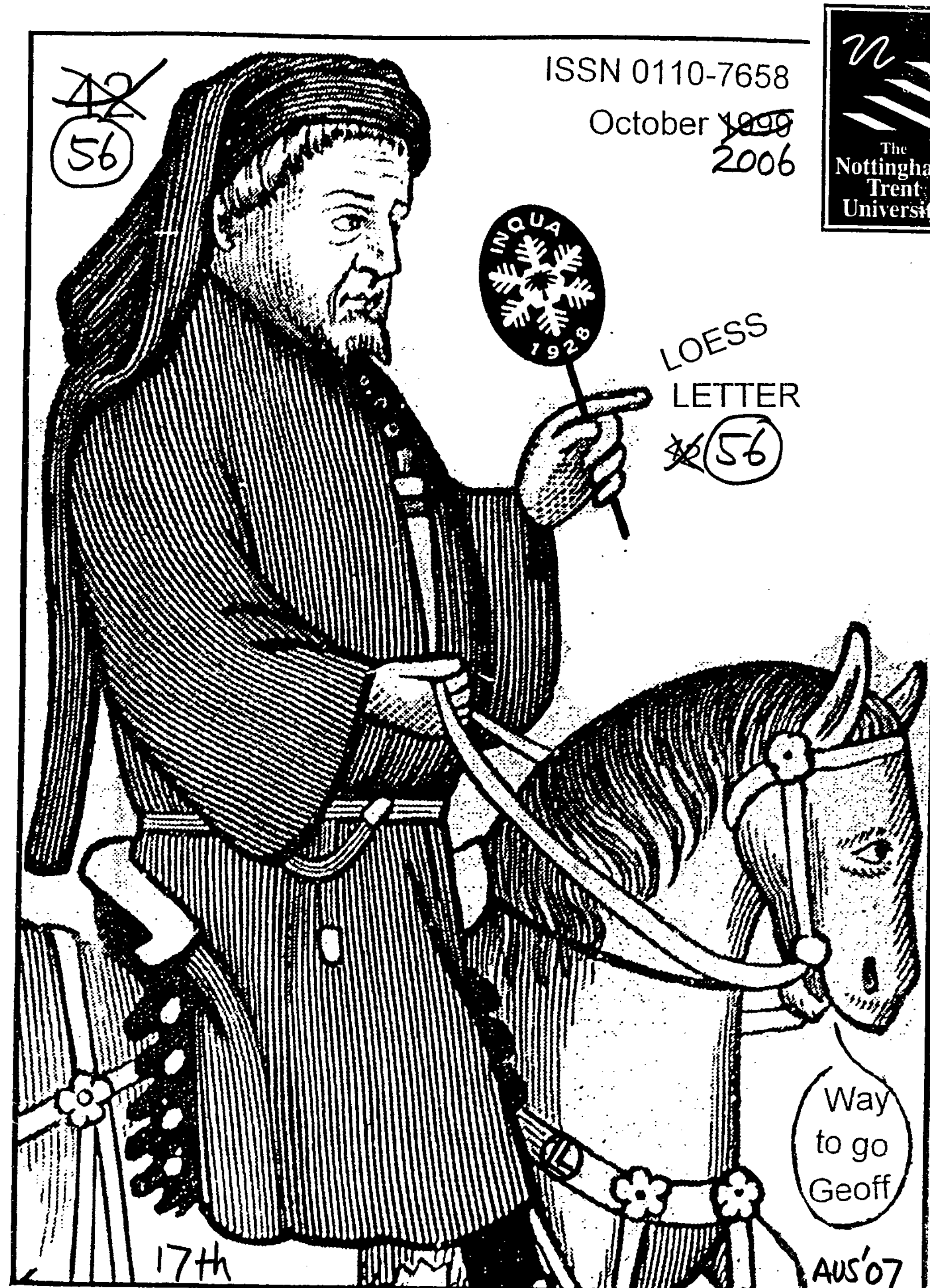


DER KAYSER UND KOENIGLICHEN HAUPT und GRANIZ FESTUNG PETERWARDEIN



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Loessification (on the 130th anniversary of the birth of L.S.Berg)

Ian Smalley
Brickearth Foundation
68 Narborough Road, Leicester LE3 0BR, UK
(smalley@loessletter.com)

Zdzislaw Jary
Institute of Geography & Regional Development
Wroclaw University, Wroclaw, 50-137 Poland
(jary@geogr.uni.wroc.pl)

Ken O'Hara-Dhand
Waverley Materials Group, Nottingham Trent University
Nottingham NG1 4BU, UK
(kenneth.ohara-dhand@ntu.ac.uk)

We can define loess- at least we can attempt to define loess (Smalley & Jary 2004); we can discuss the factors that affect its distribution (Smalley & Jary 2005a) and examine attempts to describe that distribution (Smalley & Jary 2005b), but can we grasp the slippery concept of 'loessification' – the idea that 'not-loess' ground can, by various transformative processes, become loess ground ?
Here is a word of some historical power but apparently very little contemporary relevance. It is a word that has never been deployed to any large effect in New Zealand, but there is a certain NZSN relevance because it is via the medium of soil science that it has had some impact. Also from our point of view the NZ Soil Bureau played a small, but important part, in the wider study.
We propose, in this discussion, that the idea of loessification can be considered at two levels; we shall deal with 'grand' loessification and 'petit' loessification (gL and pL for short). At the centre of the discussions is the work of two individuals: L.S.Berg (for gL: Berg 1916, 1932, 1964) and M.Pecsi (for pL: Pecsi 1990, 1995, Pecsi et al 2000).

Berg was involved in the great 20th Century debates about the nature and origin of loess. He was the main protagonist for the idea that loess came about by processes of weathering and soil formation; he offered the 'eluvial' or soil theory of loess formation, sometimes called the 'in-situ' theory; he was the guru of

loessification. According to Pyaskovskii (1946) Berg arrived at the conclusion that loess is to be regarded as a normal mineral zonal soil formation. So much of the discussion of loess in the 20th Century swirled about Berg that we feel justified in examining him and his ideas at some length.
Lev Semenovich Berg 1876-1950; more famous as an ichthyologist than a soil scientist, for most of his life associated with Leningrad University. In 1916 (when he was 40 years old) he published a long paper/monograph on loess, based on his studies in western Russia and Ukraine. In the words of the Great Soviet Encyclopedia "he proposed a soil theory of the formation of loess". This monograph was republished in 1925 in his book 'Climate and Life'. According to the Great Soviet Encyclopedia "Berg elaborated the study of landscapes and developed the teaching of V.V.Dokuchaev on natural zones.. " He was much influenced by Dokuchaev and the development of soil science, and the basic Dokuchaev ideas can be discerned in the Berg loess hypothesis. A second edition of Climate and Life was prepared and was ready for publication in 1940, but the publication was delayed by the Great Patriotic War. It came out eventually in 1947,and a translation into English of the important loess portions was published by the Israel Programme of Scientific Translations in 1964. Berg (1964) is very like Berg (1916); we do not think that the Berg loess ideas changed significantly during his life; they were certainly very influential in the Soviet Union. To quote Pyaskovskii again "There can be no doubt that the most important factor in the development of our knowledge concerning loess was the fruitful idea of L.S.Berg as presented in a series of articles and collected under the title of 'the pedological theory of loess formation' (Pyaskovskii 1946).

The basic Berg ideas (gL) were discussed some years ago in Soil News (Smalley 1980). In the New Zealand setting they were never applicable because they basically required a definition of loess which had no application in New Zealand. Loess definitions are still being discussed at some length (Smalley & Jary 2004) but we can say that if collapsibility and carbonate content are key defining factors, as Berg would require, then the NZ loess is excluded. But, if aeolian deposition and the mantling of the landscape are the key factors then NZ loess fits in nicely. Berg would never accept aeolian deposition.

Pecsi (our chosen champion of pL) was able to accept aeolian deposition as an important stage in the formation of a loess deposit. He was essentially happy with all the sedimentological preliminaries, he required loessification to operate between the aeolian deposition event and our contemporary observation of loess ground. After the sedimentological processes have finished, then the pedological processes can begin, and a discussion in Soil News takes on some relevance. Pecsi was a great enthusiast for loess, he was president of the INQUA Loess Commission for many years and wrote many papers, and edited many volumes, on his chosen material. He was Director of the Geographical Institute of the Hungarian Academy of Sciences, and made Budapest a great centre for loess research. As a member of the Central European scholarly establishment during Soviet times he was bound to be influenced by the Russian loess ideas, and supported the idea of loessification to the end of his life (in 2003). A special commemorative volume of Quaternary International has been edited by A.Dodonov and A.Velichko, which contains (inevitably) further discussion of the in-situ approach to loess formation (Smalley et al 2006). We can see the attraction of loessification in a philosophical context; it confers on loess a special status- it makes it a special, unique ground material, a marvellous and wonderful thing. A Hungarian scholar might well be drawn to loess because it is a major deposit in that country and there is, in that land-locked sedimentary basin, a relative shortage of things to investigate. And in Soviet times there was no way that you could be an oceanographer in the Pacific, or even look at the Munich loess.

Pecsi(1990): a key paper with an intriguing title 'Loess is not just the accumulation of dust'. Pecsi states that "Dust only becomes loess after the passage of a certain amount of time in a given geographical zone". That small word zone has interesting echoes of a Dokuchaevean past; the idea of a zonal control of loess formation was very strong in the Russian approach to the problem. In fact in one of the most recent maps of loess distribution (Trofimov 2001, reproduced in Smalley & Jary 2005b) global climatic zones are emphasized. A similar statement from Pecsi (1995) "In the process of loessification, the development of loess fabric, the role of zonal, regional and partly of local environmental factors is regarded [as] decisive".

Pecsi et al (2000) " On the issue of explanations for the origin of loess Berg and Pecsi considered it important to emphasize that the sedimented material is not yet loess, i.e. it is not the loess which

accumulates but its mineral weight. The ideal conditions for loessification are provided by soil horizons of semi-arid steppes and open woodlands (in some places warm and dry steppes) and during Pleistocene periglacials in those of cold steppes and open woodlands; they form the megazones of loess formation.
There have been explanations given concerning loess formation emphasizing the predominant role played by the geographical environment, i.e. by the loess megazone, in the soils of which organic and non-organic processes play a more important part than any other transportation or accumulation processes (.... Berg 1916, Pyaskovskii 1946, Kriger 1965....)"

Pecsi produces a gloss on Berg's forthright views and adapts them somewhat to his own position. The Pecsi position is more interesting and does actually have some relevance to 21st century loess studies. Berg was too extreme; denying aeolian deposition was a mistake. It is interesting that Pecsi cites Pyaskovskii(1946). This is a remarkably interesting paper and gives real breadth to the gL discussion. This is where Soil Bureau made a critical contribution to the debate; the English translation of Pyaskovskii (1946) was prepared at Soil Bureau and published by Loess Letter in 1986; there is a shortage of windows into the Berg world- this allows a critical glimpse. There are aspects of interpretation which touch on the Pyaskovskii paper- it opens with a paean of praise for Berg (see above) but a careful reading suggests that it might be a carefully coded, and damaging attack on the Berg position. Pyaskovskii picks out a great weakness in the gL approach; how do you deal with deposits that have enormous thickness? Does the process front work its way down through hundreds of metres of ground, or is some alternative required to provide these vast amounts of loess material?

It is better to let the sedimentological processes perform their function before applying the pedological reasoning. Pecsi is taking a correct approach, and this approach can be fitted quite neatly into a study of loess deposit formation which requires all the critical events or stages to be identified and elucidated. Actually many questions remain, and in the interests of context setting a few can be discussed here. Berg (1932) stated that.. " The wind, according to its velocity, can carry either coarser or finer particles, but why it should give a preference to particles of 0.01 to 0.05 mm in diameter, has never yet been explained by any follower of the aeolian theory." This is easy to explain; a simple compromise is operating. The forces on ground particles are essentially cohesion and weight; the smaller particles are more cohesive and the larger particles are heavier. At around 80 um the best lift is achieved, so it is no surprise that aeolian loess has particles in the silt size range. There is another factor becoming more established; it appears that quartz in nature is predisposed to fracture and breakage leading to a silt-sized product (Kumar et al 2006); so the silt sized pick-up occurs because it is silt sized particles which are overwhelmingly available. It is interesting to note that Berg may have been the first person to suggest that the size range 10-50um is the special 'loessial' size range (see Browzin 1985).

The 'sequence-of-events' approach to loess deposit formation has been brilliantly deployed by Wright (2001) to explain loess deposits in Nigeria, China, Hungary and Tunisia. We can add the pL event on to the main sequence and it will fit quite comfortably. There are other event types which are still being currently discussed. The problem of making the silt particles for loess deposits is still active (see Wright 2001, Kumar et al 2006) and this bears on the difficulties of supplying material for deposits of 'desert' loess. There is increasing awareness of the role played by large rivers in distributing loess material far and wide across the landscape, before the property-producing aeolian transportation event occurs. There is almost certainly much more loess in India than has been appreciated and the great rivers, e.g. the Indus, the Ganges and the Brahmaputra, deliver vast amounts of potentially loess material into convenient positions. And another three rivers, the Dnepr, Don and Volga, have had a greater effect on loess distribution in western Russia and Ukraine than has been hitherto acknowledged. So there are vast transportation events that require further study, and now we have a late event, a post-aeolian event, to add to the list of significant loessial activities that require investigation and explanation.

The aeolian deposition event gives to a loess deposit its open, metastable structure, and contributes to the characteristic (Berg-noted) particle size distribution. This appears to us to be the truly defining event; all the other events are important and significant, but at the heart of loess deposit formation is that remarkable aeolian event. Now, although this provides the metastability, it does not necessarily provide collapsibility. The open metastable system has potential energy, it could collapse into a more stable system- but a mechanism has to be available to allow the collapse

to take place. And this is where the pL process has a role. Recent (on-going) studies on the loess at Ospringe in Kent, UK have indicated that post-aeolian processes modify the inter-particle contacts in the metastable ground and facilitate collapse. Deposition of a network of needle-shaped carbonates at particle contacts allows clay mineral material to be trapped and concentrated at the particle contacts. A clay level content is reached which provides collapsibility. It has been noted that a system with a very low clay mineral content does not collapse, and a system with a relatively high clay mineral content does not collapse. There is a middle range of clay content that allows collapse, and it is this middle range which is achieved in the pL process.

2006 is the 130th anniversary of Berg's birth; and it is the 90th anniversary of his pedological theory- so some celebration is justified. He has produced 90 years of discussion and debate. The gL approach may be fatally flawed- but the pL angle looks worthy of consideration. 2006 is also the anniversary (60th) of the pubblication of Pyaskovskii's remarkable paper- we should also celebrate this, and the small, but key, contribution by the NZ Soil Bureau to the great loessification debate.

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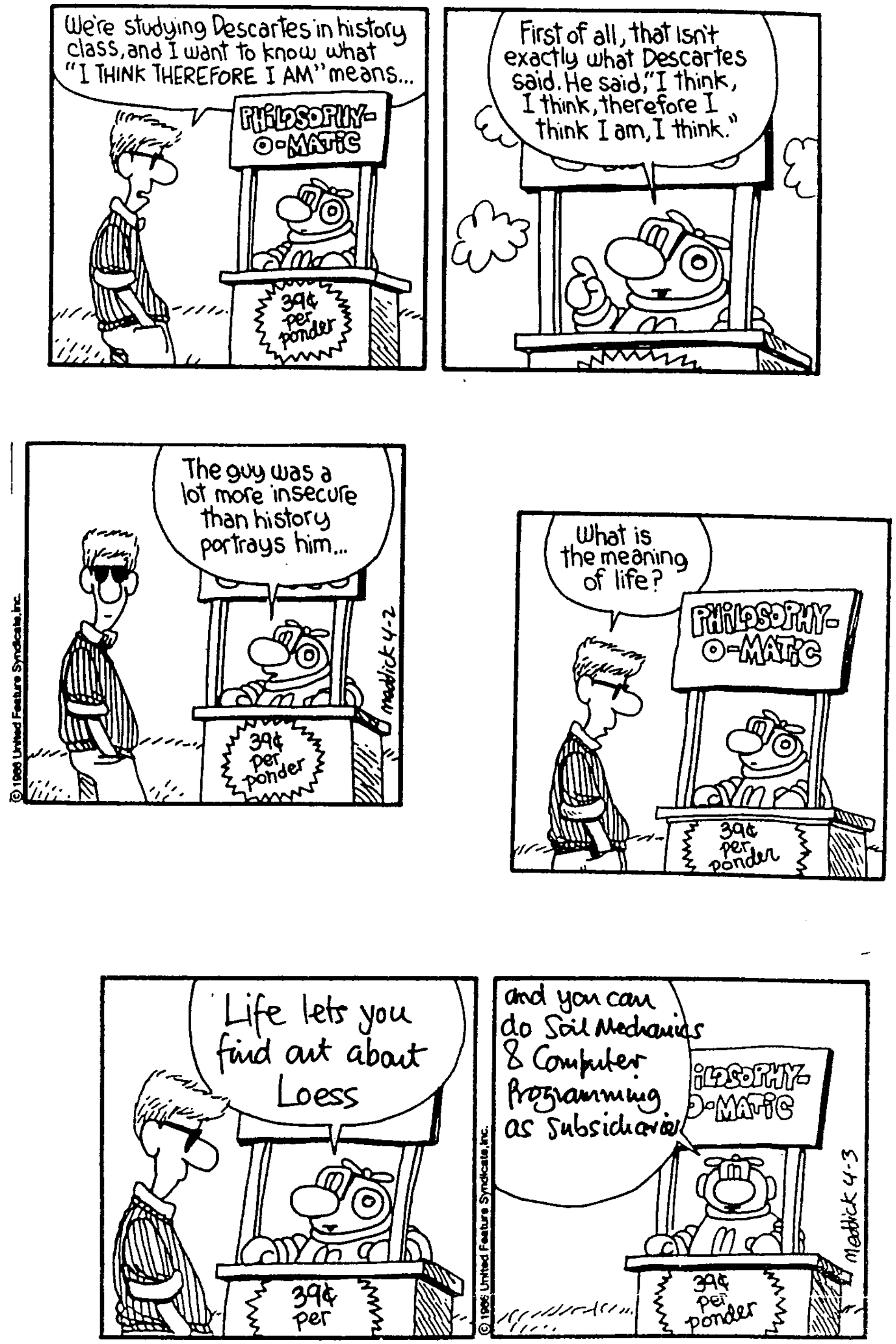

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Loess and palaeoenvironments across Eurasia - Dedicated to the memory of Márton Pésci

Edited by A.A. Velichko, A.E. Dodonov and N. Catto

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This issue of *Quaternary International* is dedicated to Professor Martón Pecsi—prominent Quaternary scientist and geographer of the 20th century. Martón Pecsi was born on December 29, 1923, in Budapest. In 1949, he graduated from the Eotvos Lorand University. His doctoral dissertation dealt with paleogeography and geomorphology of the Pannonian Plain and the Carpathian Mountains, and with history of fluvial terrace formation in the middle reaches of the Danube. While teaching in the University, Martón Pecsi took an active part in activities of the Geographical Research Center established by the Hungarian Academy of Sciences in 1952. After the Center was given a status of Geographical Research Institute (in 1967), Martón Pecsi served as its Director until 1990. The widescale Quaternary studies carried out under his guidance resulted in publications such as the National Atlas of Hungary, seven-volume monograph on the Hungarian landscapes and many others. His meticulous and extensive studies spanned a variety of environmental problems and particularly those of Quaternary history.

It seems logical to suggest that it was the search for original sources, for the roots of the present-day environmental systems that dictated his growing interest in loess sequences. Martón Pecsi fully appreciated the loess series significance as a source of data on the history of environments: a sequence of fossil soils alternating with loess horizons provides an excellent instrument for reconstructing paleoenvironments over many hundreds of thousands of years, for placing modern environments within this evolutionary process and foreseeing their development in the future.

The most detailed studies were primarily performed by Martón Pecsi and his colleagues on key sections of loess-paleosol series in Hungary, including Mende, Basaharc, Paks—those names soon become applied to stratigraphic units not only in Hungarian schemes, but also in stratigraphic correlations of other countries. The mentioned sections being widely known among scientists of many countries may be partly attributed to the fact that Martón Pecsi was always open handed with his results and readily invited foreign scientists to take part in his researches. This quality of a genuine scholar could be defined as "scientific hospitality". Most of his colleagues abroad were equally willing to share their results with him.

Being an enthusiastic researcher and indisputable authority on the loess problems, Martón Pecsi served as the President of Loess Commission (INQUA) from 1977 to 1991. His contribution to the scientific work of the INQUA Commission on Loess was especially important. The Commission activities, as planned by Martón Pecsi, started from direct studies of loess-paleosol series in various regions of the Earth, extensive discussion of their characteristics and appraisal of their capacity as a source of palaeogeographic information. Regional stratigraphic schemes for North America, Western, Central and Eastern Europe, southern Siberia, Tajikistan and China were essentially amplified in the process. In Central Asia, new material on loess research was presented during the International Symposium on the Neogene-Quaternary boundary, Tajikistan, 1977, and then in two field excursions during the 11th INQUA Congress, Moscow, 1982, and the 27th IGC, Moscow, 1984. In North China, the International Loess Symposium, followed by a five day

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Being an enthusiastic researcher and indisputable authority on the loess problems, Martón Pecsi served as the President of Loess Commission (INQUA) from 1977 to 1991. His contribution to the scientific work of the INQUA Commission on Loess was especially important. The Commission activities, as planned by Martón Pecsi, started from direct studies of loess-paleosol series in various regions of the Earth, extensive discussion of their characteristics and appraisal of their capacity as a source of palaeogeographic information. Regional stratigraphic schemes for North America, Western, Central and Eastern Europe, southern Siberia, Tajikistan and China were essentially amplified in the process. In Central Asia, new material on loess research was presented during the International Symposium on the Neogene-Quaternary boundary, Tajikistan, 1977, and then in two field excursions during the 11th INQUA Congress, Moscow, 1982, and the 27th IGC, Moscow, 1984. In North China, the International Loess Symposium, followed by a five day

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Loess Letter

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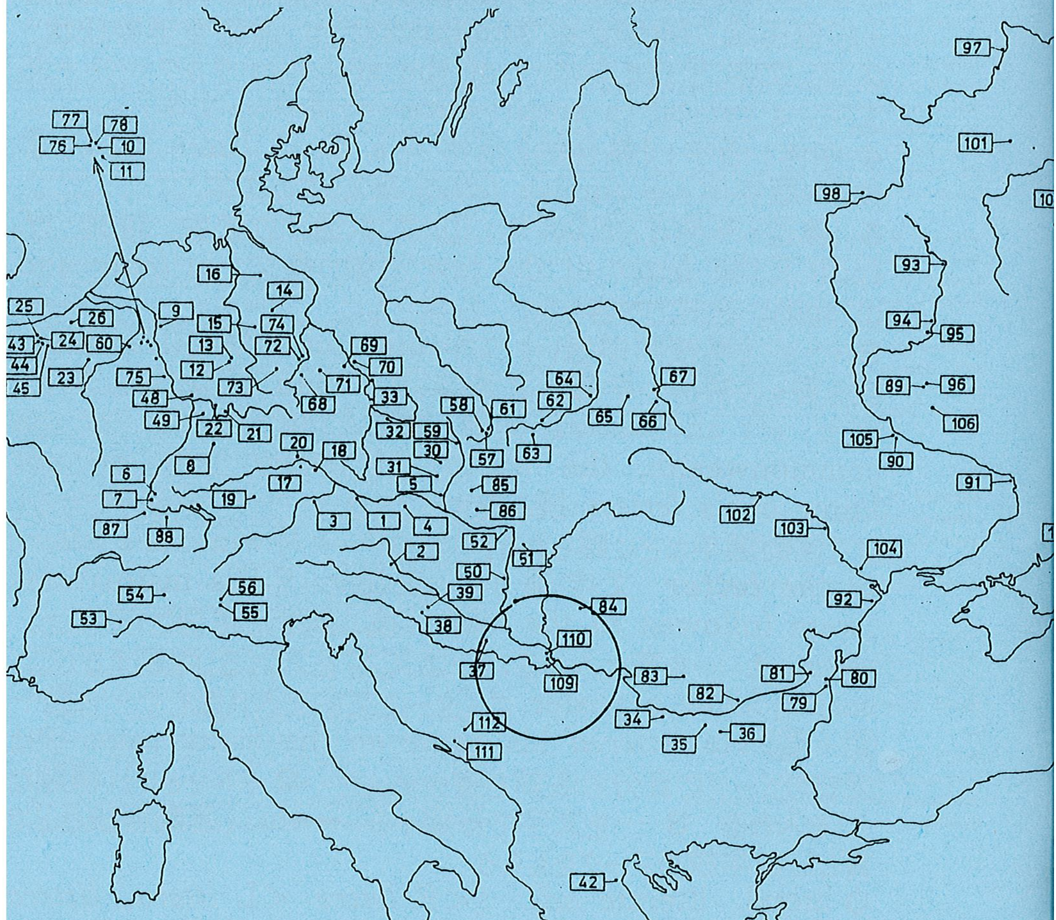

FIG. 1. — *Localisation des profils décrits dans le présent travail.*