INQUA LOESS & DUST COMMUNITY

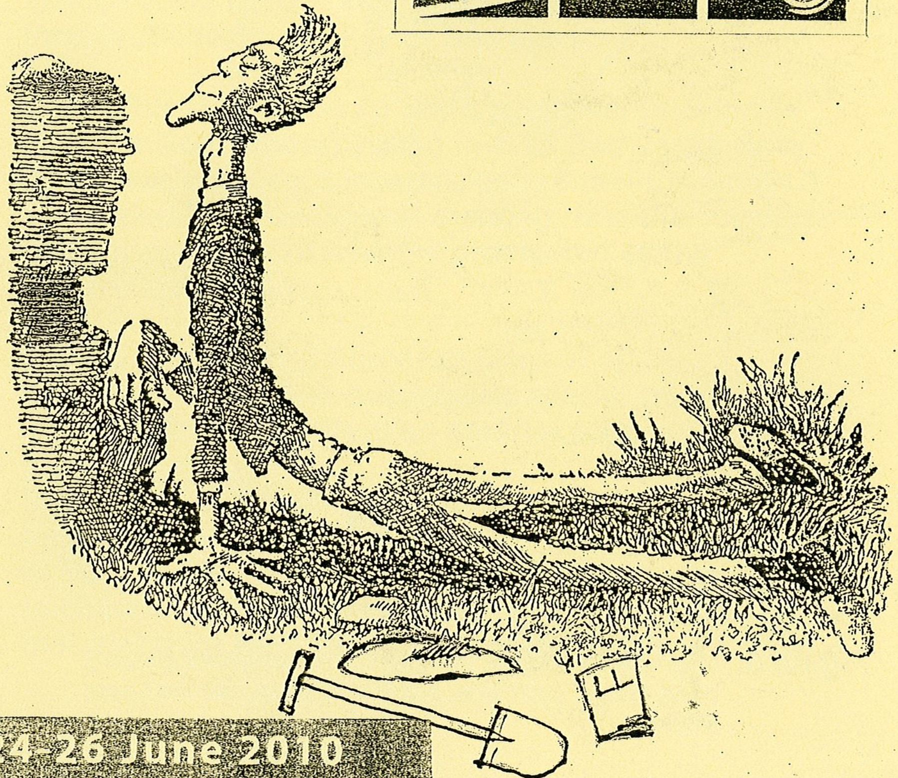
NOTTINGHAM TRENT UNIVERSITY

LL63 April 2010 ISSN 0110-7658

LOESS LETTER 63

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.

GEO TRENDS



24-26 June 2010
Novi Sad | Serbia

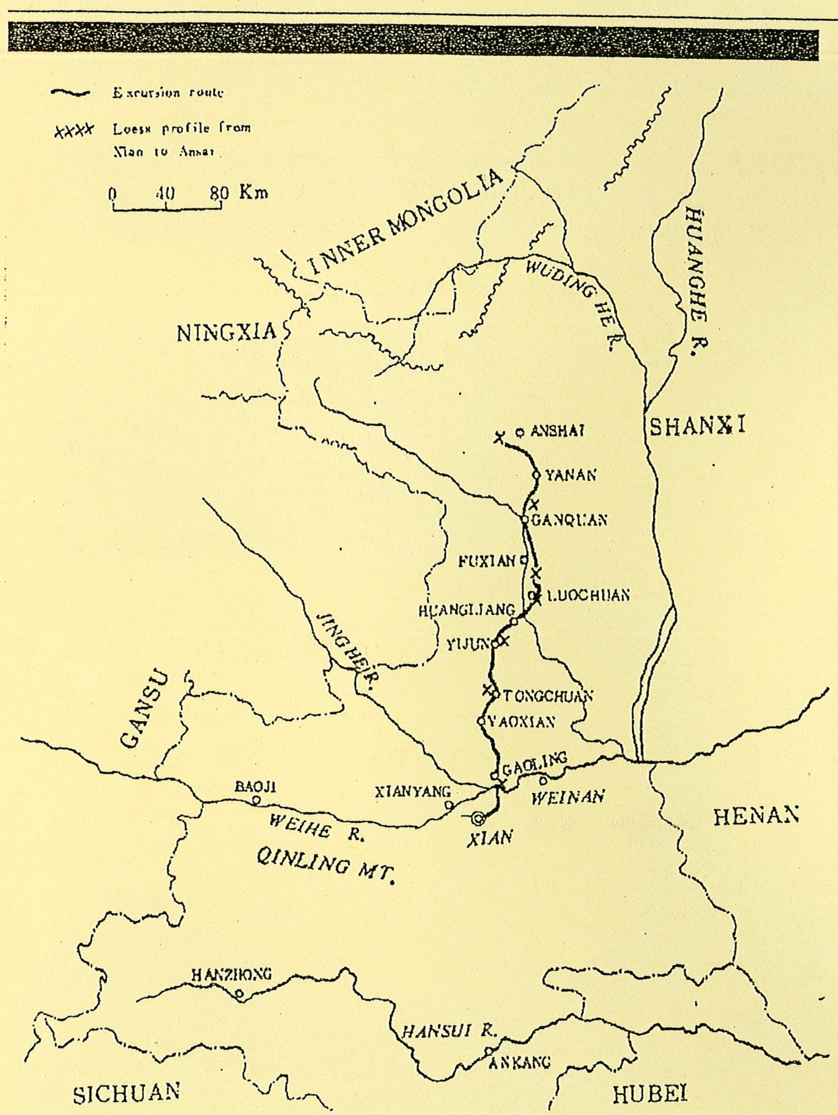


Figure 3. Map from Guidebook for 1985 China conference showing route of field excursion. North from Xian, into the Loess Plateau.

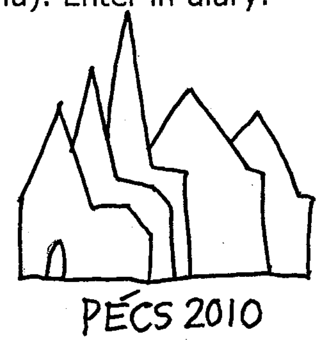
Loess Letter LL63 April 2010

Loess Letter LL is a newsletter for the INQUA Loess Focus Group, for the INQUA Loess & Dust Community, for anyone interested in Loess. It is published, within an INQUA framework, by the Giotto Loess Research Group of the Arkwright Materials Project at Nottingham Trent University (editor Ian.Smalley@ntu.ac.uk). INQUA is the International Union for Quaternary Research, dedicated to investigating the events and environments of the last 2.6 Myr (www.inqua.tcd.ie). Loess is defined at www.loessletter.co.uk. The key people in the Loess Focus Group are Prof.Dr.Ludwig Zoeller (Ludwig.zoeller@uni-bayreuth.de)- President; Prof.Dr.Zhou Liping- Vice-President; Prof.Dr.Slobodan Markovic- Secretary.

LL63. This LL is a special issue published to coincide with the GeoTrends meeting in Novi Sad 24-26 June 2010 (see www.dgt.uns.ac.rs/geotrends/ for details.) LL supports the GeoTrends meeting, and the concept of GeoHeritage. LL63 will be distributed at the GeoTrends meeting.

CEJGS. The Central European Journal of GeoSciences has just published a special issue devoted to Loess. This is an on-line, open-access journal, go to http://versita.com/science/geosciences/cejg/. The special issue is a spin-off from the LoessFest meeting in Novi Sad in August/September 2009. We propose to devote much of the space in LL63 and LL64 to material from the CEJGS Loess special- this is a very important publication. In 63 the emphasis is on history and short papers, in 64 there will be more of a scientific emphasis.

Danube. The Danube loess has received much attention lately, some accessible background can be found at www.loessletter.co.uk. LL celebrates Danube Day on June 29 2010, see www.danubeday.org, see iksd Internationale Kommission zum Schutz der Donau.
Pécs. Meeting: International Workshop on Loess Research & Geomorphology, Pécs, Hungary 17-20 October 2010. Contact Dr.Janos Kovacs (jones@gamma.ttk.pte.hu). Enter in diary.



INQUA. The **18th INQUA Congress** will be held in Bern, Switzerland on 20-27 July 2011. The general theme of the meeting will be 'Quaternary Sciences- the View from the Mountains'(www.inqua2011.ch) and there will be a symposium on loess with the title 'From Mountains to Loess', convened by Ludwig Zoeller within SACCOM (the Stratigraphy & Chronology Commission).

Facebook & Twitter. The 'Loess Appreciation Group' Facebook page is recommended to LL readers. Read the tweets of Loessperson on Twitter.
Illustrations. Most of the pictures in 63 are by Mervyn Peake- based on his illustrations for the Hunting of the Snark. On the front cover the BeLLman appreciates an exposure in Voyvodina, one of his favourite places. The back cover shows the George pub in Southwark, probably not named after George Kukla.

Zircons. Stevens,T., Palk, C., Carter, A., Lu, H., Clift, P. 2010. Assessing the provenance of loess and desert sediments in northern China using U-Pb dating and morphology of detrital zircons. Geological Society of America Bulletin 122, 1331-1344; doi: 10.1130/B30102.1.

Quartz OSL. Lai ZhongPing 2010. Chronology and upper dating limit for loess samples from Luochuan section in the Chinese Loess Plateau using quartz OSL SAR protocol. Journal of Asian Earth Sciences 37, 176-185.

Wrocław. We hear that there may be a loess meeting in Wrocław in May 2011- only a rumour so far but maybe worth another note in the diary.

Central European Journal of Geosciences

Climatic and environmental changes recorded in loess

Editorial

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The current issue of the Central European Journal of Geosciences contains several papers devoted to climatic and environmental changes in loess. This is the first topical issue published in the journal.

In his contribution to the Proceedings of the 1985 INQUA Loess Conference in China, Arnt Bronger of Kiel University wrote:
"For a comparative loess pedostratigraphy and, by inference, a record of Pleistocene climatic history of the south-eastern part of Central Europe, the major loess sections of the Hungarian and Yugoslavian Danubian Lowlands are particularly well suited."

Central Europe is an important loess region, and loess research has been carried on there for a remarkably long time. As Bronger pointed out this is a place for excellent loess stratigraphy, but we also see activity in the fields of geochemistry, and mineralogy, and sedimentology, and many other disciplines. The Danube basin, a key feature of Central Europe is a beautifully defined loess system, almost a closed system with material being delivered from the surrounding mountains and contributing to major deposits. There is geotechnical interest in Central Europe; all loess deposits present geotechnical problems and Central Europe is no exception. There are problems with landslides in the Danube bluffs and a plan has been drawn up for a nuclear waste repository in the deep loess at Kozloduy, in northern Bulgaria. It might be that the thick loess of Central Europe offers opportunities for solving long-standing and intractable problems of nuclear waste disposal. These are lands where loess snails are studied and human habitations discovered. Here are the Black Earth regions, where chernozemisation was remarkably effective and soil science was invented. These are rich loess regions.

There is a scholarly problem which might be touched on: where is Central Europe? How shall we define the limits of Central Europe? Is Central Europe the same as Middle Europe? Where is Mitteleuropa? Where are the edges?

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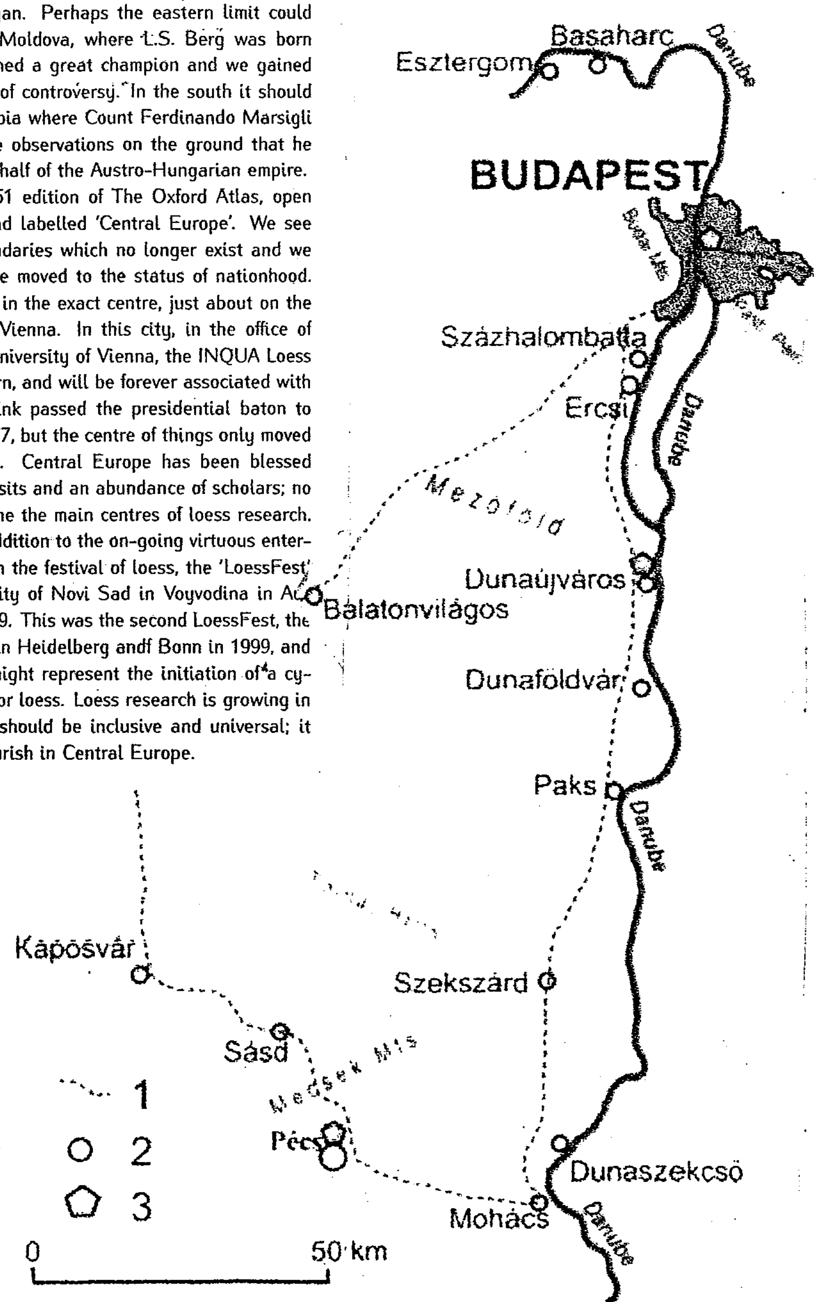
How much material do we possess? Perhaps the western .imit could reach Heidelberg where 'loess' was named, and where Charles Lyell encountered it, and where the story, in effect, began. Perhaps the eastern limit could reach Bendery, in Moldova, where L.S. Berg was born and geography gained a great champion and we gained many happy pages of controversy. In the south it should certainly reach Serbia where Count Ferdinando Marsigli made his perceptive observations on the ground that he was guarding on behalf of the Austro-Hungarian empire. We look at our 1951 edition of The Oxford Atlas, open at the double spread labelled 'Central Europe'. We see many national boundaries which no longer exist and we see places that have moved to the status of nationhood. We see that almost in the exact centre, just about on the old, is the city of Vienna. In this city, in the office of ulius Fink at the University of Vienna, the INQUA Loess Commission was born, and will be forever associated with Central Europe. Fink passed the presidential baton to Márton Pécsi in 1977, but the centre of things only moved as far as Budapest. Central Europe has been blessed with fine loess deposits and an abundance of scholars; no surprise that it is one the main centres of loess research. This volume is an addition to the on-going virtuous enterprise; it derives from the festival of loess, the 'LoessFest' held at the University of Novi Sad in Voyvodina in August/September 2009. This was the second LoessFest, the first had been held in Heidelberg andf Bonn in 1999, and we hope that this might represent the initiation of a cycle of appreciation for loess. Loess research is growing in many directions; it should be inclusive and universal; it should certainly flourish in Central Europe.



Central European Journal of Geosciences

The INQUA Loess Commission as a Central European Enterprise

Review Article

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Received 5 November 2009; accepted 16 February 2010

Abstract: The International Union of Quaternary Research (INQUA) organized the study and consideration of the Quaternary Period (the last 2.6 million years in Earth's history) via a set of commissions, sub-commissions, working groups, projects and programmes. One of the most successful and best records was the Loess Commission (LC) which functioned assub-commission and then commission from 1961 to 2003, resulting in 40 years of useful activity. The history of the LC can be divided into three phases: 1, from 1961-1977 when the President was Julius Fink; 2, from 1977-1991, with President Marton Pecsi; 3, from 1991-2003 with Presidents An Zhi-Sheng and Ian Smalley.

Fink, from Vienna, and Pecsi, from Budapest, gave the LC a distinctly Central European aspect. The nature of loess in Central Europe influenced the nature of the LC but the settings for phases 1 and 2 were quite distinct. Phase 1 was a small scale academic operation, carried out in German. As phase 2 began in 1977 the scope expanded and Central Europe became a base for worldwide loess studies. where the LC language changed to English. Phase 2 was run from a National Geographical Institute and demonstrated a different approach to loess research, although the basic programmes of continent-wide mapping and stratigraphy remained the same. The Commission benefited from this change of style and emphasis. In phase 3 the administration moved away from Central Europe but the Finkian ethos remained solid.

Keywords: Loess Commission • Central European loess • loess history • Julius Fink • Marton Pecsi

"The real voyage of discovery consists not in seeking new landscapes but in having new eyes."

Marcel Proust

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1. Introduction

It could be claimed that European loess research started in the heart of the continent, possibly via the studies of Italian scholar and soldier Luigi Ferdinando Marsigli [1]. He described noticeable loess-palaeosol exposures along the Danube river valley in his outstanding six volume work

Danubius Pannonico Mysicus [2, 3]. Since his time some of the most important loess investigations have been carried out in this Central European region, although his pioneering efforts did not produce any immediate response. Organised investigation into the Central European loess essentially began with the development of the Loess Commission of the International Union of Quaternary Research NQUA, and with the activities of Julius Fink of the University of Vienna.

n 1961, the 6th INQUA Congress was held in Poland it Warsaw and Lublin. Fink organised a loess session ind set up the sub-commission of European loess stratig-aphy as a sub-commission within the INQUA Stratig-aphy Commission. It is worth noting that it was at the oess symposium that Liu Tung-sheng presented the paper which demonstrated the multiplicity of palaeosols in the Chinese loess, an act which initiated modern loess stratig-aphy and demonstrated, for the first time, the complexity of the Quaternary period. Liu set in motion modern loess stratigraphy and, thus, Fink took the first steps towards he formation of the Loess Commission. The initial composition of the LC consisted of a president, a secretary, ind ten full members, including President: J.Fink (Austria), Secretary: O. Franzle (W. Germany), and Members: C. Brunnacker (W. Germany), E. Fotakiewa (Bulgaria), 3. Frenzel (W. Germany), G. Haase (DDR), I.K. Ivanova USSR), I. Lieberoth (DDR), V. Ložek (Czechoslovakia), . Markovic-Marjanovic (Yugoslavia), E. Mojski (Poland), A. Velichko (USSR). This is a distinctly Central European group, which provided the initial impetus. It eventually united loess scholars across Europe (and later on, hroughout the world). The aims were organizational: long with creation of an ambitious map which would show oess deposits across Europe, there were correlations to e made between interesting deposits in various countries nd there was a generalised contribution to Quaternary cholarship. G.Haase in Leipzig took on responsibility for reparing the map, which proved to be a huge task and as only recently completed in 2008 [4].

he time of the LC can be divided into three very distinct hases. Phase 1 is when Fink was president and the main ctivity was an annual field meeting in one of the partici-ating countries. This might be described as an academic eriod where a relatively small group of involved scholars orked to provide correlations between the various loess eposits of Europe. It was essentially self-contained and latively local, with well-defined local aims.

hase 2 started in 1977. At the 10th INQUA Congress Birmingham, Fink handed the LC presidency over to larton Pecsi of the Hungarian Academy of Sciences and new policy was announced. Fink and Pecsi (Figure 1) id obviously been preparing for the transition for some-time and there was a smooth transition. The new policies were, in effect, a widening of the horizons, both in terms of geography and topic. There was to be some new emphasis on practicalengineering problems, and on loess deposits outside Europe.

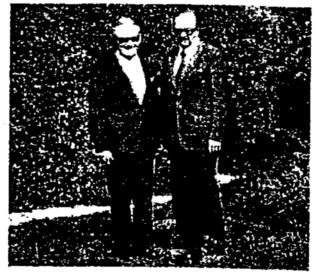

Figure 1. Márton Pécsi and Julius Fink, founders of INQUA Loess (sub)commission (http://www.mtafki.hu/kepek/pic23.jpg).

Phase 3 started in 1991 at the 13th INQUA Congress in Beijing where Pecsi handed the presidency over to An Zhi-sheng of the Chinese Academy of Sciences; Ian Smalley became secretary. Phase 3 was essentially a time of consolidation and documentation and carried the LC up to the time of the large-scale re-organisation of INQUA in 2003, when all the old commissions were swept away and a new bureaucracy established.

2. Phase 1: Julius Fink: 1961-1977

In 1961 Fink organised the loess meeting at the 6th INQUA in Poland. He organised the beginning of the sub-commission on European Loess Stratigraphy of the Loess Commission of INQUA and was quite clear in his targets: he wanted a continent-wide study of loess, which would be complemented by a detailed map. He also wished to establish continent-wide correlations with a comprehensive European loess stratigraphy. His chosen method was an annual series of field meetings and discussions, with major reports delivered at the main INQUA Congresses every four years. A timetable shows how operations were conducted during Phase 1.

Phase 1 timetable (based on Fink [5]):

1961 6th INQUA Warsaw-Lublin; Loess Symposium; Sub-Commission on European Loess Stratigraphy established

1962 31 May- 3 June Austria EuG 15, 229-235, 1964

1963 22 Aug.- 28 Aug. Czechoslovakia

1964 1 April- 4 April DDR EuG 16, 264-275, 1965

1965 7th INQUA Denver v.12 Proc. 247, 281-369; a major report published in vol.12 of Proceedings- a detailed survey of European loess stratigraphy.

1966 6 Sept.- 10 Sept. Yugoslavia EuG 19, 289-300, 1968

1967 29 Aug.- 3 Sept. Belgium

1969 8th INQUA Paris Suppl. Bull.AFEQ 176p [6]

This was a critical year, as not only was the Loess Sub-commission upgraded to full Loess Commission but a major publication resulted. The Supplement to the AFEQ Bulletin gave details of loess research in Europe and listed all the sites of interest. Over 100 sites were listed, from England in the west to the western parts of the Soviet Union in the east. This Supplement is difficult to reference; it appears on the reference list as AFEQ (1969). (AFEQ is Association Francaise pour l'etude du Quaternaire) [6].

1970 9 Sept.- 21 Sept. Bulgaria EuG 23/24, 415-426, 1973

1971 8 Aug.- 19 Aug. AGASH 16, 1972 Hungary (Figure 2)

1972 9 Sept.- 15 Sept. Rumania

1973 9th INQUA Christchurch

1974 9 Sept.- 20 Sept. W. Germany EuG 27, 220-235, 1976

1975 9 Sept.- 19 Sept. France

1976 5 Oct.- 10 Oct. Ukraine-Moldovia

1977 10th INQUA Birmingham Nature 270, 300, 1977

The 1977 INQUA meeting in Birmingham brought Phase 1 to an end. An examination of the timetable shows very clearly the nature of the sub-commission/commission activity, where the members and associates gathered each year to examine relevant loess deposits and observations made allowed correlations to be identified. Fink reported punctiliously in Eiszeitalter und Gegenwart and recorded the conclusions reached by the group. It was classic working group activity and it was either very successfulin raising interest in loess across Europe and demonstrating some attractive and informative loess sections; or it was essentially a failure in that no real progress was made on the important map where no settled trans-continental stratigraphy was agreed upon.

In retrospect it can be seen that Fink's sub-commission grew into one of the more successful and long-lasting INQUA Commissions which had many substantial successes, but it is hard to know whether this is what Fink intended or wanted.

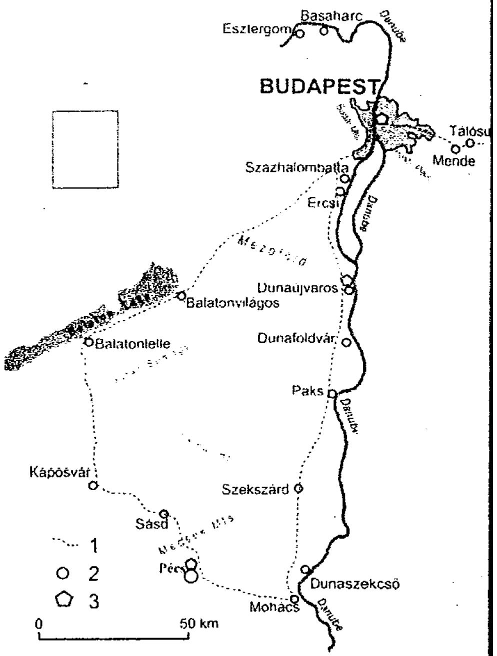

Figure 2. The key map of the International Loess Symposium, Hungary 1971 (19, modified).
Legend:
1. Excursion route; 2. Stop points; 3. Night's lodging.

3. Phase 2: Marton Pecsi: 1977-1991

In retrospect the switch of presidency from Fink to Pec can be seen as a very significant change. The whole nature of the commission changed, in a way which was n immediately apparent. The stated changes were towar a more international scope, and towards the inclusion more disciplines:an international commission operating all loess countries and looking at all disciplines. The ba sic aims were still embedded in the fabric. A timetable f Phase 2 is seen below:

1977 10th INQUA Birmingham. Not only is the ne LC policy adopted but the Western Pacific Wor ing Group comes into being- a large first step t wards the internationalization of the commissio Jim Bowler of Australian National University tak responsibility for setting up the WPWG.

1978

79 26 Aug.-31 Aug. Hungary: International Loess Meeting. Studies on Loess [7]
Jan. Australia & New Zealand Society for the Advancement of Science meeting in Auckland- WPWG programme established. Loess Letter launched; no.1 April 1979

80 First WPWG field meeting; in S.E.Australia. Liu Tungsheng, Wu Zi-rong, Yuan Bao-yin, Zheng Hong-han, An Zhi-sheng, Wen Qi-zhong visit from China.

81

82 11th INQUA Moscow. Symposium on Lithology and stratigraphy of Loess and Paleosols [8]

83

84

85 A year of loess,so described by Henryk Maruszczak [9] in Lublin. He wrote of "a greater popularity of studies on loesses" and cited the session on loess at the 1st International Conference on Geomorphology in England, and the International Symposium on Loess research in China. The China meeting was the 2nd part of the WPWG programme and was a large scale international gathering.

86

87 12th INQUA Ottawa. WPWG Loess Symposium in New Zealand 13 Feb.-21 Feb. Loess Inform#1 Geotechnical Working Group reports (see [10]).

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89

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91 13th INQUA Beijing. contained the most loess-focused papers of the INQUA Congresses; over 200 papers from the whole loess world– a mighty culmination of Phase 2. (see [11]).

ess research grows more popular and widespread, and ore disciplines are involved. The Phase 2 timetable ows a dramatic increase in world-wide loess activity, th the LC heavily involved. There is a dramatic peak 1985 when the Chinese convert the 2nd meeting of the PWG into a major international conference; and a re-arkable climax at the 13th INQUA Congress in Beijing hen loess dominates the programme and over 200 loess papers are offered (for some abstracts see Loess Letter 26 and Loess Letter Supplement 24).

The LC is still firmly based in Central Europe but loessic activity is definitely world-wide.

4. Commentary

Fink wrote in a letter circulated to LC members and associates (dated Vienna 8 July 1976):
"Here are the arguments for discontinuing our activities at the forthcoming INQUA Congress". (This was Birmingham 1977).

1. In European countries late Pleistocene loess series have been successfully dated by means of stratigraphy. The results were published in the joint paper presented at the Paris congress of INQUA (AFEQ 1969) [6].

2. Many aspects and objectives aimed for by our Commission have been included in the research work of a number of other INQUA commissions and a series of similar international schemes, (e.g., the International Geological Correlation Programme and its projects). Continuing our activities would only mean overlapping, which in turn would merely cost the members on the Commission a great deal of extra time.

3. The statutes and bye-laws of INQUA, which were carried by vote at the Christchurch congress, compel almost all of the very active members on the Commission of Loess to leave it by the beginning of the next INQUA period. As a result, work would not go on continually.

Fink was describing the shutting down of a small investigation strictly within INQUA guidelines which had run its allotted course. In 1977 a sea change occurred and although this small investigation was to all intents and purposes closed, a new larger enterprise immediately grew from it. It represented a change of approach for an INQUA Commission from what was a very detailed project oriented activity to a more sweeping interest to loess in general or, a great move from particular to general, which was to some extent reversed in the large scale reorganisation of 2003. Phase 2 promoted interest in research on loess: in every country in the world and in every scientific discipline. It also, incidentally, promoted Quaternary research in Hungary, and the fortunes of the Geographical Research Institute of the Hungarian Academy of Sciences. In Phase 2 the loess business remained a Central European enterprise. It was in the Hungarian interest to expand and continue LC activity.

Table 1. Comparison between 1st and 2nd phase of INQUA Loess (sub)commission development.

	Phase 1	Phase 2
Research topics	Stratigraphy and mapping	All aspects of loess research
Area	Europe	Whole world
Language	German	English
Organisation	Pure scholars	Research group
Newsletters	Rundschreben	LoessInform + LoessLetter
Conferences	annual meeting	International conferences
Field trips	Europe	Europe, Asia, Australia

Phase 3 benefited from the activity of phase 2 and contained several major loess events, in particular the LoessFest meeting in Heidelberg and Bonn and the NATO sponsored Collapsing Soils meeting in Loughborough [13] and the Climactic Loess in Eurasia meeting in Moscow [14].

5. The Central European milieu in 2009

Hungary is essentially a sedimentary basin. Loess is important in Hungary; probablymore important than in many other loess countries. The work of the Geographical Institute of the Academy of Sciences was perforce concerned with loess, given that loessic problems (e.g. landslides) could be national problems. By the agency of loess, Hungarian scholars could have significant international impact. The geological structure of a country must have a direct influence on the earth science research which is carried out in that country. It was no accident that the British Isles with a range of accessible rocks from Precambrian to Holocene should have been a site for pioneering work in geology. One would expect a loess rich country like Hungary to be a focus for Quaternary research, particularly if few alternatives were available.

Perhaps Central Europe is dominated not by basins but by confluences. Perhaps Central Europe is such a rich loess region because of a confluence, or several confluences, or many confluences. Smalley et al [15] have argued that rivers are critical for loess deposit formation, and that rivers have a critical determining role in the formation and disposition of loess deposits. Rivers deliver the loess material across the landscape and control the essential place of deposit formation. If this is true then a place with confluences of many major rivers is a likely treasure house of loess. This is Central Europe, a place of many confluences, and place of loess for further investigation (and utilization). The great confluences of Inn and Danube, of Sava and Danube, of Drava and Danube, of Tisza and Danube determine the nature of Central Europe. The river systems have made Central Europe a special loess place and they deliver landscape facts that need to be recorded and investigated. As Claudio Magris said in 'Danubio' [16]:

"Ma rimane, perfortuna, l'avventura della classificazione e del diagramma, la seduzione metodologica..."

"But luckily we are left with the adventure of classification, the thrill of diagrams, the allure of methodology..."

Danubio/ Danube

Actually what Magris said is only partially true as there is much tidying, recording, assessing and displaying to be done in the world of the Central European loess. However, there are many real research initiatives to be followed, and much science to be done. It appears that Central Europe is a borderland between the Danubian loess and the USWR (Ukraine South West Russia) loess associated with the Dnepr, Don and Volga rivers. The essential duality of this region was pointed out by Smalley et al [15] but some recent key observations have been made by Buggle et al [17] who investigated the geochemical evidence for the sources of the loess material in Central Europe. Here,for example, is a major research theme: investigations of the geochemistry of the loess material in Central Europe to determine its origins and sedimentological history. Anothe major research theme includes geotechnical investigations of the properties of Central European loess, particularl from the point of view of landslide dynamics, and suitability for use as wasterepositories. Technology continues to develop. Fink's indication that dating/stratigraph investigations were completed for the Upper Pleistocen of the Central European loess looks a bit like the nineteenth century physicists claiming that physics was ove and that all had been discovered. The increased precision of modern stratigraphy means that there is a vas amount of life left in the original formulation of the sub commission targets, and the mapping has certainly onl reached an intermediate stage.

Fink did remark, in discussing the 1966 meeting organise by J. Markovic-Marjanovic (Figure 3), that future researc might be aimed at the stratification and correlation of th Middle and Lower Pleistocene. He identified as partic ular regions for research the deposits on the edge of th Fruska Gora and on the Titel Plateau, a perfect Centr European focus. Fink was very perceptive in setting u a Commission to study loess, as it was a good subject f

ꟷigure 3. Jelena Marjanovic-Markovic, pioneer of loess research in former Yugoslavia.

ommission with a focus on material rather than process r location, bringing together a disparate group of scholrs for their mutual benefit. The Loess Commission was well placed Commission; INQUA was probably mistaken n abolishing it in 2003 [18] as loess research since has een diminished by this unwise decision.

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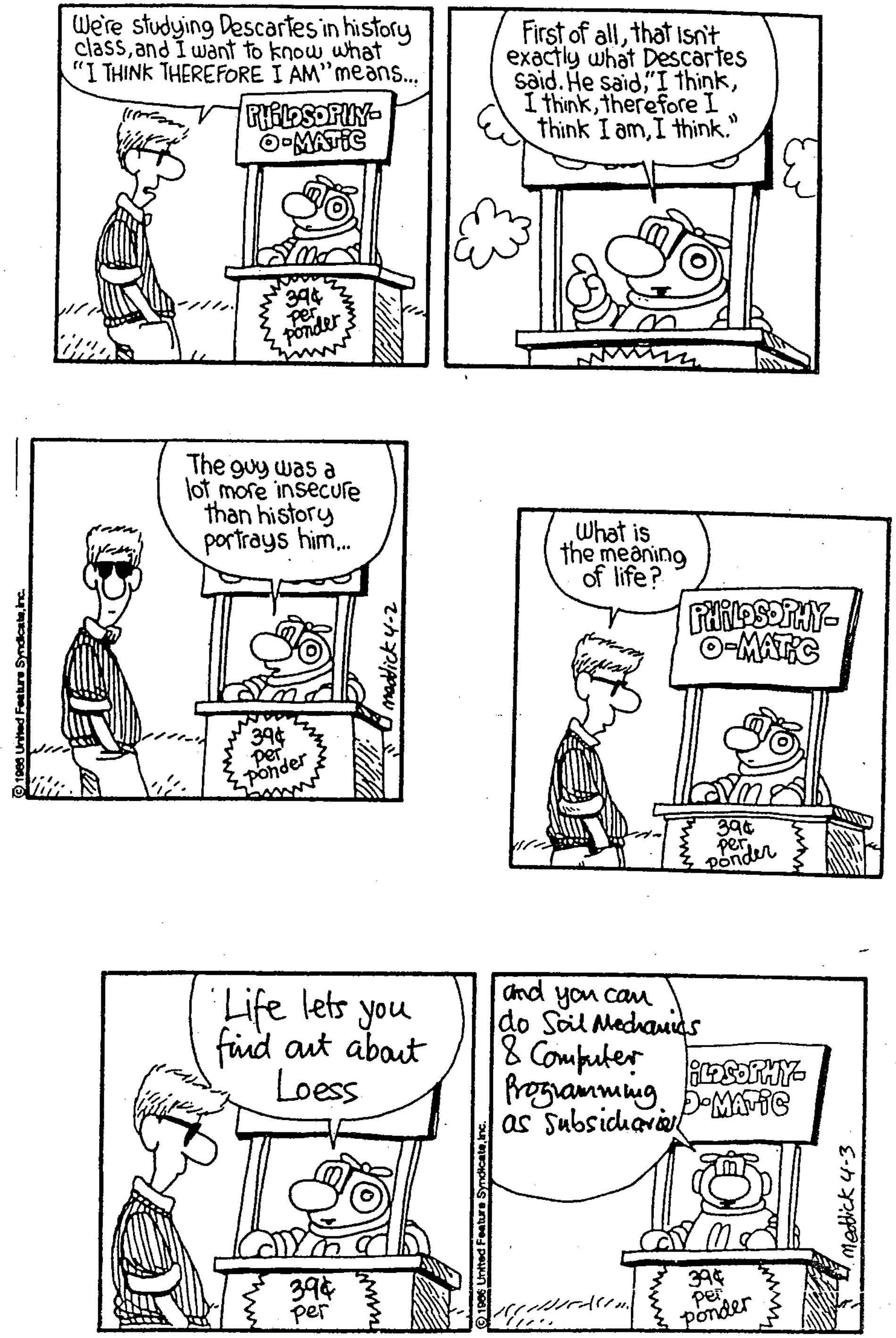

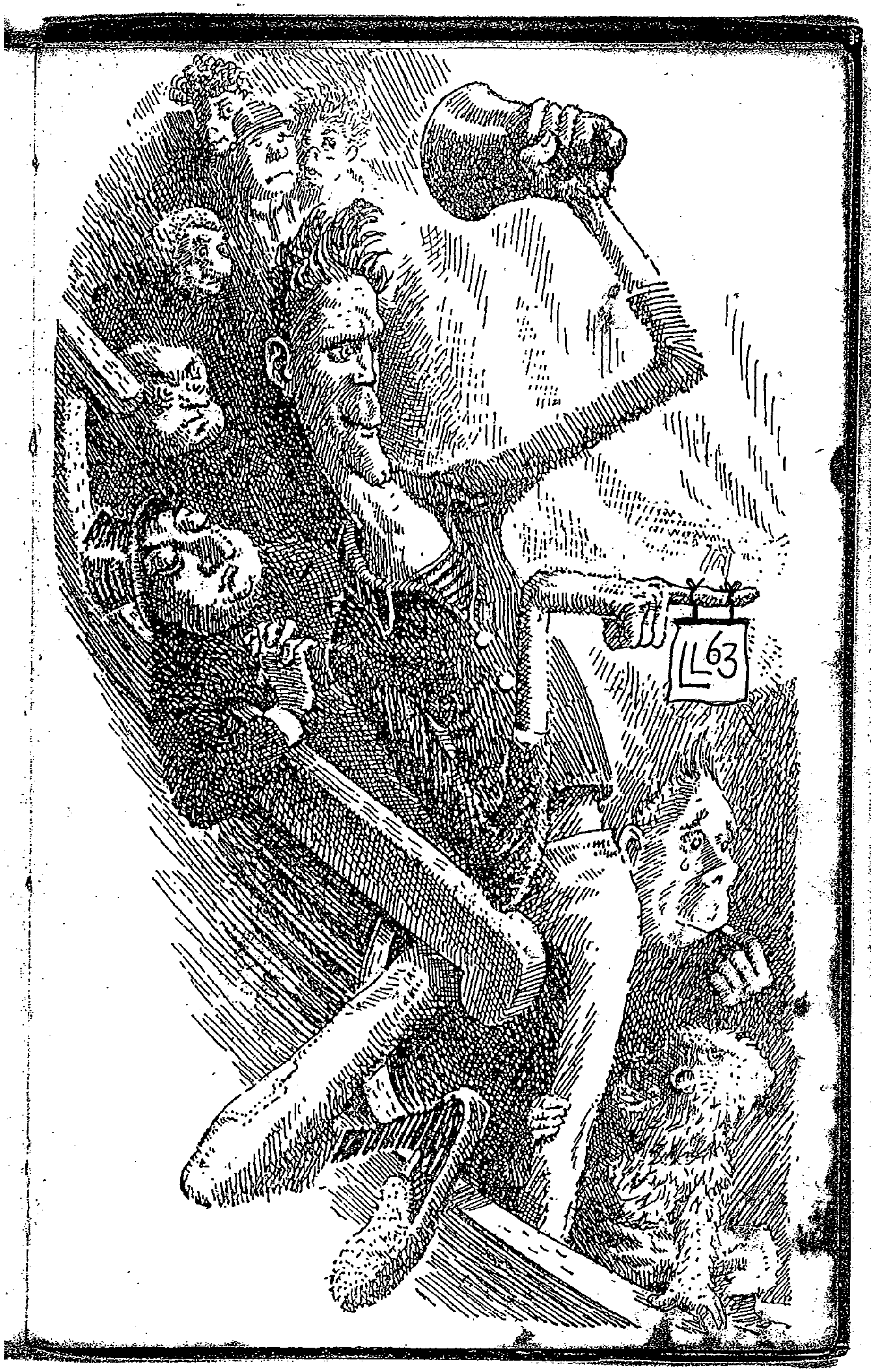

Cent. Eur. J. Geosci.
DOI: 10.2478/v10085-009-0039-y

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Central European Journal of **Geosciences**

The shape of loess particles reviewed

Communication

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Received 16 November 2009; accepted 12 December 2009

Abstract: An important property of loess is a tendency to collapse on loading and wetting (hydroconsolidation) which can have serious consequences worldwide for civil engineering projects. This paper describes the use of Monte Carlo and other analytical techniques to predict the shape of naturally occurring loess particles. Randomly generated particles are classified according to Zingg shape categories: disc, sphere, blade and rod. By assuming a uniform distribution for the basic particle, average relative dimensions are calculated for the blade category, into which most loess particles have been shown to fall.

Keywords: loess particles • probability distribution • Monte Carlo • Zingg shape • blade • hydroconsolidation

1. Introduction

Classical loess particles [1, 2] are the wind-borne product of comminuted quartz, having a mode size of approximately 30 μm. For loess to occur, there must be a source of particles [3] (usually a desert or sub-desert existing, or having once existed, nearby); a prevailing wind; a mechanism for deposition and sedimentation. Loess is found in most parts of the world, in particular Libya, China and central Asia. Smaller deposits occur in Europe, North America and New Zealand. An overview of its formation and geographical properties is given by Smalley [4]. In the right climatic conditions loess deposits give rise to a friable and fertile soil, often supporting high population densities. An important property of loess is a tendency to collapse on loading and wetting (hydroconsolidation) [5] which has serious consequences worldwide for civil engineering projects. In order to explain and predict such properties one needs to know the general shape of the basic particle, so that, for example, wet and dry packing densities can be derived. In 1993 Rogers and Smalley [6] proposed a model for the distribution of the linear dimensions of Loess particles. Using a modified Zingg [7] classification, they demonstrated using a Monte Carlo process that approximately 72% of particles could be expected to be tabular (blade shaped), 1% would be approximately spherical and the remaining 27% would be either disc or rod shaped. Their Monte Carlo method considered just 100 particles, a small number by today's standards. Consequently, the conclusions were subject to much statistical uncertainty. This paper will attempt to reproduce the earlier results, using a more extensive Monte Carlo process or, where possible, analytical processes.

If L_1, L_2 and L_3 are the lengths of the sides of the hypothetical Zingg box [7] that encloses the particle, the 4 Zingg shape categories were:

- class Im $L_1 = L_2 > L_3$ disc,

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- class IIm $L_1 = L_2 = L_3$ sphere,
- class IIIm $L_1 > L_2 > L_3$ blade,
- class IVm $L_1 = L_2 < L_3$ rod.

eality any 2 dimensions would hardly ever be exactly ial so, to be meaningful, the equalities and inequalities he simplified definitions above must be subject to nu- ical tolerances. In [6] a "definable accuracy" of 10% on length was employed. Here a parameter, r, will rep- ent the maximum difference between any 2 dimensions ey are to be deemed equal. The total range of values each linear dimension is scaled to lie in the range [0,1] r will be a small proportion of this total range – typ- ly 0.1 or 0.05 (not a percentage, but representable as ercentage by multiplying it by 100).

h r defined thus, the Zingg categories can be expressed e formally as follows: if the sides of the box, arranged ncreasing order of size, are $a \leqslant b \leqslant c$,

- class Im $a \leqslant b - r$, $b > c - r$ disc,
- class IIm $a > b - r$, $b > c - r$ sphere,
- class IIIm $a \leqslant b - r$, $b \leqslant c - r$ blade,
- class IVm $a > b - r$, $b \leqslant c - r$ rod.

h a class IIm particle (sphere) it is quite possible for exceed a by more than r (but not more than 2r), pro- d b is within r of both a and c. Apart from this, the nitions are intuitive. It can readily be seen that for values whatsoever of a, b and c, one and only one of 4 categories will apply.

Monte Carlo analysis

osing the value $r = 0.05$, a Monte Carlo process was with $n = 10\,000\,000$ replications. In each replication 3 dom numbers were generated from a uniform distribu- over the interval [0,1]. These 3 values were sorted into r and for each replication it was determined which of 4 Zingg categories applied. The proportion of repli- ons in each category was calculated and the result is wn in Table 1. The processing took approximately 1 ute to run on a desktop PC with a Pentium Processor. numbers in parentheses in Table 1 are the calculated ected errors (based on a binomial distribution) on the ortions given.

Table 1. Proportions P_i of Particle lying in each shape Category, as estimated by Monte Carlo analysis.

r	P_1 (cl. Im disc)	P_2 (cl. IIm sphere)	P_3 (cl. IIIm blade)	P_4 (cl. IVm rod)
0.05	0.12835	0.01429	0.72884	0.12847
	(0.00011)	(0.00004)	(0.00014)	(0.00011)

3. Analytical approach

Further consideration suggested the closed, analytical formula, Equation 1, for the proportion of blade shaped particles (although r is typically small, it must in any case be less than 0.5, otherwise class IIIm particles cannot exist).

$$P_3 = 6\int_{2r}^{1}\int_{r}^{c-r}\int_{0}^{b-r} da\,db\,dc = (1-2r)^3 \qquad (1)$$

Similar formulae can be derived for P_2 (Equation 2), P_1 and P_4 (Equation 3).

$$P_2 = 6r^2(1-r) \qquad (r < 0.5) \qquad (2)$$

$$P_1 = P_4 = r\left(7r^2 - 9r + 3\right) \qquad (r < 0.5) \qquad (3)$$

For $r = 0.05$ and 0.1, the theoretical values are as shown in Table 2, which for $r = 0.05$ concur with the values in Table 1, consistent with the expected errors shown therein.

Table 2. Theoretical Proportions P_i of Particle lying in each shape Category.

r	P_1 (cl. Im disc)	P_2 (cl. IIm sphere)	P_3 (cl. IIIm blade)	P_4 (cl. IVm rod)
0.05	0.128375	0.01425	0.729	0.128375
0.1	0.217	0.054	0.512	0.217

It is also of interest to calculate the average dimensions for the class IIIm (blade) particle and this is also possible in closed, analytical form (Equation 4), using a weighted version of Equation 1. Equations 5 and 6 arise from considerations of symmetry ($r < 0.5$ throughout).

Average Dimensions for a Blade Shaped (tabular) Particle:

$$A_3 = \text{average smallest dimension } a = \frac{6}{P_3}\int_{2r}^{1}\int_{r}^{c-r}\int_{0}^{b-r} a\,da\,db\,dc = \frac{1-2r}{4}, \qquad (4)$$

$$B_3 = \text{average middle dimension } b = 0.5, \qquad (5)$$

$$C_3 = \text{average greatest dimension } c = 1 - A_3 = \frac{3+2r}{4}. \qquad (6)$$

Up to this point, the dimensions a, b and c may be thought of as values drawn from an arbitrary cumulative probability distribution function – thus r could simply refer to a difference in cumulative probability. From here on, however, we will be dealing in actual dimensions, so the explicit assumption of a spatial probability distribution becomes necessary. The uniform distribution is the easiest and perhaps the most natural one. It does have the obvious limitation that the dimension cannot be greater than a preset value – unity, on this scale. However it should be borne in mind that sizes of 300 µm and greater constitute sand [5, 6] rather than loess, so this value would serve as an upper bound, albeit a very weak one, for loess dimension. In practice a stronger upper limit can be derived from the mode of 30 µm for loessic material furnished by [7], taking the absolute maximum as, say, twice this. Further glacial comminution can grind the loess to a yet finer silt of mode size 3-5 µm [8], which can also form sediments. This could suggest a bimodal distribution, which is beyond the scope of the present paper, but would be quite amenable to Monte Carlo analysis.

An alternative, unbounded distribution could, of course, have been assumed for the linear dimension: the exponential distribution would arise naturally if the surfaces of a tabular particle were entirely formed by spatially independent weaknesses in the original crystal. Analysis of the size distribution of such particles could form the basis of future studies.

With the assumption of a uniform distribution scaled in the range [0,1], Equations 4, 5 and 6 yield the results shown in Table 3, for values for r of 0.05 and 0.1, as before. The figures in parentheses give the actual dimensions assuming a maximum size of 60 µm (twice the mode size of 30 µm).

Table 3. Average Dimensions for a class IIIm Particle.

r	A_3	B_2	C_3
0.05	0.225 (13.5 µm)	0.5 (30 µm)	0.775 (46.5 µm)
0.1	0.2 (12 µm)	0.5 (30 µm)	0.8 (48 µm)

A_3 – average smallest dimension in class IIIm
B_2 – average middle dimension in class IIIm
C_3 – average largest dimension in class IIIm

Either value of r generates average dimension ratios close to the integral values 8:5:2 postulated by Rogers and Smalley [6], the value $r = 0.1$ exactly so. As pointed out by Smalley [3] blade-shaped particles of mode size 30 µm and relative dimensions in this ratio are likely to give rise to a soil of a very open structure, subject to precisely the hydroconsolidation properties mentioned earlier. The values tabulated in Table 3 have, as before, been verified using the Monte Carlo method. If a non-uniform probability distribution (eg normal or exponential) were to be assumed for the dimensions of the generating particle, the complexity of the integrals analogous to Equation 4 (and the symmetrical forms in Equations 5 and 6) increases dramatically. Hence the Monte Carlo approach would be the natural one to choose.

4. Summary

The analytical processes described give a distribution amongst the 4 Zingg shape categories that is practically identical to that of Rogers and Smalley [6]. The Monte Carlo process further supports this distribution, to within the statistical limits of the standard errors. Furthermore, when a uniform size distribution is assumed, the Zingg box shape of 8:5:2 is again suggested, with $r = 0.1$ (10%) giving the best possible agreement. Such a shape is especially susceptible to hydroconsolidation, with the implications alluded to earlier for civil engineering projects.

Analyses of this nature appear to be readily amenable to Monte Carlo modelling on a standard personal computer. Moreover, if more elaborate distributions than the uniform are to be considered, Monte Carlo simulation would be the natural – and possibly the only – choice.

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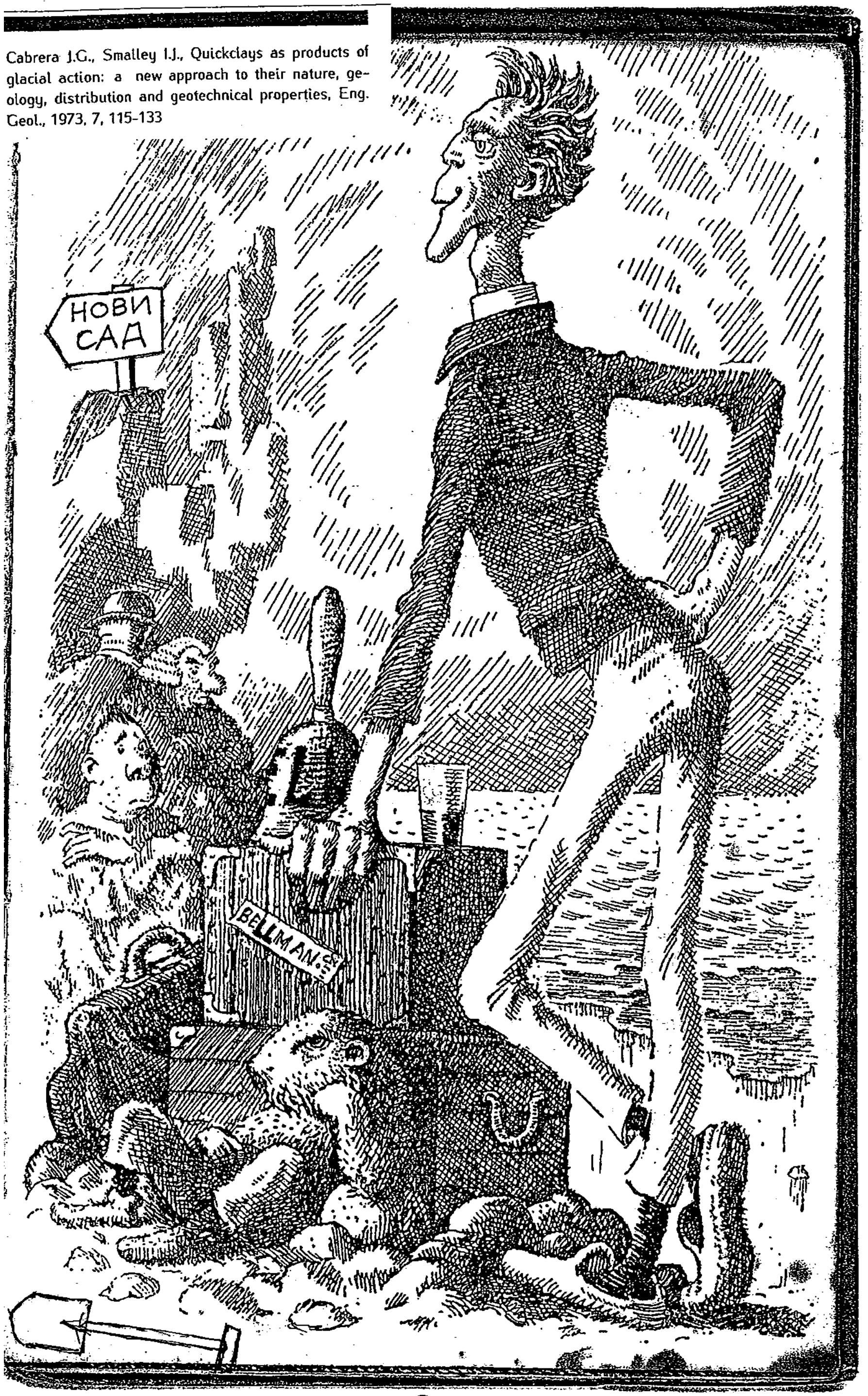

Central European Journal of Geosciences

Charles Lyell from 1832 to 1835: marriage, Principles, 2 trips to Heidelberg, snails and loess

Review Article

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Received 2009; accepted 2009

Abstract: Charles Lyell, on his way to becoming a famous geologist, married Mary Horner in Bonn in July 1832; volume 3 of his 'Principles of Geology' was published by John Murray in London in May 1833. Between these two dates Lyell encountered the loess of the Rhine valley. The loess impressed Lyell and he included mentions of it in the Principles, first in 1833 and then, with some revised ideas, in volume 4 of the 4th edition published in 1835. Twelve editions of the Principles were published between 1830 and 1875 and it became one of the most important works in the development of geology, and made a major contribution to the worldwide spread of loess awareness. It is possible that Lyell was drawn to the loess because of its high molluscan content, he was particularly attracted to the study of shells.

Keywords: Charles Lyell • loess in Rhine valley • Lyell marriage to Mary Horner • Principles of Geology • loess awareness • shells in loess

1. Introduction

Charles Lyell had an important part to play in the early history of loess studies; he is credited with spreading the word about loess, delivering an awareness of loess into every part of the world where his best-selling book the 'Principles of Geology' penetrated. As far as we know the first description of loess in English was in volume 3 of the first edition of the 'Principles of Geology', published in 1833. Lyell first encountered loess in 1832, and this encounter was due to his being married in Bonn and then heading down the Rhine valley to Switzerland for his honeymoon. He talked to Professors von Leonhard and Bronn in Heidelberg and they directed his attention to the loess, and probably suggested a short digression to see an accessible deposit. Bronn and Von Leonhard had been talking and writing about loess and it seems likely that it was a well-known material in the Rhine valley, but Lyell took this local knowledge, and terminology, and spread it throughout the World.

There are various reports and discussions of Lyell's life and works [1–3]; this paper focusses on the Lyell-loess interaction and considers the critical loess related events in the years 1832 to 1835. Lyell had an immense enthusiasm for all things geological and it is easy to see why he might be fascinated by the loess, in particular the loess as an abode of snails, a matrix for fossil shells.

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Marriage

y Horner was married in Bonn on 12 July 1832. She the daughter of Leonard Horner, a noted geologist and -time secretary of the Geological Society of London, she married an even more notable geologist, Charles l of Kinnordy in Scotland. The Horners had only lived ›onn since 1831. In the years immediately prior to Leonard had been Warden of the University of London ›r University College London) but he resigned in 1831, ›rently because of ill health, and moved to Bonn. The ›ers stayed in Bonn for two years, and in that interval rles and Mary were married. They headed south for ›neymoon in Switzerland. The wedding was a relay complicated affair [2] made somewhat awkward by requirements of German law. The first ceremony was ›il marriage before the Burgomaster of Bonn. Their ding trip took them up the Rhine to Mainz and thence eidelberg.

18 September 1832 the Lyells reached Scotland. It Mary's first visit to Kinnordy and first introduction to l's family. A few days later Charles and Mary were ied again at Kinnordy by Dr.Easton, the minister of .emuir. Lyell was anxious that there should be no ›t about the validity of his marriage.

From Heidelberg to Karlsruhe

ding south from Bonn to Heidelberg brought them into ›rbit of several important geological people, and they ed and socialised in Heidelberg for a brief time. Wil- 2] has described an outing, made with von Leonhard, ›amine the loess: "He.. went on a field trip with hard to examine the superficial deposit, peculiar to Rhine valley, called loess. Lyell found that the loess ained many of both land shells and freshwater shells ssils." Wilson puts a reference to loess as appearing inciples vol.3 (pp.151-154).

will have been Lyell's first sight of loess, but he entered it again on the drive from Heidelberg to Karl- ›, as he describes in a letter to his sister Eleanor:

> Axhern (near Strasburg 20 July 1832)
>
> My dear Eleanor: I hope to send this letter from Strasburg to-morrow, and shall first take up the diary from Heidelberg, which we stayed at on the 18th.
>
> Leonhard [*Prof. Karl Caesar von Leonhard*] was very attentive, showed me part of his collection, and begged his wife to take mine to a fine view from a neighbouring hill; then went with us to the castle, showing me by the way some geological sections, which, added to my short excursion to the Felsenmeer, have enabled me to obtain something like a fair notion of the Odenwald, both its scenery and geology.
>
> I then introduced Mary to Bronn [*Prof. Heinrich Georg Bronn*], Professor of Natural History, and learnt some geology from him of the country in a different department from Leonhard's.
>
> Next day, the 19th, to Carlsruhe [*sic*], making a delightful detour on the road, up a small valley leading from the plain up into the Odenwald hills, where I went to see a singular deposit, called 'loess' provincially, filled with recent species of land shells, and which is peculiar to the Rhine valley, found at Bonn, Strasburg, and hundreds of intermediate places.

4. Principles

Volume 1 of the 'Principles of Geology: Being an Inquiry how far the Former Changes of the Earth's Surface are referable to Causes now in Operation' was published in January 1830 by John Murray at Albemarle Street in London, and was an immediate success. The second volume appeared in January 1832. When the third volume, which mainly dealt with stratigraphical and palaeontological matters, appeared in May 1833, second editions of the first and second volumes had already been published. Charles Darwin took volume 1 with him on the 'Beagle' and volume 2 reached him in Montevideo.

In 1834, the whole work was reprinted in four smaller volumes, and called the third edition. The fourth (1835) edition quickly followed the third, in the same four volume format, and it is from volume 4 of the 4th edition that the Loess Letter pamphlet was reprinted [4]. This was the critical moment in the Loess/Principles story, this discussion of loess in volume 4 of the 4th edition was the best detailed description of loess in English, and in a widely-circulated publication.

5. Commentary

Three aspects of the Lyell/loess story might benefit from some comment and discussion:

- The initial encounter needs some slight clarification; the letter to Eleanor causes some confusion.
- The publication of the initial observations in the Principles is rather confused, but there is no doubt that the first mention, the great announcement, was in vol.3 of the first edition, published in 1833, soon after Lyell's first view of the loess in 1832. Modifications and details in vol.4 of the fourth edition.
- The 1834 paper is described by Thackray [5] as appearing in the Proc. of the Geol. Soc. but that appears to be a short version with the full length version appearing in the Edinburgh journal. Parts of the Edinburgh version were reprinted in the Benchmark collection [6].

Lyell had a long and satisfactory relationship with the Geological Society of London [5]. He presented 42 papers between 1824 and 1854; Thackray [5] has discussed three of these at length; one of these was the paper on loess which Lyell presented in 1834, based on fieldwork carried out in 1833, which, in addition to appearing in the Proceedings [7] was also published in Edinburgh [8]. Lyell reports, with some pleasure, discovering that Jon Jacob Berzelius the famous Swedish chemist had a copy of the Edinburgh journal (popularly called Jameson's Journal).

"In the summer of 1833, I collected several hundred shells, which were exposed on the margin of the Rhine...and on comparing them with a still larger collection obtained from the loess, the two groups proved to be referrible (*sic*) for the most part to identical species, and in both the terrestrial predominated numerically over the aquatic species. The genera most abundantly represented in each were Helix, Pupa, Limnea, Paludina, and Planorbis." [4, 8].

Lyell made two very useful trips to Heidelberg, in July 1832 and July 1833. The loess observations from 1832 were incorporated into vol.3 and the loess observations of 1833 were reported in the 1834 papers and vol.4 of the 4th edition [5]. His views on loess changed; Wilson [2] reports: "He also announced that he had changed his opinion concerning the origin of the loess formation of the Rhine. Lyell had previously thought that this seemingly unstratified deposit had been 'thrown down suddenly from the muddy waters of a transient flood'. During his visit to Germany the previous summer [1833], however, he had found in deep gravel pits outside the Mannheim gate of Heidelberg loess interstratified with gravel. 'Here,' he wrote, 'more than one bed containing land and fresh-water shells rests upon and is covered by, a stratum of gravel, showing the effects of successive accumulation."

Lyell was very perceptive about the loess noting, in particular, the disconnection between the loess and the ground material immediately below it, and the way the loess blanketed the landscape. Thackray [5] has described the evolution of opinions on loess over the 1832-1835 period:

"In April 1834 Lyell read a paper on the loamy deposit called 'loess' in the valley of the Rhine, which was based on fieldwork carried out the previous year. Among the distinctively Lyellian features of the paper are the use made of the modern sediments of the Rhine to deduce the environment of deposition of the loess, and the emphasis laid on the considerable geographic changes that must have taken place since the deposition of this geologically recent deposit, and yet with no sign of violence or catastrophe. The paper was published in the Society's Proceedings in 1834 [7], and the observations and ideas it contained were incorporated into Lyell's discussion of the Newer Pliocene in the fourth edition of the Principles of Geology [4, 9], where it helped to emphasize the similarities between the world of today and the world of the geological past." [5].

This is somewhat misleading; it obscures the fact that an extraordinary event - the widescale aeolian deposition of loess material, completely determined the nature of the loess landscape. The Lyell description is a perfect portrayal of an aeolian deposit:

"The loess is found reposing on every rock, from the granite near Heidelberg, to the gravel of the plains of the Rhine. It overlies almost all the volcanic products, even those between Neuwied and Bonn, which have the most modern aspect; and it has filled up, in part, the crater of the Roderberg; at the bottom of which a well was sunk, in 1833, through seventy feet of loess. Here, as elsewhere, it is a yellow loam with calcareous concretions, and has not the character of a local alluvium.

It is remarkable, indeed, that the loess is scarcely ever affected by the nature of the rocks which underlie or immediately surround its site, but wherever it occurs appears as if derived from one common source." [4, 8].

Before 1832 Lyell knew nothing of the loess, and 1832 was a year of revelation. After 1835 he did not contribute significantly to loess research but, via the widespread distribution of the Principles of Geology (12 editions up to 1875), ensured that knowledge of loess became universal [9]. The lucky chance that took Lyell to Heidelberg in 1832 meant that loess rapidly became a material of interest and loess scholarship expanded immediately. Loess scholarship began in the Rhine valley, the signal originated in Heidelberg and the Oberwald, and Lyell transmitted it all over the World.

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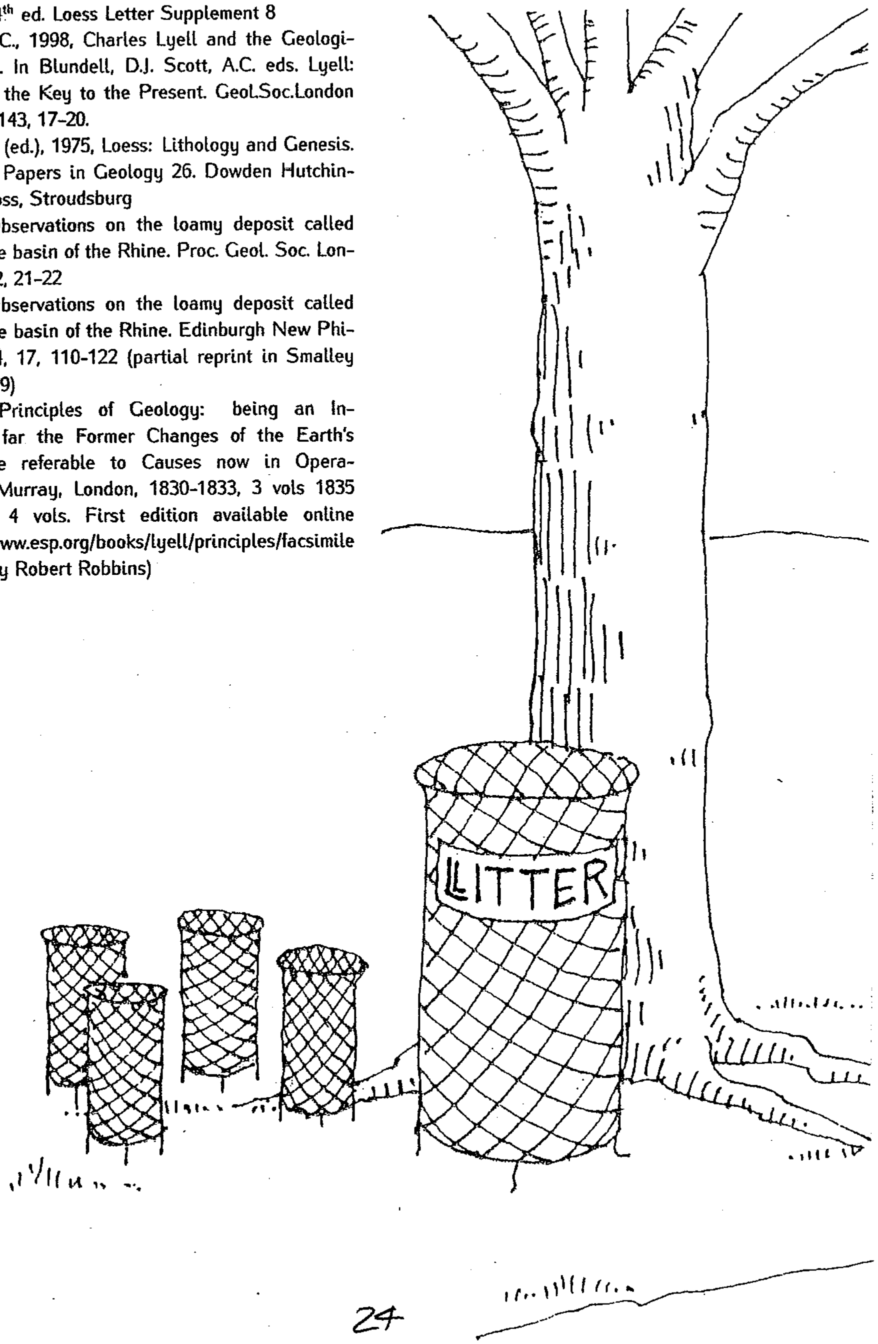

Central European Journal of Geosciences

The Western Pacific Working Group of the INQUA Loess Commission: expansion from Central Europe

Review Article

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Received 9 February 2010; accepted 3 March 2010

Abstract: The INQUA Loess Commission expanded from its Central European base after the 1977 INQUA Congress. The first, furthest, and probably most successful expansion was the Western Pacific Working Group(WPWG). Co-operative loess research between China, Australia and New Zealand demonstrated the ideal working of a dedicated research group within the INQUA protocols. The WPWG functioned from 1978 to about 1988, a critical ten years during which China re-appeared on the world loess scene. The WPWG meeting in China in 1985 was a useful precursor to the INQUA Congress in Beijing in 1991. The main function of the WPWG turned out to be facilitating the return of China to the world of loess scholarship.

Keywords: loess research • INQUA Loess Commission • Western Pacific Working Group • Chinese loess post Cultural Revolution

1. Introduction

For most of its history the International Union for Quaternary Research (INQUA) operated via a series of commissions, groups of scholars with interests in a particular aspect of Quaternary science. A long running commission was the Loess Commission, set up as a sub-commission of the Stratigraphy Commission in 1961 by Julius Fink of the University of Vienna, it became a full commission in 1969, and ran until 2003 and ended with the great reorganisation of INQUA along managerial lines.

Julius Fink was the first president of the Loess Commission, and he handed over to Marton Pecsi, of the Hungarian Academy of Sciences, at the 10th INQUA Congress, held in Birmingham UK, in 1977 [1]. Up until 1977 the Loess Commission was essentially a Central European enterprise, but when Pecsi took over he initiated two new directions, the focus on stratigraphy was widened to include applied aspects of loess studies, and the geographical compass expanded to cover the entire world.

So from 1977 world loess was to be studied, and, by chance, the world was rushing towards the Loess Commission. It was rushing in the person of Jim Bowler of the Australian National University(Figure 1). Bowler had been to China as part of a delegation of Quaternary scientists in 1975 and had seen the loess, and been inspired. He was in China because efforts were being made to re-establish links after the trauma of the Cultural Revolution. He proposed, at the Birmingham INQUA Congress, the establishment of the Western Pacific Working Group(WPWG). This idea was accepted and he was charged with the task of setting up the WPWG under the auspices of the Loess

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nmission. The Western Pacific area was deemed to in- de China, Australia and New Zealand, and each coun- would be required to contribute to group activities, and ırganise a field conference on home ground. It is possi- that Bowler's main idea was simply the rehabilitation he Chinese loess.

ure 1. Professor James Bowler (Australian National University, then University of Melbourne). Onlie begetter of the WPWG.

the 1977 Congress Ian Smalley of Leeds Univer- , who had just launched the Loess Biobibliographical ject [2] met J.D.G.Milne of the DSIR Soil Bureau in v Zealand. A consequence of this meeting was that alley moved to New Zealand in 1978 to start up a ma- study of New Zealand loess [3] and became the New land link person for the WPWG, and as a full member he INQUA Loess Commission, a link back to INQUA ɔer.

Australia and New Zealand Association for the Ad- cement of Science (ANZAAS) held its annual meeting anuary 1979 in Auckland in New Zealand. This meet- was chosen as a launch point for the WPWG. Bowler e from Canberra and Smalley travelled on the 'Sil- Star' from Wellington to Auckland. A simple plan for WG activities was devised; each country would host a l trip and loess conference, and a newsletter would be lished. The first meeting would be held in Australia the newsletter would be produced by DSIR (NZ De- ment of Scientific & Industrial Research) in Welling- and called 'Loess Letter'. LL was given an NZ ISSN ber: 0110-7658, and the first issue was printed by the NZ Government Printer in Wellington, and dated April 1979 [4].

Bowler had another critical meeting, in Beijing, later in 1979 [5]. On 10 and 11 June 1979 he met with Liu Tungsheng, Wen Chichung, Yi Sanfong and Chou Weichien to set up as many official relationships as possible and to link the Chinese workers into the project. Establishing agreement between Academia Sinica and the Australian Academy of Sciences promoted the possibilities of success for the project. Bowler, as chairman of the Australian National Committee of Quaternary Research was able to offer Academy involvement. The general scheme was approved and the way was open for the 1980 conference in Australia.

2. Australia 1980

The first WPWG meeting, in S.E.Australia, was very like a Fink-led 1960s meeting of the original Loess Subcommission; a small group of scholars discussing and observing loess in an interesting part of the world. It brought an influential group of Chinese loess investigators to Australia and enabled Bowler to press for stronger links between China and Australasia, and the rest of the world.

The participants were:

Australia J.M. Bowler (convenor), J. Beattie, P. Macumber, R.J. Wasson, J. Richardson, A. Dare-Edwards, B. Butler, C. Chartres,

China Liu Tungsheng, Wu Zirong, Yuan Baoyin, Zheng Honghan, An Zhisheng, Wen Qizhong,

New Zealand I.J. Smalley, J.D.G. Milne, N.M. Kennedy, C.G. Vucetich.

The WPWG delegates stayed at Ursula College, Australian National University in Canberra, and it was from there that the field trip departed, at the end of November 1980. (see Figure 2 for Bowler [6] map of general field trip region).

24 November: Canberra to Narrandera via Wagga Wagga. An interesting brick pit in Wagga. Evening with Riverina Branch of the Australian Soil Science Society.

25: Narrandera to Kerang via Echuca and Murray River: Quaternary tectonics, Murray River history, aeolian layers (parna) on granite.

26: Kerang to Balranald via Lake Tyrell: Lake Tyrell lacustrine and aeolian deposits, dune sequence at Nyall West.

27: Balranald to Mildura via Willandra Lakes: Geomorphology of Willandra Lakes and formation of dunes, stratigraphy and chronology of Lake Mungo- site of Australia's oldest humans, 'Walls of China' dune system (see Arthur Upfield 'Death of a Swagman' for poetic descriptions).

28: Mildura to Fowler's Gap via Broken Hill(c.f. Arthur Upfield 'The Batchelors of Broken Hill'): aeolian deposits on the Barrier Range.

29: Aerial inspection of Lake Frome (c.f. Arthur Upfield 'The Lake Frome Monster'), up to Lake Callabonna and round the edge of the Flinders range . Return to Broken Hill.

A special dinner was held at Broken Hill to honour Bruce Butler, the famous Australian pedologist and CSIRO stalwart.

30: Fly from Broken Hill to Cobar, to Sydney, to Canberra. Observe Darling River country.

The Loess Symposium was held at ANU on 3-5 December. The field trip and the conference are well recorded because Kennedy [7] and Smalley [8] submitted reports to

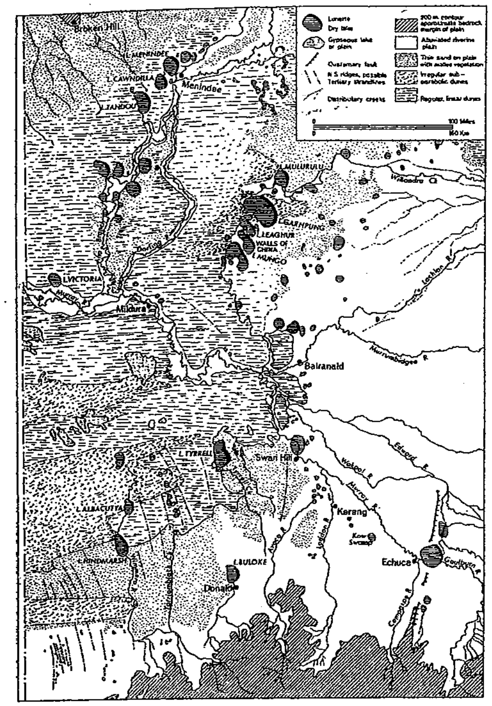


Figure 2. Map from Bowler [6] showing the region of S.E.Australia where the first WPWG field excursion was held. The excursion moves across the map from S.E. to N.W.

DSIR and these were published by Soil Bureau. (Milne should have submitted a report but he suffered from a notorious writers block and nothing was produced). The Soil Bureau Loess bibliography [3] was circulated at the symposium, and the papers presented appeared in a subsequent volume [9]. Loess Letters 1-5 all contained material relevant to this first WPWG meeting; the proceedings were published by Australian National University School of Pacific Studies [9].

3. China 1985

The second WPWG meeting was a total contrast to the first; this was a large, international loess conference. The WPWG format opened out to become a full-scale Loess Commission event which served as a basis for a great celebration of Chinese loess; the publications were a guidebook [10], a proceedings volume containing 85 titles[see LL16] [11], and a large book of papers[see LL18] [12], and a long, detailed report from Budapest by Marton Pecsi [13], writing in his role as President of the Loess Commission; and a short report in *Nature* by Wintle and Derbyshire[LL16] [14].

The field excursion started from Xian in early October 1985 and headed north into/on to the Loess Plateau proper. The route (see Figure 3) crossed through the Weihe graben (a Cenozoic depression) and the Ordos platform (mainly overlying Mesozoic deposits and Quaternary loess) and travelled about 400 km into the Loess plateau.

5 October: From Xian to Lochuan, visiting stops 1-5.

6 October: From Lochuan, visiting stops 6-1 and 6-2, then back to Lochuan.

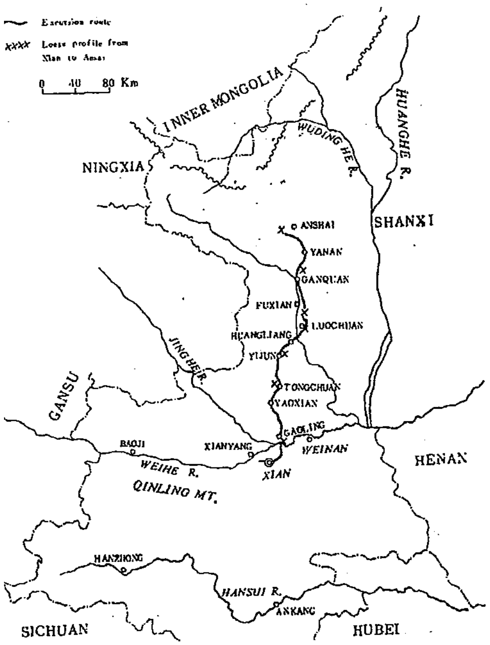
7 October: From Lochuan to Yanan.

8 October: From Yanan, to Chafang and the Xiannan gully of Ansai County. Back to Yanan.

9 October: From Yanan, to Xian

The field excursion traversed several loess regions, distinguished by their geomorphological features, between Xian and Ansai, 400 km to the north. The route crossed the broad Wei River flood plain which is mantled by loess and dissected by a few small gullies. Northwards, the hill country is dominated by long, loess-covered ridges termed liang. Limestone quarries along the road gave a unique opportunity to observe how the liangs are related to the underlying bedrock. Smaller, loess-covered hills, known as mao, separate this area from the flat-topped loess plateau, termed yuan. Here the loess is about 100-200 m thick and is extensively cultivated with wheat and maize, a little cotton and tobacco.

The most spectacular features of these yuans are the deep erosional gullies that dissect the plateau. In particular,



igure 3. Map from Guidebook for 1985 China conference showing route of field excursion. North from Xian, into the Loess Plateau.

ear Luochuan, the gully is some 130 m deep and in the ear-vertical cliffs a sequence of more than 15 palaeosols an be seen overlying the basal red clay. One site has een studied for about 30 years and the chronological se- uence had been established primarily by palaeomagnetic ieasurements of a core nearby. The results implied that ie 130 m deep sectionm spanned the last two magnetic pochs, the Brunhes and the Matuyama.

highlight of the field trip was a visit to an experimental onservation area, in Ansai County, Shaanxi Province, set p in 1980 by the Northwest Institute of Soil and Water onservation of Academia Sinica. Erosion of the loess and ıbsequent landslides are major problems for agriculture, ıad maintenance and the safety of villages.

he first paper in the proceedings volume was by Arnt ronger of the University of Kiel: he wrote

=or a comparative loess pedostratigraphy and, by infer- nce, a record of the Pleistocene climatic history of the ɔutheastern part of Central Europe, the major loess sec- ons of the Hungarian and Yugoslavian Danubian Low- ınds are particularly well suited."

emonstrating that the Central European loess would be ɔnsidered, even in the Loess Plateau environment. Most of the papers, of course, were by Chinese workers and showed the vast commitment to loess research which was waiting to be revealed. The book of papers [12] was a large (43 papers) and imposing volume, briefly reviewed in LL18. It really was a remarkable position statement for loess in the Quaternary world, and this was many aspects of loess; there were five sections:

1. Loess, palaeosol and palaeoenvironment,
2. Stratigraphy and chronology,
3. Mineralogy, geochemistry and isotopic composition,
4. Physical, mechanical properties and engineering geology,
5. Geomorphology and soil erosion.

4. New Zealand 1987

This was the third meeting of the WPWG, the wrap-up meeting for a successful working group. It was organised by Dennis Eden and Derek Milne of DSIR Soil Bureau and held 14-21 February 1987. The symposium involved a two-day conference and a six-day field trip encompassing the central part of New Zealand, led by Derek Milne. The field trip started at Christchurch in South Island where participants examined deposits somewhat similar to classical loess, though largely non-calcareous. The group then moved to North Island and examined deposits having a greater volcanic component and having vastly different morphologies. The field trip concentrated on the stratigraphy and chronology of the loess and highlighted the importance of tephras in dating and correlating the loess. Between 30 and 40 scientists participated in the two day programme at Palmerston North which dealt with all aspects of loess. Figure 4 shows the field trip route.

14 February 1987: Starting in Christchurch; examine loess sections and landscapes in vicinity; travel to Blenheim.

15 *February*: Awatere valley, loess sections and landscapes, soil erosion on Wither Hills near Blenheim, to Wellington by ferry, overnight in Lower Hutt.

16 *February*: Lower Hutt, visit New Zealand Soil Bureau at Taita, and NZ Geological Survey. Loess sections between Wellington and Palmerston North.

17 *February*: Palmerston North, loess sections and landscapes Manawatu-Rangitikei-Wanganui district, back to Palmerston North.

18 *February*: Conference session at Aokautere Science Centre near Palmerston North.

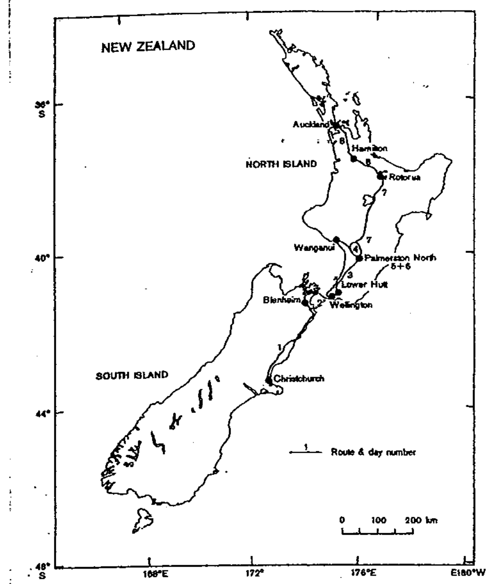


Figure 4. Map of excursion route in New Zealand; the symposium was held in Palmerston North, the day numbers show the excursion proceeding.

19 *February*: Poster papers, closure of conference.

20 *February*: Travel to Rotorua by bus, sight-seeing en route.

21 *February*: Sections at Mamaku Plateau and in vicinity. Conference disperses from Hamilton.

A conference volume was produced [13] which contained the conference contributions. This volume was summarised in Loess Letter 21, and carefully reviewed by Derbyshire [14]. The Loess Letter timing was fortuitous, LL21 was the tenth anniversary issue, the WPWG project had been running for just ten years.

5. Commentary

The expansions from Central Europe were a successful aspect of the period while Marton Pecsi was president of the INQUA Loess Commission (1977-1991). The 'topical' expansion into geotechnology is largely associated with N.I.Kriger of PNIIIS(the Construction Technology Institute for Engineering Surveys) in Moscow, and this, to some extent, revolved around the 1982 INQUA Congress in Moscow, and met with some limited success [15].

The 'geographical' expansion was a great success, largely because this period corresponded to the recovery of Chinese science from the tribulations of the Cultural Revolution and the need for Chinese loess scholars to re-establish relations with the outside world.

Bowler's WPWG was well placed to help with the restoration of the status of the Chinese loess. It is fascinating to compare the relatively modest first steps of the WPWG (the Australia meeting of 1980) with the great international loess conference of 1985 which was the Chinese contribution to the WPWG plan. Pecsi [13, 16, 17] wrote a long report of the 1985 meeting, the view from Budapest must have been very satisfactory. The timing was right and with two such key players as Jim Bowler and Liu Tung-sheng in the game everyone observed the great blossoming of loess studies which achieved a fine apotheosis with the 1991 INQUA Congress in Beijing. The timing and placing of the 1991 Congress was amazingly serendipitous (or very well planned)- this was a meeting dominated by loess, in the land of loess.

The history of the WPWG in some ways parallels that of the Loess Commission. A fairly low key opening involving a few dedicated scholars but then a large expansion to an amazing and productive second phase. Then a third phase of consolidation and consideration and appreciation. For the Loess Commission the whole process lasted about 40 years, and for the WPWG about ten years. The 1985 Conference was the high point for the WPWG (and also an important event in Loess Commission history); the high point for the Commission proper was the 1999 LoessFest at Heidelberg and Bonn. If the essential role of the WPWG was to help to re-activate interest in the loess of China it can be judged to have succeeded.

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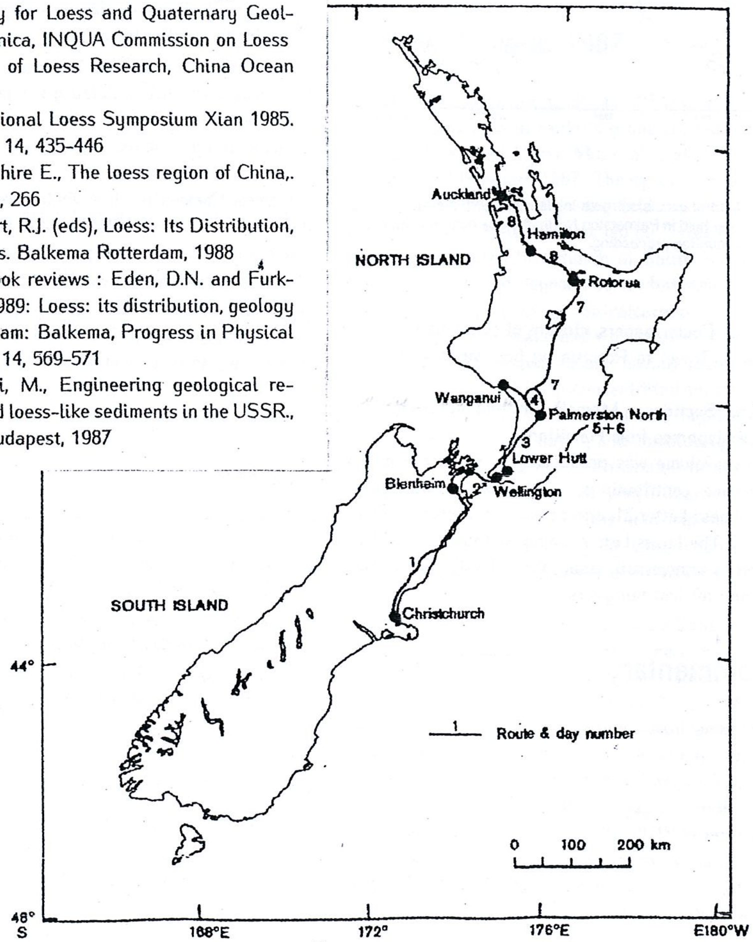

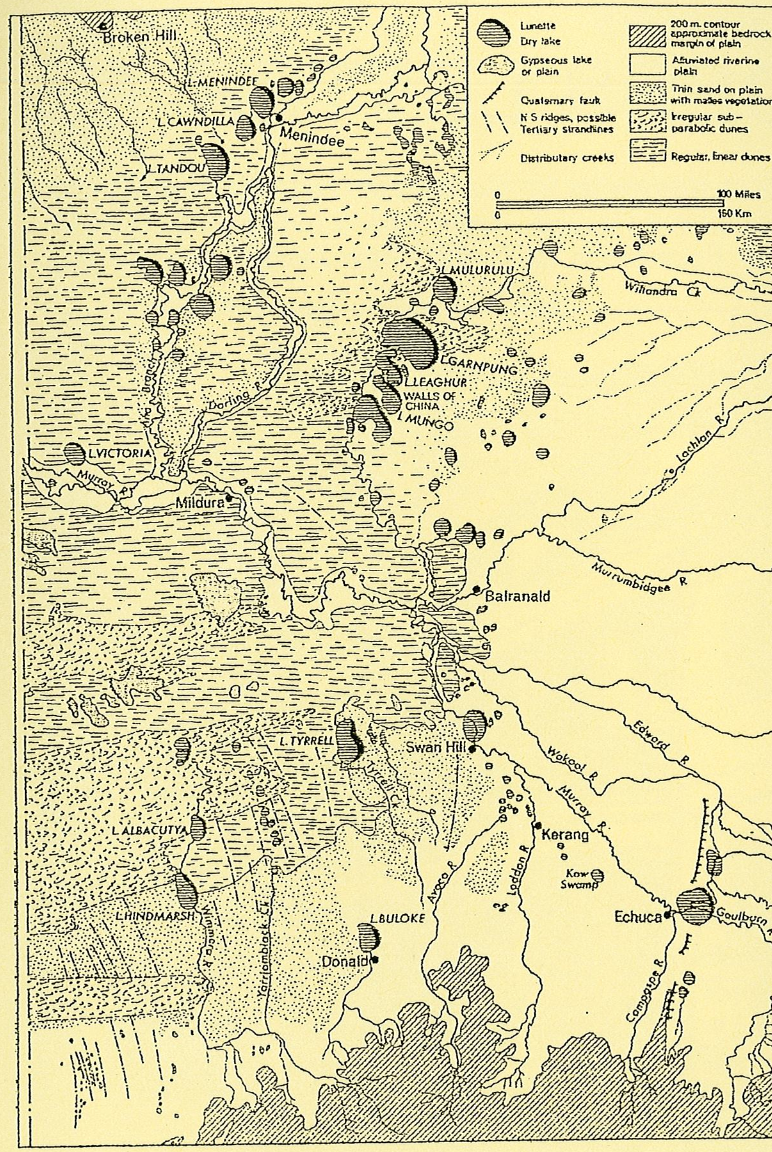

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INQUA LOESS & DUST COMMUNITY
NOTTINGHAM TRENT UNIVERSITY

LL63 April 2010 ISSN 0110-7658

LOESS LETTER 63

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.