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Published by DSIR, Soil Bureau, on behalf of the Western Pacific Working Group of the INQUA Loess Commission. LL is the informal newsletter of the WPWG. Please send news, or comments, or short reports on work in progress to Ian Smalley, Soil Bureau, DSIR, Lower Hutt, New Zealand. Two issues a year are planned; if you would like to be on the circulation list, send your name and address to Ian Smalley at the Soil Bureau.

WPWG Study Tour and Loess Workshop November - December 1980

The Study Tour and Workshop will be the first major event organised by the WPWG. The aim is to bring together delegations from China, Australia and New Zealand and to initiate joint work on the loess and related airfall deposits of the Western Pacific Region. Delegates will gather at Mildura in Victoria over the weekend of 22-23 November; the field tour will last for six days and Canberra will be reached on 29 November. The weekend 29-30 November is free, then delegates will attend the Sedimentology Symposium organised by the Geological Society of Australia; the symposium is concerned with Marine Sediments and Salt Lakes. The Loess Workshop will take place on 3-4 December. Papers should be

produced for circulation at the workshop as typescripts. The Study Tour is restricted to official delegates from the three national groups, but the workshop is open to all-comers. It is hoped that authoritative reviews of the state of research on loess and dust mantle materials in China, Australia and New Zealand will be available for presentation at the workshop. The convener is Dr J. Bowler, Research School of Pacific Studies, Australian National University, Canberra ACT, Australia.

What colour is loess?

The new cover for Loess Letter, which makes its first appearance with No. 4, is supposed to represent the colour of loess. It's the nearest the N.Z. Government Printer could get to a loess colour. You are invited to take part in our colour judging competition: write in the space below your judgement of the Munsell colour (all factors) of the cover. We will poll the Soil Bureau pedologists and offer an official N.Z. opinion in the next issue (LL 5). There are no prizes for correct answers - your only gain is an enhanced realisation of just how subjective and variable the art of colour judging is. Maybe we are too uncritical in our acceptance of the Munsell system and should be actively trying to devise a better one.

The title in Chinese which adorns our new cover was specially written for LL by Liu Tung-sheng of Academia Sinica during his recent visit to New Zealand.

Loess in Western Victoria, Australia

by
Edmund D. Gill* and S.A. Reeckmann**

Pedological Additives

Forty years ago a pedologist studying the soil on the basalt plains of Western Victoria could not understand the presence of calcium carbonate and siliceous silt in Pleistocene soils because (a) such deeply leached profiles should long ago have lost all their carbonates, and (b) there is no free silica in basalt, so whence the quartz silt? It was loess. At that time it was generally believed that loess could form only in peri-glacial areas where copious rock flour provided the source. Then Professor Zeuner visited Melbourne and told us about the 'hot loess' he had found in the Sahara Desert region. At the time, EDG was studying lunettes in Western Victoria, and At Zeuner's invitation sent a sample from the Lake Colongulac lunette to London for analysis in his laboratory. Mineralogical analysis by Dr A.W. Beasley showed that the material came from the floor of the lake, while Zeuner's grain size analysis showed that some of the material had moved as clay aggregates.

Since then it has become clear that there has been a number of Quaternary dry periods during which much wind-borne dust has been distributed over the terrain. Loess is a matter of degree. At the present time, dust is blown about every summer, but the quantity is not sufficient to build geological formations. In the dry periods, by contrast, there was sufficient loess to do this.

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* Recently retired from CSIRO Division of Applied Geomechanics.
** Temporarily employed at CSIRO Division of Applied Geomechanics, now at Geology Department, Rensselaer Polytechnic Institute.

Loess Recognition

When EDG was studying lunettes he obtained 'typical examples' of loess from Professor Jim Thorp in U.S.A. and Professor Bob Allan in New Zealand. These with his own samples from Victoria were submitted to CSIRO experts for grain size analysis. However, none of them met the strict definition of loess then accepted, for two reasons. Some clay aggregates were involved, and some saltatory material. For example, the sample from Christchurch, New Zealand, included some coarser saltatory material that must have come from the Cashmere Hills nearby.

Loess is the expression of wind action on fine sediments in dry conditions. It can originate in a number of ecosystems, but the greatest volume is generated in periglacial areas because of the exceptional supply of sedimentary fines.

Loess in Calcrete

A zone of loess deposition has been recognised in Western Victoria not before noted. In a mineralogical and isotope study of the Quaternary calcarenite sequence at Warrnambool in Western Victoria (Reeckmann and Gill in press), thin sections of a calcrete (B horizon of a fossil terra rossa) showed quartz silt that was not present in the underlying formation. The amassing of carbonate in the B horizon to form the calcrete (which does not form in the area at present) and the inblown siliceous loess are both evidence of drier conditions.

Radiocarbon dating in the Warrnambool region shows that the latest dry period was ~20 000 - 8500 yr B.P. A charcoal sample from the base of the Lake Colongulac lunette previously mentioned gave an age of 20 100 yr In the floor of the Maribyrnong River and other valleys near Melbourne, loess respread by river action forms the Doutta Galla Silt (Keilor Terrace) in which the Keilor Cranium was found. It covers the period ~20 000 - 6500

yr B.P. Giant marsupials occur in the clay below it, but only modern species have been found in the Doutta Galla Silt.

Loess Environment Changed Faunas and Floras

This last dry period was associated with the rise of sea level from the Last Glacial low. During the time that the dry conditions made the inland of Australia arid, and made semi-arid (so limiting food availability) the area between the Great Dividing Range and the ocean, the sea was rapidly rising and so significantly reducing the living space available. Was this the cause of the faunal impoverishment? Did this bring about the demise of many giant marsupials? However, this same process had happened a number of times before - at least four times and possibly as many as 15, so why did so many giant species succumb?

There was one new factor in the environment that had not been present before - the presence of the Australian Aborigines. Perhaps this last environmental change was 'the last straw that broke the camel's back'. Aboriginal hunting certainly applied a stress that had not been present hitherto.

Loess is linked with living things, because the environment it characterises puts stress on the biota.

Welcome CANQUA

Quaternary studies in North America took a major step forward in May 1979 with the foundation of CANQUA - the Canadian Quaternary Association. The first CANQUA newsletter was issued in May 1980 and lists a remarkable range of subject areas requiring attention - from paleo-climatic reconstruction to sensitive clays. No mention of loess - and yet Troy Pewe found the stuff in Alaska; there must be some in Canada somewhere. CANQUA details from CANQUA Secretariat, 5 Birchview Court, Nepean ON K2G 3M7, Canada.

Priorities for Loess Research

Priorities need to be established at different levels; when the INQUA Loess Commission meets in Moscow in 1982 there will doubtless be some discussion of world-wide targets for loess research and a programme of investigations will be proposed. Also at the WPWG meeting later this year an attempt will be made to devise joint programmes of research and to set some desirable aims for work in the Western Pacific Region. And it is essentially as a contribution to this latter operation that we offer these priorities for loess research in New Zealand.

1. Identification of paleosols. Techniques need to be developed which will aid in the recognition of loess paleosols. In the N.Z. situation snails and pollen are of no help in dating loess deposits and much reliance has to be placed on finding and identifying paleosols.

2. Fragipans. N.Z. loess deposits often feature well developed fragipan layers. Investigations of how these form should be given a high priority; they present real practical problems in terms of interfering with root growth and also they offer a challenging scientific problem. Various projects on the nature and formation of fragipans are under way at the Soil Bureau, and a large scale survey of the field is commencing. This is an area where N.Z. loess investigations can have world-wide significance.

3. Mineralogy. Very little is known about the mineralogy of the N.Z. loess - in particular the mineralogy of the modal size fractions has been neglected to date and should be investigated.

4. Loess stratigraphy. A priority is still to compare the stratigraphic evidence obtained from the North and South Islands, and to construct a picture of climatic change for the whole country. There is a

need to relate loess stratigraphy to glacial/interglacial events already established in the South Island. Investigations at the northern end of the South Island, in the Marlborough region, may provide useful inter-island links since tephra horizons can be used as time planes to permit comparison with the southern North Island.

5. Erosion. This has been a major problem in N.Z. and the various mechanisms of loess related erosion are still not understood. Investigations are continuing into the so-called 'tunnel-gully erosion' and this is seen as a high priority problem, as is investigation of other mechanisms.

6. Sources of clay. The N.Z. loess, by and large, has a much higher clay content than loess in the rest of the world. Why is this, and where does the clay come from?

7. Colour. How can be account for the colours in loess? N.Z. loess has some characteristic colour mottlings - how do these arise? Perhaps (as proposed on p.2) we should pay some more attention to the problem of colour - how to describe it and how to account for it.

8. Density. N.Z. loess has a high density; this means that the structural collapse which can cause geotechnical problems does not occur. Why is the N.Z. loess so dense? - some explanations are required.

9. Tephric loess. It appears that the tephra deposits in the North Island can be reworked and can provide sedimentary material in the loess size range. This forms aeolian deposits and has been called tephric loess. Several problems arise with respect to tephric loess; how does it relate to the more usual forms of loess? does it fit into the same definition? does it retain climatic data and useful stratigraphic information? does it occur in other parts of the world?

and should it be recognised as a major type of loess material?

10. Data collection and correlation. There is an urgent, possibly desperate, need to bring available loess data together and to review and assess it. In N.Z. there has been a lack of the necessary review activity, and a similar situation exists world-wide. In fact, it affects all subjects of Quaternary research - we have plenty of raw data; we need this data to be reviewed and assimilated and assessed in a critical manner. Many of the classic loess papers should be reconsidered; in-depth studies of classic works should be encouraged.

The above list has largely been prepared from material and suggestions supplied by Colin Vucetich, Alan Palmer and Dennis Eden of the Geology Department, Victoria University of Wellington. The ten points are not meant to be comprehensive; there are other problems relating to source identification and transport mechanisms which could be included. The ten point plan is offered as an initial guide to priorities. Correspondence on the matter would be welcomed and can be featured in LL5.

World Map Pt. 3 - Europe and Africa

The final part of the LL outline map of loess distribution concerns Europe (well covered with loess) and Africa (with virtually none). The lack of loess around the Sahara, of course, was used by Albrecht Penck as an argument against the formation of loess material in sandy deserts. But the African lack is balanced by the European abundance, and it's an abundance which is very difficult to represent in a simple style. The new INQUA Loess Map of Europe should be available soon, and this will show detailed distribution: the map is to a 1:250 000 scale and shows loesses and related materials represented by 14 types of sediment characterised by lithological features including the

pedogenic and periglacial overprint. (Map details can be obtained from Prof. Dr. G. Haase, DDR Academy of Sciences, Georgi-Dimitroff-Platz 1, 701 Leipzig, DDR.)

We need to indicate the existence of the north European band of loess, which more or less parallels glacial limits. It would be useful to show the existence of the Danube Basin loess and some of the smaller outliers like the deposits in Israel, S.E. England and N. Italy. Some deposits in Soviet Central Asia are tentatively indicated, together with the associated desert region. Deserts in Africa and the Arabian peninsula are indicated. It would be useful to have a better indication of the extent of loess deposits in the Soviet Union - perhaps this is something the organisers of the 11th Congress could arrange before the loess enthusiasts of the world converge on Moscow in 1982. The Ukraine and Central Asian deposits can be more or less located - the major problem is the deposit associated with those northern rivers; an eastern fringe was indicated in LL2; the LL4 version perhaps (?) represents the eastern limits.

Conferences

The first circular for the 11th INQUA Congress has been issued. The Congress will be held in Moscow from the 1st to the 9th of August 1982. All correspondence and requests for information concerning the Congress should be addressed to: Dr Ismail P. Kartashov, Secretary-General of the XI INQUA Congress, Geological Institute, USSR Academy of Sciences, Pyzhevsky 7, Moscow 109017, USSR.

The scientific programme is divided into six groups: Quaternary stratigraphy; Lithology and genesis of Quaternary deposits; Quaternary Fauna and Flora; Quaternary Paleogeography; Prehistoric man and his material culture; Natural resources of Quaternary deposits and their utilisation - protection of the natural environment. There are field trips before (A) and after (C) the Congress proper; excursion C-6 to the

Ukraine looks interesting but the most attractive to LL readers must be A-11 and C-11 to Uzbekistan and Tajikstan to see the Quaternary deposits of Middle Asia. These excursions start in Tashkent and end in Dushanbe and cost 510 roubles (at least).

The Congress emblem incorporates a picture which represents the organising committee's idea of the appearance of the baby mammoth whose intact body was found in June 1977 within the Kolyma River basin.

15th Pacific Science Congress

The 15th Pacific Science Congress will be held in Dunedin, New Zealand, on 1-11 February, 1983. The WPWG is organising a meeting to be held within the auspices of the Pacific Science Congress - this will be entitled 'Loess, Tephra and Aerosolic Dust: Quaternary Airfall Deposits in the Circum-Pacific Region'. Papers on loess, tephra and/or dust are requested for this meeting; a proceedings volume will be assembled after the Conference and published by Geo Abstracts. All types of contribution will be accepted but reviews, discussions or essays would be more welcome than the straightforward scientific paper. Intending authors are asked to contact Dr I.J. Smalley, Soil Bureau, Private Bag, Lower Hutt, New Zealand. It is hoped to run field trips to

see the South Island loess, and in particular, the classic Stewarts Claim formation.

CLIMANZ

Conference Theme: Climatic Change in Australia and New Zealand - Late Quaternary Events, the Last 40,000 years.
Date: 8-13 February, 1981.
Place: Howmans Gap, National Fitness Camp, Falls Creek - near Mount Beauty on the northern margin of the Bogong High Plains, in the State of Victoria.
Details from: Secretary, CLIMANZ Organising Committee, Department of Biogeography & Geomorphology, Australian National University, Canberra ACT 2600, Australia.
Theme and Topics: The reconstruction of Late Quaternary Australian and New Zealand environments in discrete time zones.

The Conference will bring together data from a wide area, from tropics of Southern Ocean and from Western Australia to New Zealand. Data will be assembled into five time zones covering the period from 5000-35,000 BP.

Publications

"100 Jahre Glazialtheorie im Gebiet der skandinavischen Vereisungen" a special issue of Schriftenreihe für Geologische Wissenschaften. This is Heft 9, dated 1978, but only recently published - by the Gesellschaft für Geologische Wissenschaften der DDR via Akademie-Verlag in Berlin. Several good papers; we mention two here and one in the snails section (see below):

Lithology, Genesis and Distribution of Loess and Detrital Sediments in the Foreland of the Scandinavian Glaciations by M. Altermann, G. Haase, I. Lieberoth and R. Ruske (in German), pp.231-255.

The exploration of loess areas and the palaeogeography of Glacial Epochs, by A.A. Velichko (in German), pp.319-337. Comprehensive studies in the loess distribution areas of the East European plain have shown a relationship between morainic horizons of all glaciations and loess horizons, the latter permitting us to distinguish glacials, interglacials, and intervals during the individual glaciations ... It is to be expected that new knowledge on the development of the Pleistocene will be provided by detailed researches in the loess provinces.

Field recognition of tephric loess (c.42,000-c.15,000 yrs BP) in Central North Island, by N. Kennedy, New Zealand Soil News 28, no. 2, 55-58, April 1980.
From his studies of tephric loess, Kennedy suggests the following climatic episodes in the North Island, New Zealand:

Period	Climate
c.42,000 yrs BP	Cold and arid
c.42,000-c.32,000	Climate warming slowly and becoming less arid
c.32,000-c.26,000	Climate warm (and humid?)
c.26,000-c.15,000	Cold and arid
c.15,000-present	Climate warming

He also provides 12 field criteria for use in the identification of tephric loess: colour, texture, structure, bulk density, sensitivity and dilatancy, root channels, lack of paleosol development, lack of weathering, allophane reaction, presence of concretions, lack of pumice grains, loess 'balls'.

Loess Bibliographies: The two bibliographies which the WPWG is associated with are both due to be published in August. The world bibliography, which is entitled "Loess - a Partial Bibliography" is being published by Geo Abstracts in Norwich, England (and can be obtained from

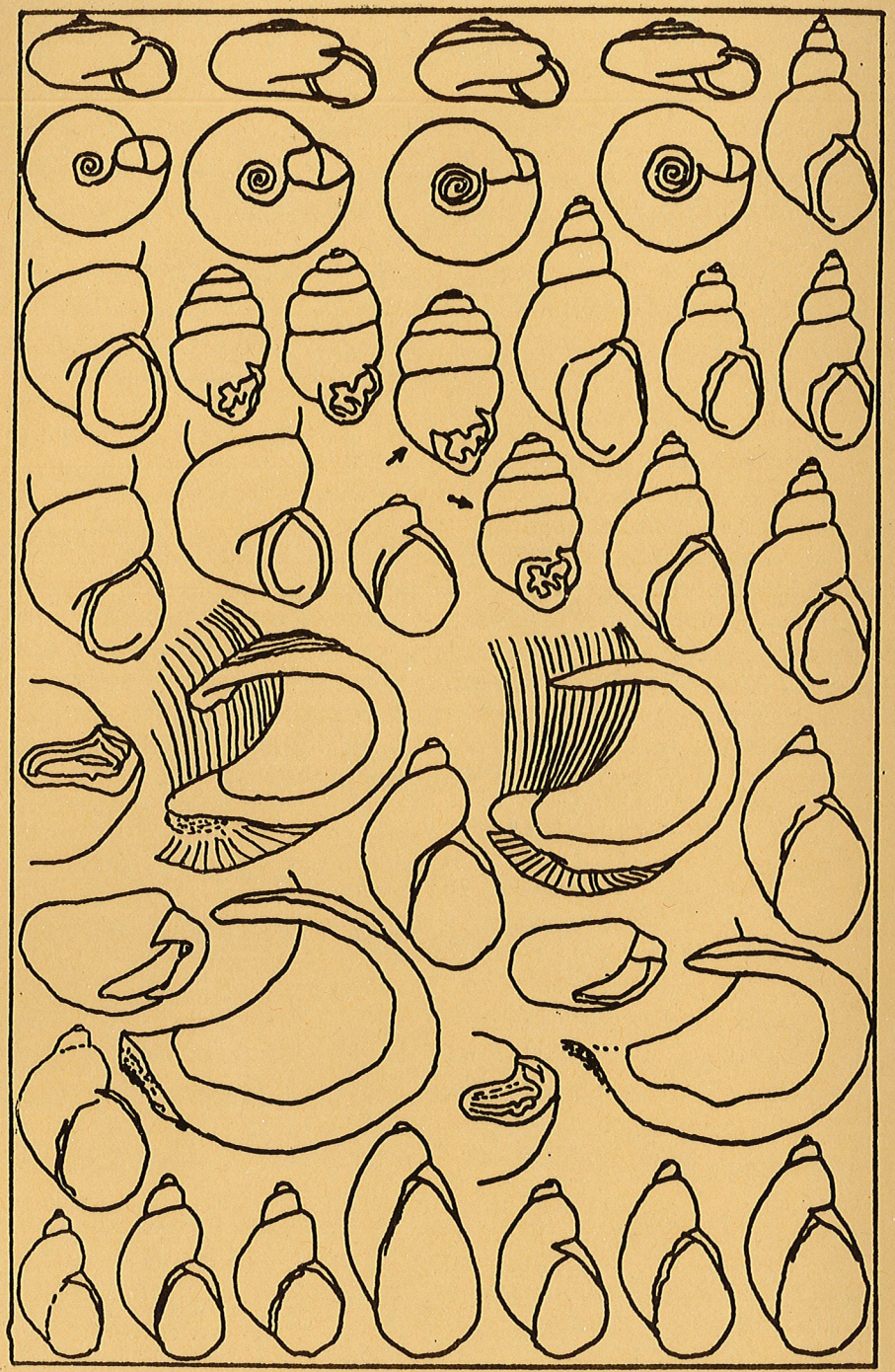
the publisher). The local bibliography is called "The First Hundred Years - A historical bibliography of New Zealand loess 1878-1978" and is being published by DSIR. Copies can be obtained from: The Librarian, Soil Bureau, Private Bag, Lower Hutt, New Zealand.

Dependence of microstructure of loesses on their genesis, by J. Sajgalik (Technical University, Bratislava). Paper presented at the INQUA Loess Commission Conference and Field Field-Workshop on the Stratigraphy of Loess and Alluvial Deposits, Budapest-Szeged, August 1979.

Abstract: Most civil engineers take loess for one litho-logical-genetical type and they give reasons for the unfavourable properties of these sediments ... based on structural collapse. On the basis of extensive microscopic study of various lithogenetic types of different strati-graphic horizons of loesses of the Danubian Plain, the author discovered that physical-mechanical properties of loesses are dependant on ... genetical conditions (ed: conditions under which the loess formed).

We found out by microscopic study under the scanning electron microscope and by chemical analyses that particular stratigraphic horizons of loesses possess different microstructures, different mutual arrangements of minerals and different relations between skeleton and plasma. The author came to the conclusion that the study of the microstructures of loesses may be useful in the determination of loess stratigraphy (ed: if Sajgalik is right, we have a powerful new tool to use in loess stratigraphy; the full paper should appear soon in the proceedings of the conference, along with 26 other useful items. The above extract from the abstract has been edited slightly by LL).

The value of mineralogical and clay mineralogical analyses of loess soils for the investigations of Pleistocene stratigraphy and paleoclimate, by Arnt Bronger. Paper presented at the same conference as the Sajgalik item and another one to look out for in the Proceedings.



after FRANK COLLINS BAKER: J. Paleontology 5,(3) pl. 32

Snails in the Loess

The picture on the inside of the back cover is based on plate 32 of the classic study by Frank Collins Baker which appeared in the Journal of Paleontology vol. 5, no. 3, 1931. The items indicated by the arrows are Vertigo loessensis, F.C. Baker, x10: upper, 3½ miles west of Lewistown, Fulton Co., Ill. U. of I coll.P2366, Type; lower, Loess at New Harmony, Ind. U. of I coll. P4213.

Snail fanciers should be aware of a newly available paper by Vojen Lozek entitled "Molluscan stratigraphy in the area of Scandinavian glaciations". It is in German and appears in the recently published Heft 9 of the Schriftenreihe für Geologische Wissenschaften (see publications section p.12). Papers on snails and loess by Baker and by Lozek are listed in 'Loess - A Partial Bibliography' compiled by I.J. Smalley at DSIR, Soil Bureau as a WPWG contribution to the activities of the INQUA Loess Commission and published by Geo Abstracts in Norwich in the spring (southern hemisphere style) of 1980.

New Journal

The first issue of Landscape History, the journal of the Society for Landscape Studies, is now available. The journal consists of 93 A4 pages including 26 pages of illustrations. The first issue contains nine papers which were delivered at the inaugural conference of the Society in 1979 on the theme of 'approaches to landscape studies', five of these being concerned with general techniques of landscape study and four with studies of specific areas.

Copies of the 1979 journal may be ordered (at £7.00 each) from the editor, Dr M.L. Faull, 3 Benjamin Street, Wakefield WF2 9AN, England (cheques or money orders payable to Society for Landscape Studies). Papers on landscape studies in loess areas would be welcomed from LL readers.