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The Ninth International Congress of Soil Science,

Adelaide, August 1968

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The author attended the 9th International Congress of Soil Science. Some details of the organisation of the Congress are given, and a geological assessment is made of the papers presented, and of the tours south of Adelaide and from Adelaide to Darwin.

Introduction

The 9th International Congress of Soil Science was held in Adelaide, from 5th to 15th August, 1968. It was attended by approximately 700 delegates from 54 countries. B.R. Senior and H.F. Doutch (from Canberra) and D.J. Grainger (from Alice Springs) represented the Geological Branch of the Bureau of Mineral Resources. Some overseas delegates were geologists.

The Congress was held in the Napier Building, University of Adelaide. All seven tours, five in Australia and two in New Zealand, held before the Congress were repeated after it; six one-day and two-day tours were held on the weekend during the Congress. Senior attended day tour G (Mount Compass - Kuitpo districts), Doutch day tour F (coastal areas south of Adelaide), and Doutch and Grainger post-Congress tour 11 (Adelaide to Darwin).

Organisation of Congress

Ten Australian committees organised the Congress. Routine arrangements for registration, accommodation, transport and tours were largely handled by QANTAS and TAA; the committees' work included arranging:

1. the opening of Congress by the Governor General of Australia, Lord Casey, the closing of it by the Lieutenant Governor of South Australia, Sir Mellis Napier, and receptions by the South Australian Government and the Lord Mayor of Adelaide;

2. the raising of $100,000 from Commonwealth and State Governments, financial contributions from 62 other sources, and material help from another 38 organisations and businesses;

3. open days at five laboratories, a trade exhibit in conjunction with the S.A. Department of Trade and Industry (opened by the Premier of South Australia), and general exhibitions in the Napier Building, Public Library, and John Martin's Auditorium. The Bureau contributed a phosphate display to the exhibition at John Martin's;

4. simultaneous translation of proceedings into French and German at all Congress sessions; up to five sessions were held concurrently;

5. the televising of some sessions by the A.B.C.;

6. the setting up of post office, bank and travel agency branches in the Napier Building. Free Xerox facilities were also arranged;

7. entertainments for delegates, with free tickets to theatre and concert performances and wine tastings, and special functions for delegates' wives;

8. the publication, in advance, of the Transactions of the Congress. The four volumes of Transactions, totalling 3140 pages (313 papers), were printed by Halstead Press, and published by the International Society of Soil Science and Angus and Robertson Ltd. Final date for submission of papers was one year before the opening of Congress. The editors revised and rewrote 100 manuscripts, and had many maps and figures redrawn by a C.S.I.R.O. Drawing Office.

Congress Transactions

The four volumes of Congress Transactions have been deposited in the B.M.R. library. Congress papers were presented within seven Commissions.

Geological Branch delegates attended most sessions of Commission V, which dealt with soil and land unit classification, weathering, soil formation, soil age, and soil-landscape relationships. A few sessions in Commissions II and VII on mineralogy of clays were also attended.

Papers presented in Commission V were geologically relevant to seven major topics.

1. Processes in provenance areas: Papers 4/30-48* were concerned with genesis and rate of formation of soils, and chemical and mineral weathering. Of particular interest are papers on the development of Russian concepts (4/39), and soil types developed on a variety of rocks (4/41 to 43).

2. Stratigraphy of soils: Principles are discussed in paper 4/59, and relation to Cainozoic geological history in 4/11 to 16. South Australian workers rely heavily on correlation with Pleistocene eustatic changes in sea level (4/67 - see also tours F and 11 below).

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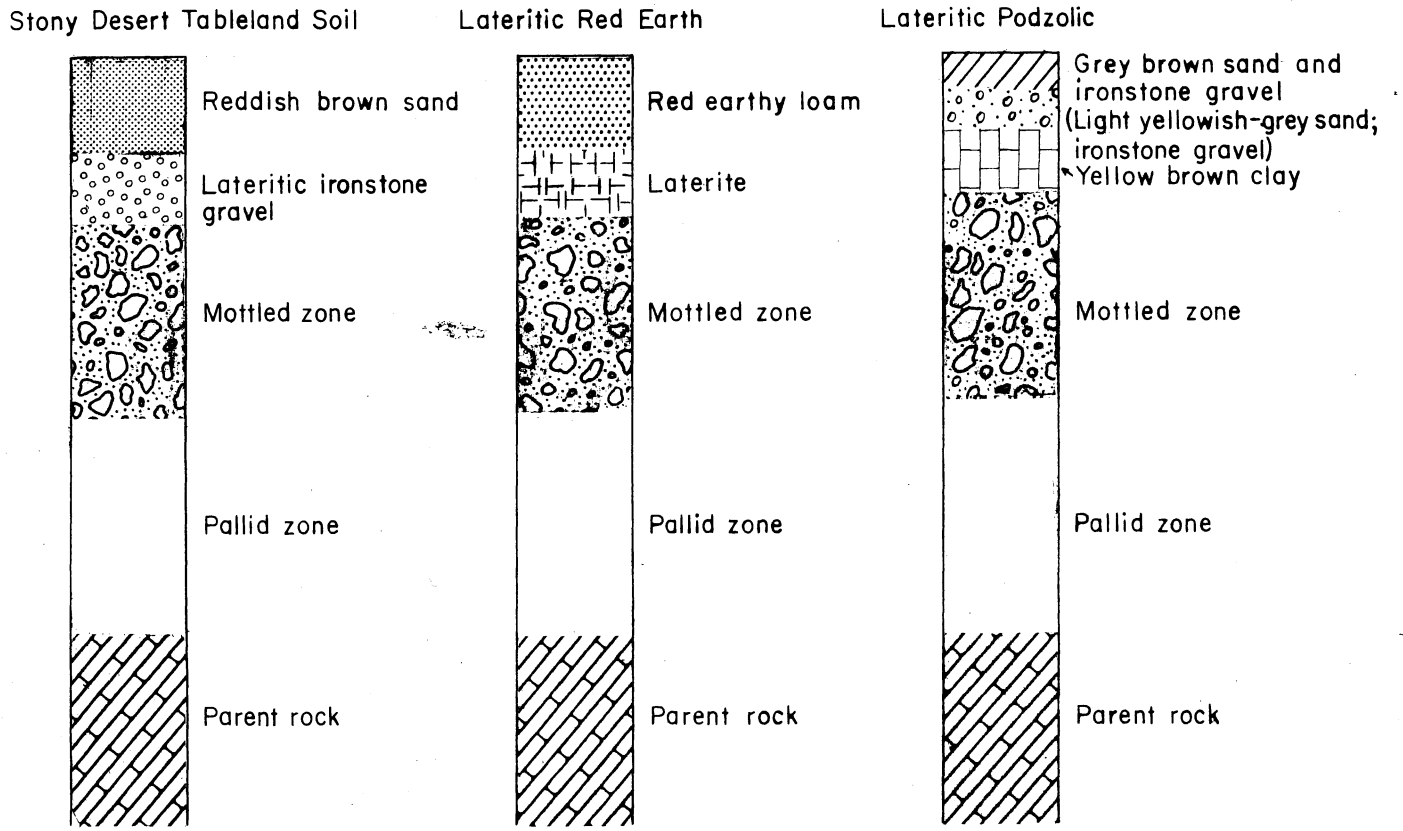
* The first number refers to Transactions volume, the second to the number of the papers in the volume. Papers are listed in this way in each volume index.

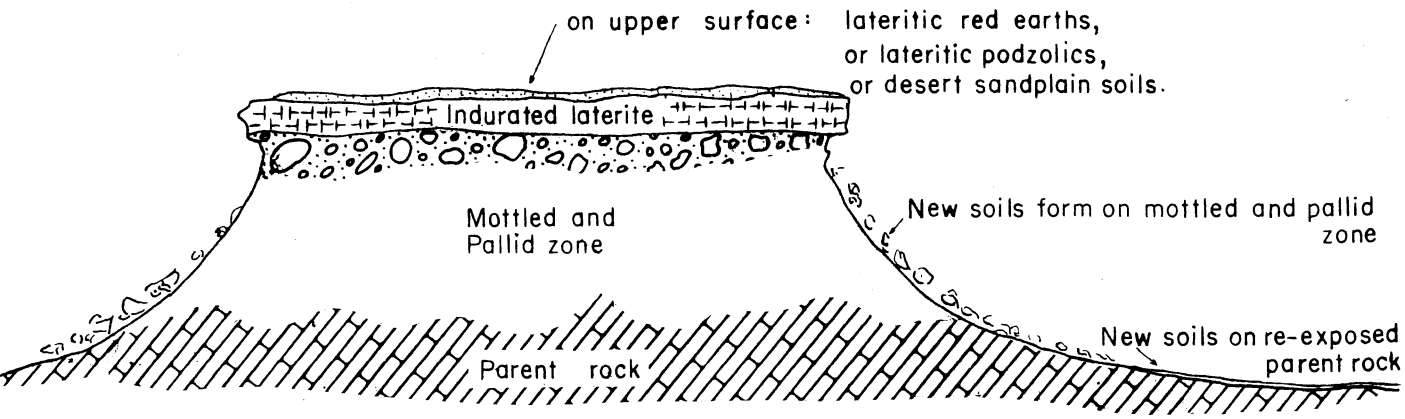
SOILS AND LATERITE

(after C.S.I.R.O. Division of Soils)

(A) TYPICAL PROFILES



(B) MESA CAPPINGS



3. Laterites: Two papers, 4/16 and 30, provoked little discussion. A number of tours included examination of laterites and silcretes (e.g. see tour 11 below). Fig. 1 is a copy of part of a display by Soils Division, C.S.I.R.O., in the exhibition at John Martin's Auditorium.

4. Geomorphology is important in various approaches to soil age and stratigraphy. These included mathematical hillslope models (4/57, 58), control of soil type distribution (4/63 to 67), and development of concepts of ground surfaces (4/14 is a development of earlier work by van Dijk and Butler in the Canberra area), and pedomorphic surfaces (4/60).

5. Groundwater: Origin and translocation of dissolved salts were discussed in papers on weathering. Russian speakers stressed the importance of lateral water movement, both locally and over very long distances, as distinct from vertical movement. Using this approach, they introduced some new ideas about soil formation within a general concept of 'geochemical' landscapes (4/31, 32).

6. Classification: Philosophical discussions on the merits and shortcomings of various schemes are directly applicable to classification problems in geology (4/17 to 19). Statistical methods of classification, using computers, are similar to those which have been considered in geology (4/20 to 22).

No one soil classification scheme has yet gained world-wide acceptance. Three different schemes were in common use at the Congress, two from Australia and one from the U.S.A. Both Australian schemes are used in the 'Handbook of Australian Soils', prepared by the Division of Soils, C.S.I.R.O., and published by Rellim, to commemorate the Congress.

7. Remote sensing: One paper (4/29) dealt with images produced by side-looking K-band radar, a technique of some potential for geological purposes. In discussion the author of the paper emphasized the value for geological interpretation of aerial photography using red and infrared wavelengths, and suggested that separating out the red component of normal colour photos would serve much the same purpose.

In Commissions II and VII genesis, chemistry and mineralogy of clays and micas were dealt with in papers 1/67 and 72, 2/59, 68 and 70 to 73, and 3/1 to 14.

World Soil Map

Commission V also included sessions on the World Soil Map, which is a UNESCO/FAO project. Most of the final draft was on display. The soil units used on the map constitute a proposed classification system derived from systems in use in eight countries, including Australia; the U.S. '7th Approximation' - the final draft of their proposed classification system - has had an important influence on the project.

Discussion was confined to generalities such as the purpose of the map and the most important criteria in the proposed classification system. The rigorous analytical approach to the project reflects the growing pains of soil science. Although many of the fundamental principles adopted for the soil map are often taken for granted by map compilers, the project has resulted in a framework of concepts useful for planning the compilation of geological maps (e.g., papers 4/17 to 19).

Tour F - coastal areas south of Adelaide

(Tour leader W.T. Ward, Division of Soils, C.S.I.R.O. Details covered by C.S.I.R.O. Soil Publication No. 23, by Ward; by a booklet prepared for the tour, now in the B.M.R. library; and by Kodachromes of sites described in the booklet. The Kodachromes are now in the B.M.R. Operations Branch collection).

The Introduction in the booklet states that Tour F was planned to show 'the geomorphic relationship of the soils of the area to former eustatic shoreline features and aeolian materials superimposed thereon'. For the geologist the tour illustrated how soils can provide data on Cainozoic geological history. In particular, the soils in the area supply evidence of the interplay of eustatic and tectonic processes. Ward claims that the abandoned shore-line features and related soils demonstrated during the tour have not been affected by tectonism, although Pleistocene faulting occurred farther to the south.

Tour 11 - Adelaide to Darwin

(Tour leaders: R. Wetselaar, Division of Land Research, and R.W. Jessup, Division of Soils, C.S.I.R.O. Tour booklets have been deposited in the B.M.R. library, and Kodachromes in the Operations Branch collection).

The tour was planned to cover soils of the southern and central arid zones and the monsoon zone of Australia. Laterite and lateritic soils are important in all three zones, and silcrete in the first two. Groups of soils were examined in three areas: Whyalla-Port Augusta, Alice Springs and Darwin.

In the Whyalla area time control of soil stratigraphy is given by basal lateritic and silcrete profiles, and abandoned beaches related by Jessup to eustatic changes of sea level in the Pleistocene; soil evidence suggests that no tectonic movements occurred during the late part of this epoch (see paper 4/67). In the middle of the (soil) stratigraphic sequence a gypseous profile occurs both on plateau tops and in valleys. Jessup contends that the only mechanism which will explain such a distribution of gypsum is aeolian deposition. If this is true, then here is an example of a geological event best established by soil evidence. Jessup's interpretation of the detailed

stratigraphy of the soils of the area depends greatly on physical, chemical and mineralogical analyses by which the presence and distribution of clays and elements were determined.

Around Alice Springs the soils examined have developed in two environments, the depositional domain of the Burt Plain to the north, and the dissected silcrete landscape between Alice Springs and Kulgera to the south. On the Burt Plain lateritic profiles are preserved more or less unaltered beneath soils developed on alluvial and colluvial material derived from the flanking hills; towards Kulgera silcrete remains only as mesa cappings. Buried laterite, sparsely exposed as inliers surrounded by young soils, poses a mapping problem: it is desirable that laterite or silcrete inliers should be distinguishable on the map from mesa top outliers so that an unambiguous sequence of geological events can be deduced.

Lateritic profiles in the Darwin area have been modified by weathering processes in the monsoonal zone. The profile in the cliffs at Nightcliff has a relatively soft 'laterite' horizon. The soil in the Forestry experimental plantation near Darwin is described as 'red earth on laterite', the 'laterite' being hard but mottled; micromorphological studies suggest that it has developed by weathering of an older lateritic profile. In the case of a lateritic yellow earth near Noonamah, it is concluded as a result of micromorphological studies, that the parent material for the soil above the laterite horizon has been transported.

Evidence such as this is essential for working out the Cainozoic geological history of the area and may be the only means of recognising Cainozoic structures.

General comments on Congress and tours

In general the value of any soils symposium to geologists lies in the soil scientists' approach to the geological processes of weathering, erosion and deposition, and to Cainozoic geology. In particular this Congress and tours, as has been shown, provided ideas of use to the geologist in the field and for interpretation, especially for surveys of young sedimentary basins.

A major problem for the geologist is the recognition of soil parent material (rock in situ or transported detritus). The tours highlighted the value of physical, chemical, mineralogical and micromorphological analyses of soils in dealing with the problem, techniques which are beyond the scope of the geologist. However, soil profile development as a weathering process and as palaeogeographic evidence does concern the geologist; formal training and further opportunities to attend symposia on soils are desirable.

The organisation of the Congress was praised by many overseas delegates, and there were no noticeable flaws or omissions. It set an unenviable precedent for the 10th Congress, to be held in Moscow in 1974.