



# book review

HORIZON NOTATION FOR NEW ZEALAND SOILS by B. Clayden and A.E.Hewitt  
 Division of Land and Soil Sciences Scientific Report 1. 30 p. \$6.00  
 reviewed by David Lowe, Department of Earth Sciences, University of Waikato

As an apprentice pedologist, I participated in the North Island Tour associated with the International "Soils with Variable Charge Conference" in February, 1981. Several events stand out in my memory from then: (1) the meticulous and methodical way in which Dr Jim Pollock introduced each soil profile to the tour party (we first looked at the soil stratigraphy from the bottom up, then the soil horizon properties and their interpretation from the top down); (2) verbal fisticuffs between the late Professor Harry Gibbs and the late Dr Mike Leamy regarding the priority of 'Soil Taxonomy' vs Taylor & Pohlen's 'New Zealand Classification'; and (3) a quietly-spoken Englishman who, apart from recounting stories including one about a tour coach that was transformed into a bus, had a persistent habit of asking palpably simple yet unanswerable questions. It has taken nearly ten years, but many of the questions have now been answered with the publication of *Horizon Notation for New Zealand Soils* by the person who exposed them, Mr Ben Clayden, of the Division of Land and Soil Sciences, and his co-author, Dr Allan Hewitt, the chief architect of the new New Zealand Soil Classification (Hewitt 1989).

The new system for horizon notation is intimately related to the development of the new New Zealand Soil Classification, as noted six years ago by Hewitt (1984) in a paper on its early development (p. 224): "FAO horizon nomenclature is used as a basis, with additions and refinements as necessary. *We must define as we go.*" (Italics added). Since then, Clayden & Hewitt have gone one step further and abandoned the FAO horizon designations for mineral horizons adopted by the New Zealand Soil Bureau in 1978 because (Clayden & Hewitt 1989, p. 5) "Experience ... has shown that the [FAO] designations for mineral horizons are not adequately defined for consistent application and that there is insufficient guidance on approved combinations of symbols. The requirement for additional designations has also become apparent." The need for the new system of horizon notation was also justified in an excellent article by Clayden & Hewitt (1990), and the authors are to be commended for publishing in full their reasons for its development. The proposed system is based primarily on that of Avery (1980), which is used by the Soil Survey and Land Research Centre (formerly Soil Survey of England and Wales).

The new system of horizon nomenclature is presented in a pocket-sized (23 cm x 10 cm), plastic-covered booklet clearly intended to facilitate its use in the field. After an introductory section providing the rationale behind the new system, the horizon notation, divided into subsections describing organic horizons and mineral horizons, is presented. Definitions of each of the allowable master horizons and associated suffixes (e.g. Oh, Ap, Er, Bs, Cu(g), R horizons) take up about half of the total pages in the booklet. A series of notes and footnotes provide further explanation for potentially 'sticky' points. An important change is the omission of the G symbol (Taylor & Pohlen 1962) for intensely gleyed horizons, these now being described as, for example, Br (intensely gleyed) or Bg (strongly gleyed) horizons. One commendable innovation is the attempt to distinguish between horizons affected by (perched) surface water, designated Bgp, and those affected by ground water, designated Bgg, for example. Such a distinction should help student understanding of soil-forming processes. Another modification is that the C horizon, defined as an unconsolidated or weakly consolidated mineral horizon that is little affected by pedogenic processes, and lacking properties of an A, E, or B horizon, may be either like or *unlike* the material from which the solum presumably formed. (Italics added). This means the abandonment of the D layer of Taylor & Pohlen (1962). It is important to realise that the authors have given specific definitions of the letter combinations used to label the most commonly occurring horizons (further emphasised in Clayden & Hewitt 1990).

Additional lower case suffixes may be added to these designations to provide more specific information about an horizon (e.g., a Bg horizon containing more than 5% by volume of concretions is designated Bgc), as outlined in the third section in the booklet. Conventions for the use of all letter suffixes (some suffixes are not allowed to be used together in combination e.g., h, s, t, w), transitional horizons, the use of figure suffixes for vertical subdivision (e.g., Btg<sub>2</sub> horizon), lithological discontinuities, buried horizons (indicated by the prefix 'b'), and the novel use of the prime conclude the main text of the booklet. A good feature of each of these sections is the use of examples to illustrate the intended specific use. The sections on lithological discontinuities, indicated by arabic number prefixes, and buried

horizons (denoted by the prefix 'b'), are potentially helpful because, in my experience, students commonly have difficulties in conceiving, let alone describing, soils with horizons superimposed on thinly layered materials of differing origins and age (e.g., soils formed on thinly bedded tephra deposits). However, the example on p. 26 of a sequence containing both buried soils and lithological discontinuities is quite complicated and is difficult to follow. An actual example with named lithologies and associated paleosols would help the reader. Also, the authors indicate (p. 25) that it is not intended to distinguish by horizon notation similar materials of different age, as commonly found in sequences of tephra or loess, with a new arabic prefix number. This is presumably an attempt to keep potentially complex profile descriptions as simple as possible, but in some cases may contradict the stated main aim of recognising lithological differences: "to draw attention to inherited layering that can significantly influence physical properties"; and may also leave out information useful for parallel studies on soil stratigraphy. The prime is used where horizons with identical properties are repeated in the profile (forming a bisequal profile), the lower of the two horizons being marked with a prime accent e.g., A, E, Bt, E', Btx, C. The advantages of such a designation are not entirely clear.

After a page of references, a quick-reference check list of defined horizons and additional suffixes forms a useful concluding index.

All in all, this publication is timely and appropriate as the first scientific report of the newly-established Division of Land and Soil Sciences. The booklet, while perhaps not being riveting bed-time reading (I did try it out one evening) is concisely written, and I have no doubt that the authors sweated over each and every word. It should be well received by most despite the necessity to learn a new system its arrival imposes, and, at \$6.00 including GST and postage, it's a snip.

Its use will be enhanced with the publication of the revision of the soil description method (Milne *et al.* in

press), the long-awaited successor to the remarkably resilient and reliable *Soil Survey Method* (Taylor & Pohlen 1962). For example, some of the terms used in the notation booklet, such as 'polyhedral' and 'apedal' are not widely known outside the Division of Land and Soil Sciences. Together with the new *New Zealand Soil Classification*, due out in its quasi-final form later this year, these publications look set to propel us into the 1990s and beyond, and to perhaps help answer more questions, both simple and complex, about the beloved soils of New Zealand.

## References

Avery, B.W. 1980: Soil classification for England and Wales (higher categories). *Soil Survey Technical Monograph 14*. Rothamsted Experimental Station, Harpenden. 67 p.

Clayden, B.; Hewitt, A.E. 1989: Horizon notation for New Zealand soils. *Division of Land and Soil Sciences Scientific Report 1*. 30 p.

Clayden, B.; Hewitt, A.E. 1990: Why another system of horizon notation? *New Zealand Soil News 38*: 18-21.

FAO-Unesco 1974: Soil map of the world. 1:5,000,000. Vol. 1. Legend. Unesco, Paris.

Hewitt, A.E. 1984: The NZ soil classification: Taylor's patch reworked. *New Zealand Soil News 32*: 220-229.

Hewitt, A.E. 1989: New Zealand soil classification (Version 2.0). *Division of Land and Soil Sciences Technical Record DN2*.

Milne, J.D.G.; Clayden, B.; Singleton, P.L.; Wilson, A.D. in press: Soil description handbook. *Division of Land and Soil Sciences Scientific Report*.

Taylor, N.H.; Pohlen, I.J. 1962: Soil survey method. A New Zealand handbook for the field study of soils. *N.Z. Soil Bureau Bulletin 25*. 242 p.

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