different kinds of deposits (for example, contemporary marine deposits, sediments of springs, etc.) according to the change in the content of radium or elements of the thorium group in separate layers of these deposits.

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[1] L. M. Kurbatov, NATURE, 136, 871, Nov. 30, 1935.
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[3] L. M. Kurbatov, ibid.

Normal Erosion as a Factor in Soil Profile Development

AMONG the factors concerned in the development of soil profiles, erosion has, until recently, received comparatively little attention. I venture to direct attention to two possible examples of the influence of normal erosion, as distinct from catastrophic erosion, on the course of profile development.

(1) Studies in North Wales and elsewhere have shown the occurrence of soil profiles which may be described as 'truncated', that is, profiles in which the surface soil resembles the sub-surface or B-horizon material of developed podsol profiles in possessing a sesquioxidic type of clay fraction. I was formerly disposed to attribute their origin to removal of the siliceous A-horizon by erosion consequent on deforestation and cultivation[1]. Further consideration of the problem, however, suggests that it is not necessary to postulate catastrophic erosion to account for such profiles.

Whilst such erosion may have occurred in past centuries, and is known to occur in certain regions, for example, in the United States, at the present day, it seems possible that normal erosion could account for the observed facts. Such slow erosion will affect principally the immediate surface soil, which, under the humid conditions of western Britain, tends to be more siliceous in character than the underlying soil. The steady removal of material more siliceous than the body of the soil profile, operating over centuries, must result in a relative enrichment of the residual material in sesquioxides.

The actual profile will represent a balance between the podsolising process, resulting in the development of an A-horizon impoverished in sesquioxides, and the process whereby this relatively siliceous horizon is removed. Truncated soils of a sesquioxidic character are found most commonly in regions of strong relief. In Wales, they are characteristic of the foothills. They are less common at high altitudes, where, it may be presumed, podsolisation keeps pace with erosion.

The suggestion may be hazarded that a similar process has operated in the formation of the sesquioxidic soils of humid tropical regions.

(2) A second example of the possible effect of normal erosion may be seen in soil profiles developed in clay formations such as the Gault and the Keuper Marl. Almost invariably, the surface soil shows a more sandy texture than the subsoil. This has been ascribed to the presence of sandy wash of external origin or, alternatively, to mechanical eluviation within the profile. In the latter case, a horizon of maximum clay accumulation would be expected, whereas normally there is a steady increase in the clay content down the profile.

While either or both of the above two causes may produce the observed differences in texture between surface and subsoil, I would suggest that normal erosion, involving lateral removal of the finer fractions, is generally a sufficient explanation of the observed facts. Such removal might take place along the surface of the soil itself or along the surface of a water table. In either case, the result would be to produce a surface horizon relatively richer in the coarser fractions than the parent material. The effect would be more pronounced under arable or partially arable conditions than under a permanent closed cover of vegetation.

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Bangor. May 12.

[1] G. W. Robinson, *J. Agric. Sci.*, 20, 618 (1930).

Cohesion of Alkali Metals

IN two recent papers[1] I have developed a statistical method for calculating the cohesion of the alkali metals. The density of the metal electrons in the lattice has been supposed to be constant. As cohesion energies, the following have been taken into account: the electrostatic energy of the metal electrons with respect to the simply charged ions, the exchange energy of the metal electrons and the correlation energy of the metal electrons with antiparallel spins as calculated according to Prof. E. Wigner and Dr. F. Seitz[2]. As causing repulsive forces, the electrostatic energy, the zero-point energy of the metal electrons and the energy resulting from their penetration into the electron clouds of the ions have been taken into account. The repulsive forces between the ions are also taken into consideration.

The method applied to the calculation of the heat of evaporation of potassium, rubidium and cæsium gives the following results[3]:

		K	Rb	Cs
Heat of evaporation	Calc.	21 kcal./mol.	18 kcal./mol.	18 kcal./mol.
	Observed	26·5 kcal./mol.	25·0 kcal./mol.	24·0 kcal./mol.

Calculated values of the lattice energy and of the lattice constant are also in good agreement with experimental values. All these results were obtained without assuming empirical parameters.

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April 3.

[1] P. Gombás, *Z. Phys.*, 94, 473 (1935); 95, 687 (1935).
[2] E. Wigner and F. Seitz, *Phys. Rev.*, (2), 46, 509 (1934). E. Wigner, *Phys. Rev.*, (2), 46, 1002 (1934).
[3] A detailed paper will appear in the *Zeitschrift für Physik.*

Stresses in a Rotating Disk

THE stresses set up in a rotating disk appear first to have been considered by Maxwell[1], and the solution adopted by many engineering text-books[2] shows that an axial hole, however small, halves the strength of the disk. This result, which is repugnant to physical intuition, does not appear to have been tested experimentally. During the design of an ultra-centrifuge[3] to be used for separating isotopes, we had to investigate the effect of a small axial hole on the bursting speed of the rotor, and it is interesting to compare our results with the above theory.