While there are manifestly many kinds of overlapping, acquaintance with the present group of retired professors reveals three general classes: (1) those who for reasons of health or other circumstances seek rest and recreation, and welcome freedom from academic activities; (2) those who have an urge to teach, lecture or engage in other special activities on their own initiative; (3) those in good health who are endowed with a zeal for creative work and are entitled to the best facilities for research and writing. For the first group, the retirement is welcome and they should be encouraged to enjoy their earned freedom from academic work. Those of the second group usually have good connections and can transfer to another institution for a year or more of teaching or lecturing under the title of visiting professor or they may engage in other special activities and services, vocational or avocational. It is with the third group that we are here primarily concerned.

In view of the present tendency for the stipulation of retirement plans to deprive these scholars of the privileges and responsibilities for continuity in well-established research projects and for delving into new ventures which are the outgrowth of these in their home institutions, there is urgent need of new concepts and agencies to meet this relatively new situation. A key to the new vantage ground might take the form of a formal implementing of the term "visiting research professor." This should unlock the door to great opportunities by promoting migration as well as by encouraging new devices for the development of a new status in the home institution.

Here it should be observed that the underlying policy of retirement plans, providing for the stepping aside of the old professors to give full sway and responsibility to younger men, is a sound policy and should be mutually advantageous. The adoption of standard retirement plans is a comparatively new venture in higher education and is a blessing to many a retired professor in so far as the bread-and-butter issue is concerned, but in many cases the financial provision is not the primary need of an able professor. He needs access to laboratories, libraries, research institutions, field projects and other forms of public and private highly technical service. He needs time and facilities for productive writing. In many cases he needs and can command very substantial additions or substitutions for his retirement allowance. He needs facilitation of inter-institutional migration and travel. He needs a well-earned and highly honored academic or professional status.

Who, then, needs all these things, of which the pension allowance is but a trifle? It is the professors in this third group, whether they come from small colleges or great universities, who may be at critical points of bringing to rich fruitage the seeds they have sown and cultivated in their professional careers. Their skill and professional proficiency in learned careers may have earned them encores, so that they may now take bows and play extra numbers in service to mankind.

We now have the well-established rungs on the academic ladder in America—the preschool and kindergarten, primary, elementary, secondary, junior college, standard college and graduate school. Now on top of this towering ladder let us put a capstone, the status of visiting research professor. Let universities and industrial and professional institutions enrich themselves by a hearty recognition of their successful sponsoring at this highest level of higher education, let educators announce to their constituency that there is such a new field of operation and encourage them for self-orientation in preparation for this highest venture, and let presidents and directors of higher institutions proceed in an aggressive policy for cooperation and self-help in the promotion of this policy.

The foundations have been contributors to this interest and there is increasing room for their initiative in opening new fields by priming policies and for sustaining activities. The rapidly developing interest in pure and applied science in industry opens new vistas for a short period of employment of retired professors recognized as specialists and authorities in their respective fields. The post-war demand for applied learning in laying foundations for a new world order and a new type of social and political cooperation and organization makes serious demands upon ripe scholarship in concentrated service. The positions open may not be called professorships, but they will have the equivalent academic status in the learned world.

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GEOMORPHIC SIGNIFICANCE OF VALLEYS AND PARKS OF THE KAIBAB AND COCONINO PLATEAUS, ARIZONA

A LATE-TERTIARY peneplane in the Grand Canyon district has been postulated by C. E. Dutton,[1] W. M. Davis,[2] Douglas Johnson[3] and H. H. Robinson.[4] Davis discussed several lines of evidence for the existence of this peneplane, which he considered to have closed the "plateau cycle" of erosion, or "great denu-

[1] C. E. Dutton, *U. S. Geol. Survey, Monograph II*, 1882.
[2] W. M. Davis, *Bull. Mus. Comp. Zool.*, 38: 107–201, 1901.
[3] Douglas Johnson, *Proc. Boston Soc. Nat. Hist.*, 34: 135–161, 1909.
[4] H. H. Robinson, *Am. Jour. Sci.*, 34: 109–129, 1907; *Jour. Geol.*, 18: 742–763, 1910.

dation," and to have preceded the present canyon-cutting cycle. Much importance was attached to the form of valleys on the Kaibab and Coconino Plateaus. In contrast to the deep, narrow canyons of the Colorado River and its immediate tributaries, valleys on the plateau summits are generally shallow and open, which led Davis to conclude that they represent mature valley forms remaining from the earlier cycle. Robinson employed similar evidence to support a hypothesis of peneplanation in the San Francisco Plateau farther south.

Field study of the valleys and park-like depressions of the Kaibab and Coconino Plateaus by the writer has revealed facts that are incompatible with the two-cycle hypothesis but seem to be the normal consequences of a continuous erosion cycle. The entire area is underlain by the Permian Kaibab and Toroweap limestones. The valleys are of three distinct types, each closely related to a zone of climate and vegetation determined primarily by altitude. The lower flanks of the plateaus, in the semi-arid pinyon-juniper woodland zone below 7,000 feet,[5] have young canyons being actively degraded by intermittent streams. The western yellow pine zone, 7,000 to 8,000 feet, has steep-walled, flat-floored valleys, lacking surface stream channels; fans of slope-wash are built out across the valleys and the valley fill likewise consists of locally derived slope-wash. The Douglas fir zone, above 8,000 feet on the Kaibab Plateau, has a cool, humid climate supporting dense forests of fir, spruce, pine and aspen; valley walls and floors are thickly mantled by slope-wash and rock outcrops are largely concealed; abundant sinkholes occupy both the valley floors and the interstream areas; surface streams are virtually absent and valley bottoms are often undulating, reversing the normal down-valley slope.

A hypothesis of valley abandonment due to the increasing effects of limestone solution at higher elevations adequately explains the above facts. Valleys initially carved by vigorous, youthful streams were deserted as underground drainage dismembered the surface streams. Valleys fell into decay, accumulating a mantle of slope-wash, and were carved by sinks. At progressively lower and drier levels, the effects of solution rapidly diminish, and in the semi-arid pinyon-juniper and lower climatic zones intermittent surface streams continue to incise the valleys.

Davis, Johnson and Robinson considered the contrast between valleys at higher and lower elevations as the result of two erosion cycles. This hypothesis seems unsatisfactory because it fails to explain the close correlation of the three-fold classification of valleys with zones of climate and vegetation. Moreover, it does not consider the abundant features of limestone solution and the absence of stream channels in the waste-choked valleys.

Parks of the Kaibab Plateau are elongate closed depressions forming a north-south trending chain coinciding closely with the structural crest of the Kaibab arch. They may have originated as valleys of longitudinal subsequent streams formed while the resistant Kaibab limestone of the arch was being stripped of its Mesozoic cover, or as subsequent valleys along a series of minor fault lines. Development of underground drainage resulted in diversion of the surface streams, and the valleys became enlarged and deepened into the present solution basins.

If the hypothesis of valley development controlled by limestone solution is accepted in place of the explanation offered by Davis, one of the major lines of evidence for the plateau cycle or great denudation, closing in the development of a widespread peneplane, must be discarded. The results of the writer's study are, therefore, of critical significance in the geomorphic history of the entire Grand Canyon district.

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SCIENTIFIC BOOKS

TEXT-BOOKS OF PHYSICS

Student's Handbook of Elementary Physics. By ROBERT BRUCE LINDSAY. xv + 382 pp. The Dryden Press, Inc. 1943. $2.25.

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[5] G. A. Pearson, *U. S. Dept. Agr., Tech. Bull.*, 247: 5–14, 1931.