sent without danger of carrying plant diseases or insect pests.

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VALLEY-FILL OF ARID INTERMONT PLAINS

UNFAILING tendency too broadly to generalize from a new-found principle is nowhere better shown than in the instance of ascribed origin of the wide intermont plains of the Great Basin in particular and in general of all desert tracts of the globe. So graphic are the descriptions of Basin Range features given by the various members of the famous Fortieth Parallel Survey that even after the elapse of half a century they continue to hold first place with scarcely a question concerning the accuracy of their genetic foundation.

One statement of the late Professor I. C. Russell furnishes the keynote to the whole problem. He speaks of the mountains of Nevada being "buried up to their shoulders in the débris of their own substances." As a corollary he ascribes enormous depths of 2,000 to 3,000 feet to the valley-fill between the various basin ranges. Russell's observations, as well as those of others, are mainly impressions gained on hurried reconnaissances through the region; and the statements made at the time really had little to substantiate them. The conceptions which they represent are in the extreme brilliant and suggestive. For this very reason it is that they go so long unchallenged.

Singularly enough one of Russell's most typical examples of buried mountains, and one oftenest cited as around which the valley-fill is thickest, is a district wherein subsequent investigation conclusively shows the valleys or intermont plains to have rock-floors. In these valleys the strata of the bed-rock are flexed and tilted often to a vertical attitude. The planed surface coincides nearly with the present ground surface. The wash or valley-fill is almost nil. To be sure there may be some instances in which there is a valley filling that has greater or less depth; but in many cases the broad intermont basin has a very pronounced rock-floor and the thickness of regolith or soil mantle is inappreciable.

Other critical data now exist that bear directly upon the extent of the valley-filling. The larger number of deep drill-holes, which have been put down in the desert regions of the west during recent years, furnish some very conclusive evidence touching the points under consideration. Of course well-logs, as a rule, are notoriously fanciful and, without proper checks, can not be implicitly relied upon. Yet many such records are adduced as proving the great depth of valley-fillings.

In a number of cases, which are really test-cases, depths of 2,000 to 3,000 feet are reported as being entirely in wash material. These statements are even presented in scientific literature. In one instance, in which soft Eocene clays and sands were dipping at an angle of 70 degrees, the drill is reported as having penetrated nearly 2,500 feet of wash débris without passing through it. In another case, that of the Santa Cruz Valley, near Tucson, Arizona, the valley-fill was said to be over 2,000 feet thick as shown by the drill; yet the late W J McGee found bed-rock near-by covered only by a few inches of soil.

One of the latest cases of this kind is the interpretation of deep-drill records in the Hueco (Tularosa) bolson in southern New Mexico. Drill-logs of more than 2,000 feet are given as evidence in support of the contention of the great depth of valley-fill. As a matter of fact, and as the records themselves clearly indicate, the beds passed through by the drill are the very red-beds that overlie the Carboniferous limestones of the region, and that one would expect first to encounter a short distance beneath the surface of the desert at those points. Abundant other data from this locality point rather conclusively to the fact that this so-called valley-fill is mainly not wash débris at all but typical soft red-beds. This seems to be another instance of forcing facts to fit theory.

What is still greatly needed in these desert investigations is further critical evidence bearing upon the geological date of the formation of the so-called Basin Range structures.

Until this is forthcoming from those travelers and explorers who are now working in this especial field the Basin Range hypothesis shall have to be considered as holding a place among those hypotheses yet unproven, and as an assumption of very doubtful utility.

CHARLES KEYES

SCIENTIFIC BOOKS

Mechanism, Life and Personality. By J. S. HALDANE. New York, Dutton. 1914. Pp. viii + 139. Price, $1.00.

I

Dr. J. S. Haldane has long been known as a philosophical physiologist. Indeed it is now for more than three decades that he has occasionally relieved the labors of an orthodox and eminent scientific investigator with the pleasures of idealistic metaphysics. At length he has constructed his philosophy of biology into a little book, "Mechanism, Life and Personality," which he offers as a contribution towards "bringing the great biological movement of the nineteenth century into definite relation with the main stream of human thought."

The first half of this book is devoted to an examination of "the hypothesis that living organisms may be regarded as conscious or unconscious physical and chemical mechanisms, and can be satisfactorily investigated from this standpoint." Such is Haldane's statement of the mechanistic theory of life. Many considerations favor such a theory. Chemical analysis reveals no mysterious substances or reactions within the body, general physiology and the study of metabolism reveal no mysterious forms or manifestations of energy, and to all appearances the laws of the conservation of matter and the conservation of energy there hold. Consciousness, to be sure, is a difficulty, but, at any rate, consciousness seems not to interfere with the operation of any law of physics or of chemistry. Moreover, when once we have commenced the analysis of organisms, whether physically or chemically, we find no structure but physical and chemical structure, no activity but physical and chemical activity.

Historically too there is much to justify the mechanistic view, for "the history of physiology displays uninterrupted progress in the successful application of physical and chemical methods to physiological problems."

In the manifold and inconceivably intricate phenomena of organic regulations the mechanist has found serious difficulties. But in the course of time, as the mechanistic nature of nervous control, of the action of hormones, and of similar phenomena were discovered, this difficulty has grown less. Again the very existence of such marvellous physical and chemical structures as living things once seemed mechanistically quite inexplicable. But when Darwin conceived the principle of natural selection this difficulty was removed.

In his zeal to do full justice to the mechanistic theory Haldane even goes so far as to declare that it is possible to imagine how life may have originated. This is perhaps too much, for I suspect that some chemists would still prefer the first chapter of Genesis to the mechanist's guesses upon the subject.

As for the traditional opponents of the mechanistic view, the vitalists and the animists, their theories have ever been sterile. Occasionally encouraged by the collapse of one or another mechanistic theory, their own efforts have nevertheless ended in mere words, for "the apparent autonomous selective action of the organism turns out to be causally dependent in every detail on physical and chemical conditions." Therefore the action of any possible vital principle must be determined by these conditions.

Further the vitalistic theory implies "a definite breach in the fundamental law of the conservation of energy" (according to Driesch not in the first but in the second law of thermodynamics). Moreover the vitalistic agency is itself "entirely unintelligible."

On the other hand, even if the position of the vitalists and animists is entirely unsatisfactory, that does not establish the justice of the mechanistic theory. We must not forget that a living thing never does *seem* to be a mechanism, especially to those who know it well and study it as a whole, that is as a real *organism*. In particular to identify stimulus and response with physical and chemical causation, a belief