plain heredity. Darwin's theory of pangenesis has been pushed aside as a cumbrous impossibility, or at least improbability. Even the modified theories of De Vries and others are only tolerated. Weismann's view, that the chromatic substance is the bearer of heredity, has nearly everything to be said in favor of it, if it be accepted that this substance is found in every living cell. But even then, according to the Neo-Darwinian, it has only a very remote connection with the somatic micellæ. Before resuggesting what has seemed to me a good position that explains details of structure, I may be allowed perhaps to become one more of the number of those who have attempted to rehabilitate Darwin's pangenesis hypothesis.

The wandering of his gemmules to and from definite positions has seemed cumbrous and unlikely, but the most fundamental law of plant and animal physiology is circulation, metabolism and ultimate assimilation as the physiological groundwork of life, growth and heredity. On the plant side physiologists have only realized within the past quarter-century how potent and generally present are ferments of diverse composition and action. Thanks to the labors of Green, Chittenden and others, we further know that highly complex nitrogenous compounds are readily converted from solid into liquid form, and can migrate, in an as yet often mysterious manner, to definite centers of nutrition to be again converted into solids. So far as my knowledge of physics and chemistry leads me, there is no obstacle to our admitting that transfers of complex dissolved materials are passing to the protoplasm, and through it to the chromatin of every cell, more or less affecting its micellar structure. It is necessary, therefore, to learn what relation, if any, exists between the chromatic and plasmatic substance of cells.

In such plants as *Spirogyra* and *Dionœa* I regard the chromatic substance as being demonstrably continuous from the nucleolus through the nucleoplasm to the cytoplasm, where connections are made with the chromatic center of each chloroplast. The so-called pyrenoid-centers in *Spirogyra* behave to stains and reagents as does typical chromatin substance, while radiating chromatic threads pass from them to the nuclear chromatin. Furthermore, in *Spirogyra* an extremely fine chromatic thread-work joins the pyrenoid centers in it transversely or obliquely. What the finer invisible terminations of it in the protoplasm may be, we cannot say, but it appears to me that, if physico-chemical laws are not to be thrown aside, it is a necessity of the case that the delicate chromatic endings in the protoplasm are being acted on, and more or less modified according to the nature of the stimuli that travel to them. As a result of this, a slow, steady but appreciable modification will be effected in the reproductive cells which epitomize the molecular structure of the entire organism that produces them.

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CURRENT NOTES ON PHYSIOGRAPHY.

UPLANDS AND VALLEYS OF KANSAS.

THE second volume of the University Geological Survey of Kansas concerns the western part of the State, occupied by Cretaceous and Tertiary formations. The physiographic matter is contributed by Haworth; the geological descriptions by Prosser and Logan. The Tertiary lies unconformably on the broadly eroded Cretaceous. The surface of the latter, north of the Arkansas and west of the paleozoic area, presents three ragged east-facing escarpments of moderate height at the margins of the Dakota sandstone, Benton limestone and Fort Hays limestone, with intervening plains gradually ascending west-

ward. The Tertiary, mostly composed of sands and gravels, hundreds of feet in thickness, derived from the Rocky mountains, is explained chiefly as river wash, and not as a lacustrine deposit. Its eastward margin is marked by an irregular escarpment formed on the 'mortar beds' (sand or gravel with calcareous cement). Its general surface, away from the river valleys, is broadly even. Faint depressions or swales occur, holding water for a month or so in the year; they are ascribed to unequal settling of the strata, followed by underground leaching. A further stage of this process is seen in the 'arroyos,' slight depressions of the surface with continuous descent, like stream channels, but broad, grassy and flat, with low bluff-like rims up to their very heads.

The uplands with their escarpments are much dissected by the rivers, giving local relief of 250 or 300 feet, and a greater variety of scenery than is commonly associated with the Great Plains; yet it seems something of an exaggeration to say of this treeless region that "near any of the drainage streams one almost invariably finds a varied and pleasing landscape which in many respects is rarely surpassed in America." Even some of the larger rivers are of inconstant flow; for example, the Cimarron river 'has water in it throughout the greater part of the year in most of its course.' Bear and White Woman creeks, one south, the other north of the Arkansas, enter the State from Colorado in well-cut valleys, and after heavy rains possess a large volume of water with much sediment; but their valley sides decrease in height down stream, and at last the waters and sediments are spread out on the even uplands or lost in the sand hills, without joining any other river. Smoky Hill river is working on bed rock for much of its course; but the Arkansas has heavily aggraded its valley. The report is illustrated with a number of photographs, whose value would have been greater had they been taken when possible from higher points of view. The last of a number of plates gives a bird's-eye view of the State, with geological areas, rivers, and county boundaries marked on the surface and vertical sections on the margin, of much service in elucidating the text.

BELL ON CANADIAN RIVERS.

Robert Bell, of the Canadian Geological Survey, discusses the 'Evidences of northeasterly differential rising of the land along Bell river' (Bull. Geol. Soc. Amer., VIII., 1897, 241–250), which flows northward from the upper Ottawa to Hudson Bay. Good proof is given that the upper Ottawa crossed the present height of land in postglacial time and followed the Bell; and that its diversion to the St. Lawrence is due to a rise of the land in the north or northeast still in progress. Some of the ragged expansions of the rivers, forming lakes, which are commonly explained as the result of drift barriers, are ascribed by Bell to backwater flooding in consequence of the tilting of the land. The small relief of the region and the low divides between the rivers, combined with the resistant character of the ledges where crossed by streams, are all favorable to these results. The Bell river, flowing towards Hudson Bay, has acquired a low-grade course through a clay-covered lowland of till; it is here and there interrupted by rapids on hard ledges. At present the water becomes deeper (even thirty or forty feet), the stream broader, and the banks less defined in going up stream from from one fall to the next; and this is well interpreted as a result of uplift in the north. The out-branching 'lost channels' of various east- or west-flowing rivers are generally found on the south side of the main stream. The Churchill River seems to be on the verge of spilling over south-

ward at Frog portage, 500 miles from its mouth, and running to the Nelson. Altogether, this is a most interesting and valuable contribution to the natural history of rivers.

THE PLATEAU OF WEST VIRGINIA.

A REPORT by M. R. Campbell and W. C. Mendenhall, dealing primarily with the 'Geologic section along the New and Kanawha rivers in West Virginia' (17th Ann. Rep. U. S. G. S., Pt. II., 1896, 479–511), includes a brief account of the physiography of the plateau thereabouts, with a number of excellent illustrations from well selected points of view. The river canyon, for such it truly is in spite of its occurrence east of the 100th meridian, is a full thousand feet deep, with forested walls descending at angles of 35° or 40° to a narrow valley floor. Where the river cuts down upon harder sandstones it has not yet developed a graded channel; elsewhere it has narrow belts of flood plain, now on this side, now on that. The canyon is sharply cut in a Tertiary peneplain that was well smoothed for a number of miles on either side of the river, but further away the upland is interrupted by knobs and ridges that rise distinctly above it. The dissection of the peneplain was permitted by a broad arching uplift late in Eocene time, its present altitude being 2,600 feet near Hinton, but of less amount to the southeast and northwest. The river fortunately maintained its antecedent course across the broad arch, and thus opened the important highway through a region that would otherwise be difficult to traverse. Agriculture has lost much in the conversion of the smooth peneplain into a dissected plateau, but mining has made corresponding gains in the exposure given to numerous coal beds on the valley sides.

CRATER LAKE AND MT. MAZAMA, OREGON.

AN account of Crater Lake, by Diller (Amer. Journ. Sci., III., 1897, 165–172) notes that the Mazamas, a society of mountain-climbers of Portland, met at the lake last summer and gave their name to the vanished cone, now replaced by the superb caldera. So far as I know, this is the first instance of giving a special name to a vanished volcano, although the habit of naming extinct lakes is now common. Besides the evidence from truncated lava beds and headless valleys, which points so unequivocally to the loss of the Mazama cone, Diller adds evidence from glaciation. Not only are there moraines in the valleys two to five miles down from the river, but the topmost rocks of the rim are planed off and striated on the outer slope, while the cliffs turned toward the lake have angular and broken faces. The ice, therefore, came from a higher source than any now present, and, judging by the extent of the glaciation, Mazama was in the glacial period a rival of Shasta and Rainier for the supremacy of the range. It was still active during the presence of the ice; for on the northeastern rim a glaciated lava flow covers two layers of pumice separated by a sheet of rhyolite, and all these lie on an older glaciated surface. It is suggested that the heavy deposits of waste that occupy the lower radial valleys were washed down by floods that were caused by eruptions from the snow-capped mountain. The caldera is explained by the withdrawal of the deep lavas, followed by a great cave-in of the upper cone. An edition of the Crater lake topographical sheet, published by the Geological Survey, has been printed with a number of excellent photographic views on the back.

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CURRENT NOTES ON ANTHROPOLOGY.

MAN AND HIS ENVIRONMENT.

Two of the lectures at the National Museum, reprinted in the last Smithsonian Re-