tions, giving rise, each, to its own characteristic group of phenomena, the subject matter of its own peculiar department of science. For convenience we give them names. Now the group of phenomena characteristic of living things is a more peculiar group than any other lower group, and therefore the determining form of energy *better deserves a distinctive name* than any other and lower form.

But some one will say: "vital force is a metaphysical conception and as such has no place in science." If so, then must we banish also all ideas of force, or power, or cause as metaphysical. The fact is, science cannot get on without metaphysical conceptions. We strive in vain to realize a science such as Comte imagined—a mere succession of phenomena following one another like the trooping shadows of a phantasmagoria *without causative nexus between.* Comte repudiated the idea of atoms and of a hypothetical ether as metaphysical ideas, and yet, who can estimate the service done to science by these ideas?

These views I have maintained for the last 30 years. In spite of the odium scientificum I have continued to use the term *vital force*, not indeed in its old sense but in a true rational sense. But the reaction toward a more rational view is now fairly on. It may again go a little wrong. I cannot sympathize entirely with all the recent views on this subject. Some of them seem to smack a little of the old supra-naturalism, but it will come right in the end. Meanwhile, I would commend to the attention of all who, like Professor Kingsley, are afflicted with a dread of *vital force*, an article in the *Monist* for July, 1899, entitled 'Biology and Metaphysics,' by that acute thinker and lucid writer, Professor C. Lloyd Morgan, as being altogether just. Professor Morgan is admitted to be an exact and painstaking biologist; but he is also what is far better and rarer, a profound and philosophic thinker.

Perhaps I have already said too much. All I can ask is that those interested, unbiased by the fault-finding criticism, will examine for themselves in a fair and sympathetic spirit. I do not fear the result.

JOSEPH LE CONTE.

BERKELEY, CAL., May 24, 1900.

GLACIAL EROSION IN THE WHITE MOUNTAIN NOTCHES.

TO THE EDITOR OF SCIENCE: In *Appalachia* for March, Professor W. M. Davis discusses the glacial erosion of certain over-deepened valleys in the Alps and the relation that is borne to them by the hanging valleys of their tributaries. He suggests that "the head of the Saco valley in the White mountains below Crawford notch deserves examination to see how far its smooth sides and U-shaped cross-section may be explained as the results of glacial scouring by an ice stream that hurried through the deep opening in the White mountain mass." The present note may throw some light on this question.

It is in the first place remarkable that, although there are valleys of east and west trend in northern New Hampshire, all the deeper notches and passes practicable for roads through the main mountain group extend from north to south, as would be natural if the notches had been deepened by ice streams moving in the general direction of the glacial striæ in New England. Moreover, Carter notch as seen from a distance, the Crawford notch as seen from Mt. Willard, and Franconia notch, all present essentially U-shaped cross-sections, their troughs being bordered by continuous cliffs rather than by projecting spurs, thus suggesting erosion in a roughly horizontal direction along the sides of a glacial channel, rather than down-hill erosion by streams on the side slopes. In the second place, if one climbs Carter dome from the notch, the path is so steep for the first eighth of a mile that one must cling to the trees to ascend it; but then there suddenly comes a gentler slope. As a boy I climbed the western wall of the White mountain or Crawford notch by way of the bed of Brook Kedron, south of the Willey House, and found it so steep as to be almost impracticable; but here again a point was reached from which the stream was seen coming leisurely over the plateau south of Mt. Willey before its plunge down to the Saco on the floor of the main valley. Standing on Mt. Willard, one looks east across the notch trough to where the Silver and Crystal cascades slip and leap down over the shining ledges, now and then disappearing in narrow clefts that

they have worn in the rock; but above the cascades, one sees the wooded valleys of the streams as mountain hollows enclosed by gradual slopes that lead up to the heights north of Mt. Webster. These features seem to correspond to the hanging valleys of the Alps, although their dimensions are comparatively insignificant. East of Mt. Washington, the point of the spur between Tuckerman's and Huntington's ravines has the appearance of having been sheared off; and over the verge of the steep slope thus formed swings the white thread of Raymond's cataract, recalling the gauzy veils of the Yosemite cliffs.

Another characteristic of the glaciated and over-deepened Alpine valleys with their cliff walls is repeated in the rock falls from the sides of the White mountain valleys. The floor of Carter notch is heaped with rough rock fragments, forming two little ponds. The avalanche that killed the dwellers in the old Willey house is famous; the sides of the upper Saco trough towards Crawford notch are scarred with the paths of many other slides; and the Saco flows beneath heaped granite blocks that have fallen from the enclosing cliffs. Long talus slopes descend from the foot of the shear cliffs of the Franconia notch. These phenomena are not normally characteristic of mountains so old as those of New Hampshire, although they seem appropriate enough to ice-cut notches in old mountains.

The notch streams are not large enough to have produced prominent waste fans; yet north of the gate of Crawford notch—evidently the old divide—the streams which come down from the east and west, in Gibb's falls and Beecher's cascades respectively, have built a double fan where the Crawford house now stands, thus forming a new divide, on which one stream turns south to form the Saco. Probably the waste here was largely accumulated as a delta when the district to the north was a glacial lake that had its outlet southward over the old divide into the notch. The attitude of the headwaters of the north-flowing Peabody river would indicate that they had been diverted similarly from a southern course into the south-flowing Glen Ellis river by a waste filling on the floor of Pinkham notch near the old divide.

The general form and the recent changes in the White mountain notches thus indicate that they are the result of strong glacial erosion along the course of north and south valleys.

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FLOATING SAND AND STONES.

Perusal of Dr. Erland Nordenskiold's description (*Nature*, vol. 61, p. 278, January 18, 1900) of the floating stones which he observed during his journey along the southwestern coast of Patagonia and of Professor Simonds's discussion of the topic in Science (Vol. XI, N. S., pp. 510–512, March 30, 1900), prompts me to add a locality to those already mentioned at which sand and stones have been observed floating on water. While camping on the 'Thumb,' or West Arm, of Yellowstone Lake, Wyoming, in July, 1899, the writer and other members of the party, among whom were several geologists, saw dark patches from two to six inches in diameter on the surface of the lake. These patches were numerous near the shore, and occasional ones were noted as far out as we could see. Examination showed that they were composed of the coarse black and red obsidian sand which forms much of the lake shore. The sand consisted for the most part of subangular particles 2 or 3 mm. in diameter, but pebbles 5 or 6 mm. across were frequently seen, and at least one fully 10 mm. long and rudely ellipsoidal in shape was observed by the writer among these floating aggregations. The material was solid glass, not cellular, and probably had a specific gravity of 2.345 (see J. P. Iddings, in 7th Ann. Rep. U. S. G. S., p. 291). The sand was not very dry, on the other hand, it seemed to be rather damp, when it was picked up from the shore by the gentle ripples and carried out by the moderate current produced at this locality by the inflow from an adjacent hot spring area. Ripples which did not break the surface of the water did not destroy the patches of floating sand, but crested wavelets precipitated the particles at once and stopped the formation of other patches along the shore line. The conditions therefore at this locality are a sand composed of material somewhat repellent to water and motion of the