

SCIENCE:

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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The Gulf Stream and the			
Weather.			

THE WARM WEATHER of this winter has given rise to many theories as to its cause, in some of which the Gulf Stream has figured as an important factor. The Gulf Stream does change its position to a slight amount, but not in the arbitrary manner or to the great extent stated by some of the newspaper writers of late. The usually accepted position of the stream along our coast is that fixed by Professor Bache, based upon temperature observations made by various officers in the navy,—Davis, Lee, Sands, Bache, Craven, Maffitt, and others. The Gulf Stream probably has a vibratory motion, as evidenced by anchorages of the coast survey steamer "Blake" off Cape Hatteras, and off Rebecca Shoal, Florida. Anchored there on the northern edge of the stream, riding to the wind with a gentle current, the latter would suddenly become strong, and swing the vessel until she was stern to the wind, to remain but a short time; and then, the current becoming weaker, the wind would gain the ascendancy. This was repeated a number of times. Lieut. Pillsbury, U.S.N., who for five years was in command of the "Blake," believes that the daily volume of the stream varies but little, except as due to declination of the moon; that its track through the ocean is absolutely fixed by law; that its vibration is periodic, although the limit of the periodic change may vary to a trifling amount. Along the northern coast, however, it is not always on the surface, but is, from an unknown cause, overrun by other currents. The generally accepted belief, that a wind blowing across the current changes the position of its axis, is, Lieut. Pillsbury is convinced, erroneous. Every temporary wind, however, does transport water (chiefly by means of waves), and with it goes its heat or cold. The fact of finding gulf-weed within a few miles of Nantucket lightship does not so much prove that the current is nearer our shores as it does that winds have prevailed in the direction from which it comes.

THE METHOD OF MULTIPLE WORKING HYPOTHESES.¹

As methods of study constitute the leading theme of our session, I have chosen as a subject in measurable consonance the method of multiple working hypotheses in its application to investigation, instruction, and citizenship.

There are two fundamental classes of study. The one consists in attempting to follow by close imitation the processes of previous thinkers, or to acquire by memorizing the results of their investigations. It is merely secondary, imitative, or acquisitive study. The other class is primary or creative study. In it the effort is to think independently, or at least individually, in the endeavor to discover new truth, or to make new combinations of truth, or at least to develop an individualized aggregation of truth. The endeavor is to think for one's self, whether the thinking lies wholly in the fields of previous thought or not. It is not necessary to this habit of study that the subject-material should be new; but the process of thought and its results must be individual and independent, not the mere following of previous lines of thought ending in predetermined results. The demonstration of a problem in Euclid precisely as laid down is an illustration of the former; the demonstration of the same proposition by a method of one's own or in a manner distinctively individual is an illustration of the latter; both lying entirely within the realm of the known and the old.

Creative study, however, finds its largest application in those subjects in which, while much is known, more remains to be known. Such are the fields which we, as naturalists, cultivate; and we are gathered for the purpose of developing improved methods lying largely in the creative phase of study, though not wholly so.

Intellectual methods have taken three phases in the history of progress thus far. What may be the evolutions of the future it may not be prudent to forecast. Naturally the methods we now urge seem the highest attainable. These three methods may be designated, first, the method of the ruling theory; second, the method of the working hypothesis; and, third, the method of multiple working hypotheses.

In the earlier days of intellectual development the sphere of knowledge was limited, and was more nearly within the compass of a single individual; and those who assumed to be wise men, or aspired to be thought so, felt the need of knowing, or at least seeming to know, all that was known as a justification of their claims. So, also, there grew up an expectancy on the part of the multitude that the wise and the learned would explain whatever new thing presented itself. Thus pride and ambition on the one hand, and expectancy on the other, developed the putative wise man whose knowledge boxed the compass, and whose acumen found an explanation for every new puzzle which presented itself. This disposition has propagated itself, and has come down to our time as an intellectual predilection, though the compassing of the entire horizon of knowledge has long since been an abandoned affectation. As in the earlier days, so still, it is the habit of some to hastily conjure up an explanation for every new phenomenon that presents itself. Interpretation rushes to the forefront as the chief obligation pressing upon the putative wise man. Laudable as the effort at explanation is in itself, it is to be condemned when it runs before a serious inquiry into the phenomenon itself. A dominant disposition to find out what is, should precede and crowd aside the question, commendable at a later stage, "How came this so?" First full facts, then interpretations.

The habit of precipitate explanation leads rapidly on to the development of tentative theories. The explanation offered for a given phenomenon is naturally, under the impulse of self-consistency, offered for like phenomena as they present themselves, and there is soon developed a general theory explanatory of a large class of phenomena similar to the original one. This general theory may not be supported by any further considerations than those which were involved in the first hasty inspec-

¹ Paper read before the Society of Western Naturalists, by President T. C. Chamberlin, Oct. 25, 1889.

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