

"their life has not an eternal principle as its center; at their death, all is at an end with them." According to Paracelsus, "All the elements have a soul and are living. . . . They are not inferior to man, but they differ from him in not having an immortal soul. They are the powers of Nature—that is, it is they that do what we usually attribute to Nature. We may call them beings, but they are not of the race of Adam." A similar doctrine is developed in Madame Blavatsky's *Isis Unveiled*. The same method of conceiving of the production of physical phenomena has had defenders in the world of positive science, as in the doctrine of monads of Leibnitz; in the anatomical elements of Claude Bernard, who speaks of our bodies as being composed of millions, milliards of minute beings or living individuals of different species, of which those of the same species unite to constitute our tissues, while the tissues join to constitute our organs, and all react upon one another with a harmonious concurrence for a common end;* and in Sir John Herschel, who wrote in the *Fortnightly Review*, in 1865, that all that has been attributed to atoms, their loves and hates, their attractions and repulsions, according to the primitive laws of their being, becomes intelligible only when we admit the presence of a mental quality in them. Modern scientific theories tend to assume the unity of matter, of a protyle, which forms all substances by different degrees of condensation. Some go still further, and assume that there is no matter in the ordinary sense of the word, but only force and energy. F. Hartman argues that we can change force into matter, and that is what takes place every instant in the human body, as well as in the vegetable and animal world, and we can change matter into force under like conditions. This etheric force, the base of all the others, is what Lord Lytton describes in his romance, *The Future Race*, as "vril." So these dreams are repeated—to receive, perhaps, possible verifications in future discoveries; and thus old follies may, as Beaumarchais says, in the *Marriage of Figaro*, become wisdom, "and the fictions of the ancients be transformed into pretty little truths."—*Translated for The Popular Science Monthly from the Revue Scientifique.*

According to calculations by M. L. Niesten, all the asteroids known (now more than 300), if combined into one, would form a body not quite 514 miles in diameter, or less than one twentieth the diameter of the earth; and it would require 8,575 bodies like it to form a planet having the volume of the earth. The largest of the asteroids, Vesta, is 230 miles in diameter, and the smallest, Agatha, four miles and a half. As all of these bodies having considerable size have most probably been discovered, the estimate of the mass of the whole is not likely to be materially affected by the detection of new ones.

* *Revue des Deux Mondes*, September 1, 1864.

THE COLORS OF LETTERS.

By DAVID STARR JORDAN.

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THERE are certain powers possessed by childhood, which grow weak or disappear with advancing age or wisdom, until at last all recollection of them is lost. One of these is the ability to recognize shades of color in ideas or objects which can have no color at all. Now and then some trace of this power persists through life, and even in connection with some degree of maturity of judgment. It is then looked upon as a mild hallucination, provoking a smile of sympathy or of incredulity, but not regarded by the person himself—still less by his friends—as possessing any value or significance.

Nevertheless, such associations have a degree of psychological interest. A chapter has been devoted to them in Francis Galton's admirable work, *Inquiries into Human Faculty*; an interesting essay on *Word Color* has also been very recently published by Prof. Edward Spencer, of Moore's Hill College.* As a supplement to Galton's work, and as a contribution toward the more exact knowledge of the associations in the human mind of color with conceptions with which the idea of color is incongruous, the present paper is written. And as what I have to say is in a large degree subjective, partaking of the nature of a confession, the use of the first person may be pardoned.

In my youth I always associated the idea of color with the letters of the alphabet. In later years the discovery that other people recognized no such coloration came to me as a surprise. The letter R, for example, always calls up the idea of greenness. It is impossible for me to think of R without the thought that it is green. In like manner S is yellow, and X scarlet. The coloration does not seem to lie in the letter itself, as printed or written, but to coexist with the conception which the letter represents. As the letter R comes into my mind, it seems to go, with grass and leaves, into the category of green things. The sound has nothing to do with its apparent coloration, for C soft and C hard are recognized as the same letter and therefore colored alike. The coloration is not affected by the character of the type. It is in the letter itself, regardless of the way in which it may be printed, or of whether it is printed or written at all. The idea has no connection with the lettering in any colored picture books, nor does it arise from any association of that sort.

* *Proceedings of the Indiana College Association for 1889*, pp. 40-45, published December, 1890.

Words seem to me also more or less definitely colored, but the association of coloration with me arises solely from the letters of which the words are composed. The dominant letters, especially the initial letter, or the letters most conspicuous in pronunciation, give color to the word. Thus *Rosalind*, though containing but two green letters, has a dominant shade of green, as *salvia* or *silica* have of yellow. A pleasing variety in the colors of the letter tends to render a word attractive. Thus the words *Vernon*, *Severn*, and *Exeter*, with contrasted colors, are more attractive than such words as *Patton*, *Hammond*, or *Armenia*, in which the colors are few or not contrasted. This association of color is stronger than that of the names of the colors themselves, for these fail with me instantly to call up the colors they represent. Thus the word *red* seems decidedly green in its hue, and it seems unnatural to me that so many words beginning with *R*, as *red*, *roth*, *rouge*, *ruber*, *rufus*, and the like, should have come to mean red. The word *blue* is also largely green, while yellow is very far from the hue indicated by its meaning.

These letter colors seem for the most part not deep or vivid, but suggest transparent shades like the hues of colored stars, and they are often evanescent where the attention is fastened directly on them. The red, for example, is more like that of the planet *Mars* than that of a flaming torch. The shades of red vary somewhat, from the scarlet of *X* or *Z*, in which the colors seem most pronounced, to the reddish brown of *a* or *n*, in which the coloration is less conspicuous.

On the basis of these colors I would make the following classification of the alphabet, placing in each category the most positively colored letters first:

Red,	X, Z, F, E, H, A, N.
Green,	R, L, B, T.
Blue,	V, D, Y, K, W, M, P, Q; the V of a violet shade, the M and P lead-color, the Q almost colorless.
Yellow,	S.
White,	O, C.
Straw-color,	G, U.
Blue-black,	I.

In some cases, as in *O*, *C*, *G*, *U*, *I*, *J*, this supposed coloration is plainly derived from the forms of the letters themselves, the *O* inclosing most empty space, the *I* none at all. In some other cases, as *E*, *F*, or *R*, *B*, *W*, *M*, the resemblances of form in the pairs in question may have led to their taking place in the same category, the duller letter taking its place beside the brighter one which it resembles.

Similar associations take place with the numerals, although to me the coloration of figures seems less vivid than that of letters.

1 and *0* (zero) agree with *I* and *O*, *2* is red, *3*, *6*, and *9* more or less greenish, *4* and *5* bluish, following the letter *V*, *7* orange, and *8* light yellow. I have also tried the Greek alphabet, with a view to testing its possible color associations. I find, however, that I can not separate these letters from their Latin cognates. *Theta* seems to me as greenish as *tau*; *chi* (*X*) vacillates between *C* and *X*, and *psi* (*ψ*) is like the *ps* of which it is composed.

I have also made attempts to find the color relations in the Chinese alphabet, but without much success. I have no childish associations with these letters, and I can imagine color only in those which in some way suggest by their form the letters in the Latin alphabet. Thus *ㄉ* (tree) seems greenish like *T*, and *ㄨ* (woman) seems to follow *Z* or *X*.

I find that with other persons who confess to similar color associations there is a decided lack of agreement as to the impressions produced by most of the different letters.

My friend, Prof. Edward Spencer, has given me a chromatic alphabet, arranged as follows:

Shining black,	I, E, H, R, T,	Chocolate,	G.
	1, 3, 4, 6, 7, 9.	Light gray,	O, N, X, 5.
Dull black,	F, J, K.	Pale,	D, Z, V.
Brown,	B, M, Q, W.	White,	O.
Golden,	C, 8.	Water-color,	U, Y.
Orange,	S.	Without color,	L, P.

In this category the letters for the most part represent gradations from jet-black to white. We may, however, trace some relation between the supposed colors and either the forms or the sounds of the letters. Except in the color of the vowels *I*, *O*, *U*, and the isolated and emphatic position of *S*, there is little in common with the list above given by me.

In my own case, although I have no recollections to justify the theory, I feel sure that these associations are due to the bringing together of a childish classification of letters, with childish categories of color. I was, more than most children, interested in the individuality of the letters. I liked to assort them, to play with them, and transpose them to form other words. In like manner I was interested in colors. I had a childish liking for blue above the other colors, as also a meaningless preference for *V* and *D* over the other letters. I can, therefore, see how *V* and *D* should be associated with blueness. Other letters of pronounced qualities, as *R*, *L*, *X*, *Z*, came to head other categories, and the letters which I regarded as indifferent took their places next to those which in form or sound or otherwise appeared to the child similar to these.

Dr. Gustaf Karsten, of the University of Indiana, a philologist interested from boyhood in phonetics, recognizes color in the various vowel sounds, but none in the letters themselves. Thus *a* (in

ah) is the most sharply colored—a burning red—and *o* (in *go*) is of a deep blue. These colors Dr. Karsten associates with the use of these vowels as interjections, *ah* having the red hue of interest or surprise, *O* the blue shade of pity or regret; *a* (in *may*) is greenish, *a* (in *cat*) is yellow, in *law* dark brown; *e* (in *tree*) is white, *i* (in *in*) is grayish, *o* (in *on*) dull violet, *oo* is black, and *u* dusky grayish.

A lady of my acquaintance recognizes color associations only with certain proper names. Thus, with her, Caesar is crimson, Theodore blue, Lillian white, Mary or May yellow, Ethel and its compounds lavender, Edith heliotrope. Only names of some marked quality seem to have any color at all. Thus John, James, and the like are without this attribute.

In his article on Word Color, already mentioned, Prof. Edward Spencer has given an interesting account of his own associations of color with words. The substance of his observations he has kindly condensed in a letter to me, from which I quote as follows, adding to it two or three suggestive paragraphs from his paper on Word Color:

“It is natural that the first assertion of the experience of double impressions should have been received with incredulity. I have vainly tried for years to find ears attentive to what I honestly believed a real and reasonable experience, and it is now a great satisfaction to me to see the remarkable growth of interest in this class of subjects.

“My own experience with this class of phenomena has been almost entirely confined to the observation of shade and color as being inseparably connected with characters and words. Word color was first observed by me at the age of six years. At the time it suddenly flashed upon my mind that stone was light in color and the word ‘rock’ was darker, each one quite nearly resembling the color of the article to which the name was applied. Soon after this time the Arabic figure 8 appeared a beautiful golden yellow. Next, when beginning the study of Greek, the letter *θ* (*theta*) appeared the color of pearl. Since then shade and color have manifested themselves in an ever-increasing list of characters and words, until they are now perceived in most of the letters and in all parts of speech in all the languages with which I have any acquaintance.

“All suggest to the mind an appearance of shade: some being very light; others dark, and others medium. Color is less often distinguished, but when seen it is even clearer than is the degree of shade. Beginning with one color—yellow, seen in ‘rock’—the list has slowly increased until it now includes cream, pearl, black, gray, golden brown, orange, light blue, light and dark brown. The last mentioned was first noticed while writing these pages.

“Thought and reason seem to give but little assistance in determining the character of any word. It is, however, noticeable that the more attention that is given to the subject in general, the clearer do all words shine out. These shades and colors are permanent. A word or symbol seems to have a peculiar and individual character which never changes.

“A student of mine, Mr. C. E. Mead, of Ramelton, who had never before heard of the subject, has spent some time examining me and recording the results.

“If one should wish to divide all visible objects into classes on a basis of the lightness or darkness of their shades of color, he would find some manifestly very light, almost white; others very dark, almost black; others would be of intermediate shades. Let him call all that are very light, 1; all that are very dark, 5; then 2, 3, and 4 would indicate intermediate shades. Some objects would easily be seen to belong to certain classes. Others, even with the aid of contemporaneous examination, would be very difficult to locate. It is convenient to divide words into classes upon the same basis, indicating their degrees of shade by numbers, letting 1 represent very light words, 5 very dark ones, and 2, 3, and 4 the intermediate shades.

“A newspaper article containing fifty words was taken, and a number representing the degree of shade was assigned to each. After two weeks, Mr. Mead returned to me the same list of words, and numbers were reassigned. Out of the list, instead of ten, which the law of chance would indicate would be the same, thirty-four were identical. In no case was there a variation of more than one degree. For example, no word which bore number three in the first test was given number one in the last, nor *vice versa*. Colors were assigned to twenty-one out of forty names and characters. Two weeks later the same colors were reassigned to all but one.

“I do not know how these distinctions are made. I am not conscious of obtaining them by application of any rules or principles. When a word is presented, it is felt to be light or dark, black or yellow, and the mind declares it to be such with little thought or delay, and apparently in the same manner as the pitch and quality of musical sounds are judged.

“My own experience has been so vivid and persistent that I could not doubt that there were reason and law as the basis of the matter. Yet I could not and did not expect that a theory of word-color would be able to find credence as the result of my single testimony.

“Whether or not there is any significance in the fact, nearly all who perceive color in words have made the first discovery in early childhood.

"Various theories have been suggested: the association of the emotions with the words which arouse them, the form of the characters, the sound of the pronunciation of the characters or words, the nature of the mechanical production of the sounds.

"I believe that the fairest conclusion of the matter is, that color and shade depend chiefly upon form, but that sound and sense may have some influence. That there is some relation, some analogy which warrants the statement that this word is light and that is dark, I can doubt but little more than that it is appropriate to say that one sound is high, another low.

"Can it be that this association of form and color is an arbitrary product of the imagination? I would believe it myself but for three facts: The phenomena were observed at an age apparently too early for the origination of any such strange and elaborate idea; too early for the development of any theory universally applicable to all words and letters; too early for the dreams of the imagination to remain as the realities of later life. Second, I do not know nor remember of ever having laid down any principles of criticism. Third, I am not conscious of employing any such principles. To do this would require great use of the memory. I have no reason for believing that it is so employed. Indeed, rather than burdening the memory with special facts or general principles, word-color even relieves it of a part of its proper work. It has more than once assisted in the study and use of ancient language vocabularies. For example, only by means of this have I been able to distinguish between *ferus*, fierce, and *ferrum*, iron. When wishing to refer to the place of the former use of a word, its shade is of great service in finding its position on the page. Sometimes by its assistance words are seen to be correctly or incorrectly spelled. How many are there of you who do not write in two ways a word of doubtful spelling, and then choose one for no other reason than that it 'looks right'? Such an act is, perhaps, an unconscious testimony to word-color."

Associations of color with musical tones are not uncommon. Certain musicians claim to play the piano by color. One of my correspondents is positive that there exist definite relations between color and sound. In his view "every person has a key-note, and each key-note corresponds to a color which the person naturally prefers to any other." He claims to be able to indicate a "person's favorite color by knowing this key-note. A fine piece of music may thus be worked into a painting by using the colors corresponding to the musical notes." Conversely I should suppose the colors of the rainbow might be rendered into a musical symphony of perfect harmony.

Not less curious is the occasional association of color with taste. A student tells me that when she was a young girl she

frequently recognized colors in the taste of various articles of food. Sometimes she would say to her mother that this food—otherwise agreeable—"tastes so very yellow that I can not eat it." She was reproached for such eccentric notions, and finally outgrew them. Now she is unable to recall any of these associations, or to remember what substances formerly tasted yellow, and what ones blue or green.

I may close this discussion with a wise observation of Francis Galton: "Persons who have color associations," he says, "are unsparingly critical. To ordinary individuals one of these accounts seems just as wild and lunatic as another, but when the account of one seer is submitted to another seer, who is sure to see the colors in a different way, the latter is scandalized and almost angry at the heresy of the former."

ANIMAL AND PLANT LORE.

By Mrs. FANNY D. BERGEN.

IV.

ACCORDING to popular tradition, a surprising variety of physical ailments or discomforts may be relieved by human saliva, used in compliance with certain explicit rules. Such prescriptions abound both in our own day and in the pseudo-medical literature of earlier ages, varying more or less in different places and in different periods, but here and there to-day we find some interesting survival that tallies exactly with a superstition two thousand or more years old.* Many of these popular prescriptions apparently are based entirely upon supposed curative virtues of human saliva, while others may more properly be said to be directions for working, by means of spittle, spells or charms, that are supposed to cure bodily disorders.

So general do I find to be the belief that human saliva has medical properties, that, desiring to be on the safe side before ranking as out-and-out superstitions many very common customs dependent upon this belief, I have consulted a number of trustworthy medical authorities in regard to the matter. The universal testimony is to the effect that there is not the slightest scientific warrant for any prescriptions in which relief of pain is promised on account of any specific remedial quality of spittle. Warmth and moisture may be grateful to a burn, insect-bite, or

* The present paper, which deals almost entirely with the uses of saliva in folk medicine, forms only a part of a somewhat extended treatment of the subject of American superstitions in regard to saliva which the writer hopes, at some future time, to present in a more permanent form in connection with other folk lore.