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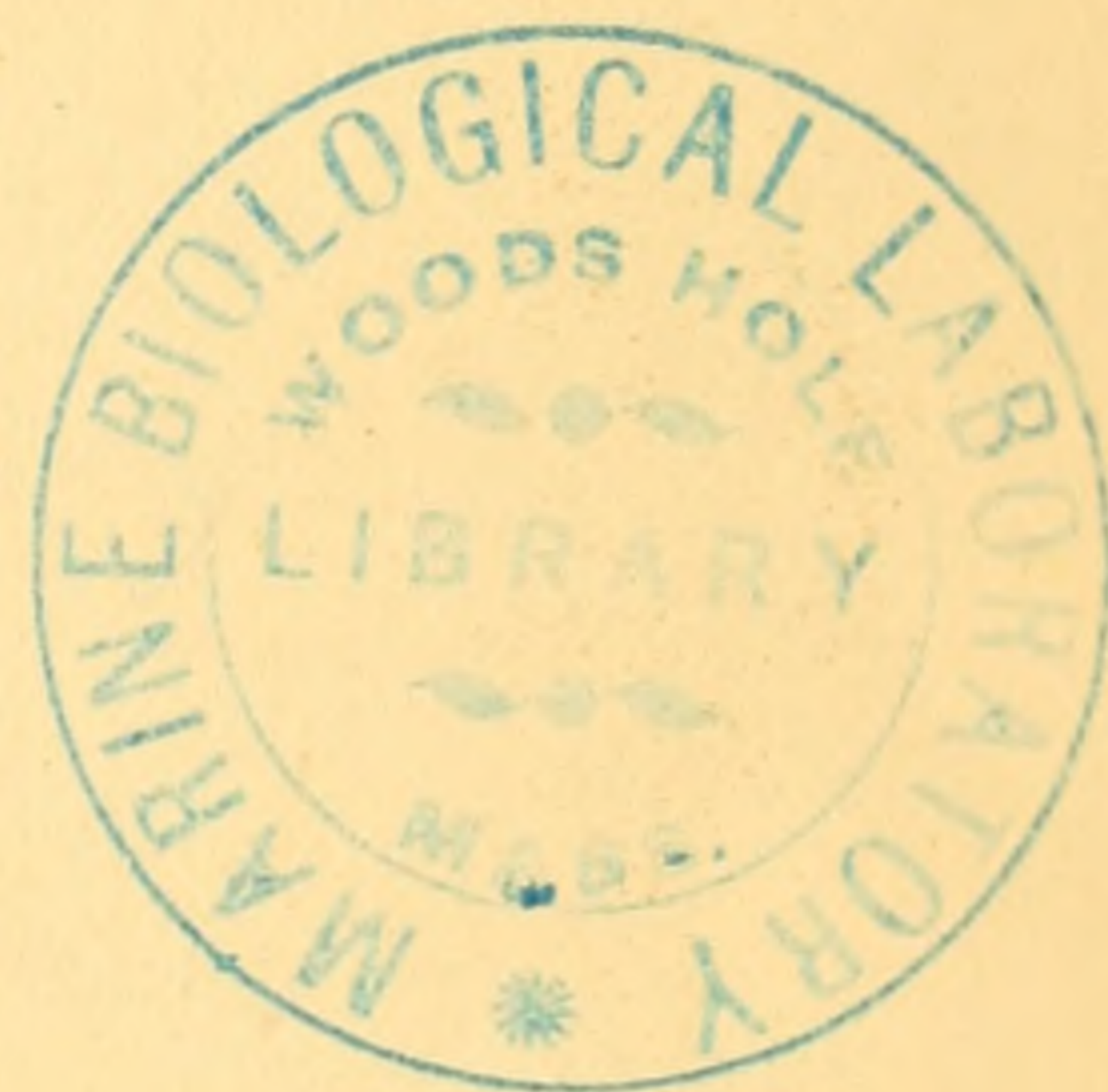
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DECEMBER, 1887.

INVENTIONS AT PANAMA.

BY STUART F. WELD.

AS the difficulties connected with the Panama enterprise, from at least certain points of view, increase, its advocates dwell even more than hitherto upon the way in which like difficulties were overcome at Suez. Probably no more pointed or liberal recognition of these has appeared than one contained in a speech of Mr. Gladstone in the House of Commons, July 23, 1883. Speaking for the ministry, he said :

“We think it our duty to do justice, as far as lies in our power, to this great canal company, and to its sagacious and energetic projectors. I say that they have claims upon us—claims to respect and honor ; for they have conferred a vast benefit upon mankind, and have conferred it by enormous labors, and in the midst of great dangers, under unparalleled difficulties—difficulties which were, unhappily, in some respects due to the unfortunate action of this country in former times.”

It is not to be inferred, however, that if such obstacles were successfully overcome, a similar success is to attend the efforts at Panama. Should some sanguine advocate of the enterprise aver that the stockholders were to be as richly rewarded as those of Suez, and within as short a time, we should listen to the prediction with no every-day skepticism, and should insist upon drawing our own conclusions. Many would as readily accept the wonders of the Arabian Nights as trust to estimates of this description. It will not answer to carry too far a similarity, though its existence is not to be denied, between the completed undertaking and the one De Lesseps has now in hand.

But if, from a financial point of view especially, the prospects of the undertaking are not as bright as its advocates might desire, it is

## THE COLOR OF WORDS.

By N. E. NEWELL.

THERE are some curious things in regard to the way in which the human mind is affected by colors as well as the human sight. We are all familiar with what is termed color-blindness, and the unexpected results that sometimes attend it ; but color-sound is something which has received much less investigation.

How much, or in what way, animals are affected by colors, is not very well understood ; but the subject has been investigated enough to know that they are influenced by them, and the future will probably bring out some surprising results to the one who shall thoroughly cultivate this comparatively unexplored field of research.

Some people can select and appreciate the colors of sounds ; and to them the speaking of a name presents, mentally, a well-defined color, or combination of colors, different names having different shades or combinations.

The same name should, of course, always present the same color, or combination, when spoken, although, to different people, possessing the faculty, a given name or sound does not present the same characteristics. To prove the first of these two facts, a list of names was prepared, and the shade or color given by a lady who has this power, marked against each one of the list. After several weeks the names were again read to her, and the colors designated by her marked. This course was pursued several times during a year or more, the lady not being allowed to see the results in that time. During these several experiments the only variations in the answers given were such as would be natural where there was some uncertainty in regard to terms: for example, the answer to a given name at one time might be, "bluish," and at another, "lead-color" ; so, what was called "straw-color" might be afterward called "buff." The approach to similarity in the shades shows that the same mental picture was present, and only language was at fault.

With one or two exceptions these were the only changes noted in the several trials ; and the extent to which the experiments were carried warrants the belief that there was a well-defined idea of the color of words.

A few years ago a New York physician had two patients that probably had this faculty of the mind abnormally developed : one had a horror of all words in which the letters *ch* were placed ; and the other was taken with hysterics at a certain shade of blue. Whether or not the latter case has any bearing on the subject, may be questioned ; but it seems as though a perception so acute in regard to certain colors would involve the power of word-coloring.

Following are the words and the colors assigned to them in the experiments noted above, including a few double numbers : 1, black ; 2, light-cream ; 3, dark-cream ; 4, brownish-red ; 5, black ; 6, tan-color or cream ; 7, greenish-black ; 8, dark-straw ; 9, mud-color ; 10, black ; 21, black and straw ; 22, light-cream ; 23, dark straw-color ; 24, light and brown.

Some three years ago Professor E. S. Holden contributed a paper to "Science" on "Visualized Numbers," in which examples were given that differ in some points from the results obtained by the writer. For the purpose of comparing, I quote from Professor Holden's article : "1, black ; 2, cream ; 3, blue ; 4, brown ; 5, white ; 6, crimson-pink ; 8, white ; 9, greenish ; 10, brown."

It will be seen that where there is a variation it is a radical one. I do not attempt to explain the reason, but state it as a curious example of mental idiosyncrasy.

Following some familiar names are given, and the color of each, and also the letters of the alphabet : Mary, dark-red ; Abbie, tan ; Lucy, dark-blue ; Richard, light-gray ; Atalanta, steel-gray ; Charlotte, light-red ; Claire, light-blue ; Newcomb, dark-red ; Lincoln, black ; Morse, brown ; Newhall, gray-black ; Frank, dark-green ; A, light-straw ; B, gray ; C, tan ; D, blue ; E, black ; F, black ; G, light-straw ; H, red ; I and J, black ; K, blue ; L, black ; M, brown ; N, dark-blue ; O, light-red ; P, light-green ; Q, blue ; R and S, light-straw ; T, green ; U, gray ; V, yellow ; W, blue ; X, gray ; Y and Z, dark-brown.

"Color-hearing" has been considered in "The Popular Science Monthly" [August, 1883]. I quote from the article : "There are, in fact, persons who are endowed with such sensibility that they could not hear a sound without at the same time perceiving colors." These are the colors of sounds, and the sound of colors is what can be regarded as another branch of the same scientific mystery. Dr. Sophus Trombolt has investigated in this direction and according to the testimony of one hundred and forty-four persons in Norway in relation to the emission of sound by the northern lights, ninety-two were found who believed in such sounds, and fifty-three asserted that they had heard them. The sound was described as sizzling, hissing, whizzing, crackling, rushing, rippling, rolling, flapping, creaking, and roaring.

[NOTE BY THE EDITOR.—Connected with this subject it may be well to recall an interesting relation of experiences which was started several years ago by Mr. Francis Galton, respecting what he designated "visualized numerals," and the association of colors with various numbers. The term "visualized numerals" in its simplest sense means the conception, or mental vision, when any number is spoken or thought of, of that number as it is written, the power to form which may extend in some cases to lines of considerable length. In a fuller sense the term means more, and may be associated with very curious

shapes and orders in which the digits or numbers arrange themselves, of which a considerable variety have been described by Mr. Galton and his correspondents, and by M. Jaques Bertillon. One correspondent reported to Mr. Galton that when a child he counted by imaginary cards from one to ten, and his little boy in the same way used an imaginary domino ; another pictured numbers in groups of so many dots ; to the same person, the numbers, from the part they played in the multiplication-table, had been personified. Thus, 9 was a wonderful being of whom he felt almost afraid ; 8 was his wife ; “and there used always to seem a fitness in  $9 \times 9$  being so much more than  $8 \times 8$ ” ; 7 was masculine ; 6, of no particular sex, but gentle and straightforward ; 3, a feeble edition of 9, and generally mean ; 2, young and sprightly ; 1, a commonplace drudge. “In this style the whole multiplication-table consisted of the actions of living persons, whom I liked and disliked, and who had, though only vaguely, human forms.” Mr. George Bidder, who was known in early life as “the calculating-boy,” saw the numbers arranged in their order along a concavely-scalloped curve, the first part of which, comprising the first ten numbers, followed the arrangement of figures on a clock-face.

Another person's experience was to see the numbers arranged in association with certain colors up to 108. After 108 the notion of place became hazy and indistinct, though visualization was still possible, with effort. This writer as a child had a great liking for 6, arising, possibly, from his desire to be six years old. He was also very fond of blue, the color which he associated with 6. One of this writer's sisters saw numerals in a differently arranged diagram, and the figures themselves colored, each its own color. Another sister and a brother saw the figures in diagrams, but less clearly. The effects of heredity were strongly marked in two families of cousins. A sister in the first family saw the figures up to 200 in a rather complicated arrangement in a kind of cloud-land of different degrees of shading ; another sister saw them ascending in a directly perpendicular line in front of the eye up to 1,000, when they became vague and seemed to turn to the left. A brother saw them in a straight line from left to right, black, on a ground varying in illumination—the millions in a vague, bright distance to the right. Other members of these families associated them with figures or with linear arrangements peculiar to themselves.

To another writer the figures presented themselves in an intricate curve, in which “the zero-point never moves ; it is *in* my mind ; it is that point of space known as ‘here,’ while all other points are outside, or ‘there.’ When I was a child, the zero-point began the curve ; now it is a fixed point in an infinite circle.” To another, who saw the numerals arranged for the most part in a regular row, like park palings, they appeared as far as 12 to be concealed in black shadow ; from 12 to 20 was illuminated space, in which he could distinguish no divisions.

A person who was described as a mathematical astronomer, of rapidly-rising reputation, saw the numbers in a straight row, while he would be standing a little on one side. They went away in the distance, so that 100 was the farthest number he could see distinctly. The row was dusky-gray, and paler near to the observer. The tens were marked by a kind of fleecy lumps.

M. d'Abbadie made a communication on the peculiarities of numerical vision to the Anthropological Society of Paris, and this led M. Jaques Bertillon to relate his experiences in the matter, beginning with the time when he learned to count. "I connected," he says, "each of the numbers as it was taught me with some object in our garden, so that when I went over the series I would in imagination walk along an alley that led from the house to the end of the garden. Thus, an indestructible association of ideas arose between the figures and the plants in the garden: the figure 1 became attached to a chestnut-tree that marked the beginning of the walk, the figure 5 to a bench near it, the figure 7 to a tub farther on, the number 14 to a little laurel; 30 and the following figures were lost in a dark avenue of trees that terminated the walk; while beyond 40 the numbers ceased to be associated with any object, probably because I had not learned to count further when I made the pleasant associations. If I wished to add 14 and 5, I would in fancy go to the place (the laurel-bush) that 14 occupied in the garden, and go some steps farther to 19. The puerile work was wholly involuntary; and I well recollect when my tendency to proceed thus was almost invincible. I had another process for fractions: the idea of  $\frac{1}{4}$ , for example, was directly associated with the idea of a quarter of an hour marked on the clock; and if I had to add  $\frac{1}{4}$  and  $\frac{1}{3}$ , I imagined the hand pushed forward twenty minutes, or one third of an hour, and I immediately had the result,  $\frac{7}{12}$ . I was not able, however, to calculate any fractions in this way the denominators of which were not factors of 60."

A professor of mathematics in Geneva saw the numbers in a zig-zag line which made turns at 10 and at 60, up to 116, and no further, and added to his description that when young he likened some sounds to colors: a grave sound was black, a less grave one, red; an acute sound, yellow; a very acute one, bright yellow.

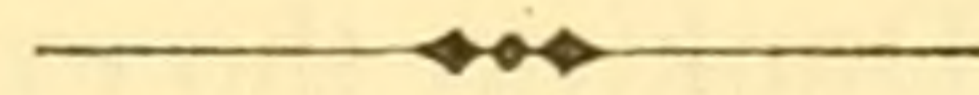
Another correspondent saw the numbers arranged in their regular orders in a system of lines—the first 10 in a horizontal line, the next 10 in a line perpendicular to it, the third 10 in a line running diagonally from right to left, the numbers from 30 to 90 in a perpendicular line parallel to the line of the second series, and the larger numbers to 1,000 in a line running from right to left parallel with the first one. The vision stopped at 1,000.

To another correspondent of M. Bertillon's the numbers presented themselves—not very clearly distinct from one another—in a descending column, quite narrow down to 10, where it doubled in width;



from 16 to 20 the column swelled out till it formed a rectangle twice as broad as the double column from 10 to 16 ; passing 20, the column narrowed again, changed direction, and ascended perpendicularly, but in such a way that it was impossible to tell how the new column was connected with the former descending column ; but it went up, whatever might be the fate of the other column, presenting its rectangular swelling at every 10. Passing 50, it curved to the right, still retaining its dimensions and its swelling at every 10, then descended in a curve to 100, where the vision stopped.

All of the seers so far quoted had the numbers presented to them in a plane. One other one described his vision as that of an arrangement around the three sides of a triangular prism. On the first face appeared the first 30 numbers, running in a zigzag line, 10 and 30 being seen at apical angles, 20 at a depressed angle ; on the second face the numbers from 30 to 100 ran in a straight horizontal line ; and on the third face those from 100 to 1,000 in a straight ascending line. The spiral returning to the first face of the prism, the numbers from 1,000 to 30,000 appeared upon it in a zigzag line parallel to the first line of 1 to 30. The second face again contained the numbers from 30,000 to 100,000, and the third face those from 100,000 to 1,000,000 in lines parallel to the other lines on the same faces.]



## JOHN JACOB BAEYER.

By J. HOWARD GORE.

WHEN Frederick the Great, June 22, 1740, wrote, "In this country every man must get to heaven his own way," there were many sturdy Germans who were glad to embrace the opportunity to turn aside from the route to which the beliefs of their ancestors restricted them. But they did not wish to be alone upon the unknown sea into which their independence had launched them ; every one felt the need of that encouragement which comes from the association of those whose aims and methods are the same. To secure this, the gracious sovereign allowed colonies to be formed of those of like faith and order. One of these colonies was Müggelsheim, about fourteen miles southeast of Berlin. Among the founders of this village there was a "faithful follower" who came from Odernheim seeking that religious sympathy which was here vouchsafed. This pilgrim sat as magistrate in the new settlement, while another coming from Mainz was the school-teacher ; these two became connected by the former's son marrying the latter's daughter. On the 5th of November, 1794, this couple rejoiced over the birth of a son—JOHAN JACOB BAEYER. The first few years of the lad were uneventful ; he watched the geese, herded the cattle, and laid, in healthful exercise, the foundation for a