however, that the blood in this case came from the verumontanum. Hemorrhage in chronic urethritis not infrequently makes its appearance late in the course of the disease, and the blood is passed by such patients in the last act of micturition when the prostatic urethra is vigorously compressed. Moreover, topical applications of silver nitrate and other caustics—made by means of an instillator which reaches into the prostatic urethra—quite often stop the hemorrhage. So that bleeding from the verumontanum in inflammatory conditions of the prostatic urethra does occur. It is also seen as an independent condition without the association of inflammation as a cause. During the winter of 1903-1904 I saw in the practice of Dr. Young a patient who was brought to him for hematuria without cause or accompanying symptoms. The boy—13 years of age—had been passing blood for some time, but he had no pain or other trouble suggesting kidneys or ureter as the source of the blood. He denied venereal infection and the absence of shreds in the urine corroborated this denial. Cystoscopy showed a normal bladder and the urine from both ureters was clear. When the cystoscope was pulled well out so that its window commanded the prostatic urethra a large, swollen, and hemorrhagic verumontanum could be seen. This was evidently the source of the hemorrhage.

There is, then, abundant clinical evidence to show that bleeding may occur from the verumontanum, and it is noteworthy that in this patient *every time the sound passed over the verumontanum there was severe stinging and burning pain.* In other words, just those clinical features were present which we should expect if the colliculus seminalis were enlarged and inflamed. Such an enlargement *does* occur and is one of the forms of congenital stricture described in the literature. Ziegler, in his account of the genital malformations seen at birth in the male, says: "An abnormal narrowness may exist in a portion of its (the urethra's) course or throughout its whole extent. *Its lumen may be compromised by an hypertrophy of the colliculus seminalis.*" There is then good ground for assuming that the hemorrhage in this case came from an enlarged verumontanum.

The interesting features presented by the case reported may be summarized as follows:

1. This patient presented a urethral stricture in which a positive diagnosis of its congenital nature could be made. Such a diagnosis was warranted by: (a) The history, from which all record of urethral traumatism or of venereal infection was absent. (b) The association of an obvious congenital stricture at the meatus. (c) The complete cure of the clinical manifestations by proper treatment of the stricture. (d) The presence of clear urine and the absence of symptoms after the actual stricture had been dilated.

2. The second point of interest was offered by the clinical symptoms presented. These were nausea and vomiting, hematuria, and pain over the left ureter. They suggested renal or urethral disease, and obscured the diagnosis which was really only cleared up by the therapeutic test.

3. In the third place, this case suggests that another item must be added to our already long list of causes for hematuria, and that congenital stricture may be associated with blood in the urine, the source of which may probably be an hypertrophied verumontanum.

SYNESTHESIA.[1]

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The subject of synesthesia, for many years, has attracted a good deal of attention in Germany, France, England, and Italy, and latterly a number of cases have been reported in America. The phenomena of this interesting condition are known as "secondary sensations," or "associated sensations," by which are meant constant and involuntary subjective impressions associated with actual perceptions. Synesthesias are found in many persons to a limited degree, but cases showing numerous and well-marked features are exceptional and always of interest.

Not a few individuals experience a shivering sensation at the squeak of a pencil as it is drawn over a slate, or at the sound produced by the tearing of a piece of linen. Others have their teeth put on edge when the filing of a saw is heard. Such sensations are spoken of as *sound feeling.*

Color hearing or *sound seeing,* as it is sometimes called, is among the rarer types of associated sensations. It is the constant and involuntary visualization of color associated with some definite sound. Goethe and Hoffman were among the early observers who referred to the existence in certain people of this peculiar faculty. Sachs in 1812 published an account of the phenomena as possessed by himself and his sister. Nussbaumer first excited general interest in the subject by a description of his own case before one of the scientific societies in Vienna. An eminent neurologist, who was present, considered his sensations as pathologic and predicted some oncoming mental disturbance. Nussbaumer, however, remained well. In 1881 Bleuler and Lehmann, the former of whom had the idiosyncracy, reported the result of their inquiries among 596 normal individuals. They found that 12.8% of these were more or less synesthetic. Among other observers may be mentioned Galton and Fechner, and, in America, Baldwin and Miss Calkins. Flournoy's book "Des

[1] Read before the Johns Hopkins Hospital Medical Society, February 6, 1905.

Phenomènes de Synopsie," contains a most exhaustive study of the subject.

Color sensations remain constant in the same person but vary in different individuals. For example, the sound of the vowel *a* is red to one, blue to another and black to a third. Colman has shown conclusively that the colored alphabet used in teaching children their letters has nothing to do with color audition. In one family all of the members were synesthetic, and had learned their letters out of the same book but possessed nothing in common in their color associations. The deeper vowel tones usually suggest the shades, and the higher vowel tones the tints of colors.

Again, the kind of sound giving rise to color sensations varies for different individuals. In one case color sensations are produced by the vowel sounds, in another by the tones of a speaker's voice, while many associate musical tones, the days, numbers, months, seasons, odors, taste, and touch with corresponding colorations. Some people when reading rapidly, can detect misspelled words by the wrong color impressions received.

When light instead of color is associated with sound we have what is known as photism; when a color, or some definite image, suggests a sound we have phonism. Cases of singers have been cited who could pitch their voices accurately when they thought of the corresponding tint or shade of color, and certain violinists have been known to tune their instruments by employing a similar method. Galton reports the case of an individual who could read the colors of a gaily decorated wall-paper as syllables and sounds.

Color hearing may prove annoying and confusing. The inevitable color sensations associated with tones destroy in the minds of some subjects the strains of music, and the incessant play of colors seen while reading or writing is most irritating to others.

Another interesting but more common type of synesthesia is known as the *number-form*. It is characterized by the visualization of serial numbers, dates, important events, etc., as occupying definite geometric positions in space. Such a condition opens up a wide range for the formation of mental diagrams or symbols, which are so far-reaching that to the average mind they are as inconceivable as is space itself. They are usually circular, spiral, or wave-like in shape and are peculiar to the impressions of the possessor. They serve as ready reminders of past occurrences and are generally helpful in mental calculation and memorization, but for higher mathematics and abstract speculation they are, in the main, a hindrance.

As to the true nature of synesthesias, nothing positive is known. Neiglicki and Steinbrügge regard the phenomena as pathologic; on the other hand, Chabalier, Urbantschitch, and Baldwin consider them to be strictly physiologic. Ziehen says that synesthesias are more common among the sane than among the insane. Baldwin states that "synesthesias of all sorts cannot be considered specifically abnormal, certainly not morbid, but belong to the realm of the unusual and idiosyncratic, within which explanation is difficult"; he adds that, "although subjective, they are not hallucinations."

Heredity is a proven factor since the condition has been observed in two or more generations of the same family. Males appear to be more frequently affected than females, yet in the latter the color visualization is the more intense. The photisms, color-hearing, and phonisms of early life are more vivid and last longer than those acquired during adolescence, and all tend to grow less distinct with advancing years. The number-form seems to exist throughout life unchanged.

HISTORY OF CASES.

The synesthetic family to which I shall refer more especially includes the father and all of his children—three daughters and two sons.

CASE 1. Mr. G., a clergyman, aged 49 years, is a man of high attainments but of a retiring disposition. He states that since his early childhood he has associated the sound of each letter of the alphabet with a definite color value. The letters *f, j, k, r,* and *x* are a reddish-brown; *o* and *c* are snow-white; *a, d, g, n, s, q,* and *u* have the appearance of glycerin. The remaining letters are of a dull lead color, shading down to black. When a little boy he was laughed at by his older brothers and sisters because he "anxiously asked them" why a certain bay horse was given "the white name of Charlie."

Words receive their color almost entirely from capital letters. He does not know of a similar affection in any of his antecedents, but his niece, a sister's daughter, has the color audition form of synesthesia, and also the involvement of the pain sense. A vivid purple, she says, is seen when she is suffering intense pain.

Mr. G. has never mentioned his associated color sensations to his niece or his children, which goes far to prove that he is unduly sensitive about his idiosyncracy.

CASE 2. Miss A., aged 23 years, is the oldest daughter. She is a clever young woman, a teacher in one of the large female institutions of the South, and, incidentally, is fond of matters psychologic. She, and, indeed, all of her brothers and sisters seem to have inherited their father's quiet and rather shrinking nature. My attention was first directed to the study of synesthesia by her somewhat startling questions: "Why are the keys of the piano colored in my mind?" and, "Why is it I sing or play anything familiar by color?"

Before she learned the alphabet she refused to call her mother "mother" because the name looked ugly to her; she preferred "mamma" on account of the more cheerful and pleasant color association.

The letters of the alphabet assume no definite form but come out on a light background as they are spoken; some of them are transparent, most of them are opaque, all are colored.

Words, whether thought of, heard, or written, get their color, as a rule, from the prominent initial letter sound. "Gray words" are due to the "g" sound, as *gray, grief, get,* etc. "Yellow words" have a prominent "s" or "*y*" *sound,* as *sweet, Xerxes, yonder,* etc. "Blue words" have the "l" sound, as *love, law, light,* etc. "Sunlight words" have the

"c" sound, as *child, chair,* etc. When she wishes to recall a name, tune, or any event, she first thinks of the associated color. The names of the seasons, months, and numerals, in fact all names, possess their characteristic coloring in her kaleidoscopic brain.

The higher musical tones are light in color, the deeper tones are dark, and the deepest are black. Some tunes are disliked because of unpleasant color associations. Melodies learned in her childhood retain the most vivid color effect, in fact, in all of my cases the earliest color impressions are the most distinct. The *tactile,* the *temperature,* and the *pain sense* are all involved but the stereognostic sense is normal. Hard objects when touched are dark in color; soft objects are light. If she feels something hot a dark gray is seen, if a piece of ice is grasped, white is promptly visible. A dull pain is of a dark lead color, a sharp pain is of a light steel color.

Case 3. Miss M., aged 22 years, is the most practical of the three sisters. She has an excellent memory for details and dates in general. She tells me that she has often lost her temper with her sisters because their color impressions were entirely discordant with her own. *Words* are colored by each letter which retains its individual color index.

She possesses to a marked degree the number-form of synesthesia. The numerals, whether counted in English, Greek, Latin, French, or Japanese, occupy the same fixed positions in space. She likes numbers as a general rule, particularly 3 or its multiples. The months of the year group themselves in a circular fashion and are comparable to the hour-marks on a clock dial. The hour-mark 5 is in the middle of January, 4 in the middle of February, etc. The alphabet, the list of the kings of England, the multiplication table, the catechism, and any series of important dates has each its specific mental diagram. These diagrams she and her younger sister call "roads," and once clearly visualized, they do not tend to fade, but serve as a ready means for memorization and recollection.

Tunes are not colored, but the keys of the piano are, and possess more or less human characteristics.

When an object is put into her hand she at once obtains a true mental image of its *form;* then follows an associated *color sensation.* For example, when a nickel was put into her hand, her eyes being shut, she said, "I feel a coin about the size of a nickel, but it is of a dark brown color." This phenomenon, as I take it, shows involvement of the *stereognostic sense.* The *pain sense,* the *temperature sense,* and the *tactile sense* are all slightly involved in her case as well as in that of her younger sister.

Case 4. Miss L., aged 20 years, has many accomplishments. She is clever with her brush, writes music, poems and short stories of more than usual merit. She has color hearing and the number-form both developed to a remarkable degree, and as noted in the cases of her older sisters, numbers, letters, and all words are associated with colors. The coloration of her words is due to the overlapping of the colors of the component letters. Capitals are more highly tinted or deeply shaded than are the corresponding small letters. In her case the consonants take on brighter hues than the vowels—the reverse being usually the rule. During early childhood she formed likes and dislikes for certain letters and numbers. "S" is a jolly, companionable letter; "d" is gloomy and unfriendly. Kindly letters are yellow and red, those "not fancied" are blue and purple.

The keys of the piano are colored, the high tones are light, the medium tones are dark, and the lowest are black. The key of F is green; that of G is yellow, and of C is blue. It is interesting to note that the colors of these musical letters do not agree with the coloring of the corresponding letters of her alphabet. She writes me that the G and D chords always make war upon the C chords, which are protected by the F chords. The figure 5 is a pleasant one. The figure 6 has always been disliked.

Numbers, serial events, poems, etc., that have been committed to memory, have, as in the case of her older sister, their characteristic "roads." These roads are usually seen in "rooms" which are bounded by points of the compass. The inherent tendency to arrange the points of the compass around her mental images—with a good deal of originality—she terms her *direction sense,* and she refers to it as one of the earliest dictates of her consciousness. The relation of the points of the compass varies but is constant for the associated concept. This is well shown in her mental diagrams for the "direction sense" of all the books she has read. When she thinks of the human body, certain books, sewing, painting, etc., she imagines herself as facing the southwest, but when embroidering and other acts are thought of she must face in the opposite direction. Curiously enough, the Hymnal and the Prayer-Book face from opposite directions, though she has been accustomed to see them bound together. When thinking of the months she sees a clock-dial diagram that of course is peculiar to herself.

Case 5. E., a youth of 17 years of age, is of less interest. The coloration of his alphabet is not vivid, and his *word coloring* is distinctly independent of the colors of the individual letters. Numbers are not colored, and the number-form of synesthesia is wanting. This boy is very intelligent and stands first in all of his classes.

Case 6. Master F., 14 years old, is an unusually clear-headed and logical youth. He has a goodly store of grotesque mental diagrams, which greatly aid him in his mathematical work and in recollecting facts. His clock-dial diagram is elaborate and embraces the seasons, the months, and indistinctly, the days of the months and of the week. He has no color sensations associated with sounds.

Summary.

The sensitive nature of Case 1 and his children reminds us of the advice given by Galton, viz., that synesthetic children should not be punished by teachers or teased by their playmates when they refer in all sincerity to their associated

sensations. Case 2 presents color audition, photisms, phonisms and involvement of the temperature, tactile and pain senses. Case 3 has a combination of color audition and the number-form of synesthesia and the involvement of the stereognostic sense. Case 4 is notable for the association of human characteristics with certain numbers, colors, and musical tones, and for the very odd mental diagrams. Cases 5 and 6 show fewer variations. The senses of smell and taste are not involved in any of the cases. Among other points worthy of note are the following: the direct transmission of synesthesia from the father to all of his children; that the color sensations are dissimilar, and those formed in early youth are more intense than those acquired later in life, and, that all tend to fade in time. On the other hand, the mental diagrams of the number-form remain unaltered, and serve as strongholds wherein past impressions are arranged in an orderly way and can be passed in review at will. Finally, all of our cases are, from an intellectual standpoint, far above the average; and are sane, healthy, and happy.

In conclusion, I desire to say that though the literature on synesthesia is abundant, relatively few contributions have come from general medical men. I believe that more careful study on their part would add something to the psychologic data and would not be void of practical results.

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CORRESPONDENCE.

KNOWLEDGE OF GREEK AND CORRUPTION OF LANGUAGE.

NEW YORK, April 7, 1905.

EDITOR JOHNS HOPKINS HOSPITAL BULLETIN:

Sir:—The following remarks may be of historical interest and very timely at the present state of our disgraceful appendicitis, oophorectomy, gastro-saccharorrhœa onomatology:

Two men, the great physician, philologist, and noble patriot, Adamantios Koraïs, and a German physician, L. A. Kraus, almost simultaneously—about eighty years ago—made some remarks, the one on corruption of language, the other on the necessity to a physican to know Greek, which may be of interest at this present time.

Koraïs wrote: *Νομίζω ὅτι ἡ διαφθορὰ τῆς γλώσσης εἶναι συγγενὴς νόσος τῆς διαφθορᾶς τῶν ἠθῶν καὶ κατὰ τοὺς ἱπποκρατικοὺς κανόνας ζητεῖ καὶ συγγενῆ καὶ παρομοίαν θεραπείαν.*

(I consider that the corruption of language is a disease closely allied to corruption of manners, and demands also, according to Hippocratic canons, a similar course of curative treatment.)

L. A. Kraus: Pfuscher kannst Du ohne Griechisch werden, aber glaube mir, nie ein sicherer Arzt. Wer nur einigermassen die Erfordernisse zu einem Arzte, welcher mehr als jeder andere Mensch alle Lebenssphären so tief als möglich erkannt haben soll, zu begreifen vermag, muss zugeben, dass selbst der relativ beste Arzt (denn einen absolut guten kann es ja nicht geben) ohne Griechisch, ein noch viel besserer sein würde, wenn ihm dieser unschätzbare Vorzug der höheren Ausbildung vor dem gemeinen niederen nicht abginge.

A. ROSE.