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CONSENSUAL SUPPORT OF VISUAL ACUITY

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For centuries the subject of the relationship between the senses has been discussed by scientists; Aristotle having fist distinguished the five senses as those of sight, hearing, smell, taste, and touch. Ancient scientists, as well as our own contemporary medical authorities disagree as to the relationship between these five different senses. My endeavor to establish some authority for asserting that there is a correlation between the senses of sight and of smell has led me to assemble a number of facts, which while they ate interesting are also very often contradictory.

Early scientists made constant reference to a 'sensorium commune' or common resort of all sensations, where every separate sensation was received and, in some way, fused with every other sensation. Assuming that they were correct in their theory and again borrowing Aristotle's wisdom, we might use his logic and state the question in the form of a syllogism which would read something like this:

Sight and smell are two of the five senses.
All of the senses are correlated.
Therefore sight and smell are correlated.

Having thus disposed of the question we might feel that we have accomplished all that we had set out to do, unless we went more deeply into the subject and found abundant reason for doubting the correctness of the minor premise in the syllogism, i.e. that all of the senses are correlated.

Johannes Peter Muller, who died in 1858, who is often called the father of modern physiology, who wrote Muller's handbook of Human Physiology, and under whom our own Helmholtz studied gave us Muller's law which shows that each sensory center is specific, yielding only its own kind of sensation, however, it may be stimulated. He disposed entirely of the theory of a physiological fusion of the sensations. Many of our modern scientists still maintain this law, to quote one of the most recent publications, THE HUMAN BODY by Logan Clendening: "We may therefore answer the question 'What is the nature of sensation?' by saying that sensation is specific for the nervous and organ originating it, and the ganglia receiving it."

At this time it might be well to go a little farther into this sensation known as smelling and see just how it is accomplished. The upper part of the nose is where the sense of smell is concentrated and these upper cavities are lined with an epithelium upon the surface of which there is a film of liquid which absorbs the minute, invisible particles coming from anything which has an odor. These molecules bombard the sensitive cells of the olfactory organ, attack the olfactory hairs and thus initiate nervous changes leading to the sensation of smell. When we consider that some odors, notably those of ancient Egyptian perfumes and sandal-wood endure throughout the centuries, apparently without any alteration whatever in the original substance, we know that the quantity of molecules necessary to be perceived by these cells is indeed minute.

To be specific, in the case of Mercaptan -smell of garlic- the amount necessary for a single whiff is $\frac{1}{460{,}000.000}$ of a milligram and 200 B molecules are concerned in the process, which if I know my table of measurements makes a molecule quite small.

Obnoxious odors may come from substances having a chemical effect upon cell life; some of these are poisons which absorb wager so rapidly that the effect brings a stinging or burning sensation to the mucous covering of olfactory organ. In this case we are not dealing with a sense of smell entirely but with a combination of that and the chemical change which takes place. Again, there are substances which are so delicate in their odors and so minute in their quantity that the entire system may be poisoned without anything more than a very faint sensation to the olfactory nerve. Among these is the deadly carbon monoxide gas which as a sweet, almost imperceptible odor but which, even when breathed mixed with air has the strength to take human life.

There are some odors which are strongest when they are fresh but which quickly evaporate and expand themselves in the air. In this way many flowers which are quite fragrant when they are first picked soon lose their scent and leave the old blossoms almost without odor.

It is said that we, as a civilized people, are fast losing our keen sense of smell and this is easily understood, especially in large cities where our noses are constantly exposed to air poisoned by gases from the exhaust of motor cars. This is the reason, no doubt, that animals and unspoiled savages have a more acute sense of smell than do we. That this is true is shown by the fact that Arabs of the Sahara recognize the smell of fire 30 or 40 miles away and that Peruvian Indians detect strangers in the dark at a great distance by their sense of smell and can ascertain whether he is an Indian, and European or a Negro. Knowing as we do that pure albinos have no sense of smell and that pigmented cells are essentials to convey consciousness of odors, we are led to wonder what, if any, relationship the strength and prevalence of odors in different countries has with the variation in the color of the skins of their inhabitants.

This thought brings to mind the effect of odors upon the sexual organs and arouses a curiosity as to the problematical relationship between the early development of the females of the tropics and their unquestioned voluptuousness, with the constant exposure to the highly perfumed flora of those countries. That odors do have a pronounced and effect upon the sensual impulses is proved by the use of perfumes and incense in the courts of ancient potentates, he harems of sultans and the modern brothel.

To come back to the correlation between the senses of sight and of smell, there have been some very interesting experiments conducted recently by Dr. George W. Hartman of Pennsylvania State College, which would seem to prove that there is a direct relationship between these senses and also the sense of sight and of hearing. Dr. Hartman's experiments showed that a gong sounded in the ear increased acuity of vision and also that the use of odors of citronella and Xylenol -coal tar- had the same stimulating effect.

My own experiments, much to my disappointment, were not definitely conclusive. When Dr. Spitler suggested that I use this topic for observation I began to collect smells until, as he said, I had every smell from skunk to lavender. I kept all of these odors in small bottles and had hem numbered so that the association of ideas connected with the names of the various smells would not influence the participant in the experiment.

Speaking of numbers and odors brings to mind he odor and flavor chart devised by the research laboratories of Arthur D. Little, the industrial chemist. 'A rose by any other name would smell 6523.' Other smells are given numbers which make them much easier to classify. Each digit expresses one of the four types in sensation which are fragrant, acid, burnt and caprylic; you can guess what caprylic is by knowing that it is deprived from 'gost'. Moth balls rate 4564 and hydrogen sulfide -rotten eggs- 5364, the numbers on a scale of eight indicating intensity. The sweetest odor so far being 6021, vanillin, which is a 6 in fragrance, zero in acid, two in

burnt and one in caprylic. The skunk-like civet, used in the expensive perfume is 5777 but the chemist failed when he came to butyl mercaptan, garlic.

In order to observe the effect upon vision I made tests in the following manner; test letters; red and green charts as used with the new A. O. Project-O-Chart; two black blocks placed in such a position that the dividing line between them was not visible unless he visual acuity was increased in some way; and also the syntonizer filter α, giving a blue-green complementary color when looking at a white screen. This last test was used in this way: When the complementary color first began to fade, the olfactory nerve was stimulated with the idea of increasing the intensity of the fading color.

Using thirty-nine 'smells' I had the following results, from 263 tests, some with normal vision and some with defective vision: -Increase first, decrease next, and no results last.

Oil Citronelle	30/20/50
Pine Tar	25/20/55
Cinnamon	20/0/80
Lemon	5/0/0
Lilac	5/0/95
Oil Eucalyptus	5/5/90
Sassafras	5/0/95
Menthol Tube	3/3/95
Ammonia	2/0/98
Cloves	2/0/98
Chloroform	0/50/50
Ether	0/45/55
Iodoform	0/30/70
Sweet Spirits of Nitre	0/20/80
Pepsin	0/10/90
Moth Balls	0/10/90
Formaldehyde	0/10/90
Camphor	0/5/95
Turpentine	0/3/97
Carbolic Acid	No Effect
Chlorine	" "
Carbon Disulphate	" "
Wintergreen	" "
Cedar Wood	" "
Beech Wood Creosote	" "
Rose	" "
Djer Kiss	" "
Chloras Hydrate	" "
Black Leaf 40	" "
Trichloroacetic	" "
Vanilla	" "
Oil Sweet Anise	" "
Musk	" "
Cod Liver Oil	" "

Iron Valerate	"	"
Lime Sulphur	"	"
Lavender Musk	"	"
Gasoline	"	"
Alcohol	"	"

In general, the order of increase was Oil Citronella, Pine Tar. Cinnamon, Lemon, Oil Eucalyptus, Sassafras, Menthol Tube, Ammonia and Cloves. Decrease: Chloroform, Ether, Iodoform, Spirits of Nitre, Pepsin, Moth Balls, Formaldehyde, Camphor and Turpentine.

My conclusions are that while some odors do give an increase in vision the improvement is so very slight that I do not believe it can be of any great value. None of the odors seems to have any effect or contraction of the pupil at any time.

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