The Doctor Prescribes Colors

The Influence of Colors on Health and Personality

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By

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BOOKS BY
EDWARD PODOLSKY, M.D.

Medicine Marches On
Young Women Past Forty
Old Age Postponed

To
MARTIN JAY

Coloring, if properly adapted, lends its aid, with powerful effect, in just discrimination and forcible expression of them; it heightens joy, warms love, inflames anger, deepens sadness, and adds coldness to the cheek of death itself.

OPIE

CHAPTER I.

THE RIGHT COLORS AND GENERAL WELL-BEING

We are constantly affected by the colors of our surroundings. The right color combinations in our homes, offices, shops, travel accommodations and hospitals are exceedingly important, both for health and efficiency. Injudicious color combinations are not only in bad taste; they also work havoc with our well being.

Almost every doctor is acquainted with instances in which the wrong color was the cause of mental upset or physical discomfort. Dr. Sabin of New York University reports several cases of mental irritation caused by harmful color combinations. He relates the case of a woman who was nervous, fretful and complained of ill-health generally. An examination by the family doctor revealed nothing organically amiss. It was noticed, however, that on her visits away from home she improved.

This gave the doctor a clue, and he sent this woman and her daughter on an extended trip to Europe. The daughter wrote back saying that her mother's mental condition and health had improved notably.

The doctor called in an interior decorator and the two made an inspection of his patient's home. The decorator was at once struck by the violent display of colors in this patient's bedroom. It was a disturbing combination of deep violet and purple, colors which have a very exciting effect. Lighter colors were substituted, calming greens and yellows. When the patient returned home from her European trip those black moods never returned again. There is no doubt that living in a room of such violent display of irritating colors had a great deal to do with upsetting her emotionally and mentally.

Dr. Sabin reports another interesting case in which colors exerted a striking influence. The office of a factory had been a warm bright yellow. An efficiency expert was called in and he decided that a slate blue would be more practical and would need less cleaning or repainting. This expert was woefully ignorant about colors and their effects on human beings.

When winter came the stenographers began complaining of the cold, something that had not happened before, when the room had been a bright cheery yellow. The janitor protested that the thermometer showed 72 degrees, the customary winter temperature of this office. The complaints, however, continued and finally the thermostat was changed to 75 degrees. The girls in the office continued wearing their coats until the cold, slate blue was again repainted a warm yellow. After this repainting the room felt warmer at 72 degrees than it had at 75 with slate blue walls.

A somewhat similar instance occurred a little later. A manufacturer not far from New York had the women's cafeteria in his factory repainted a light blue. It was not long before the women began to complain that the cafeteria was always chilly and that they had to wear their coats at lunch. Here again the temperature in the cafeteria was precisely the same as that elsewhere in the factory, where the girls could work in comfort without their coats. This state of affairs continued until a color expert was called in who recommended that the baseboards be painted orange and that orange slip covers be placed on the chairs. When this was accomplished the complaints stopped.

That colors play an important role in interior decorations has long been realized. In the early 18th century there was a vogue for blue and purple window glass because it was thought to be healthful. This was in time shown to be true, for both of these colors are very restful

and calming. With the passing of the years, color schemes and combinations as a vital item in interior decoration began to receive more serious consideration.

In these days of high-speed travel the part that colors play in the decoration of airplanes has received the attention of Howard Ketchum, color engineer, who is devoting himself to the task of boosting travel via airplane.

"Certain colors," he explains, "are conducive to nausea. Others breed confidence and cheer."

Mr. Ketcham is advising his airplane clients not to serve mayonnaise and to avoid coffee, if possible. Yellow and coffee colors may have unpleasant effects on the stomach. Yellow, likewise, is to be avoided, if possible, in the interior decorations of a plane.

On the other hand, Mr. Ketcham has found that a green which is neither blue nor yellow has a cheerful effect on air passengers, and is particularly suitable if it is grayed a little.

"Green is appropriate for all climates," is the belief of Mr. Ketcham. "In the summer it looks cool, and yet in the winter it does not look cold."

New planes which are being built for the Pan-American Airways, for service to South America and across the Pacific, will have detailed interior and exterior color schemes worked out by Mr. Ketcham.

"Everything in them is keyed to green," he asserts. "We have used certain shades of brown and red." The sheets, blankets and almost all furnishings will be colored.

There is no doubt that we are all very definitely influenced by the colors of our surroundings. A very interesting illustration of this influence was recently afforded when the city of London, in an attempt to reduce the number of suicides from Blackfriar's Bridge, painted that ancient and gloomy structure a bright green. Thereafter suicides

from that bridge were reduced more than a third. Previously the black, drab color of the old bridge invited self-destruction, but the new, bright cheery green has just the opposite effect.

Not only in homes is the importance of the color scheme being appreciated as a source of happiness and efficiency. Far-sighted educators have begun to realize that the colors used in the decoration of schoolrooms play a very important role in learning. For years the dreary blackboard formed the chief motif in the decoration scheme of the classroom. The surrounding walls were equally cold and gloomy. Now, in Elgin, Illinois, white blackboards, or more properly, whiteboards are being used, and with happy results. Not only is black chalk on white board easier to read, but the white color of the board imparts a decidedly cheerier atmosphere to the entire classroom. After several months of use it has been found that besides relieving eyestrain, the whiteboards combined with light-colored walls make the classroom more cheerful, and learning a much more pleasant adventure.

Color has also invaded the still more dreary shops and factories. Superintendents of shops are now realizing that cheery surroundings can go a long way in making the hours pass more quickly, increasing the efficiency of their workers and elevating the quality of the work done. White-washed walls, dirty neutral colored floors and coal black machines are dismal and depressing.

There is now a definite trend toward bright, cheery colors in interior decoration of shops and factories. The print-shop of the Hershey Chocolate Company at Hershey, Pennsylvania, is but one example of many, of how a little splash of color will go a long way.

The machines are not the usual, depressing black. They have all been painted with a rich, Deft-blue, oilproof machine enamel of a tough, quick-drying type. The floor is of oiled maple. Pillar bases are light gray, the upper portion is a bright yellow. Side walls are glazed hollow tile of a mottled tan color, and the ceiling is a bright buff in order to avoid too great a variance between the glazed tile and ceiling areas. Table tops are mahogany, and waste cans are light blue. There is a sufficient display of colors to brighten up the place considerably. Time passes faster, work is accomplished much easier and with greater efficiency, and the men feel happier and brighter.

With but a little thought the average shop can be brightened up with colors. Thus, a maximum of white ceiling and side wall should be provided to conserve the light from natural sources. Sash should not be painted gray or black, not only because these colors are depressing, but also for the very practical reason that these colors absorb as much as 47 per cent of the light entering such areas. Sash should be painted white or ivory for more light reflection.

Carrying this color scheme further, the five-foot dado, or lower wall panel, should be a light green or tan, preferably on the gray-green or jade green side for softness, and also to kill the very appreciable but generally ignored "ground light" reflected upwards to the eyes of the machine operators. The ground light may be a very real accident hazard.

As for the shop machinery, all starting equipment, clamp-rack, knobs, machine table edges, and guards should be painted a bright red or scarlet. This becomes very effective on machine-table edges when they carry a narrow stripe of bright yellow along the center of the red.

As for the bodies of the machines, they should be of some light color. A light to medium chrome green has been found very effective. They may also be a soft light

straw or tan, trimmed with bright green and scarlet. At any rate, heavy, deep colors should be avoided, as they make the shop dull and dreary and the work is affected in the same way.

It has been found that in shops and plants where colors have entered into the scheme of things the efficiency of the workmen has increased, the quality of the work much improved, and the health of the workers greatly benefited. The average human being would rather do his work in a brightly colored, cheerful shop than in one decorated with dull, dirty grays and funereal blacks.

Color enters into all our activities. Athletes have also come to realize that color, properly applied, plays a most important part in maintaining efficiency at a high peak. In 1928, Alonzo Stagg, football coach at the University of Chicago, made a practical application of colors in increasing the effectiveness of his football players. He fitted out two dressing rooms for his team. One was decorated in blue for rest and recuperation, and the second was painted in flaming red in which he delivered his pep talks. The red room was used before the players went out on the field, and it acted as a wonderful stimulant. The blue room was used after the game to afford rest and recuperation.

The color scheme of the home very often enters into the success or failure of the social amenities. When the Empress Josephine was informed that a woman she detested would on a certain occasion wear a dress of deep green, she had her drawing room, wall paper, furniture, coverings and rugs, hastily re-decorated at great cost, to a shade of blue that would make the green dress appear glaring and vulgar. She certainly knew how to use colors to make a person she did not care for uncomfortable.

On the other hand, the use of colors can make a social gathering a huge success. A woman was giving a dinner

party and wanted to employ colors to the best advantage. She approached Mr. Howard Ketcham, who knows something about colors, for advice.

"Try magenta light," he suggested. "Buy three or four 1000-watt lamps and some holders. Put magenta-colored slides over the lamps and plant them around the floor under the furniture. Then turn out all the other lights and see what happens."

His instructions were carried out. The party was a huge success. The soft, flattering glow had made the women look ten years younger. The women were pleased, the men were gallant. The conversation flowed easily and gracefully. The food tasted better, and everyone's spirits ran high.

Colors have also come to the hospitals where they are needed more than in any other place. No longer is the dominating color white. The Doctor's Hospital in New York has long realized the importance of colors in making the patient and his visitors feel cheerful. The foyer is decorated in green and the page-boys wear dark green uniforms. The bedrooms have chintz hangings and there is a tasteful display of soft, comforting colors everywhere.

But colors do not enter into the scheme of only the more exclusive hospitals. The idea is spreading into the city hospitals also. Federal art projects have been called upon to brighten things up. At the Queens Hospital a color project is now in process in the form of a painting called *The Development of Medicine*. It will be 360 square feet, and it will be on the walls of the incoming and outgoing patients' room. In Greenpoint Hospital the children's medical ward solarium has a country landscape and a circus as a background—850 square feet—with bright gay colors. Two black pickaninnies swinging from a cocoanut palm decorate the children's ward at Harlem Hospital. These

various color schemes have worked wonders in bolstering up the patient's morale and helping him to take a more cheerful view of things.

Color has even invaded the operating-room. White is no longer regarded as the only desirable color. Blue-green is now common in hospital operating-rooms. It rests the surgeon's eyes and makes his work surer and more efficient.

One hospital recently had a whole floor of rooms done in various bright, cheery colors, instead of the monotonous white. So popular was this floor that nurses as well as patients were anxious to get assigned to the brightly colored ward. In time the whole hospital assumed a gay color, and the results were remarkable, both from the viewpoint of health and morale.

Colors are now regarded as a very essential item in our everyday activities. There is no doubt that we are affected by the colors of our surroundings, whether in the home or in our place of business. The right colors play just as important a part in maintaining health as do the right food.

CHAPTER II.

THE RIGHT COLORS FOR PROPER DIGESTION

Not so long ago a most interesting dinner was given by Mr. Samuel G. Hibben, illumination engineer and authority on light and colors.

At this dinner, food and drink were the best that money could buy. There was gay music and story telling, but the dinner was far from enjoyable. And the reason was this.

Mr. Hibben had arranged special lighting for the evening. Instead of ordinary clear or frosted lamp bulbs, he substituted especially designed filter lamps which cut out all the ordinary spectrum of colors except greens and reds.

When the guests strolled in leisurely they were a laughing, hearty lot. But as soon as they were in the dining room they began to notice things, queer things. Steaks were whitish gray. Celery was gaudy pink. Milk had the unwholesome color of blood, and the salads were as blue as the sky. Lemons had the color of oranges, and the coffee had a pale, sickly yellow tinge. Fresh green peas looked like black caviar, and the peanuts were a brilliant scarlet.

The food and cooking were of the best, but the broken spectrum lights imparted strange and unusual colors to the food. Most of the guests lost their appetites and could not eat. A few hardier souls did eat some of the weirdly tinted foods. They became violently ill, although the food was good and the taste perfect. Mr. Hibben's unusual experiment was a complete success.

This dinner party was a demonstration in a most dramatic way of the effects of colors not only upon the sense of sight, but also upon the related senses of touch and smell.

Mr. Hibben was curious to know what happened when food assumed unusual colors. He found out, much to the dismay of his dinner guests. He proved to his own satisfaction that the right colors are absolutely essential for proper digestion.

Unaccustomed colors in foods have an adverse effect on the digestion. This is fact that is well established. Years before Mr. Hibben gave his little party, cooks who loved to experiment with colors in food knew that when a food assumed a new color it somehow seemed to lose its appeal. Red butter on grēn bread may taste the same as yellow butter on white bread, but it is not quite as easy to swallow and digest because the color combination is a strange one.

There are many vegetable dyes on the market with which it is easy to tint foods various colors. After several years of experimentation along this line the practice has fallen into disuse, because the colors seem to act as destructive influence on the appetite. Somehow they make the gayly colored food appear not only indecent but even poisonous.

Those who are not very well acquainted with the color psychology of food still continue to experiment. Only recently Professor H. E. Botsford of the New York State College of Agriculture found a way to color the inside of eggs. Control of the hen's diet to let her eat more or less of a dye called xanthophyll, found in a number of plants and grains, was the method used. With this dye it is possible to color the yolk any color desired, without affecting the taste or wholesomeness of the egg.

In time a supply of deep orange, green, gray, blue and other colored eggs (yolks) found their way to the restaurants. Those who tried these strangely colored eggs found them hard to digest and enjoy. The old-fashioned

natural combination of yellow yolk and white is still the best. Weird colors in foods may be a novelty, but evidently it is not a welcome one.

Another interesting thing in connection with colors and food is that the container in which the food is served has a great deal to do with digestion, almost as much as the color of the food itself. Serving milk in red glasses has been tried by many restaurants and cafes and found to be a hindrance to the digestive processes. The red imparts a blood-like aspect to the milky white and this is not very helpful. Even blue glasses for white or neutral colored drinks somehow interferes with the enjoyment of the drink. About the only neutral or colorless drinks that may be served in colored glasses are cocktails. In most other cases; the relation of the drink to the color of the glass must be taken into consideration.

Dark beverages should be served in dark glasses. Thus light beer served in a dark brown or black glass somehow does not taste just right, but stout, porter or Guiness when served in a black glass or dark brown glass seems to have a better taste than when served in a white glass or a light colored one.

Milk is best served only in colorless glasses, because the dense white color seems to take on the tint of the container and subconsciously suggests another beverage. If, however, the milk is altered in color by the addition of chocolate it may be served in a brown glass with an apparent accentuation of the chocolate taste. Similarly, milk mixed with strawberry syrup can safely be served in a deep red glass, and the strawberry flavor will seem to have a better taste.

As regards the serving of food in colored dishes, modern chemistry has perfected a whole new series of materials and plastics from which dishes of every color of the rain-

bow may be made. A display of lively, light colors at the table imparts a festive air even to the most commonplace meals and makes them taste better.

Unlike beverages the serving of food in brightly colored dishes does not act as a deterrent to digestion. In fact, it has just the opposite effect. Serving a roast in a bright yellow plate makes it taste a little better than serving it in the regulation white. Beetle-ware plates, dishes and cups, colored in the different tints of the rainbow are available. A bright display of color in the dinner-ware will make even the most ordinary meals look like a feast.

Monotonously colored food, though not actually repellant, is not very appetizing. A restaurant owner found that serving a dinner consisting of pork chops, potatoes, cabbage and lima beans was never popular. The reason is that all these foods are of a similar hue, and though tasty, had no eye appeal. By substituting green peas for the lima beans, red cabbage for the white cabbage and browning the potatoes he created a lively eye appeal and increased the demand for this dish. This addition of color made the combination look much tastier.

Serving a meal of similarly colored foods, no matter how appealing to the sense of taste and smell, is never very popular. Contrast in color, red and yellow, green and white, brown and gray, and other contrasting colors, as well as variety in colors, will go a long way in making the food taste better.

Lighting effects at the dinner table also exert a most profound effect on the enjoyment of the meal. However, some thought must be given to the color of the lights used. The most desirable colors are a warm red, orange, yellow and true green. The colors to be avoided are yellow-green, lemon-yellow, blue, violet and purple red, for these somehow do not seem to go well with the food.

Always popular are browns and tans of almost all shades and hues. They always seem to make the food taste better. Amber lights are very popular and are to be found in almost all inns. Other popular colors are red orange, pink, pale orange and warm pale yellows. The colors that seem to clash with the food are yellow green, cool pinks and purples, and when these colors have been tried the appetite for eating was never very strong. Perhaps these unpopular colors may be used as an added aid to reduce, for they certainly make the food taste insipid, and not very much of it is eaten when these sickly colors are used.

When the color scheme of the surroundings accentuate the type of food served and blend with the natural colors of the food on the table, the sense of taste seems to be livelier. For taverns and chop-houses colors suggesting hearty meals are desirable. The most successful inns and taverns are those which display the right colors. Thus, the walls are usually a rich tan which suggests well-baked breads and well roasted meats. To heighten the effect of good food there should be suggestions of roast-beef red in the motif of the designs. Light orange, yellow the color of butter and green suggesting cool lettuce will further help impart the suggestion that the food is good, wholesome and tasty. In such a color scheme the table cloths should be pure white to serve as a contrast with the brown, greens, reds and yellows of the food served. The table wear should be of a light blue color.

The restaurateur who knows his colors in addition to his foods and savors will always get the most diners. Enjoyment of food depends not only upon texture, flavor and savor of the food served. It depends also very largely upon the color of the food and the color of the surroundings.

The color idea at meals has now extended to the post-prandial cigarette. Otto L. Miller has been granted a patent for treating cigarettes to give off colored smoke. It is a well-known fact that half of the enjoyment of cigarettes comes from watching its smoke. Those who have smoked a cigarette in the dark know that somehow it seems to taste differently.

When the cigarette smoke has a distinct color it adds enjoyment to the smoke. These new cigarettes give off smoke of various hues. Thus, brown, green, red and other colors may be imparted to the smoke without in any way injuring the quality of the tobacco. The after-dinner cigarette may be smoked in the proper color surroundings giving off blending colors or contrasting colors, according to the tastes of the smoker. Perhaps digestion may go on smoother when the after-dinner smoke is a soothing green.

As regards food itself, it has been found that colors are exceedingly important in keeping the food free from contaminating influences. Dr. Mayne R. Coe in a federal bureau at Washington discovered that certain colors act as preservatives for food. Bacterial organisms thrive in light and are stimulated by particular color radiations.

Some colors, particularly a chlorophyl or sextant green keep out the most stimulating color frequencies. Dr. Coe wrapped his foods to be preserved in green colored paper. Similar foods not so wrapped, and exposed to similar conditions, spoil quickly, while green-protected foods remain sweet and fresh. With some foods, black wrappers are most effective as they shut out all life-giving radiations that promote the growth of bacteria.

Many years ago Luther Burbank, the wizard of plant culture, said: "Color and flavor both aid digestion very favorably." It is now realized that color is just as important as flavor, particularly the right color.

CHAPTER III.

INCREASING EFFICIENCY WITH COLORS

The right color combination goes a long way in increasing mental and physical efficiency. It is now a very definitely established fact that certain tasks can be accomplished faster and more expertly under certain color conditions than others. By taking color preferences into consideration the effectiveness of sales campaigns may be increased.

Colors have an influence on many processes of the body. Metabolism, muscular activity, tapping activity are among the most prominent noted. Colors also effect life and growth. It is a well-known fact that flowers grown under blue glass greatly increase in size and vitality.

Dr. Fere, studying the effects of colored light upon muscular activity found that in ordinary light the muscular activity to be 23 units. It increased to 24 units for blue, to 28 for green, to 30 for yellow, to 35 for orange and to 42 for red. The colors in the red purple section of the spectrum are not only warming. They are distinctly energizing.

Dr. Pressey found that after submitting a person to a given color for five minutes he could detect differences in the effects of the various colors upon tapping activity, memory, mental work, etc. He found subjects with pronounced intolerance for certain colors. The mental process of one person was found to take 20 per cent more time under the influence of one color than another. He also found that the memory work of another person might show a marked improvement under a certain colored light. Thus

tapping activity was more uniform with green light, slower with blue light and decidedly quicker under red light. Arithmetical activity, for instance, was strongly improved under red light, as was to be expected.

That colors have a very real effect on the motor activities of the body was recently proved in a very interesting way. Dr. H. Ehrenwald blindfolded a few subjects in a dark room and told them to stretch out their arms. A beam of light was directed upon the throat and cheek. Nothing happened. A red glass was placed in front of the light source. Without knowing it the subjects moved their arms toward the light. A blue light was then interposed and the arms moved away from the light.

The use of color in the right places will go a long way in easing the performance of various tasks. A series of exhaustive tests in the Channel Islands off the English coast have proved that a concrete road colored dull orange or marigold has at least 40 per cent less sun and headlamp glare than an ordinary white road. It has also been found that accident per mile on colored roads are fewer. At night pedestrians stand out more clearly on a colored road than one that is neutral. It has also been found that a colored road can be followed much more easily without the necessity of looking for signs and markers. The cost of coloring roads is very small, and when it is realized that a little color in our highways will go a long way in reducing the number of accidents on them, the cost is more than justified.

In the field of diversion changing from conventional colors to more effective ones is now being considered. For a great many years billiard tables, for instance, were covered with green cloth. An enterprising manufacturer has found that claret-colored cloth is more desirable as it leaves no after-image as does the green cloth. This annoying

after-image has often interfered with the enjoyment of the game as well as reduced the efficiency of the player.

Reading may be helped considerably by using colors that do not contrast too strongly. At the present time black print on white paper is used, and this gives the greatest possible contrast. It is for this reason very fatiguing. By reducing the contrast eye fatigue is reduced to a minimum. For instance, gray ink on yellow or green paper is much less tiring, and with this color combination even the smallest print can be read with comfort.

In industry the color engineer is now occupying as important a place as the efficiency expert. It is now realized that colors, the right colors play just as important a role in increasing and maintaining efficiency as do other factors.

Very often a little splash of color in the right place accomplishes a great deal. Thus, a manufacturer of men's shoes painted his black machinery a light color. This gave a better contrast with the black and brown leathers that went into the making of his shoes. The result was that there were fewer rejections, a lower accident rate and lower insurance costs.

A machine tool manufacturer found that when he dipped rough castings in a vivid red protective coating his machines were more accurate in the finishing of these castings. The red acted as a definite visual stimulant and made these castings stand out more clearly and distinctly.

Similarly, a scale manufacturer painted his dirty gray machines a bright light green. As a consequence the machines were kept cleaner and in much better repair.

A candy company met the problem of afternoon fatigue among its workers by decorating the cafeteria used by the people employed by this company in rich, vivid and stimulating colors. This change in color broke the deadly monotony and production was increased.

A radio tube manufacturer adopted a light blue color for his benches to offset the feeling of heat created by a welding process. The tops of the tables were made a dark blue to give contrast with the materials handled. Occasional accents of orange were introduced to avoid monotony. The workmen did much better work.

The manufacturer who gives a little consideration to colors is the one who gets the most and best work done in his shops and factories. Thus green and blue should be used where the working conditions involve heat and high temperatures. These colors are cooling and suggest subconsciously cooler surroundings than actually exist.

On the other hand, buffs, pale yellow, tans and flesh colors suggest warmth and make the shop look warmer. These colors are of distinct value in places where the temperature must be kept low for the purposes of manufacture.

Where temperature is not a factor, neutral colors are of value. These suggest neither heat nor cold. Among the most popular of these are pale red violet and pale yellow green.

In the kitchen color preference and increased efficiency seem to go well in hand. It has been found that bright reds, greens, oranges and blues are the colors most often desired and used. Browns and grays are the less desirable color schemes. A brightly colored kitchen goes a long way in making the work seem easier and the time pass faster.

There is no doubt that colors have a distinct bearing on temperature. When Picard made his first ascent into the stratosphere where the temperature is 75 degrees below zero, the gondola of his balloon reached the sweltering temperature of 100 degrees above zero. The reason for this was that the black paint of the gondola caught the sun's rays and converted them into heat. On his second trip Picard painted his gondola white, and as white has

just the opposite effect (it deflects the sun's rays), he shivered in a temperature that was near the zero point.

This gives us a scientific basis for color in clothes. If you use the right colors you will not feel the heat and cold quite so much. In summer, white and light tints of blue, green and yellow are the colors to be preferred. These colors deflect the sun's rays and make you feel cooler. In winter, black, dark shades of blue, grey, brown, absorb the sun's heat and make you feel warmer. Personal efficiency is greatly increased when a little thought is given to the right color.

Colors have invaded every field of human endeavor to make things easier to see, tasks easier to accomplish and life pleasanter to live. Colors may also be used to save human life. Georges Claude who gave the world brilliant colors to brighten the dark hours of the night with his neon lights and who has been thinking colors all his life recently rose from his seat at a meeting of the French Academy of Sciences and told how he would use colors to save aviators who had fallen into the sea.

"I believe," he said, "it would be possible for the ill-fated plane to produce a huge colored spot in the ocean which would be seen from afar and which would last for a long time, even in a storm."

Claude knew that a small part of many an organic dye is enough to stain ten million parts of water. Among the most effective of these is fluorescein. This is a chemical which comes in the form of deep red crystals and is capable of imparting a yellowish green stain to water which lasts for a long time.

A year ago Claude made some tests with this chemical on a French submarine. Two pounds of acid fluorescein mixed with powdered cork and thrown overboard made an irregular green spot about 650 feet in diameter. The spot

could easily be seen from an airplane at a distance of about two and five-tenths miles, especially when the sun was behind the observer. After three and a half hours the spot was dissipated by a storm.

There is, however, one drawback. Fluorescein is readily discolored by the sun. It loses its color after about three hours. For this reason the solution must be renewed continuously. This is accomplished by packing this chemical in little perforated cylinders half an inch in diameter and three inches long. One of these cylinders is good for twelve hours and even for 24 hours if special packing is used.

Claude's idea of marking the spot at sea depends upon the use of color to increase visual acuity. It is but one example of many in which colors may be used to save human lives.

The color-clever individual can use colors to achieve success in almost anything he undertakes. Color preference is a very real thing and it must be recognized. According to experiments conducted in psychology classes at Westminster College, Pennsylvania, romance is associated with white. First, white is connected with moonlight; moonlight with romance, and finally romance with marriage. So girls in white get more offers of marriage. Color psychology is often very effective in increasing one's chances of success.

Increasing one's efficiency as a salesman is also very much dependent upon a knowledge of colors. Manufacturers of tooth-brushes have found that red will increase the sales of 10-cent tooth-brushes, but when used in 25-cent tooth-brushes will hinder their sale. Amber seems to be the color preference of those who buy 25-cent tooth-brushes.

Automobile manufacturers are now thoroughly aware that color is of extreme importance in increasing the sales of their cars. For this reason they have constructed a color-preference map of the United States. The entire

country is divided into seven zones or groups of states. Each week reports of customers' preferences in colors of cars are posted so that the trend may be seen at a glance.

These trends do not vary greatly by season, but they do vary by geographical location. Black is the preferred color in the eastern and southeastern sections of the country. Lighter grays, browns, greens and blues are more popular in the far western states. A knowledge of colors has been a big factor in helping the automobile manufacturers increase the efficiency of their sales forces.

Colors are also the key to increased sales of numerous small articles. Makers of fountain pens have learned that green is the color that sells a fountain pen faster than any other color, and those who offer pens of various shades of green will sell more pens than those who insist on selling red pens or yellow pens. The DuPont Company is making many new plastics, and they have an immense variety of colors to choose from. But they are going about it in the right way. They found that lilac and coral were the most popular colors for their line of boudoir sets. They realize that color preference is a very real thing.

A little thought to the right color will often go a long way in increasing one's efficiency in almost every field of endeavor. Colors exert definite, measurable effects on every human emotion and physiological process. The right color in dress, interior decorating, lighting and food will do a great deal in making life a little easier and brighter.

CHAPTER IV.

THE EFFECTS OF COLORS ON THE MIND

During the World War we learned a great many things of which we had a vague conception before. We learned that the health of mind and body is dependent very largely upon the proper stimuli. We began to appreciate that Nature had certain healing forces whose effects were even more remarkable than we had ever suspected. We learned that music and color had pronounced effects on minds gone crazy and nerves shattered.

The greatest number of impressions are received through the eyes. Subconsciously our emotions are affected by colors, music and odors. Of these, colors seem to enter most subtly into the chemistry of our thoughts and emotions. Colors of the right kind and in the proper combinations exert a most profound influence on the brain and nervous system.

There are many interesting case histories of how colors helped pave the way to mental health. There was, for instance, the case of the soldier who had sustained severe shell shock in Flanders. His nervous system became so seriously affected that the sudden closing of a door and an unexpected voice caused nervous prostration. Gradually his mental health also began to fail, and in time he was seized with black fits of depression. It then occurred to the doctors who were treating him that color treatment might prove of benefit.

This soldier was admitted to a hospital and placed in a color room the governing idea of which was sunlight. The room suggested the open fields, and the color was that of spring. The ceiling was blue, the upper portion of the

walls was yellow, and the lower portions light green. The floor covering was of green felt toning with the colors of the walls. The window hangings were of deep yellow, and the artificial light was diffused by means of orange electric bulbs placed around the walls behind a cornice. The patient lived in this room for several days, supplied with light literature and appetizing food. Within a month he had so visibly improved that all signs of nervous irritability had gone.

An almost similar case was that of a young officer who as a result of the horrors he had passed through, sustained a severe shock to his nervous system which assumed the form of acute insomnia. The color scheme of the private ward used in this case was carried out in mauves, blues and greens, all of which have a sedative action. The patient entered the ward in the morning and spent the whole day there under the influence of the color scheme. That night he had his first unbroken and refreshing sleep since the advent of his nervous ailment.

Colors are not only calming in their effects on the mind; they are also distinctly energizing. Red, for instance, is a most stimulating color. Scarlet rooms for lazy boys have been tried with great success. There is the case of a young woman who was subjected to very severe periods of melancholia. When this patient felt a fit of depression coming on, she went into the red room and turned on the lights which came from red colored bulbs. The melancholia was effectively dispersed. She then passed into a room the color scheme of which was carried out in yellow and gold, a combination producing a mild stimulation. This brought her back to her normal state of mind.

Many physicians who specialize in the treatment of mental ailments have been particularly interested in the effects of colors on the mind. They have experimented

with various color combinations and have brought to light many interesting and valuable facts. Dr. Zeller was among the first, some twenty-five years ago, to use colors in the treatment of mental and nervous disorders. He cites the case of two hospitals in Switzerland where eight verandas were provided, three enclosed with ruby glass, three with violet, one with opal and one with amber, each type of solarium being designed for the treatment of a definite mental disease. The results were remarkably good.

In a red pavilion, having red walls, red carpets and red lights, a number of melancholic women were placed, and in a comparatively short time their depression was overcome and they became brighter and more contented.

Dr. Porras is another physician who has been using colors with interesting results in the treatment of mental disorders. A man who refused all nourishment and who was considered to be in danger of his life was placed in a red room for twenty-four hours, after which, on his own accord, he asked for breakfast. A maniacal patient was placed in a blue room and after only one hour showed a marked change for the better.

Colors have very real effects on the mind. They act very much in the same manner as do drugs. They may be stimulating or calming. Thus an insane asylum in Illinois uses red to stimulate cases of melancholia. Blue has definitely good results on neurotics. Those whose nerves have been shattered will often find comfort in a room decorated with gaudy checks and stripes of color. These act as a veritable tonic.

Color is coming to play more and more of an important part in the decorative schemes of hospitals devoted to the treatment of mental diseases. Dr. W. R. Dunton, Jr., of Harlem Lodge, Catonville, Indiana, has found that mentally depressed patients require greater stimulation from color than do normal persons.

Dr. S. E. Katz, of the New York State Psychiatric Institute and Hospital, has made a study of the color preferences of the insane. In every group of insane patients blue was found to be the most pleasing color. Green was a distant second. Red was a close third, with violet, yellow and orange, fourth, fifth and sixth in order. Green was more favored by inmates who were in for a short duration. Orange and yellow were the least liked by this group and best liked by those who had been in the hospital for three years or more.

Green was better liked by males and red by females. Red, orange and yellow were more pleasing to manic-depressives (circular insanity) than to others, and green was most pleasing to those suffering from dementia praecox (split personality insanity).

It is well for directors of mental hospitals to take the color preferences of the insane into consideration when decorating their living and sleeping quarters. Colors will play just as much a part in their recovery as will drugs, food and rest.

In choosing the color scheme for those of unsound mind another fact should be taken into consideration. The constant visualization of blankness, no matter what the blankness may be, is discouraging to the sick mind. Accordingly, while the walls and furnishings of the room may be predominantly of one color this color should be relieved by the introduction of other hues, as in dadoes, friezes and other embellishments that are analogous rather than complimentary.

Thus, green may be modified by touches of yellow or blue. Soft yellow, by pale green; pale blue, by pale violet; red, by orange or violet, violet by red or blue.

Bright, pure colors should be used sparingly and judiciously, care being taken not to throw the general impression of the room (stimulation or sedation) off balance. Surfaces should be dull rather than shiny, and monotony should be avoided by using different color schemes in the various rooms, or by the devise of using a ground color and a harmonizing top color, the latter being partially removed when wet by a sponge mottling or by crumpled roll finishing.

Even in milder cases of mental and nervous upset, colors may be used to great advantage. In cases of neurasthenia, yellows, blues and greens are of value. A blue ceiling has often been used with such excellent results in cases of neurasthenia that no other measures were necessary. This gives the patient a sense of space, and combined with the sunlight yellow of the walls dissipates the feeling of oppressive confinement.

A combination of blue and violet has been found beneficial for overactive nerves, especially in insomnia. Sleep is often induced by the judicious use of these soothing colors. Headaches and insomnia are best dealt with by blues, violets and mauves.

Firmament blue is magnetic and astringent. It is also soothing in cases of overwrought nerves. Blue also helps to concentrate. Sunlight yellow is a mental stimulant. Sunlight primrose is less brilliant than sunlight yellow, and may be used in conjunction with the yellow for stimulating effects.

Spring green is a combination of purest blue and yellow, and is a fine mental sedative. Anemone mauve is a mental sedative and it has been used in conjunction with firmament blue in cases of insomnia and nervous headache.

Cardinal red is of value in extreme cases of mental depression. It has definite stimulating properties, not only

on the mind, but on other functions of the body. It has been used in the rooms of indolent children and by athletes about to run a race. Rose color is a mental recuperative. Yellow will stimulate without exciting, and in conjunction with violet is beneficial in cases of depression, one color being the compliment of the other.

Black is a color not necessarily depressing, and is useful for toning strong colors. It should therefore always be used in combinations; alone it is not quite cheering. White is a cheering color which attracts sunlight, but, if used alone, is cold. Combined with red, yellow or orange it is stimulating.

Brown is restful and warming in quality, but if used alone tends to have a depressing effect. It is very useful in combination with orange, yellow or gold, when it suggests sunlight and counteracts melancholia.

Purple and mauve are sedative and soothing and productive of sleep. They concentrate and are very useful in cases of mental instability. Gold is a bright, cheerful color, useful in convalescence, while gray depresses and suggests cold.

Blue is a color possessing cooling, sedative properties which, to some people, are depressing. If it is used in too large quantities it is capable of producing melancholia, therefore it is useful in reducing cases of excessive mental excitability.

Green possesses cooling properties, which is useful in nervous diseases as it subdues excitability. It acts as an opiate and counteracts the brightness of the sun. It excites the eye less than any other color, even black, and induces repose.

Red is a stimulating color of high standard, which excites and increases the working power of the brain. Too much

can disturb the mental balance of delicately poised minds. It disperses melancholia most effectively.

Yellow is a cheery and stimulating color. According to Dr. Babbitt, it is the central principle of nerve stimulus as well as the exciting principle of the brain. It is not as violently stimulating as red.

When discussing the effects of colors on the mind another factor must also be taken into consideration. In the minds of certain peoples and races certain colors suggest definite qualities and characteristics. Colors are symbols and are used in the process of symbolic thinking. From earliest times man has thought of colors as symbols, and has associated them with emotions and thoughts. Thus red may stand for action and courage, but also anarchy and carnage. For this reason it may evoke desirable reactions in some, but in others, red may suggest blood and destruction and have an adverse effect.

Pure yellow suggests cheerfulness, glory, prosperity and sunlight, and in those who have this symbolic evaluation of yellow this color acts as a means of bolstering up the emotions. Yellow also suggests shoddiness, disease (jaundice, anemia, etc.), and cowardice. In people who have this subconscious evaluation of yellow, this color brings distress and discouragement.

Purple may be the color of royalty, magnificence and heroism. In these instances it is an ennobling tint and capable of exerting a very desirable effect. Purple to some people suggests passion, mystery and suffering, and in these people is freighted with undesirable emotional reactions.

Another interesting fact which must be taken into consideration when thinking of colors as a factor in the chemistry of the emotions is that certain persons are much more affected by colors than others. Artists, writers and poets, ordinarily are more affected by colors than those whose

emotions do not enter very strongly into their daily lives.

Blue always evoked the most pleasant reactions in Lafcadio Hearn, the writer. Says he: "In my own case the sight of vivid blue has always been accompanied by an emotion of vague delight—more or less strong according to the luminous intensity of the color. It was when I beheld for the first time the grandest vision of blue in the world—the blue of the Gulf Stream; a magical splendor that made me doubt my senses—a flavoring azure that looked as if a million summer skies had been condensed into pure fluid color for the making of it." Blue was Hearn's favorite color, and it always perked his spirits up. It lifted him up emotionally more than any other color.

On the other hand, red was the favorite color of Louisa Fletcher, the poet. For her, red "was the color of Harlequin, the pulse of all things. A deal of me and you have carnival, a little, and the heart must skip a beat." Red was just as emotionally uplifting to Miss Fletcher as blue was to Hearn. This brings up another interesting point in the sexual preferences of color. Blue is and has always been the favorite color of man, while red has always had the most attraction for women.

Color preferences also must be taken into consideration when dealing with the emotional and mental make-up of different classes of people. When a certain color is given preference it always exerts a more profound effect on the mind than one which does not have this preference. Thus, it has been found that athletes of both sexes tend to favor red. Intellectuals have a decided preference for blue. Egotists, for some strange reason, have a passion for yellow. The convivial always go for orange. The lovelorn always tend to gravitate toward red.

The age of the person is still another factor which must be considered. Children invariably prefer bright, gay

and flashy colors. So do negroes. Harlem, on a Sunday is a vivid splash of purples, reds, violets, blues and other colors. The elderly prefer black, dull grays and browns. So do people with conservative tastes. When considering color therapy these factors must be taken into serious consideration.

Finally, mental prejudice is a very important factor in color preference and the emotional qualities it evokes. Color prejudice is very closely bound up with racial and national characteristics. A Chinaman, for instance, will not react to the same color combinations as will an American. A large oil company with filling stations in China, painted them white. Business fell off considerably. White is the color of mourning in China. It may suggest purity and cheerfulness to an American, but to a Chinaman white suggests death and sorrow. It cannot be used to cheer him up because of its emotional associations. Yellow would be more successful, for it is the royal color of China. Similarly, yellow is the marriage color of India, and for the Hindu it has pleasant associations.

In Japan, red is never popular and always evokes distress because it is the symbolic color of fire and destruction. In India, however, red is extremely popular. It means health and protection from diseases. These deeply ingrained prejudices must always be taken into consideration when planning the color treatment of mental and emotional disease.

There is no longer any doubt that colors play a very important part in the mental and emotional health of every individual. This is a world of colors and each one exerts a very definite effect on our mind and psyche.

CHAPTER V.

MOOD CONDITIONING WITH COLORS

Colors influence moods. Certain colors evoke specific emotional reactions. Green suggests grass, blue is symbolic for sky, white is synonymous with purity, and red is the color of fire and passion. Our language is sprinkled with color-mood expressions. We feel *blue;* we are *green* with envy; we wake up with a dark *brown* taste; we fly into a *white* rage.

How colors affect moods has been a problem of particular interest to producers of plays and moving pictures. Dr. Robert R. Ross of Sanford University recently made a series of interesting experiments on the emotional equivalents of colors. These experiments were conducted at the Pasadena Community Playhouse. He found that gray, blue and purple are associated with tragedies. Yellow, orange and red compliment comedy scenes. Red was also suggestive of great dramatic intensity. Gray and purple were the next most effective.

With the coming of Technicolor, moving picture directors have become intensely interested in the emotional equivalents of colors. William A. Wellmann, who has made several notable color films, has an interesting theory of color-induced emotions. His theory is behavioristic. It is his belief that colors have become identified with emotion as a result of primitive environmental association.

Mr. Wellmann has constructed an interesting and informative chart giving the emotional equivalents of colors. His chart considers eight colors, their chief auxiliary influence, contributing influences, the emotional state evoked and associated factors. He has made good use of this chart in making color photoplays. It has been his attempt to use certain colors to evoke certain, definite emotional responses.

The Wellmann chart of colors is as follows:

WELLMAN CHART OF COLORS AND THEIR ASSOCIATED EMOTIONS

Color	*Source of Primitive Color "Bath"*	*Chief Auxiliary Influence*	*Contributing Influences*	*Emotional State Invoked*	*"Prime Factor" of Color*	*Associated Factors*
BLACK	Night	Charcoal	Smoke, black rocks	Sleep, unconsciousness	Negation	Gloom, depression
WHITE	Fair-weather clouds	Snow	White sand	Awareness	Affirmation	Uplift, zest
GRAY	Rain	Fog	Stormy seas	Decadence	Death	Old age
BROWN	Earth	Autumn leaves	Muddy water	Sorrow	Illness	Melancholy
BLUE	Sky	Sea	Ice	Thought	Infinity	Spirituality
GREEN	Leaves	Clear water	Springtime, plant growth	Sense of well-being	Health	Abundance
RED	Blood	Sunrise, Sunset	Lips, wounds, red rocks	Combat	Life	Vigor
YELLOW	Fire	Sunlight	Large flowers, clay earth	Comfort	Happiness	Warmth, joy

Says Mr. Wellmann: "We have seen that grayness is a factor antithetic to life, and more than black—which somehow suggests a coarse vitality—grayness is the dismal symbol of death. Yet when gray is brightened with the metallic luster of silver, it becomes something else again. In a scene in *Nothing Sacred,* Carole Lombard wears such a dress, and its effect is to accent her blond beauty, to heighten the tones of her hair."

Another depressing color is brown. Brown is the color of hopelessness, of approaching death. It is the dominant color of Autumn, the death of summer. It is the color of the approaching of Winter, of dreary cold and lessened sunshine. This Mr. Wellmann knows. He has made a very interesting application of brown in mood-conditioning. In another scene in *Nothing Sacred,* a sad, lugubrious effect was desired, and both Miss Lombard and Fredric March wore dark, dull-brown clothing. The predominating colors of the scenes were browns and blacks.

On the other hand, joy, happiness, festivity, is conditioned by warm, gay colors, reds, purples and gold. A night-club sequence in *Nothing Sacred* was a veritable rainbow of vivid colors. They conditioned a happy, joyous mood.

There are rare exceptions to color mood-conditioning as there are to other factors. This Mr. Wellmann realizes. "Our conclusions are based," he says, "on the average norm of many reactions. In such a survey as we could undertake, it was impossible to consider individuals except as they influence mass calculations. Some people most certainly do not share the general color reactions of the rest of the human race.

"It must be remembered that certain individuals set up defenses against instinctive color preferences. A person will reason subconsciously that it is silly for him to have

a prejudice against blue, for example, and so will voluntarily express a choice for that color."

It is Mr. Wellmann's belief that an individual's color preference has nothing to do with his reactions to color on the screen. If this condition obtained, it would be useless to attempt to fix an emotional scale of colors on the screen. Conditioning moods with colors is dependent largely upon instinctive color reactions and color symbolism.

Not only is mood conditioning by colors limited to Technicolor pictures. Toning is also employed with signal success to express the mood of non-color photo-plays. Pictures are now being made in a variety of sepia and blue tones which definitely evoke emotional responses, perhaps not as vividly as Technicolor, but the response is there just the same. Thus, sepia color is more successful in evoking an emotional reaction to a desert scene than mere black and white. It suggests burning sands, heat waves and trackless wastes.

The film *The Good Earth* was filmed in sepia and here a color was used to condition the proper mood of the story told. It was a story of heat, famine and drought, all blazing emotional qualities, told very effectively in the warm suggestiveness of sepia.

In *The Firefly* tinting was also used to advantage in bringing about appropriate emotional responses. There was, for instance, a scene in a Spanish barnyard that called for romantic treatment. Sepia and blue were skillfully blended to create the mood of a romantic moonlight night. Later a gypsy campfire scene was depicted. A similar combination was used, except that a small dash of orange was added to bring out the glow of the campfire on the faces of the players.

In everyday life colors constantly suggest moods. They condition moods and evoke emotional responses just as

surely as heat and cold condition temperature and hunger conditions appetite.

In all the languages of man colors have been used as symbols to express human emotions. Primitive physiologists made careful note of the changes of the color of the human face and associated these colors with certain human emotions. Redness is indicative of anger and other violent emotions. Yellowness is the outward sign of grief, envy, resentment and when tinged with green, of jealousy. Blueness is expressive of hate, fear, terror, agony, despair and death.

There is in reality a true anatomic basis for these color changes. The face actually does assume a reddish glow in anger, due to an increased flow of blood to the face. On the other hand, a lack of blood may impart a bluishness which is indicative of terror and agony. Doctors know that certain diseases of the heart are characterized by a bluish tinge, and death itself bathes the body in a depressing blue.

Nature, on a larger scale, reflects colors in her moods. Summer is the season of warm, brilliant golds, reds, purples and orange. Green is the dominant color of Spring, the awakening of life, the coming of warmth and sunshine.

Winter is white and pale bleak gray. These are cold colors, dismal and discouraging. Autumn is brown red and black, the approaching of cold and death.

These color moods of the seasons affect all mankind profoundly. They condition human moods and emotions just as surely as the changes in temperature condition the sensations of heat and cold. Poets and singers have always carefully noted these color moods and in their more successful attempts have noted their relations to human emotions.

Color symbolism has its origin in the primitive obser-

vations of early man. He associated certain colors with certain moods and emotions, and these persist even today. Says G. Field in *Chromatography*: "Of these popular symbols, black denotes mourning or sorrow; gray, fear, etc.; red is the color of joy and love; blue, of constancy; yellow, of jealousy; green, by a physical analogy, of youth and hope; and white, by a moral analogy, of innocence and purity.

"These remarks do not apply merely to the more positive colors individually, but extent with even greater force to the more neutral or broken compounds, every hue and shade having its corresponding shade of expression and reciprocation, affording materials for the cultivation of feeling and taste; the sublimest expression vibrating in all cases with the most delicate touch."

To catalog the mood and emotional equivalents of all the known colors would require a book of several thousand pages. We shall here consider eight of the most common colors and see what moods they are capable of evoking.

BLUE. This is one of the primary colors. Blue always suggests cold. Physiologically this is sound. We tend to turn blue when we feel cold. A room painted in blue never seems to be heated properly, even when the temperature is above 70.

Blue is soothing in its effects. It is suggestive of melancholia and similar feelings. It is a sedate rather than a gay color, even when it is very brilliant. In nature blue is the color of heaven and of the eye. For this reason it is emblematic of intelligence and divinity. It is used in mythological representations to distinguish the mantle of Minerva, the blue-eyed goddess, and the veil of Juno, the goddess of air; while Diana, or the Moon is robed in blue and white, as the Isis of the Egyptians and her priests were in pure

azure; and Poetry herself is personified in a vesture of celestial blue.

RED. This is another of the primary colors. It suggests opposite feelings and sensations from blue. Red conditions heat, blood, passion, splendor and power. Anything that is red suggests an intense emotion of some kind.

In Christian mythology red is symbolic of the Passion of Christ, and of the suffering and martyrdom of the saints. Says Durandus: "Scarlet vestments are used on the festivals of apostles, evangelists, and martyrs, on account of the blood of their passion, which they poured out for Christ."

Red is expressive of ardor and the sanguine passions: it is hence peculiarly a military color, as appropriate to war as white is to peace: hence the red plumes worn by military heroes in ancient times. It dyes the flag of defiance, and is the emblem of blood, naturally stimulating and indicating fierceness and courage. As powerful, it has become the symbol of power and distinction, and hence has decorated equally the regal robe and the mantle of martyrdom, producing awe, veneration and fear; while in its gentler offices it moves and assists the affections of—

"Love, Hope, and Joy, fair Pleasure's smiling train:
and is upon the whole, the most effective of colors."

Red always suggests a vigorous mood. It energizes mind and body. It suggests motion, vitality, vigor.

YELLOW. This is also a primary color. Yellow represents the effects of heat and fire. It is the color of the sun, of life and it is quite stimulating.

On the other hand, yellow is also the symbol of jealousy, envy and other base emotions. It has also been used to express charity, joyousness, plenteousness and old age.

GREEN. This is a secondary color, and is made up of a mixture of blue and yellow. It is the most restful of colors and is very grateful to the eyes.

Symbolically green is the emblem of youth, bountifulness, happiness and prosperity. The green field is the emblem of felicity and prosperity. An abundance of green in the fields symbolizes bountifulness.

Green is the symbol of hope, which like the animating color of plants, is suggestive of life. It is also emblematic of immortality, and the figure of old Saturn or (Time is crowned with evergreen. This color denotes also memory, and affords a great number of epithets, metaphors, colloquial as well as rhetorical.

Plenty is personified in a mantle of green. In mythological subjects it distinguishes the draperies of Neptune, the Naiades, and the Dryades; and, from being a general garb of nature, perhaps, has been held to be a sacred or holy color.

ORANGE. This is another of the secondary colors and is made up of red and yellow. Orange is the color of a flame and is therefore suggestive of warmth. It suggests the sun at the close of day. It is also bound up with connotations of wealth and fruitfulness.

Orange is also very suggestive of gold (hence the suggestion of wealth), and the ancients called the orange the golden apple. Orange like yellow and red from which colors it derives its origin suggests cheer, hope and festivity.

PURPLE. This is a secondary color made up of red and blue. It is a color of dignity, state and regal power. However, when it has more blue than red it is symbolic of sadness, sorrow and gravity.

Concerning purple Field says: "As purple, when inclining toward redness, is a regal and pompous color, it has

been used in mythological representations to distinguish the robe of Jupiter the King of Gods, and in general also as a mark of sacerdotal superiority: in its effects on the mind it partakes principally, however, of the powers of its primary, or ruling color, blue, and hence is a highly poetical color, stately, dignifying, sedate and grave; soothing in its lights, and saddening in its shades; accordingly it contributes to these sentiments under the proper management of the painter and the poet, as it does also popularly in its use in court mournings, and other circumstances of state: hence the poets sing of *purple state*. The rhapsodists of Greece often used to recite in a theatrical manner, not only with proper gestures, but in *colors* suitable to their subject; and when they thus acted the Odyssey of Homer, were dressed in a purple-colored robe to represent the sea wanderings of Ulysses: but when they acted the Iliad they wore one of a scarlet color, to signify the bloody battles described in the poem."

Next to green, purple is the most pleasing of the consonant colors; and has been celebrated as a regal or imperial color, as much perhaps from its rareness in a pure state, as from its individual beauty. It is probable, nevertheless, that the famed Tyrian purple was nearer to the rose, or red, than the purple of the moderns, in which inclination of hue this color takes the names of crimson, etc., as it does those of violet, lilac, etc., when it inclines toward the other constituent blue; which latter color it serves to mellow, or follows well into shade.

Purple is always expressive of nobility, dignity, royalty. Similarly when deep sorrow is to be expressed purple is also used. When a King or a President dies, purple rather than black is the color of mourning.

WHITE. Strictly speaking, white is not a color. It is the sum total of all colors. But for practical purposes

white is a color which brings about reactions just as definitely as red or green or blue. Symbolically, white signifies pureness of living. White is used in the Festival of Angels.

White also represents, according to Gavantus, glory, joy and innocence. Other symbolic values of white which are of importance in mood conditioning are piety, innocence, gentleness, timidity, modesty, dignity and peace. As it was also pointed out in a previous chapter white is the color of moonlight and as such conditions romance, and romance leads to marriage. Psychologists have proved that girls who wear white more readily receive proposals of marriage than those who wear red. White suggests not only romance but also innocence and purity.

GRAY. Gray is a somber color. It is next to black, the dreariest and most dismal of all colors.

Grave sounds, like gray colors, are deep and dull, and there is a similarity of these terms in sound, signification and sentiment, if even they are not of the same etymology. Gray is almost as common with the poet, and in its colloquial use, as it is in nature and painting. The grays, like the other semi-neutrals, are sober, modest colors, contributing to the expression of gloom, sadness, frigidity, and fear—the grave, the obscure, the spectral—age, decrepitude, and death; bordering in these respects upon the power of black, but aiding the livelier and more cheering expressions of the other colors by diversity, connection, and contrast, and partaking of the more tender and delicate influence belonging to white, as they approach it in their lighter tints.

BLACK. This is the most dismal of all colors and symbolically it expresses all that is opposite to white. The grave is black, sin is black, death is black, crime is black. It is the emblem of woe and destruction. It is the most depressing of all colors. It is the color of mourning.

Colors are of the utmost importance in their effects upon the mind and the creation of moods. Different colors bring about different emotional reactions. In the main mood conditioning with colors is dependent largely upon instinctive color reactions and upon the symbolic significance of colors.

CHAPTER VI.

THE COLOR PSYCHOLOGY OF CLOTHES

Colors in clothes serve several important functions. First, color has a great deal to do with comfort. White and light colors are cooling; they ward off heat as an umbrella does rain. For this reason white is the predominant color in the summer and in the tropics. On the other hand, black and dark colors absorb heat, and are for this reason popular in the northern countries and during the winter months. This is a principle so well-known and so universally appreciated that an extended discussion of it is not necessary.

Second, the colors of the clothes one wears has as definite an effect on the mind and emotions as the coloring of the house one lives in. A person who habitually affects dark colored clothes is a person of grave mein, overwhelming dignity and gravity. Priests, rabbis and other ministers habitually wear black. This is in keeping with their calling. The doctor of fifty years ago considered it beneath his dignity to wear anything but black and dark brown suits.

Similarly, actors, actresses, singers, dancers and others whose vocations deal with the lighter side of life prefer light grays, tans, reds, and other gay colors.

It has been found that the colors of one's attire exert just as profound an effect on the mind as do the colors of one's surroundings. Therapeutically, gay colors in the clothes of those habitually depressed act as a tonic. Somber hues, on the other hand, act as a sedative for those who are over-exuberant and violent. Psychiatrists are now agreed that the manner in which a mental patient is dressed will

go quite a way in either helping his mental condition or retarding it.

Third, the color of the clothes one wears is extremely important as far as the natural coloring of the skin and hair is concerned. A pleasing harmony or a delicate contrast between the color of one's clothes and one's natural coloring plays an important role in efficiency, happiness and comfort.

Dr. George Ashdown Audsley, a profound student of colors, particularly of colors in dress, has discovered many interesting facts in connection with color harmony in dress. He classifies human coloring into four types: the fair blonde, the ruddy blonde, the pale brunette, and the florid brunette. Each type calls for special preferences in the coloring of the clothes.

The pale blonde has a skin that is pale with a delicate tinge of pink. The eyes are clear, soft blue, and the hair is light golden in color. These colors must be taken into consideration when choosing the color of the clothes to be worn.

According to Dr. Audsley, green is the most desirable color of this type of coloring. Green gives to the delicate coloring to the skin a richer glow of pink. It forms a pleasing contrast with the blueness of the eyes and the golden color of the hair.

The lighter shades of green are preferable to the darker. Olive green and sage green are the preferred shades. However, green is not the only color that can be used to the best advantage by the pale blonde. Orange and deep gold also go well with this type of coloring. Blue is also a favorite color with this type. It harmonizes well with the golden hair and also emphasizes the color of the eyes. White may be used beautifully to harmonize with the blue, which should always be light in shade.

The pale blonde should always avoid red, yellow, purple

and brown. These colors tend to form jarring and unpleasant contrasts with the natural coloring of the skin, hair and eyes.

Black and white are colors that always seem to go well with the pale blonde type. They form pleasing contrasts and emphasize the more pleasing nuances of this type of coloring.

The ruddy blonde has a fuller coloring to the skin than the pale blonde. Her skin is pinker, her eyes are of a deeper blue color and her hair is inclined to be browner or redder than the pale blonde. In this type of coloring deeper tones and less pronounced hues are called for.

Green also seems to be desirable for this type of blonde coloring, but the green should tend toward the darker hues. Blue is another color that goes well with this type. Here also the shades should be deeper than those used by the pale blonde.

Black and white are always harmonious with this type of blonde coloring as with the previous type. The colors to be avoided are the same as mentioned in the case of the pale blonde. Violet should never be used, as it has a most jarring effect on the color of the skin.

The pale brunette has a tendency toward a sallow complexion, her skin is always pale. Her eyes are deep brown or brown-black; her hair is a deep dark rich brown or black. The motif in this type of coloring is that of a deep contrast, contrast between skin and eyes and hair.

The colors suitable for the pale brunette are either light or dark, for contrast, never medium colors. White while it is suitable for the blonde type of coloring is undesirable in the case of the pale brunette. White has a tendency to emphasize the pale, sallow complexion and give it a deady aspect. Blue white is particularly undesirable. However, cream-white can be used, but only sparingly.

Black is another color that is not flattering to the pale brunette. It also serves to focus attention on the sallowness of the skin. It makes the paleness assume a sickly glow, and gives the impression of sickness, brittleness and pathological delicacy.

Blue is another unflattering color for this type. It also casts an unhealthy glow on the pale skin. It seems particularly to emphasize the underlying orange tinge and invariably suggests ailing.

Some shades of brown are very flattering. However, olive brown and grayish brown should be avoided. Warmer colors are always suitable. Claret, deep russet and crimson go well with this type of coloring. Old rose, reds, gold and maize always form agreeable contrasts and are recommended.

The colors to be avoided are light blues, light greens, pale violets, purples and pinks. These colors always accentuate the paleness and sallowness of the skin.

The florid brunette has a rich, pink glowing skin, dark brown eyes, and hair that is either very dark brown or jet black, almost bluish black.

Subdued reds are flatteringly worn by this type when it appears vulgar in all others. Maroon, with a good dash of red is also desirable. Dark blue and rose pinks are also in harmony with this type of coloring.

The colors to be avoided are light blues, light greens, pale violets, violet-pinks and all shades of purple. When these colors are used unsparingly they overemphasize the ruddiness of the skin and the blackness of the hair and give a jarring and very unpleasant contrast.

The question of color in clothes for men is not quite so complex. Men are very conservative as far as color in dress is concerned. It is only within recent years that color

has come to play any part in his attire, and this is limited to his neckties and shirts.

Coloring in men follow, in general, the same tendencies as coloring in women. When considering a splash in colored shirts and neckties the same laws apply as in female preferences. Suits are not as wide in color selections as dresses and hats for women, but even in their narrow limits wise choices may be made.

Within recent years there has been a definite trend towards a wider use of colors in clothes for men. Even formal attire is no longer black. Various shades of blue are now advocated in tuxedos and dress suits. In the tropics, white is the preferred color.

Fashion shows for men are now a yearly event. *Esquire*, the magazine for men, has been sponsoring these shows for the past few years, and they have aroused a great deal of interest. Colors no longer tend to lean toward the deeper colors of the spectrum, blacks, browns and grays. They are now livelier and gayer.

Even the newspapers now carry fashion notes for men. Al Taylor runs a regular feature in the New York Daily News with accounts of the latest trends of fashion for the male. Men are becoming color conscious, not quite so much as women, but they are beginning to awake from a three century lethargy. During the 15th and 16th century men wore clothes of many colors, like Joseph's coat. There was more romance and adventure in those days, gay colors, spirited music and groaning festive boards.

The men's fashion reporter always has his eyes open for the latest in what well-known men are wearing. Thus Al Taylor in a recent column had the following style flashes. Charles Butterworth in a brown worsted suit, tan short and brown and tan striped tie, a symphony in browns, which always goes well with the coloring and stature

of Mr. Butterworth's type. Men with a tendency towards dark skins and brown hair always look well in browns and tans. Black is also becoming, but grays and other light shades are jarring.

Ralph Bellamy, on the other hand, being tall, and of lighter coloring, seems to have a preference for light grays. But dark shades of the livelier colors are also becoming to him. Al Taylor in one of his style flashes reports seeing Ralph Bellamy in a dark green suit, tan shirt and medium green tie. Former Senator Bingham of Connecticut was always dressed in gray. This blended with his gray hair very nicely and always gave him a well-groomed appearance. Grays are becoming to men of tall stature, while men who are inclined to be short and rather stout look better in dark blues, blacks and browns.

Tall men who are not stout seem to have a greater variety of colors to chose from. Buster Crabbe was reported in a sharkskin plaid suit with blue and red stripes, white shirt with blue stripes, and red and blue tie. Age also has a great deal to do with color choice. This ensemble would look out of place on an older man. More conservative colors are called for.

Another factor responsible for choice of colors in clothes is the vocation of the wearer. Actors, singers and others whose work calls for public appearances tend to prefer a wider choice in colors. In a recent style column Michael Bartlett was reported in a brown knitted golf jacket, gray flannel trousers, tan shirt, green and tan plaid flannel tie and green hat. A professional man of Mr. Bartlett's build and coloring would prefer more conservative colors.

John Ruskin, who was one of the greatest of art critics and who incidentally knew something about colors said concerning color in dress:

"The man and woman are meant by God to be perfectly

noble and beautiful in each other's eyes. The dress is right which makes them so. The best dress is that which is beautiful in the eyes of the noble and wise persons.

"Right dress is therefore that which is fit for the station in life, and the work done in it: and which is otherwise graceful—becoming—lasting—healthful—and easy; on occasion, splendid; *always* as beautiful as possible.

"Beautiful dress is chiefly beautiful in color—in harmony of parts—and in mode of putting on and wearing. Rightness of mind is nothing more shown than in the mode of wearing simple dress.

"Ornamentation involving design, such as embroidery, etc., produced solely by industry of hand, is highly desirable in the state dresses of all classes, down to the lowest peasantry.

"National costume, wisely adopted and consistently worn, is not only desirable but necessary in right national organization. Obeying fashion is a great folly, and a greater crime; but gradual changes in dress properly accompany a healthful national development."

Prescribing the right color for dress is not a very easy task. There is the trend in fashion to contend with. This aims at standardization without taking into consideration the natural coloring of many and different persons. Fashion decrees that certain colors are to be worn by all and necessarily dissimilar persons. Still another factor is personal tastes and preferences. Prejudices are also to be taken into consideration.

In the main, color in dress is an individual problem for each of us. Constant experimentation is required before one can arrive at a fairly good idea as to what colors suit us best. Also, colors of skin, hair and even the eyes change with the state of one's health, and these factors must also receive careful consideration. Age is still another factor.

No matter what the coloring may have been, gay, flamboyant colors in the clothes of an elderly person is vulgar and indecent.

The color psychology of clothes is a most fascinating study. When given the time and effort it deserves a lot may be gained in increasing personal efficiency, mental health, emotional satisfaction and satisfaction with life.

CHAPTER VII.

THE HEALING EFFECTS OF COLORS

There is as much actual healing in colors as there is in drugs, heat, massage and other physiotherapeutic methods. And these medicinal effects are as real and measurable as any obtained through other means.

Some fifty years ago Dr. Edwin D. Babbitt wrote a book entitled *The Principles of Light and Color* which was among the first to deal with the medicinal effects of colors. He called this method of treatment chromopathy, and in time it attained quite a vogue. The trouble with Dr. Babbitt was that he was a bit overenthusiastic. He sought to treat too many conditions with colors, and today he is regarded in a somewhat unfavorable light.

But Dr. Babbitt was a pioneer, and all pioneers have a tendency to overstate matters. He invented various machines to be used in the color treatment of disease, and for a time these were widely used by the doctors of those days. One of his most popular inventions was the Chromo Disk which was capable of giving off various colors. Different colors were recommended for the treatment of various ailments.

Thus, a blue disk was used for inflammation, wounds, excitable heart and hemorrhage. It was directed over the stomach for the treatment of gastritis, the bladder in cystitis, etc.

A yellow or amber disk was highly recommended for the treatment of nervous conditions. When used over the liver it was thought to stimulate the flow of bile, and similarly when concentrated on the left side of the abdomen was believed to overcome constipation.

A purple disk was advocated as highly efficacious for the treatment of indigestion when it was concentrated over the area of the stomach. Dr. Babbitt also firmly believed that this purple light was of great value in the treatment of asthma.

Dr. Babbitt meant well, but he let his enthusiasm run away with him. His book, which numbers some six hundred pages, is more amusing than useful. He saw colors as the basis of life, of thought and of the universe. He even founded a college in New Jersey devoted exclusively to the teaching of color therapy which for a time had its faithful disciples.

Another physician who was a firm believer in the healing effects of colors was Dr. S. Pancoast. He wrote a book, much briefer than Dr. Babbitt's entitled *Red and Blue Light.* He was not quite so radical in his views, and his work with colors is quite interesting.

Dr. Pancoast reported many case histories in which colors played an important part in alleviating certain conditions. There was the case of a boy of eight who had paralysis of both legs. He was subjected to treatment with red light over the legs from one to two hours at a time. After several weeks of such treatment Dr. Pancoast noted a perceptible improvement in his condition.

Another case was that of a woman of 32 who had suffered from sciatica for several years. She was treated with blue light which was played over the region of her spine. Within ten days there was a noticeable improvement in her condition.

Still another case of Dr. Pancoast's was that of an infant of 18 months who was suffering from cholera infantum and diarrhea. He, also was treated with blue light and after two months treatment made a fine recovery.

While Dr. Babbitt used all the colors of the spectrum,

Dr. Pancoast used only the colors red and blue. Between these two extremes there were many others who were firm believers in color treatment. Not only medical men but laymen were very much interested in the healing effects of colors and used the many color machines available at that time for the treatment of every imaginable disease.

Colors are now used in the treatment of various ailments, and it has been established that colors act in three different ways: as a sedative, as a stimulant and as a recuperative. For years doctors have been using colors in the treatment of diseases at the Light Research Institutes at Munich and Bad Aussie. This work interested Dr. Noel Scott, Surgical Assistant at the Royal Waterloo Hospital in England who carried out an intensive study on a series of cases with very interesting and significant results.

His case reports are of interest and are reproduced here to show the remarkable effects that colors exert in a variety of diseased states: Case No. 1: Mr. E. B. He was suffering from a stomach ulcer, and he began to suffer pain 1½ to 2 hours after food, which was relieved by taking more food (which is characteristic of that type of ulcer situated in the duodenum or the beginning of the small intestine). He was treated for some weeks in a hospital on a milk diet. The pain decreased considerably but although he dieted very carefully he was never absolutely free from discomfort. However, as time went on the pain after food appeared to be increasing and he was steadily losing weight. His general condition was poor and he was somewhat emaciated.

Dr. Scott decided to treat Mr. E. B. by means of chromotherapy and for this purpose a 1,000 watt Solux lamp was used, fitted with yellow and red filters as was also a Kromayer ultra-violet, water-cooled lamp. The whole of the affected area was first of all radiated for ten minutes

with the yellow light at a distance of 24 inches, then the red light was applied at the same distance for a period of eight minutes followed by compression radiation by the Kromayer lamp for fifteen seconds. Compression radiation is the close application of the lamp to the skin of the patient so that the rays shall be prevented from passing through the atmospheric air. Finally, in order to give a deep penetration of the ultra-violet rays, a blue filter was placed between the Kromayer lamp and the skin of the patient and the stomach area was radiated for three minutes.

The interval between treatments was 48 hours, and in all, ten treatments were given. After the first, light diet could be taken without discomfort, but the patient still continued taking the alkaline powders which had been prescribed for him after food. After the second treatment the powders were discontinued and the light diet was adhered to with no ill-effects. After the fifth treatment, boiled fish and chicken were taken with no discomfort. After the eighth, red meat in small quantities was attempted successfully and after the tenth and final treatment, the patient resumed ordinary food with no ill-effects whatsoever. At the end of the treatment the patient stated that he felt perfectly well. He had also gained in weight.

Case No. 2: Mr. H. was suffering from low blood-pressure. He complained of mental depression, loss of appetite and lack of energy. The slightest effort left him very fatigued. He was treated with a general body color bath with the open Sollux lamp at a distance of 24 to 36 inches until his skin assumed a ruddy glow. Then ultra-violet radiation was applied for three minutes back and front at a distance of 36 inches followed by radiation over the heart for three minutes at 15 inches over the front and back of the neck at a distance of 15 inches for 8 minutes.

After the third treatment, the radiation with the yellow

light was increased to six minutes at 15 inches over the front and back of the neck. Six treatments were given in all. At the end of the sixth treatment the patient's blood pressure had risen to normal and he felt fine in all respects.

Case No. 3: Mrs. W. Her complaint was high blood-pressure. She complained of dizziness, occasional severe headaches and shortness of breath. She was treated with a general color bath with the open Sollux lamp at a distance of 24 to 36 inches for three minutes. The blue filter was then applied over the heart for three minutes at a distance of 12 inches, and over the front and back of the neck for 6 minutes at 12 inches.

In subsequent treatments this radiation with the blue filter over the heart and neck was gradually increased from three to six minutes over the heart and neck was gradually increased from three to six minutes over the heart and from six to 15 minutes over the front and back of the neck, the distance being 12 inches.

After the third treatment the blood pressure fell twenty points, and after the sixth treatment another 10 points. She was now free from headaches, although there was still some dizziness.

Case No. 4. Miss T, aged 50. Her ailment was deafness. She had had a nervous breakdown five years before and since then she noticed that she had been gradually becoming deaf. First the left ear was affected and shortly afterward the right ear. Treatment consisted of a general body color bath with the open Sollux lamp, followed by ultra-violet radiation all over the body for three minutes at a distance of 36 inches. The green filter was then applied over both ears and neck for 12 minutes at 8 inches distance. The same treatment was repeated two days later, and on the third treatment, another two days later, the ultra-violet dose was increased to five minutes at 30 inches, and the

green dose over the ears and neck to 15 minutes at eight inches.

At the end of the treatment the patient could hear the tuning fork clearly at two inches from both ears, and faintly from a distance of three inches. The green light dosage was gradually increased to 20 minutes at eight inches, and at the termination of the eight treatments the tuning fork could be heard at a distance of nine inches from both ears, and the patient stated she could listen to the radio and hear the birds singing, something which she had been unable to do for three years.

Case No. 5. Miss E. aged 48. The diagnosis in this case was chronic gastritis. She complained of a heavy feeling immediately after meals which developed into acute pain 1½ to 2 hours after eating. She had been suffering from indigestion for many years which had been gradually getting worse. She could tolerate only a light diet, and was living mostly on milk and soups. Consequently, she was losing weight.

She was treated by radiation with the open Sollux lamp at a distance of 36 inches all over the abdominal region for a period of 25 minutes until the skin assumed a ruddy glow. She was then radiated with the yellow filter for 12 minutes at a distance of 15 inches. At the second treatment three days later the same procedure was repeated, except that the time of radiation with the yellow filter was increased from twelve to 18 minutes. After this treatment the patient stated that she was able to eat fish with no subsequent discomfort. The third and fourth treatments were given also at intervals of three days and the period of radiation by the yellow filter increased on both occasions from eighteen to 21 minutes at the same distance of fifteen inches. At the end of the treatment the pain after meals was gone and the patient began to put on weight.

The sun is the source of all life on earth; it is also the

source of light and heat, two types of energy required by all living things. When Newton analyzed a beam of sunlight by means of a triangular piece of glass he found that this beam consisted of many colors. For this reason it has been held that black is the absence of color, while white is a combination of all colors.

Sunlight is a combination of all the colors of the spectrum, visible and invisible. Among the latter are ultra-violet and infra-red. These two invisible colors exert very profound physiological effects and are widely used in medicine today.

The healing power of sunlight is dependent upon both the effects of heat and of a combination of all the colors in a single ray of white. Properly speaking then, sunlight is still another application of healing with colors, in this case, using all the colors, visible and invisible, simultaneously.

From very early times it has been known that the sun is a source of health; perhaps a subconscious recognition of this fact was the actuating factor of the sun worship of primitive religions. Sun-bathing dates back to antiquity. The love of basking in the sun seems to be inherent in all living creatures.

Today, more than ever before, sunlight is recognized as a powerful factor in building and maintaining health. In many cases in which other remedial measures have failed, sunlight has been found to exert a favorable influence. Even in surgical tuberculosis, sunlight, reinforced by the atmosphere of high altitudes, have done much to bring about a successful recovery. Indeed, the sun's rays possess so wide a range of usefulness that it is interesting to recall that Dr. O. Bernard found that a reopened abdominal wound which would not heal under ordinary treatment, almost immediately assumed a better aspect following several hours' exposure to the sun, and closed quite rapidly thereafter.

Skin that is constantly exposed to the sun for considerable lengths of time gradually takes on a bronze hue, which turns copper colored and finally becomes a chocolate brown. As pigmentation progresses, the skin becomes soft and velvety and very healthy looking, and seems to require considerable resistance to bacterial infection. Those who have acquired this condition of the skin are immune to infection after abrasions, even though previously they were not immune. It has been found that a bronzed skin is seldom attacked by acne or boils.

The influence of the sun's combined colors on general health is remarkable. Pain, fever and chills disappear readily, and the condition of the blood is often improved. Both hemoglobin and red cells increase and the general composition of the blood is enriched. As a result, anemic, chlorotic and scrofulous patients have been found to derive immeasurable benefit from sun-baths. Sunlight exercises a powerful action on the nourishment of all living animals. When the rays penetrate the depths of the body they increase the metabolism in all the tissues. This action is also bactericidal and pain relieving.

Sinus infections and ulcers react markedly to sunlight; the profuse discharge that occurs at first is followed by sloughing, the formation of healthy tissue, and a gradual drying and healing of the sinus infection or ulcer. Sunlight reduces the volume of pus abscesses and frequently causes complete absorption. The rays of the sun cause a similar absorption of fluids in the joints, abdominal and lung cavities. This is especially noticeable in peritonitis.

Sunlight also stimulates the heart and other vital organs. It produces an increase in the oxidation of protein, which in turn causes a rise of temperature. Perspiration is increased, causing an extra amount of poisonous material to be eliminated. Sometimes the increase in perspiration is from 2¼ ounces an hour, which is the normal amount, to as much as 2 or 3 pounds an hour. Sunlight stimulates the nervous

system, improving the appetite and mental attitude and inducing better and healthier sleep.

Colors, light heat and light are dependent upon wave lengths. These waves vary in length and these variations are the basis of the colors. When these lengths are ultra short they become invisible, but the color still exists, even if it is not seen by the human eye.

It is believed that the healing effects of colors depend largely upon their wave length. Different colors have different wave lengths and that is why different colors have varying healing effects. The penetrating power of colors also depend upon their wave length. The shorter rays are capable of penetrating greater distances. For this reason ultra-violet and infra-red are the two most frequently used colors in medicine today. Their effects are most noticeable.

At most, color therapy is a very young branch of the healing art. It is fraught with many interesting and significant possibilities and clinics throughout the world are using colors, in appropriate cases, with beneficial results. However, it should be remembered that color is not a cure-all. It is of value only in appropriate and selected cases.

CHAPTER VIII.

THE EFFECTS OF COLORS ON OTHER LIVING THINGS

Colors affect not only human beings but all other living and growing things as well. Dr. Camille Flammarion found that under red glass lettuce grows four times as quickly as under direct sunlight. Green light is also good for lettuce, slightly better than direct sunlight, while blue stunts the plants. Corn thrives best in direct sunlight, growing 25 inches during the experiment. Red glass produces 18 inches of growth; green glass 8 inches; blue glass, 6 inches. Beans flourish under red and white glass, and die under green and blue.

Dr. Babbitt who was so interested in the effects of colors on human health was also interested in the effects of colors on plant growth. He conducted many experiments and arrived at some interesting conclusions. He found that blue aids germination, while red and yellow aid growth. Yellow rays cause carbon to deposit from the air and develops woody fibres in plants. Red and yellow likewise causes seedling and fruitage. This would seem to indicate that the yellowish-green of plants and the gay colors of blossoms serve a very definite purpose in plant growth.

It has also been found that the green coloring of plant foliage is a light screen which prevents absorption of other colors which cause rapid oxidation by removing the blue-violet and ultra-violet frequencies, leaving more carbon to utilize as cellulose or plant structure. In human beings the red radiations stimulate assimilation and aid metabolism.

Dr. Flint, a famous experimental botanist, found that in terms of plant growth, yellow, orange and red are the colors of life, while the part of the spectrum which we see as blue

and violet are colors of death and dormancy to the leaf. That is, the coarser light waves are best for plants, whereas the finer waves, including the ultra-violet, are of no help whatsoever.

Dr. Flint and Dr. Johnson of the Smithsonian Institution found that red is poisonous to plants. There is a narrow band of coarse red just at the top edge of our visible color spectrum, and it is sure death to leaf and seed alike.

Astronomers believe that the vast envelope of oxygen surrounding the sun, filters sunlight of this particular wave length. In their native state, plants are therefore not exposed to this coarse red.

Dr. Flint proved that an oat sprout, growing healthily in ordinary unfiltered light, is definitely improved by yellow or golden light, but when exposed to blue light, growth of the little plant ceases, its strength begins to fail, and presently dies.

Other interesting experiments on the effects of colors on plants were conducted by Dr. Enoch Karrier. He found that seedlings exposed to blue light were bent toward the source of illumination. In addition the tips of these seedlings were bent toward each other. In red light they were bent away from each other. The greenest growth occurred when plants were illuminated by orange light. The yellowest growth was possible when the plants were subjected to blue-green light. Roots grew longest in extreme blue light and shortest in orange-red light.

Other parts of the plant responded differently to different colors. Thus, the leafy sheath attained its best growth when exposed to green or orange light and its least growth when subjected to blue and deepest red. In green light, the growth of the leaf sheath appeared to be stunted, and the leaf broke through prematurely, but its growth was rapid when exposed to full white light.

The effect of sunlight upon plants is dependent upon a

large measure on the various colors which go to make up sunlight. Dr. Earl S. Johnson has devoted a great deal of thought and study to the effects of sunlight and rays upon plant growth.

It is Dr. Johnson's belief that the brilliant colors of Alpine flowers are attributable to the presence of ultra-violet light in the clear sky of high altitude. Similarly, the broad succulent leaf growth within a dense tropical forest can be attributed in part to reduced light.

Numerous experiments have been carried out by Drs. Garner and Allard, of the United States Department of Agriculture, which demonstrated that plants may be made to produce flowers or continue their vegetative growth by merely regulating the number of hours of exposure to white light.

Another plant physiologist, Dr. R. B. Withrow, of Purdue University found that different colors had different effects on the flowering of plants. For example, in a long-day plant like the stock, the greatest response occurred when exposed to red. Red, however, proved a hinderance to short day plants like the cosmos and salvia.

Photosynthesis, a very vital process is all plant life, is profoundly affected by color. Its energy is derived from radiation. Mr. Hoover, of the Smithsonian Institution, has made quantitative determinations of the dependence of wheat on the different wave lengths of light or colors for the assimilation of atmospheric carbon dioxide. He found that red rays are most promotive, blue rays second, green and yellow rays useful, and the infra-red and ultra-violet contribute nothing to the assimilation of carbon dioxide in wheat.

Dr. John M. Arthur, of the Boyce Thompson Institute for Plant Research has found that only the visible and near ultra-violet regions of the color spectrum are useful to the plant in the process of photosynthesis. Plants grown only

in red light are tall, with thin stems and slender leaves, and resemble plants illuminated with white light of very low intensity. On the other hand, when all but the blue light is screened out, the plants are short and squatty with thick stems and leaves. There is no doubt that the two extreme regions of the visible light spectrum are necessary to balance each other, as far as plant growth is concerned.

Water plants have been found to be very sensitive to white light and the more they receive of it the better they grow. This was proved by Frank B. Lee and Dr. J. T. Charleson of the William Tricker Water Gardens who set up three tanks for study. In them they placed identical collections of flowering arrowheads, tropical water lilies of a type particularly hard to grow, shell flowers and other aquatic plants. Each tank was planted and fertilized in identical ways.

Above the first tank, a 300-watt mazda lamp was suspended, the distance from the water to the bulb being about 36 inches. Above the second tank was placed a 300-watt incandescent lamp having a special bulb which transmitted only ultra-violet rays. No lamp was placed above the third tank. Daylight reached all tanks in equal amounts.

These lamps were burned five hours each night, and during the experiment, the tanks received between nine and ten hours of daylight.

The results were most interesting. In the first tank, the plants flourished, but their leaves became ragged, partly caused by insects. In the third, the plants struggled along with little growth, and in some cases died. In the second tank, the one having the ultra-violet producing lamp, the leaves grew almost as well as if they were in summer sunlight, and the lilies produced well-developed flowers. Furthermore, there was scarcely any insect damage.

Another experiment along similar lines in a Cleveland greenhouse resulted in the production of leaf lettuce of a

usable size two to three weeks ahead of schedule. Three beds were planted. No artificial lighting was used at one. Above the second, ordinary 150-watt lamps were used, five feet above the soil. Above the third bed, ordinary 300-watt mazda lamps were suspended. The lamps were kept lit four hours each night, just before dawn.

The unlighted bed produced lettuce to a height of seven inches during this experiment. The average height of the plants illuminated by the 150-watt lamps, was nine inches. The 300-watt bed produced plants averaging eleven inches.

Dr. Laurenz Greene of the Purdue Agricultural Experiment Station of Lafayette, Indiana, has carried out many interesting experiments on the effects of light on plants. His experiments were carried on with mazda lamps ranging in size from 50 to 1000 watts, mounted in most cases in bowl reflectors and suspended fifty inches above the plant benches. Lamps were turned on and off with electric time switches and periodic measurements of light intensities were made and averaged for each experiment.

These tests showed in general that artificial light used to lengthen daylight periods caused earlier flowering, induced each plant to bear more flowers, and produced longer flower stems.

These experiments are going on all over the United States and they all seem to point in one direction, namely, that exposure to light is of great value in aiding plant growth. Drs. Laurie and Poesch found that clear-glass, gas-filled mazda lamps of 50 or 100 watt size, burned from six to ten p.m. speeded up the blossoming of various potted plants, including calcelaria hybrida, cinceraria multiflora and primula obconica. Geranium, cyclamen persicum, and asparagus increased in size under similar treatment.

Delving deeper into the problems of the effects of different colored lights on plant life, scientists have found that different colors have different wave lengths and that these

wave lengths exert specific effects on plant growth, flowering, size and even shape. Taking an oat seedling it was found that blue was almost a poison to its growth, and that the further away the light was from the blue part of the spectrum, the better was the growth of the seedling.

These studies of the effects of light and colors on plants are of very recent origin. The future will reveal many interesting and significant facts. Says Dr. Johnson: "With better light filters and with the construction of new light sources it is hoped to break white light into narrower and narrower spectral regions of sufficient intensity to study more accurately the many reactions that take place in the living plant—reactions upon which life itself depends." There is no doubt that colors play a very essential role in the very life process itself.

CHAPTER IX.

COLORS FOR ENJOYMENT

Of the five special senses, hearing is the only one which has a highly developed system of sensory elements specifically designed for their enjoyment. This system of sounds is known as music, and music is a method of arousing sensory stimuli solely for the object of giving pleasure.

At the present time there are no specifically designed systems of odors, flavors or colors which may be compared to a system of sounds known as music. There have, however, been several interesting attempts to formulate systems of these sensory impressions into something analogous to music.

About sixty years ago, Dr. Septimus Piesse, a French chemist, plotted a scale and assigned a well-defined odor to each note. This was the first attempt to give us a system of related odors. Dr. Piesse attempted to start a music of odors and he used the music of sound as a basis. His system was primitive, but it was a brave beginning. It was his belief that odors, just like sounds, could be made into an organized system to be enjoyed simply for themselves.

Dr. Piesse wrote many articles on his system of odors and for a time it was quite popular. He found that there were related odors and discordant odors, and with a little thought a really effective system of odors, analogous to a system of sounds, could be devised.

He plotted a scale and assigned a well-defined odor to each note. Thus starting with the bass cleff three octaves below middle C the musical notes and odors assigned to them are as follows:

BASS CLEFF		TREBLE CLEFF	
C.	patchouli	C.	rose
D.	vanilla	D.	violet
E.	clove bark	E.	cassia
F.	benzoin	F.	tuberose
G.	frankipane	G.	orange flower
A.	storax	A.	new mown hay
B.	clove	B.	aurome
C.	sandalwood	C.	camphor
D.	clematis	D.	almond
E.	rattan	E.	Portugal
F.	casroreum	F.	jonquil
G.	pergulaire	A.	synringia
A.	balsam of Peru	A.	tonka bean
B.	carnation and pinks	B.	mint
C.	geranium	C.	jasmine
D.	heliotrope	D.	bergamot
E.	iris	E.	citron
F.	musk	F.	ambergris
G.	pois de senteur	G.	magnolia
A.	cinnamon	A.	lavender
		B.	peppermint
		C.	pineapple
		D.	citronel
		E.	vermain
		F.	civet

For many years there was no means of propagating Dr. Piesse's symphony of odors. Now, however, Rowley and Warner have developed a machine which emits odors, much in the same way as an organ emits musical sounds. The primary object of the Rowley-Warner odor organ is to provide appropriate smells for talking moving pictures. This machine emits odors synchronized by the sound track of the film. In this way there is a very effective fusion of three senses, hearing, sight and smell to heighten the enjoyment

of the film. The Rowley-Warner odor organ was recently placed on exhibition at Central Hall, Westminster, England, and it attracted favorable attention.

Long before Dr. Piesse and Messers Rowley and Warner thought of establishing a system of odors to be enjoyed simply as such, attempts were made to establish an independent color art somewhat analogous to that of music.

In order for colors to attain a vogue as popular sensory art, appropriate means of propagating colors had to be devised. A music organ is designed specifically for the purpose of manufacturing sounds in the form of music. In the same manner a color organ is an instrument for the sole purpose of manufacturing colors as an independent art.

Among the first to put the color organ into practice was Lewis Bertrand Castel, a Jesuit of Montpellier, who lived some three hundred years ago. He invented an Ocular Harpischord which was strung with colored tapes instead of wires. It was placed in a darkened room and when the keys were touched the translucent tapes which corresponded with them became visible. In this way various combinations of colors were produced.

It was A. Wallace Rimington, some fifty years ago, who constructed the most advanced type of color organ. An order of colors based on the spectrum was used as the basis. Rimington constructed a scale showing the relation between the seven notes of the diatonic scale and certain colors:

Blue	Purple	Red	Orange	Yellow	Green	Olive
Do	Re	Mi	Fa	Sol	La	Si

Rimington wrote a book on his color organ in which he set forth his ideas. He believed that there was an intimate relationship between music and colors. Concerning this he said:

1. Color and musical sounds are both produced by vibrations acting upon the nerve terminations of the eye and ear separately.

2. Both are limited to a certain range of visible and audible vibrations, and there are certain numerical relationships in them which may or may not be of psychological significance.

3. Both are largely dependent for their common, mental or psychological effect upon relative degrees of harmony and discord.

4. Combinations and sequences of notes or tints in both are capable of affecting us emotionally and giving us pleasure and pain.

5. Both are capable of adding interest to and deepening or lessening mental impressions received from other sources.

There are many analogies between sounds and colors. The gradual dying away of colors in a sunset is usually more or less pathetic, like a melody in a minor key, and the increase of lights and colors in a sunrise has a joyfulness comparable to swing music.

Like music, a passage of beautiful or striking color seems to demand its echo. The beauty of the isolated stem of a silver birch or the delicate lines of a group of reeds is increased by their reflection in a pool of the moorland. Colors have as many fine shades and nuances as sound. They can be combined in beautiful and appealing chords much in the same way as music or sounds.

Rimington's color organ was as complete as a music organ and as scientifically constructed. In many respects it was similar to a music organ. It divided the spectrum band of colors similar to a musical octave. This organ had a keyboard like that of an organ or piano, and the general control of the whole keyboard was by means of stops somewhat like an organ.

Rimington's color organ provided higher and lower octaves in the color scale of relatively paler and deeper intensity, somewhat analogous to the higher and lower octaves

of the musical scale. The keys of the color organ were connected with suitable mechanisms to allow the colors to appear on a screen as soon as the keys were depressed. A swell pedal was also provided, and if moved in one direction the brilliancy and intensity of the color was increased throughout the whole of the length of the scale. When moved in another direction the color effect was made more tender. Another stop enabled either softened or staccato productions of color upon the screen to be given.

Rimington gave many color recitals with his organ. A typical scene was the following. A darkened concert hall at one end there is a large screen of white, much the same as in a movie theatre. A rapid series of pale lavender color notes begin to flit across it, gradually strengthening into deep violet. This, again becomes shot with amethyst, and afterwards, changing gradually into a broken tint of ruby, gives a return to the warmer tones of the opening passage.

A delicate primrose now appears, and with little runs and flashes of pulsation leads through several passages of indescribable cinnamon color to deep topaz. Then suddenly interweavings of strange green and peacock blue, with now and then a touch of pure white make us seem to feel the tremulousness of the Mediterranean on a breezy day, and as the color deepens, there are harmonies of violet and blue green which recall the waves under a Tramontana sky.

Rimington gave these color concerts for many years. They were popular and evoked great interest. This was a practical demonstration that color could be enjoyed as an independent art, just as music is enjoyed simply for its beautiful sounds.

But with colors there is some limitation. There are no great symphonies of colors as there are symphonies of sounds. In spite of the work of the colorists no impressive literature has sprung up. Many people are incapable of enjoying colors simply as such, detached and alone, as music,

which is sound, detached and existing simply as such, can be enjoyed. It is doubtful if color concerts would draw as well as music concerts. Furthermore, the means of propagating sound are much more completely developed than the methods of propagating colors. Radio is a very important factor in disseminating music. Even when television becomes developed to its fullest extent, it is doubtful if colors could be transmitted and enjoyed in the same way that music is at present.

For the majority of people, colors offer pleasure and satisfaction not merely as detached colors, but as the characteristics of familiar, everyday objects. The average person enjoys the colors of his clothes, his food, his surroundings. When an attempt is made to separate these colors and offer them merely as such, he loses interest.

CHAPTER X.

LINKAGE OF THE SENSES—ODORS AND TOUCH

The sense of sight is closely interwoven with the other four senses, and together with these senses serves as a means of communication between ourselves and the outer world. According to their aesthetic values the senses are arranged in the following manner: sight; hearing; smell; touch and taste. The degree of sensuous satisfaction is greatest through the organs of sight and decreases down the scale, being least in the sense of taste.

Color is the means by which the most notable impressions are transmitted to the body and mind. In previous chapters these color impressions and their ramifications were discussed. However, very frequently all the senses act in concord and quite a few effects are produced in this manner.

Closely related to pleasing colors are pleasing odors. Just as there are harmonies of sounds and colors there are harmonies of odors. It has been suggested that a melody of flower-like scents in quick succession, accompanied by a booming chord of vintage clarets and burgandies would be most delightful.

Pleasant smells have been esteemed for many hundreds of years. From the Bible, especially the Song of Solomon, also from the Arabian Nights and from other early works we can gather much evidence that perfumes were highly regarded in early times. The three wise men coming to worship at the cradle of the newly-born Christ offered gold, myrrh and frankinsence. A few grains of frankinsence or a few drops of perfumed oil were regarded as gifts worthy of the acceptance of a god or king. Incidentally, the beautiful color of the gold together with the beautiful odors of

the myrrh and frankinsence completed the illusion of magnificence.

Robert Burton in his *Anatomy of Melancholy* says that the sense of smell is an organ of health, much the same as the eyes. By avoiding bad smells and disagreeable colors, and by choosing good ones, the body can be altered and affected many times.

Harmonious odors like colors play an important part in the art of dining. The ancient Greeks recognized the influence of sweet odors and were cognizant of their happy effects on the digestive system. According to the historian, Athenaeus, they made use of scent bags for sweetening the air as they sat at table. The odors of roasts harmonize with browns; the aroma of sweet butter and light yellows are most helpful. For the desserts sweet smells and lively splashes of reds, greens and purples fuse into a sensuous melody that is most helpful for the digestion.

Much in the same manner as colors have been advocated to brighten one's surroundings, odors have been advocated to make life a bit more pleasant. Some three hundred years ago John Evelyn proposed to make London the healthiest and happiest city in Christendom by planting around it hedgerows of sweetbriar, rosemary and jasmine. The colors of these blossoms would have been still another factor in emphasizing their pleasant perfumes. A color is more enjoyable when it has an accompanying pleasing odor.

The use of certain perfumes, like certain colors, is prophylactic to a very high degree. Everyone knows of the refreshing and soothing feeling imparted by the citrine odors to the invalid. They are as stimulating as gorgeous reds and golds. Lavender water, eau-de-cologne, attar of roses, are among the perfumes that have been found effective in relieving headaches and resting the fatigued mind. These are as sedative as green and blue.

The exhilerating effect upon the mind of the fragrance

of the country air on a spring morning is as real as the stimulating effects of the golden sunshine. The sweet sea breeze laden with brominic odors from stranded weeds wonderfully invigorates the nervous system even as do the bright purples, violets, yellows and reds of the marine landscape.

Sandalwood has been used to relieve the nervous excitement in fevers. Balsamic odors from pine needles are quieting in insomnia, and neurasthenics declare that they feel easier when they use essential oils topically. These odors are sedative and strangely enough the sources from which they are derived—pines, for example, are also sedative in their natural colorings of greens.

Sick children enjoy and are benefitted by the odors of sweet pea, lily-of-the-valley and rose. Convalescents from accidents and surgical operations appreciate such scents as lilac, lavender and heliotrope. Again, the odors are derived from gayly colored blossoms, red, lilac, lavender and sunshine, which in themselves are stimulating. Flowers in the sick room are decidedly beneficial, for two good reasons. They are the source of stimulating colors and odors.

Sharp odors like brilliant colors are stimulating. "I remember," says Sir W. Temple, in his "*Essay on Health and Long Life,*" that walking in a long gallery of the Indian House of Amsterdam, where vast quantities of mace, cloves and nutmegs were kept in great iron chests all along one side of the room I found something reviving by the perfumed air, that I took notice of it to the company with me, which was a great deal, and they were all sensible to the same effect, which is enough to show the powers of smell and their operations both upon health and humour." In a similar way some people become aware of a reviving effect upon entering a brilliantly colored ball-room.

Colors have for years been used as a means of enhancing sexual attractiveness. The *fille de joie* consciously makes

use of colors that are symbolic of eroticism and passion, red and similar colors. Scarlet in both dress and facial adornment has long been regarded as the badge of the woman of easy virtue. Odors also play a very important role in the sexual function.

Dr. Louis Montgomery, New York psychologist, tells of a lawyer of fifty-two, who fell in love with his nineteen year old illiterate Swedish maid and wanted to divorce his wife, leave his two grown children and marry her.

"Neither the lawyer nor I knew what was behind this strange infatuation," Dr. Montgomery relates. "It took us six months to discover that the Swedish maid used a perfume with which the lawyer was really in love. He quickly realized that it was the same perfume which a devoted nurse, who attended him as a boy, had used. The affair stopped dead."

Like colors, the stronger the odor the more pronounced its effect. A very well known example in which strongly odorous substances are taken advantage of in medicine is the use of smelling salts or aromatic spirits of ammonia in reviving a person who has fainted or who has lost consciousness. This very valuable medical aid was originated by Sylvius de la Boe about 1650. Originally it contained cloves, musk, salt of tartar and spirit of wine, all possessing very sharp odors. It has been changed now, but it still exerts its effects through the sense of smell.

Just as everything has a characteristic color so has it also its individual smell, and those whose olfactory apparatus are keen can appreciate this. Helen Keller finds that there are as many smells as there are philosophies, and certainly as many as there are colors.

"I usually know what part of the city I am in by the odors," she says. "I never had time to classify my olfactory impressions of different cities, but it would be an interesting subject. I find it quite natural to think of places by their

characteristic smells, Fifth Avenue, for example, has a different odor from any other part of New York. It may sound like a joke to say that it has an aristocratic smell. As I tread its pavements, I recognize expensive perfumes, powders, creams, choice flowers." This is in keeping with the aristocratic color scheme of Fifth Avenue. Noble smells and colors go together.

Talcott Powell, the writer, had a keen nose for city smells. Pittsburgh's outstanding odor, he declared, is soft coal; Philadelphia's faint odor of decay; Indianapolis', stale water and raw meat and San Francisco's, Oriental fog.

Webb Miller is also an expert on city odors. Here are some of his findings: London, wet soot, old cold stones; Paris, *sole meuniere* and women's hair; Amsterdam, sea brine and stagnant water; Moscow, sweat-soaked felt boots and sourish, fetid bodies; Florence, dead incense, ancient dust; Munich, stale beer, boiled pig's feet and sauerkraut; Cairo, musk, saffron, dry dust; Rio de Janeiro, bitter black coffee, and Adowa (Ethiopia) plain stink. These olfactory perceptions are just as vivid and real as visual impressions, and if they are analyzed they all seem to correlate with the characteristic color schemes of these cities.

When the sense of sight is gone and colors are shut out, the other senses seem to take on this lost function. Helen Keller is a wonderful example of a person whose olfactory perceptions have taken over the functions of her eyes. Dr. Frederick Tilney, famous neurologist, had a most interesting experience with Miss Keller in this respect.

"I took a drive," he says, "with Helen Keller from Forest Hills to Garden City, Long Island, about 20 miles. The windows of the car were open. It was a fresh, crisp day in winter. I asked Miss Keller if she could tell us anything about the country through which she was passing, and her observation was that we were making our way through open fields. This was the case. Later, as we drove through

a small grove she said we were passing trees. She then called attention to the fact that we had just passed a house with an open fire, and looking back I saw a small cottage with smoke pouring out of the chimney. Shortly after that she mentioned that we had just entered Garden City and were passing the plant of Doubleday, Doran and Company, which actually was the case. Her awareness she said was due to her smelling the ink from the presses of the publishing house, with which she was very familiar. Yet Miss Keller's olfactory sense shows nothing above the average when tested objectively. Her case demonstrates what the brain may do under the influence of concentrated attention."

Miss Keller herself has this to say about her unusual ability to recognize odors: "Sometimes it happens that I meet people who have no distinctive odor; I rarely find them animated and agreeable. On the other hand, those persons whose odor is very marked often have a great deal of life, energy and intelligence. The exhalations of men are generally stronger and more individual than those of women. In the perfume of young people there is something elemental. One smells in it the pulsation of force and of the desire of life. I should like to know whether others have observed as I have, that all little children have the same perfume, indescribable, like their personality which has not yet awakened. It is not until the age of six or seven that they begin to have a perceptibly individual perfume. This develops and ripens with their physical and intellectual forces.

"The odors of those I love are so unmistakable that nothing can quite obliterate them. If many years should elapse before I saw an intimate friend again, I think I should recognize his odor instantly in the heart of Africa as promptly as would my brother that barks."

There are persons with all their senses intact who get as much pleasure with their noses as most of us get with

our eyes. Quite often the one sense reinforces the other. Richardson Wright, the traveler, gets as much enjoyment out of his nose when he travels as he does from the colorful things he sees. Says Mr. Wright; "Smell is a splendid sense to take on a journey. So much of local color is a matter of smells—the slow inhaling of wine's bouquet, the stale incense of damp churches, the dry, punk-like aroma of the Far East, the mingled sweat and vegetable miasma of public markets in hot countries, Latin-Americans drenched with toilet water, the acrid smoke of Arabian dung fires, the soapy overtones in quiet Philadelphia streets when the housewives are scrubbing their front steps—these are fields for the nostrils."

Travelers have found that warm colors go with warm smells. Profusion of odors and a riot in color go hand in hand. The jungle is a symphony in blazing colors and hot, acrid odors. The Arctic is as void of odors as it is of colors. Whatever odors there are are faint and cold, just as the predominating hues of the north are cold whites and grays.

There are preferences in smells just as there are in colors. E. V. Lucas, the essayist, has taken time out to tell us of his favorite smells "What are the most delicious scents? I know what my list would contain. Sweetbrier in the air, so vague and elusive that search cannot trace the source. Pine trees in the air on a hot day. Lime blossoms in the air. Brake ferns crushed. Walnut leaves crushed. Mint sauce. Newly split wood in a copse. Any kind of gardener's rubbish fire. An unsmoked brier pipe. Cinnamon. Ripe apples. Tea just opened. Coffee just ground. A racing stable. A dairy farm. A shrubbery of box. Cedar pencils. Cigars in a box. A hot day on the South Downs when a light wind brings the thyme with it. The under side of a turf. A circus. And I have said nothing of flowers."

Odors like colors, are capable of arousing all sorts of emotions and reactions. Their effects on health, personality and efficiency are quite as pronounced. In closing this discussion on odors I can find no more appropriate words than those of Dr. Marston Taylor, professor of organic chemistry of Columbia University, who has devoted a great deal of thought to this matter:

"The sense of smell has unlimited power over the mind. It is capable of lifting you to heights of ecstasy, of causing sudden intense inspiration. Perfume is a mental stimulant which if governed correctly is capable, like faith, of enriching the life of the individual beyond mere facts; for like faith, it is of the intangible. Even a case of the doldrums may be cured instantly by perfume. On the other hand, the sudden nostalgia which often grips a person without warning may be occasioned by an odor, perhaps almost forgotten but associated in the mind with the past. Perfume is an esthetic art and a cultural aid which American women should use more often."

The sense of touch may be the avenue of very interesting sensory impressions. Touch is satisfied by pleasing contacts, textures and pressures, just as sight is satisfied by pleasing shades of color and color contrasts. Trail your hand in the water of a swift stream over the side of a boat, stemming the current and feel the thrill of meeting a whirling eddy, which drowns the steady, stimulating opposition of running water. This is almost as exhilerating as a symphony of reds, golds and deep purples. The sense of touch can minister to the greatest sensuous pleasures.

"Love," said Chamford, "is the contact of two skins." The kiss, therefore, is the supreme satisfaction of the sense of touch. Carrying the relation between the senses a step further, Wagner has magically transmuted the thrill of the kiss into tones and is felt by a thousand spectators simultaneously with the lover in *Siegfried*.

Dr. Malespine has given an interesting estimate of the kiss; "The image aroused in consciousness by the physical contact of a kiss form a series of subsidiary sensations. The kiss is thereupon compounded of memories of sensations previously received and stored in the mind, the whole explosion in the consciousness being like that of music, except that the impressions do not come through the ear. The kiss from primarily being physical becomes idealized, spiritualized, a subtle evocation of every physical faculty into a tremendous moment of consciousness."

Strange as it may seem, the lips are not the most sensitive part of the body, and a kiss upon the lips is not equivalent to the highest satisfaction of the sense of touch. The minimum pressure needed to excite a sensation equivalent to that upon the lips, differs considerably when impressed on different parts of the body. Thus a kiss impressed with the force of two milligrams on either the forehead, temple, nose or cheeks, three milligrams on the palm of the hand, five milligrams on the eyelids, and fifteen milligrams on the palmar surface of the index finger, is equivalent to a kiss upon the lips. This latter would have to be impressed with a pressure of five milligrams in order to incite any sensation.

An attempt has been made to analyze the effects of a kiss upon blood pressure. An ordinary blood-pressure machine has been found satisfactory for this purpose. As is to be expected, there is a rise in blood pressure and a quickening of the pulse during a kiss. A long drawn out kiss, for instance, quickens the pulse noticeably, with a rise in blood pressure of 30 millimeters. In women the rise in blood pressure is only 22 millimeters.

The sense of touch cannot only minister to the greatest sensuous pleasures, but a form of tactile stimulation, known popularly as massage has, for hundreds of years been a very popular health practice. Massage is to the sense of touch,

what music is to the ear and beautiful and pleasing colors to the eye.

The word massage has its origin in the Arabic *mass* or *mass'h* which means to press softly. It was Hippocrates, the Father of Medicine, who made massage popular. His teachings were accepted by the most celebrated physicians of Greece and Rome.

Massage became in time part of the luxurious daily routine of the conquerors of the ancient world. It was as much esteemed as a means of sensuous stimulation as colors for the eye and music for the ear. It was also regarded as quite a daily necessity.

Tactile stimulation brings about certain well-defined changes.

1. It stimulates muscles, nerves and gland cells.
2. It soothes the nerves.
3. It acts on the lymph and blood supply, increasing the number of red blood cells.
4. It aids the absorption of fluids and breaks down adhesions.
5. It increases the flow of blood and lymph and stimulates the entire body.
6. It increases the activity of the skin, such as secretion of wastes and increases its nutrition.
7. It helps in the removal of waste products and thereby removes fatigue.

Massage, like colors, is healing. In rheumatism tactile stimulation is not only exceedingly gratifying but actually helpful. It promotes the absorption of waste products, and long, passive movements promote mobility. The blood and lymph channels are opened up, the normal flow of blood and lymph is reestablished and healing is encouraged.

The pain of neuritis can frequently be removed by stroking along the course of the affected nerves or by massage

over the site of origin of the pain. Neurasthenia and insomnia are greatly benefitted by gentle stroking.

Massage has very interesting effects on nervous irritability, much in the same manner as soothing colors. Following tactile simulation, the nervous twitching ceases and the anxious facial expression changes to one of repose and comfort. The amount of relief that can be given to sufferers from facial neuralgia and headache is often great, especially if the pain is due to fatigue.

There are three main varieties of tactile stimulation: stroking massage, compression massage; percussion massage.

Stroking massage consists in passing the hand over an extended area of the body. It may be superficial or deep.

Compression massage may consist of kneading, friction or petrissage, all of which closely resemble one another and are used to exert local pressure. This is a more vigorous form of tactile stimulation and the effects extend deeper into the structure such as the muscles and the blood vessels.

Percussion massage consists of administering a series of blows to the part. This is the most vigorous form of tactile stimulation and the results are invigorating and immediate. The effect is one of toning up, stimulating and bringing tissues to life.

Touch is down toward the end of the list in the series of the special senses but it is a very interesting avenue of imparting stimulation and pleasure.

CHAPTER XI.

LINKAGE OF THE SENSES—FLAVOR AND MUSIC

The linkage of the senses completes the entire cycle. colors pervade the spheres of smelling, tactile perceptions, flavors and hearing. There is a color for everything. Psychologists tell us of cases of color-hearing, a phenomenon in which certain sounds arouse certain colors.

Color and flavor are intimately bound up. You may recall the saying of Luther Burbank, quoted in an earlier chapter, who said that color and flavor are both necessary for good digestion. This is even more realized today than ever before.

The health-giving virtues of certain spices have been known for a great many years. Quite a few spices are used today by physicians as aids to digestion. The experiments of Pavlow, the great Russian physiologist did much to place the mode of action of spices in the alimentary tract in a clear light. He found that they acted through the organs of taste, and partly by reflex, and in most part by direct action on the stomach and intestines.

In these various ways the appetite is aroused and secretion of the digestive juices is promoted. The late Dr. Harvey Wiley, father of the pure Food Law stated that "Condiments (including spices) themselves aid the digestion by exciting in a perfectly proper way the activity of the glands which secrete the digestive ferments."

In spices, colors and function seem to go together. The stimulating spices are always brightly colored, the reds are very strong in taste, while those spices which are neutral or brown or black in color are generally sedative in their action.

The sedative action of certain spices is well known.

They ease irritability of the stomach and the sense of warmth they create relieves difficult breathing, cramps and sometimes even hiccough. Nutmeg, for instance, is especially valuable in cases of weak stomach. The carminative action of spices is also of great value. By their action on the stomach and intestines they relieve flatulence by expulsion of annoying gases.

Some spices have distinctly antiseptic properties and are particularly useful in abnormal fermentative conditions in the intestines. They remove at the same time the discomfort caused by gas, and check the growth of the bacteria which give rise to it. Research has shown that cinnamon, cloves and mustard are suitable for seasoning in preventing the growth of certain small organisms, such as moulds, on foodstuffs. These are all very stimulating and brightly colored. Nutmeg and allspice have been found to delay the growth of bacteria.

Cloves are said to promote the digestion of fatty foods, and coriander is an aid to the assimilation of pastries. Spices have a general stimulative effect on the system which greatly increases the physical endurance of the consumer for a time. Pepper tea is drunk as a stimulant and as an antidote by loggers working in the freezing northern woods.

It will not be out of place to refer here briefly to the medicinal virtues of several of the more common flavors. Majoram is a mild tonic, diaphoretic and liver stimulant. Saffron is a stomachic and tonic. Sage, among other things, is an excellent astringent. It is a remedy of some value in difficult breathing, certain chronic lung diseases, excessive sweating and sore throat. Tumeric has slight stimulant properties and is used in most European countries for the treatment of jaundice. Vanilla as a medicine has been found useful in certain nervous affections.

In food it has been found that the spicier taste goes hand in hand with the gaudier color. The foods which have stim-

ulating colors also have definitely stimulating flavors. The neutral colored foods are somewhat lacking in flavor. Dr. Babbitt has made a most interesting study of the relation of the colors of foods and other substances to their tastes. He found, invariably, that the brighter the substance the more pronounced its taste. In the tropics the most exotically colored fruits and vegetables have the most flavorsome tastes.

Authorities have, for many years, claimed that there is an intimate relationship between the senses of sight and hearing, the two most important of the five special senses. Many cases of color-hearing have been reported in psychological journals. There are people who see a color at the same time they hear a certain sound. Red is always associated with high-pitched notes, while blue and green with low pitched sounds.

In the tropics where there is always a profusion of everything gay colors and shrill sounds are always found together. The tropical birds are gayly plumed and have shrill voices. In the Arctic where there is a predominance of whites, grays and blacks the sounds are low and moany. The seals and polar bears grunt gutterally, in keeping with their whites and blacks.

Music is a collection of pleasing sounds and it exists solely to give pleasure. Music is harmony in sound, just as tastefully selected clothes or appropriately decorated interiors are harmonies in color. Both are for the purpose of giving pleasure.

Music is the most highly organized of all stimuli as far as establishing sounds as an independent art is concerned. Music is the enjoyment of sounds simply for themselves. There are many instruments for the propagation of music and they have been successful. There has been but one color organ, and it did not seem to arouse much attention.

There is scarcely an organ or set of organs in the human body that does not react to music. This fact impressed Drs.

Binet and Courtier so profoundly that they determined to make a thorough study of the effects of music on all the organs of the body. Their investigations of the effects of music on breathing is of extreme interest.

The reactions of an individual were studied. In one series of experiments, tones, chords and musical exercises, having no intellectual or emotional associations were used. These stimuli produced no changes in breathing except an acceleration of from .5 to 3.5 additional respirations per minute. This acceleration varied directly with the increase of the movements, and was greater for the minor tones and also for the discordant sounds.

It was found that musical selections, chiefly songs, arousing emotional associations, according to the introspection of the subjects, vary in their influence, according to the effect of the tones evoked. Thus sad melodies increased the rate of breathing by 2.6 on the average and considerably decreased the depth of the breaths taken.

On the other hand, gay music for example, military marches, produced a speeding up of 3.8 and showed less tendency to decrease the depths of the breaths taken. There was a third class of melodies which produced complex and unclassified emotions. The following table is a summary of the Binet-Courtier experiments:

Music	Action on Breathing	
	Before	*After*
Marche Triomphale (Tannhauser)	9.6	13.5
Marche de Fauste (Gounod)	9.0	12.5
L'Epee (Chant) Wagner	9.5	14.5
Marche Hongraise (Berlioz)	11.0	14.5
La Chavauchee (Wagner)	9.0	14.0
Printemps (chant) Wagner	9.5	13.0
La Rencontre (Faust)	10.0	13.0
Laissez moi contempler ton visage (chant)	10.0	12.0

More pronounced results are obtained when instead of listening to music the person makes the music himself. Singing is most beneficial for the organs of breathing. It undoubtedly strengthens the throat and lungs. By a purely mechanical process it expands the chest and puts an end to any vicious habits of breathing through the open mouth, instead of through the nose. It is well known fact that pulmonary and chest complaints as well as catarrh are rare among singers. Indeed, I have known some physicians to say that singing not only prevents chest complaints, but it may also be used actually as a curative measure against them.

The evaluation of the effects of music upon muscular activity was undertaken several years ago by Professor Seashore, who has done considerable work along this line. He found that the greatest pressure which could be exerted by the thumb and finger grip during silence was 4 kg. When the "Giant's Motive" from *Das Rheingold* was played the grip was increased to 4.5 kg. The "Slumber Motive" from *Die Valleyne* reduced the power to 3.2 kg. It yas also found that music tends to reduce or delay fatigue and consequently increases muscular endurance.

These effects of music on the muscular system have been taken advantage of in industry. Some time ago it was noticed that workmen repainting a liner in Hamburg harbor during the rehearsal of a concert by ship's orchestra were found to get through with their work much quicker if the music was of a lively nature, whereas they were inclined to lounge and paint slowly if the character of the music was drowsy. The industrial applications of music to speed up production is based on its well proved effects on the muscles and nerves.

It was in 1887 that Dr. Lombard observed the reinforcement of the knee action caused by music, while making a general experimental investigation of the variation of the

knee-jerk in relation to the activity of the central nervous system. The apparatus consisted of a hammer suspended on its axis through the handle, falling like a pendulum so that the source of the blow could be regulated, and a rod connected with the foot sliding in the groove of a wheel, and equipped with a needle which recorded the extent of movement on a blackened surface. His observations are summed up as follows:

Conditions	*Knee Jerks*	*Average*
Silence (25 experiments)	.....	32 mm
Music of a passing band	60, 71, 74, 60, 65	65 mm
Maryland, My Maryland	62, 76, 74, 71, 66, 64, 59.	64.7 mm
Drum corps	48, 51, 11, 55, 49, 52.	61.8 mm

The height of the knee-jerk, therefore, seemed to vary distinctly with the intensity of stimulation. There was an increase and decline in the extent of the knee-jerks as the music approached and receded. In a subsequent experiment to test the effect of music on the knee-jerk an air was played on a piano in an adjoining room. The average knee-jerk was 32 mm at 11 P.M. At 10:30 at the time of the experiment the normal knee-jerk would have been about 30 mm.

A more complete table of the conditions of this experiment is the following. The melody was Beethoven's Funeral March and its influence in it various modes on the knee-jerk was variable, as the table shows:

Stimulus	*Knee jerks*	*Average*
Beethoven's Funeral March	82, 104, 96, 104, 99, 108, 95, 106, 118, 117, 90, 113, 119, 98, 100, 124, 108, 112.	105 mm
Interval of silence	83, 90, 90, 90, 56, 83, 59, 75, 50	74 mm
Soft music	52, 63, 47, 50, 55	53.4 mm
Deeper passage	66, 73, 58, 78, 70, 67, 77, 87	60.4 mm
Soft	66, 43, 59, 61, 72, 68, 51, 79, 86, 86	83.6 mm
More thrilling	79, 86, 86	83.6 mm
Varied and softer	58, 57, 79, 64, 47	61.6 mm
Quiet after 15 minutes (25 experiments)		29. mm

Nervous energy is clearly allied with muscular energy, and both are considerably enhanced by lively, brisk music. This increased output of total energy under musical stimulation means increased nervous and muscular energy. On the other hand, soft, slow music causes a decrease in both muscular and nervous expenditure, and this, of course, accounts for its sedative effects.

While these interesting laboratory experiments on the effects of music on nervous and muscular energy were going on practical use was being made along these lines by people throughout the world. Because music enhances energy it also enables one to work faster and more efficiently. The laboratories merely confirmed what had been known for a long time.

For a great many hundreds of years it has been known that under the influence of music the working hours pass faster and more pleasantly. It was Athenaeus, immortal Greek writer, who first became aware of this fact, for he tells us that the Etruscans regulated everything by music and even made bread, boxed and flogged people to the sound of the flute. Perhaps the music made the flogging less painful.

Another Greek immortal, Pausanias states that Eoaminondas, a Greek engineer with curiously modern ideas, had the walls of Messena built to the sound of Bactrin flutes. Ovid, Greek poet, and investigator of the mysteries of love, exclaimed, "even the miner while clanging his chains sings and lightens his burdens with untaught songs. He too sings while bending low on the oozy sand, dragging the slow barge against the stream."

Quintilian observed that "every man when at work even by himself has his own song, however rude, which may soften his labor." Bucher who has made a thorough investigation into this subject says that the old Greeks had special songs for harvesting, thrashing, grinding grain, wine making, spinning, weaving, drawing water, dying, and daily labor of every kind.

Down through the centuries every people in every clime realized that music makes the day's work a pleasant adventure instead of a task. In East Africa the fisherman sings as he rows, the porter as he drags his load, and the women as they grind the grain. James Grant, the noted African explorer says that when his negroes were cleaning rice they were always supported by singers who accompanied the words of the song by clapping their hands and stamping their feet, continuing this weird accompaniment until the rice is almost ground to powder.

All through Africa labor is made easier by music, a glorious symphony of weird, energizing sounds. At Zleetum, North Africa the negro women sing a song in chorus while pounding wheat, always in time with the music. In the southeast of Congo porters of the Mamba tribe usually sing songs while at work. It is well known that the negro stevedores and cotton pickers in the United States sing continuously while at work.

All over the world in civilized as well as in uncivilized countries those who labor love to sing to soften their tasks. Among the peasants and working classes song is an habitual accompaniment to work. There are handmill songs, songs accompanying the preparation of textile material, weaving songs, water-drawing songs, and songs that accompany ploughing, planting, mowing, harvesting, fruit-picking and dozens of other duties.

Trade songs are characteristic of artisans, while communal songs are used to lighten the labor of gangs engaged in arduous occupations such as loading, excavating, etc. Work songs, according to Bucher, present certain common characteristics. Through rhythm they facilitate the synchronous expenditure of energy by workers engaged in a

common task and thus economize. There is a definite energizing influence in tonal elements.

Music has always been a great necessity in the armies. It helps soldiers carry on their physically difficult task with greater ease and efficiency. There is nothing more stimulating than a lively military march. It makes even the monotonous hours of long marches pass more pleasantly.

For many years it has been known that physical exercises are more successfully carried out when accompanied by music. Plato recommended such a regime in his *Republic*, and the success of the German as contrasted with the Swedish system of calisthenics is due to the fact that the Germans make extensive use of music.

There is a wide choice in the present day musical literature to suit all types of bodily calisthenic movements when set to music. Thus for the body twist a slow waltz such as Victor Herbert's *When You're Away* is suitable. In shadow boxing the *Hula Hula* or *Turkey Trot* are adaptable for fast work, as are also *The Battle Hymn of the Republic*. For a slow movement the *Narcissus Waltz* is suitable. For the arm swinging exercises *The Trail of the Lonesome Pine*, or Grieg's *Ase's Death* or some other slow music is of value.

According to authorities music acts in the following manner to increase efficiency in movements requiring expenditures of nervous and muscular energy.

1. The strength of muscle contraction while at work or exercise increases with the intensity of the sound.
2. The effect of music upon muscular contraction is greatly increased by a sound made simultaneously with the movement.
3. The strength of the contraction increases with the pitch.
4. The point of fatigue is greatly improved.
5. The steadiness of contraction varies.

The utilization of music is receiving more and more

serious consideration with those who concern themselves with physical tasks. Dr. Clarence W. Spears head foot-ball coach at the University of Wisconsin has introduced music as an aid to foot-ball. He has found that music is of prime importance in the making of a great athlete. A knowledge of music is a valuable asset to a good center, Dr. Spears maintains. In addition to big hands and ability to pass accurately, a sense of rhythm and timing is one of the most essential qualifications of a center. The center position is the most important one, and all things being equal Dr. Spears gives preference to those who have had some musical training.

Several years ago the influence of music on efficiency in sports was tried out during the six-day bicycle race at Madison Square Garden. Without music an average time per mile was three minutes and fourteen seconds, or a rate of 17.9 miles per hour. When music was played the average time was three minutes and four seconds per mile or a rate of 19.6 miles per hour which was a rather appreciable increase. The riders were also able to do this with much less fatigue.

For years in business schools the music of the phonograph or piano has been used to control or accelerate the speed of learners of type writing or penmanship. From schools, music as a stimulant to increased work output has spread to the shops, offices and factories. Experiments on the influence of music on workers in an architectural drawing room was carried out at the Carnegie Institute of Technology. It was found that music helped to increase efficiency and speed. The architects agreed that music may be profitably used during a greater part of the workers' time with benefit to themselves.

Painters have also found music helpful in their work. Says Professor Bingham: "Some artists paint to music, finding that it helps them to conjure up beautiful visions." It is

said that Da Vinci listened to the tones of a lute while he painted the most famous of his pictures, the Mona Lisa. Modern painters also find music of definite value in their work.

Modern industrialists are not backward when it comes to applying methods to increase production. A dry cleaning establishment in the middle west offers music at frequent intervals to its 300 workers as a stimulus to effort. A sufficient number of phonographs have been established to afford lively music during most of the working day. Ragtime and popular music, selected by the employees and played at their pleasure is used and singing and humming on the part of the worker, if he feels so inclined is permitted and encouraged.

It is said that most of the railroads of the south were built to the rhythmic singing of negro workmen. The tobacco factories of Virginia, Kentucky and the Carolinas are run by negro music. Experiments in sorting mail in a post office were recently carried out with music with interesting results. It was found that while music was being played there was a reduction in the number of errors by as much as 12.86 per cent. The speed of sorting was also increased. The pieces used were Dvorak's *Humoresque,* Labitsky's *Dream of the Tyrolienne* and Rachmaninoff's *Prelude in C Sharp Minor.*

By no means is the utilization of music to lighten labor and make it more pleasant confined to the United States alone. Foreign industrialists are also realizing that music is a potent instrument for increasing production. Workmen are able to get through their work more quickly and more efficiently when they have music to accompany their effort.

J. Verns, a noted French financier and manufacturer said some time ago that he will introduce music into all the industries with which he is connected. There is no doubt

that he will greatly benefit by this innovation. In South America music has an important place in cigar factories where music is furnished by phonograph or radio to help the hours go more pleasantly as well as to increase the speed and efficiency of the workers.

At a highly successful Music Supervisor's National Conference held in Philadelphia some years ago, one of the foremost speakers was Dr. Russell H. Conwell, author of *Acres of Diamonds* and founder of Temple University. Dr. Conwell in a stirring address recounted some remarkable experiences with music resulting from experiments carefully conducted under scientific supervision at the Samaritan Hospital.

Dr. Conwell related the case of a man who for a long time, had lost his memory completely. He was a very elderly man, and his relatives were very anxious to find out where he had placed certain important papers. After trying every imaginable expedient to endeavor to restore his memory, Dr. Conwell suggested "Why not try music?" A quartet from the Baptist Temple of which Dr. Conwell was pastor was secured. The names of songs familiar to the old man were procured, and the quartet rehearsed these songs and then went to his bedside and sang them. While they were singing the old man's memory returned, and his mind was clear and expressive. He told them where he had secreted all his papers, and conversed intelligently with his relatives.

From the earliest times the value of music at the dinner table was realized. It was for this reason that Epictetus called a table without music a manger; and because of the realization of this fact, musicians were considered a dining necessity and were rarely absent from the feasts and banquets of the Greeks and Romans. It was several centuries later that Sir Thomas More, in his *Commonwealth,* provided for music at the meals of every class in a model com-

munity. And about two hundred years later the satirical Voltaire was led to observe that people were in the habit of going to the opera in order to digest the dinner they had previously eaten.

In 1881, Dr. Walter. H. Walshe, of London, England wrote a treatise *Singing Physiologically Estimated,* where he stated that singing is of marked value in jaundice, liver complaint and indigestion. It aids in extracting the nutritive elements of food and facilitates digestion. It is easily explained by the fact that singing involves deep breathing, and deep breathing leads to considerable oxidation of body tissues which occasions hunger and increases the appetite.

Teachers of singing have always observed that the appetite and digestion of children being trained to sing are always superior to those of non-singers. The trainers of choir boys, when questioned as to the digestive powers of their young charges always make such statements as: "Singing always makes boys hungry." "Singing is certainly appetizing."

The late Professor Philip Ames of Durham, England, said that his boys have the "appetites of horses and the digestion of ostriches." We have here a sort of double action, the mechanical exercise of the muscles of the abdomen, and deep inspiration while the increased amount of oxygen improves the blood.

Pavlow also helps to explain why music has such a favorable effect on digestion. Stated briefly, music, by arousing pleasurable emotions, promotes the flow of digestive juices. This increased flow causes a more thorough digestion of the food. Still a more curious fact is that the principal nerve of the tympanum (middle ear) ends in the center of the tongue and connects with the brain, reacting alike to the sensations of taste and sound. Hence, good food and good music is a most ideal combination.

Another interesting fact discovered within recent years

is that music is the enemy of pain. Some years ago Dr. Hunter noted diminution of pain as an effect of music in his experiments on a group of patients at Helensburg Hospital. Not long thereafter Dr. Mays obtained a notable reduction of pain by music played in minor moods in a patient suffering from neuritis. Miss Harriet Seymour found that in war hospitals music was played with good results when patients were entering or emerging from the anesthetic state.

In more recent years Drs. Burdick and O'Neil of the Kane Hospital, at Kane Pennsylvania performed surgical operations to a musical accompaniment maintaining that cheerful music on the phonograph selected in the light of the patient's nationality, interest and taste reduced suffering and improved the attitude of the patient.

Recently a young man rejected an anesthetic in place of music played on a harmonica by himself while surgeons probed for a bullet in his thigh. He was able to go through this ordeal without experiencing any appreciable pain.

Many years ago an Indian doctor made his appearance in Dublin, Ireland, who made a specialty of extracting teeth. He used to troop around the city with a band of musicians offering to extract teeth without pain. When a patient arrived for a tooth extraction, the band struck up a lively air which was kept up during the operation. The patient usually testified that he felt no pain while the tooth was being extracted.

Within the past few years dentists in this country have come to realize that there might be something in this dentist's practice. Dr. Elmer S. Best of Minneapolis has devised a dental chair which employs music as an anesthetic while dental operations are being performed . A recording and amplifying system built into the operating chair is used to maintain auditory contact with the patient's mastoid bone while the dentist is drilling.

The music, by travelling through the bones, drowns out the grinding noises and lessens the wincing and grinding. It is done by a novel use of the latest bone conduction instruments developed originally for the deaf. Tipped back the patient's head comes in contact with the two plates fixed in the head rest. They are the new sound-bone conduction plates and are attached to a phonograph by wires leading into another room. No sound is audible to the ears. But when the head touches the plates they transmit the music perfectly through the bones and the pain occasioned by the dental operation is considerably diminished.

In the course of a description of the exact details of using procain as a spinal anesthesia, together with an analysis of the results, Rusca of Locarno, made the interesting suggestion of using music to soothe a patient during an operation. As soon as he is placed on the table the patient is given a pair of head-phones through which he hears nothing but music, broadcast by means of a radio-phonograph apparatus. Care must be taken, states this authority, to choose music suitable for the condition of the patient. Not only do the head-phones effectively isolate the patient from the noise of the operating room, but the stimulus is a useful counteraction to the "painful" stimulus provided by the surgical proceedings. Patients afforded this comforting addition to spinal anesthesia have remarked how quickly the time of the operation has appeared to pass.

How does music fight against pain? Psychologists have a ready answer. Dr. Diserens who has devoted a great deal of thought to this particular problem says "Music as experiments amply demonstrate evokes or tends to evoke motor reactions. In any case, incipient motor reactions probably result even where imagery is alone detected. These in turn arouse a large number of propreioceptive sensations, which may possibly be very faint, but when added to the intense auditory sensations greatly increase the total sensations tend to be lost or crowded into a marginal position."

Whatever the explanation, music is a real enemy of pain, both pain of body and pain of mind. In the latter condition it is being used with great success in many mental hospitals. In the former it is proving an interesting competitor with ether and chloroform.

Music is playing a very important part in the hospital. A singer who has been devoting a great deal of her time in bringing comfort to the sick in the wards told a most interesting story of what took place in the Coney Island Hospital, in Brooklyn.

"A boy of 19 kept asking me for one song after another. We had already outstayed our time and he was begging for just one more. Something about his looks made us hate to refuse, and at last the nurse came up and whispered: 'You don't realize what you are doing! That boy hasn't more than a few hours to live; he is in no pain, but soon he will be in a coma and you are keeping his last moments happy, and the attention of the other patients away from him'."

Recently a most interesting bit of work on the effects of music was widely reported. It has been found that musical sounds exert definite and profound chemical changes. It has been found that such sounds break up or dissolve lumps of cholesterol, the material found in gallstones, and certain types of hardening of the blood vessels which lead to heart disease.

Experiments forshadowing this have been reported by Professor William Malisoff, physiological chemist of the University of Pennsylvania who is conducting researches on the chemistry of disease. This is, of course, only the beginning. The future will, no doubt, reveal most interesting and important information on the effects of music chemically on certain chronic ailments. In such an event music may become definitely established as a therapeutic agent in the treatment of certain chronic diseases.

Music may be prescribed as a valuable adjunct in increasing efficiency in our daily tasks, whether physical or mental. It is a valuable stimulant of proved power. Greater advantage should be taken of it.

Colors, music, tactile sensations, odors and flavors are food for the five special senses. When these are catered to intelligently life is more worth the living. Health and emotional efficiency is possible only when the special senses are adequately stimulated. Lately it has been shown that such ailments as high blood pressure and certain forms of heart disease are due to emotional imbalance. The terrific pressures of modern civilization are perhaps the greatest causes of emotional imbalance. To offset these proper stimulation of the special senses will go a long way in creating and maintaining a healthful condition. And of these colors is among the most important.

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