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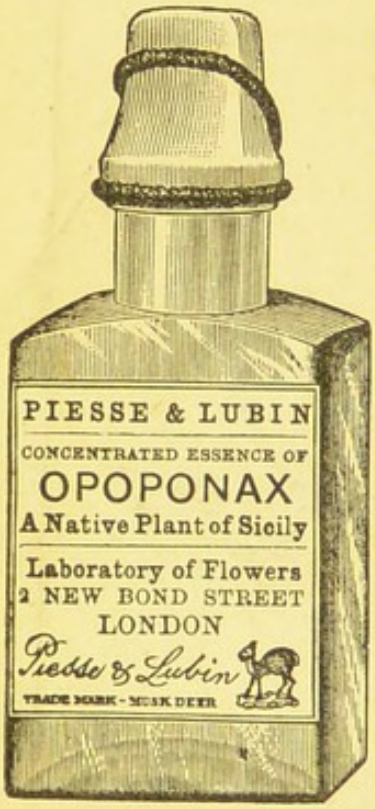

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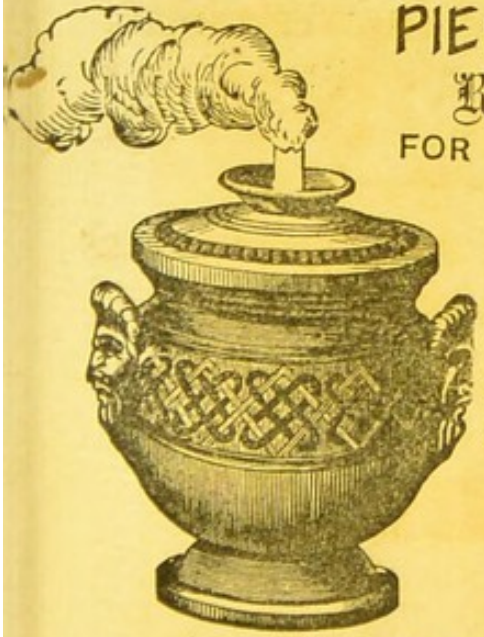

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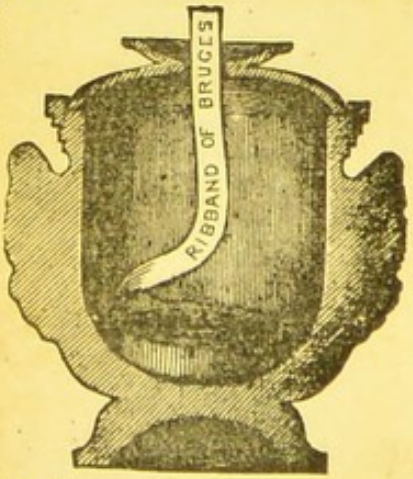

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ENGLAND

OLFACTICS

AND THE

PHYSICAL SENSES

BY

CHARLES HENRY PIESSE

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, FELLOW OF THE INSTITUTE OF CHEMISTRY, FELLOW OF THE CHEMICAL AND OF THE MEDICAL SOCIETIES OF LONDON, ETC., ETC. PUBLIC ANALYST. AUTHOR OF "CHEMISTRY IN THE BREWING ROOM," ETC.

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PREFACE.

ELIA in his "Chapter on Ears" says boldly, "I have no ears;" and then explains that, though not destitute of the aural appendages, he has "no ear" in the musical sense of that phrase. Though not deaf or incapable of hearing, he was unable to follow those fine gradations of sounds which constitute the charm of listening to music—he could hear without appreciating.

How many among the living millions have "no nose"! They have no nose for smell in a refined sense. They smell, but their consciousness is but slightly affected, scarcely stimulated—in a word, they smell, but do not appreciate. "Noses have they, but they smell not."

Yet it is difficult to realise, impossible to exaggerate, the importance of the faculty of smell to the individual and to the nation. Both personal and public hygiene would make rapid strides were the faculty of smell even only slightly cultivated. Cases of so-called accident, terminating ofttimes fatally, are recorded, which it seems impossible to admit could ever have

happened were the sense of smell not so blunted, or its warnings so completely ignored, as is too generally the prevailing condition. Thus a professional nurse gave to her patient a quantity of carbolic acid in mistake for a dose of magnesia; an infant's nurse put otto of roses into the infant's ears in mistake for glycerine; a man drank some paraffin in mistake for whisky! Where were their noses? Yet these kind of "accidents" are relatively common.

Would some of the Continental cities be the hot-beds of typhoid that they are, with their too often stink-laden atmosphere from unnumbered cesspools, and the methods of leading the atrocious odours therefrom into the houses, unless with the consent of their inhabitants, whose want of sense of smell can only be compared with Elia's want of sense of hearing? Would Cologne still possess the "seven and twenty stenches and several stinks" which Coleridge detected—and these are defeated both in power and number by the effluvia of Barcelona!—if its people had noses still capable of smelling? Sir John Kirk says of the stench of Zanzibar, that "one could almost manure a ten-acre field with a slice of it!" No greater boon could be conferred on the rising generation than that its sense of smell should be thoroughly cultivated. The wisdom of wholly utilising the five Divine gifts requires no comment.

C. H. P.

Cassiobury, Fulham, S.W.
1887.

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CHAPTER I.

INTRODUCTORY.

The Senses as Sentinels—Use brings Strength to Muscle and Mind—Modern Education—Effect of Civilisation on Sense of Sight—Mr. Brudenell Carter's Lecture—Culture and Education—Cultivation of the Senses—Neglect of Sense of Smell and Misery resulting therefrom—Old fallacy attributing superiority of Intellect to Sense of Touch—Theory confuted by Gall—Cultivation of Senses necessary in Early Life—Maternal Instinct—The Senses are the Natural Protectors of the Individual—The Common Origin of the Senses—The Living Body a Self-mending Machine—The Power of Compensation in the Body exists also for the Senses—Inheritance of Ideas.

OUR five senses may be regarded as sentinels which keep guard over the body, and the health and happiness of every individual are to a very great extent dependent on the state of wholesome discipline in which these sentinels are kept. There is a well-known relation which prevails in the animal economy, that increase of function is followed by increase of power.

In one respect it resembles the accepted law of political economists, which maintains that supply naturally follows demand.

A familiar example of this is seen in the muscles of the arm of a blacksmith, or in the leg of an opera

dancer. Constant use and practice have brought the muscles of their limbs into a state of perfection for performing the functions to which they are put. On the other hand, neglect to use the muscles causes them to become weak, flabby, and useless in inverse proportion.

What is true of the muscles is equally applicable to the mind. The more the mind is cultivated the more it is strengthened. Still it must be remembered that this strength is entirely dependent on the mode of cultivation. Every mind, howsoever highly cultivated, has its weak spots, owing to the non-cultivation of these spots. A profound mathematician, who has spent his life in the cloistered walls of some old college, would be utterly unable to hold his own, at starting, in a speculative market on the Stock Exchange, though he would be contending with men, none of whom, probably, could approach him in the higher mathematics.

What is wanted for everyday life is that we should be practical and businesslike, healthy, and in full possession of all our senses, not only of mind, but of body. Unfortunately, the modern system of education seems to have but one object in view, placed on the pedestals of vanity and selfishness. Each school vies with the other in endeavouring to turn out, not the men and women best capable of making their way through the world with credit to themselves and with benefit to others, but the most pupils taught up to some certain standard of knowledge; alas! too

seldom of a knowledge that can be turned to any practical account in the battle of life.

Fortunately, of late some attention has been directed to the cruel abuse of *one* of our five bodily senses — viz., that of sight. Practical men know that the future welfare of our nation depends upon our being able to produce healthy men, strong of arm, delicate of touch, keen of vision, and acute of smell; as well as healthy women, who can cook, clean, sew, and be good mothers. "The system" seems bent on passing all through one of two moulds: every girl is to be a nursery governess and every boy a pupil-teacher or a clerk.

Alarm has at last been taken at the terrible abuse that seems of late to have been made of the sense of sight. On January 29th, 1885, the *St. James's Gazette* observed:—"Like many other good things, civilisation has its drawbacks, and the deterioration of the human eye is one of the most serious, if not the most generally recognised of these. It is curious how widespread is the belief that short sight is strong sight, and will improve with age. As Mr. Brudenell Carter pointed out in his lecture at a meeting of the Society of Arts, eyes which are short-sighted in a high degree, if not actually diseased, are always on the threshold of disease. Some defects in the sense of vision are hereditary, and short sight is peculiarly prevalent amongst dwellers in towns, and especially amongst those whose habit or occupation leads them to look for a long time together at things very close

to their eyes. The only remedy is the cultivation of the sight in childhood and youth. Mr. Carter believes that if the eyes received as much attention as the muscles, England, in the course of two or three generations, would be peopled by a race which might successfully engage in a seeing contest with any other representatives of the human family. Perhaps this will come about when we have as a nation that 'ambition for health' which Sir James Paget is so anxious to welcome."

So far so good. A note of warning is thus raised about the evil of neglecting or abusing one sense out of the five, but we can rest assured that if we ever attain to the "ambition for health" we must treat them all with equal respect. The sense of smell is the one that has been most generally neglected, and, consequently, is the one of all others that we should carefully cultivate in the future.

Culture means something more than education. The former is suggestive of a possession of refinement as well as learning. The law compels the children of the masses to attend school; there they are taught to read, to write, and learn a variety of subjects, but are they taught refinement? It is often urged that this can only be done at home. The fact, however, is that only an attempt is made to cultivate the intellect, the cultivation of the senses being completely ignored.

The object of the present work is to show the importance of cultivating the senses, and in particular

the sense of smell. It is this sense that stands guard over the very air we breathe. Yet we neglect its warnings, till from long disuse it almost ceases to warn at all.

How much of the misery and the disease rife among all classes can be traced to foul and vitiated air?—air actually charged with evil odours! And yet the fact is, as a rule, persons are unconscious of the existence of bad smells. Those who are familiar with the habitations of the poor must admit the fact. Reference is not simply to the slums and alleys of our large towns, whose lamentably malodorous condition is patent to all, but to the cottages of the poor in the open country. The unopened windows, the sack up the chimney to keep out the draught, the adjacent pig-sty, the adjoining field of rotting cabbage stalks, all tell the same tale. The sense of smell, given by the Creator as a guard against disease in one of its most common forms of assault, has been neglected till it is virtually dead. Of the vast majority of the inhabitants of this country it can truly be said, as of the idols of old, "noses have they, but they smell not."

What is the result? The sentinel through neglect fails at his post, and enemies rush in. Their name is legion. The germs of every disease pour in through the callous nostril, and pass unchallenged into the highways and byways of the tissues of the lungs—fitting soil! Lassitude, idleness, the demon alcohol, the triplet feebleness of muscle,

mind, and will, are but few of many. How much the pernicious craving for stimulant is due to breathing polluted air which one sense tells plainly we should not breathe, the medical profession knows full well. But then that sense, through neglect, is dead or moribund, and the result is written in every newspaper, in the annals of the police-courts, it walks the streets, and fills the asylums and too often the gaols.

We trust that we shall not be accused of falling into the old fallacy of believing that the excellence of the senses is the source of the superiority of the intellect. What we maintain is that culture is alike essential to mind, muscle, and the bodily senses, and that it is quite as important to train and cultivate the senses as it is the mind and muscles. What would our reason and our strength be worth if we could neither see, hear, feel, taste, nor smell? Civilisation is advancing by leaps and bounds, not steps. Assuredly if we neglect to cultivate the original gifts of the Creator, a reaction will set in, followed by relapse into barbarism.

Among the ancient philosophers, Galen and Anaxagoras held the astonishing theory that the superiority of the intellect of man to the brute creation was owing to his superiority in the sense of touch. In their opinion it was the hand rather than the brain that made the distinction. This opinion seems to have been also held by Buffon, Condillac, Cuvier, Herder, Richerand, and Vicq d'Azyr, but the absurdity was confuted and completely over-

thrown by Gall,* the German writer on the functions of the brain.

Education commences from the hour of birth, and a certain education of the *senses* is absolutely necessary before any attempt to educate the intellect is possible. It will be seen, too, that if this education of the senses is neglected in early life it is almost impossible to rectify the omission later on.

Nixon, one of the deepest thinkers, believed a child's whole life depended on the way it was treated during the first two or three years of its life, and probably even the first two or three weeks.

There is a true saying that all great men have had good mothers. It is the mother that first teaches the child to use its senses, and the last sense brought into use by the infant seems to be that of touch, as distinguished from the mere sensation of feeling.

Perhaps the first sense brought into requisition is that of smell. A very young baby will remain quiescent in strange arms, but the instant it reaches its mother, it turns its head in her bosom, before even the tiny hand is outstretched to guide the way.

How soon the little mouth is seen wandering after what it seeks! Who can say but that the character for life is then formed? A contented disposition or discontented one may be dependent on the early results of these first efforts.

Of all the ideas inculcated into the infant mind by a

* Gall, II. cc. 4to, p. 208 sqq. 8vo t. i., p. 85 sqq.

mother's love and care, there is none so important as the cultivation of the sense of smell. A child's sense of refinement will greatly depend upon the extent to which this sense is cultivated or neglected. But we shall refer to this subject more fully in chapter ix.

Cultivate the sense of sight to colour, to form, and to distance. Cultivate the sense of hearing by harmonious sounds. How ready is this sense for cultivation! At two years of age all languages—Russian, Arabic, Chinese, English—are learnt with equal facility, and with perfect accent. Cultivate the sense of touch with mechanical toys, knitting, sewing, carpentering, &c., alike for *both* sexes. Cultivate the sense of taste with food suited for children. But above all, cultivate the sense of smell. Teach the child to dread bad smells and foul air. Teach it that of all adulterations there is none so bad as the adulteration of air. Teach it to smell the rose, the honeysuckle, the wallflower, the sweet-scented hay, the enticing perfume of the freshly-watered ground, and to distinguish one smell from another. Then send the child to school. It will be found that that child, keen of vision, handy with its hands, healthy in its taste, and, above all, sensitive with its nose, a lover of fresh air and cleanliness will be quick of learning, and soon surpass any child who has been brought up in the neglect of these fundamental gifts of the Creator. It will, however, as a rule be found that unless children are brought up with this sense cultivated, it is rarely acquired in mature

life, even under the most favourable circumstances. What lady is there who could not tell a servants' bedroom blindfold, simply by the sense of smell? It may seem hard to say so, but facts are facts, and they must be faced, their existence cannot be ignored. The type of folly is the ostrich, which buries its head in the sand and thinks itself safe. It is somewhat *apropos* that the type of foolishness should be the animal which stands almost alone in the disregard of the duty of rearing its young. The reason being, "Because God hath deprived her of wisdom, neither hath He imparted to her understanding."

Man's senses are his natural protection against various dangers. Some can be seen, some can be felt, some can be heard, some tasted, some smelled. An animal will smell strange food before tasting it, and reject it after tasting if instinct warns that it is dangerous.

It must, however, be constantly borne in mind that the real seat of the senses is in the brain, their exercise is one of its functions, and that these functions are rendered acute by practice, just as the intellect is by mental work, or the muscles by manual labour.

It is probable that the senses have all one common origin, for it will be found that the same idea may be conveyed to the brain by different senses. The smell of a lemon, the taste of a lemon, and the sight of a man sucking a lemon, all produce a somewhat similar sensation on the brain, or at least one

which excites a similar reflex—viz., a rapid flow of saliva.

The sight of meat will excite the palate of a hungry carnivor, and literally make its mouth water, as may be seen any day at the Zoological Gardens. Perhaps the best evidence of one common origin of the senses is the wonderful manner in which one sense assists the brain as compensation for the loss of another. To this may perhaps be owing what has been called the "harmony of the senses."

We should do well to more constantly bear in mind that the living body is to a certain extent a self-mending machine. It contains a principle or power of compensation, and a most beautiful and wonderful power it is. The late Sir Thomas Watson, in his lectures on the Principles and Practice of Physic, in speaking of this power says it is especially noticeable in some of the organs that are double. If one kidney wastes or is spoiled by disease, an increase of function devolves upon the other, and by this beautiful power of compensation the sound organ, without any alteration of its peculiar fabric, enlarges, so as to do the work of both.

The same principle holds good with the senses; when one is lost, the others become more acute to supply the deficiency. Take the case of the blind. The inmates of a blind asylum can tell you instantly, on entering the dining-hall, what there is for dinner, mentioning not merely the meats, but the vegetables. The sense of smell is rendered more keen by what

is probably an instinctive cultivation to make up for the deficiency of sight. Again, a blind man can, by tapping his stick on the ground or clapping his hands, ascertain when he has come to the corner of a street; the sense of hearing has been developed to compensate in some measure for the loss of vision. Even these instances are nothing when compared with the powers of the brute creation; the smell of a hound and the hearing of a watch-dog far surpass all human efforts.

Ganibasius de Volterre, a sculptor, being blind, felt faces, and then modelled them in clay. Saunderson, by exploring a series of medals with his hands, distinguished the genuine from the spurious, although the latter were so well counterfeited as to deceive a connoisseur with good eyes; and he judged of the accuracy of mathematical instruments by passing the ends of his fingers upon their divisions. Like the blind man of Puiseaux, he was affected by the least variations of the atmosphere, and could perceive, especially in calm weather, the presence of objects some paces distant. One of the most common instances of the increase of acuity in the sense of touch in the blind is the ease with which they read a book by touching raised letters.

Again, when a man loses the sense of hearing, or has been born deaf, how much keener becomes his sense of vision; with what ease he follows and understands the most rapid movements of the

fingers employed in communication by means of the deaf-and-dumb alphabet.

Later on attention will be directed to the extraordinary powers of seeing, smelling, &c., possessed by savage races. But it should be borne in mind that we all possess latent powers which can be quickened by cultivation. Sometimes these are rendered suddenly and abnormally acute by disease. Dr. Brachet relates that when he was Resident Medical Officer at the Bicêtre Hospital in 1811, the male nurse of the surgical ward one day astonished him by the increase which his powers of vision had acquired since the day before. The man could distinguish the most minute objects at an enormous distance. Five hours afterwards he felt a slight headache, and a few hours later was seized with a crushing apoplexy, and died the next night.

One of the most interesting and at the same time obscure subjects in connection with the senses is how far do we inherit ideas. Some are born with an eye for the beautiful, an ear for music, a refined taste, a delicate sense of touch or smell, and some without. It must be remembered first that the seat of the senses is the brain, most probably some limited areas of its central portions. The absence of the power to distinguish colours (colour blindness) may be accompanied by great keenness of vision. A person may be extremely quick of hearing, yet unable to distinguish between two distinct musical airs. Every individual has limits to his power of perceiving

musical notes, both as to treble and bass, which are peculiar to him. The root of the evil, or disease, if it be one, is probably in the sensitive matter of the loci of the brain and not in the organ of sense.

This possession of innate Sense, such as the musical ear, the conception and perception of beauty, has been often used to support the doctrine of the previous existence of the soul held by Socrates. How far the senses are affected by hereditary influences is apparently an open question, though it is certain that physical characters and deformities are often transmitted from parent to offspring. A strong and healthy father and mother may expect healthy offspring, and *vice versâ*.

It is far easier to believe in the immortality of the soul if we can realise that in one sense it is an emanation from the Deity.

CHAPTER II.

SIGHT.

Necessity of the Cultivation of this Sense Generally Acknowledged—Dr. Carter on the Influence of Civilisation upon the Eyesight—Effects of Vitiated Atmosphere—The *Evening Standard* on the Eyesight of Londoners—Dr. Carpenter on Hereditary Power of Distant Vision—Well-meaning but mistaken people—The *Globe* on Civilisation and Eyesight—Sight and Religious Impressions—Sight and unsuitable combinations of Colours—The Horrors of Blindness described by a Novelist.

THOUGH the evil consequences ensuing from the neglect of the cultivation of *all* the senses can scarcely be said as yet to have become a pressing subject of universal interest, we can congratulate ourselves, in noticing what we hope will prove to be the insertion of the thin edge of the wedge, on the general alarm that has recently been felt on the subject of sight.

Just as a man may go on for years in an unsatisfactory state of health, and at last hurry off to the surgeon on the sudden appearance of some symptom that gives him alarm, so Society, suffering from years of neglect of the cultivation of every physical sense, seems recently to have taken fright at the enormous increase in the numbers of children who suffer from defective vision.

The note of warning has fortunately been raised, and that, too, in a clear tone not to be mistaken. Among the poorer classes the increasing defectiveness in sight is very marked, and the cause, or rather one of the chief causes, is traced to the want of cultivation of the sense of smell.

Nearly every writer on the subject mentions vitiated air as being one of the primary causes of defective vision. This is one of numerous instances of the sense of smell being, of all the senses, the one most worthy of attention. This sentinel—the olfactory nerve—may be regarded as the outpost on duty, and so long as he remains active at his post the others are in comparative safety.

The subject of defective sight was brought prominently before the public on the 16th of September, 1884, in a letter addressed to the *Times* by Mr. R. Brudenell Carter, F.R.C.S.

Heading his letter, "The Influence of Civilisation upon Eyesight," he says:—"A few weeks ago I was deputed by the Medical Society of London to defend, at a Conference upon 'Over-pressure in Schools,' held at the Health Exhibition, the proposition that 'long hours of confinement in what is too often a *vitiated atmosphere*, coupled with the other ordinary conditions of school work and discipline, exert a hurtful influence upon the physical development of the frame, especially upon the heart and lungs and the *organs of vision*, and that this influence is so considerable that it must already be regarded as a matter of national importance.'"

In January last this eminent ophthalmist gave a lecture on the same subject at the Society of Arts,* which was taken up by nearly the whole of the London press. An exceedingly interesting article, entitled "The Eyesight of Londoners," appeared in the *Evening Standard* shortly afterwards, giving the cream of Mr. Carter's lecture. We quote it:—

"The theory of evolution crops up in so many quarters, that we need not be surprised to find Mr. Brudenell Carter applying it to his own speciality in the lecture which he has so recently addressed to the Society of Arts. The eye, he argues, on strict Darwinian principles, is derived from some remote ancestor who, in 'the struggle for existence,' obtained, by a process familiar to the student of this method of reasoning, this unquestionable advantage for 'the preservation of the species,' and has continued the enjoyment of the boon thus obtained. Every organ improves by its judicious use, and, as the blind insects of the Carniolan and Kentucky caves demonstrate, will, provided the organ is not put to its legitimate purpose, gradually disappear. In Nature nothing stands still; it must either retrograde or advance; and it is the opinion of the distinguished oculist whose opinion we have summarised that, owing to the artificial circumstances with which civilisation has surrounded us, we are, so far as eyesight is concerned, undergoing a process of involution. Every tenth person in a city like London is afflicted with myopia,

* *See also page 3.*

or short-sightedness, while spectacles and glasses of some description are too common to be attributed to that particularly imbecile form of vanity which takes the shape of wearing a *pince-nez*. In time, if this retrograde action goes on, we shall not exactly lose our eyesight, for we have not yet ceased to employ the eyes, but the chances are that, as a nation, we may become little better than the Germans, seventy-nine per cent. of whom, taking the statistics of the University of Tubingen as an extreme case, are myopics. On the other hand, though from five to thirty-five per cent. of the children attending the Breslau schools were short-sighted—the percentage increasing according to the grade of the seminary, and the consequent severity of the studies followed—it has been found that the pupils of the rural schools were almost free from this defect of the eyes. The same rule has been found to apply, with more or less accuracy, to many other countries, though, as the London School Board declines to gratify a scientific curiosity which is likely to bring on them more tirades in the shape of admonitions regarding the 'subjects' and 'standards,' Mr. Carter is unable to confirm the data mentioned, so far as the Metropolis is concerned. Nor, perhaps, except for the sake of comparison, is the investigation necessary, for the German returns prove that, while the country child, required to use his eyes in moderation, accustomed to cast them over the wide landscape before him, and to bathe them in a pure air, is almost unaffected by myopia, those living in the corrupt

atmosphere of towns, compelled to pore over badly-printed books in an imperfect or artificial light, and to take next to no exercise, begin at an early stage the involutionary process indicated by the lecturer, and transmit their defective vision to their children, and, if the latter do not make a fresh start in 'the struggle for existence,' to their children's children also.

"These inferences apply, of course, to adults as well as to inadolescents, for impaired eyesight contracted in early life is apt to follow the child to his grave. Unlike savages, acute vision is of little use to them in the battle of life. In a city there are no enemies from whom we can escape by sharp eyes, unless, indeed, it may be bores and duns; and even these are never numerous enough to exercise the optic nerve to any remarkable extent. Hence the eye ceases to be a factor in the citizen's 'struggle for existence,' and the stimulus to improvement of vision which is supplied by direct and immediate usefulness is withdrawn. Many of the habitual dwellers in towns rarely see a distant object, and most of their work is done at tables, desks, and benches, where the eye is always close to the point at which it must be directed. Moreover, in the murky climate of London, in fogs and imperfectly-lighted rooms, much of the daily toil of its inmates is performed by defective light, which drives them to place the book, or the tool, or the paper, closer and closer to the retina, with the result that by this approximation the malformation of the eyes which produces short sight is caused. Nor is travelling by railway and the continual straining of

the eyes in badly-lighted and shaking carriages, and the constant change in the focus of vision necessitated by the shifting panorama which passes the windows, altogether blameless for a disease which we are told is one of modern times. Now, in a normal state of matters something very different occurs. The savage is compelled by the necessity of keeping a sharp look-out after the animals on which he depends for existence, or on the enemies which would deprive him of it, to exercise his eyes. Hence, his vision becomes wonderfully keen. Dr. Mann tells us of a Zulu who could recognise two specks as two particular persons when the whites of the party failed to do more than make out by the aid of a powerful binocular that they were two human beings. A Peruvian Indian recognised M. Bonpland standing on the side of the volcano of Pichincha at a distance of eighteen miles, though Humboldt was for a long time unable to make him out with a telescope. The Georgians, Nubians, Indians, and other races are singularly sharp-sighted. A glare of light is almost as prejudicial to the eye as an entire absence of it, snow-blindness being, if more frequent, not more pronounced than night-blindness. Mr. Carter instances a Scotch forester as a good type of a man who is 'evolving his vision' by judicious use, and though he did not refer to the American hunters, these men are equally good examples. Even Audubon, the Naturalist, who was in youth not remarkable for powerful vision, by being constantly in the woods on the outlook for bird and beast, grew

so sharp-sighted that by the time he had attained middle life he could detect a squirrel running along the top of a fence, when his companions could barely recognise the fact of there being a rail in the place along which it ran.

"Mr. Carter's remedy for this deterioration in our vision is, of course, a reversion as far as possible to the state of matters from which we have fallen, though at the same time the cure advocated cannot be regarded as new, since in Germany and France, where short-sightedness is far more frequent than here, the attention of the State and of physicians has been for a long time directed to the question. A parent should, before decreeing the profession of his son, be careful to ascertain whether his eyes will bear the future duties demanded of them, and what may be called the gymnastics of the eye ought to be as carefully attended to as the gymnastics of the muscles. There should be 'seeing contests' quite as much as running or leaping, or swimming, or bicycling, or heavy hammer-throwing competitions. Half of the school books in use—and it may be inferred nine-tenths of the 'cheap editions' of popular authors—ought to be tabooed in favour of others printed in larger type and on better paper, since it has been affirmed, not without some foundation, that a great portion of the defective eyesight of the Germans is—or was, for these are getting out of use—due to the Gothic letters of their reading matter and the infamous paper on which their school books were printed by that frugal race. That

is, however, not all. The mode in which a child is sometimes allowed to place the copy-book in which it is writing often causes, as Mr. Henry Power pointed out some years ago, impaired eyesight; while slate writing should never be permitted, since both in slate and lead-pencil writing there is a particular reflex, and the letters are indistinct unless the light is falling in a certain direction. Neither reading nor writing ought to be tolerated in the dim light of evening, nor, Mr. Power insisted, should a child ever be allowed to read stretched out on the hearth-rug, endeavouring to spell out its lessons. Want of exercise and of regular meals does not in itself cause myopia, but indirectly, by reason of the influence it has on the system in general, may be regarded as a predisposing cause. Nor can the undue use of tobacco and alcoholic stimulants be acquitted as powerful agents in injuring the best of eyesights, though the worst of the difficulty is, no one will acknowledge that he is trespassing in that direction."

Perhaps one of the most alarming features of this epidemic of bad vision, if it may be so called, is the strong ground there is for the belief that unless active measures are taken in early life to counteract the tendency, defective vision is likely to prove an hereditary disease.

Dr. Carpenter, in his book on Human Physiology, observes (page 759) :—"It is interesting to observe that the power of descrying objects at vast distances appears to be hereditarily possessed by two races of

men, the Mongols of Northern Asia and the Hottentots of Southern Africa, both of which dwell on vast plains that seem to stretch without limit in every direction. It seems probable that this power was in the first instance acquired by habit in each case, and that, as frequently happens with acquired peculiarities which are kept up by constant use in successive generations, it has become fixedly hereditary."

What can be more disastrous to a nation like ours than having our sons growing up with defective sight, the extent of the evil increasing year by year?

One of the curses of the present day is the large number of self-appointed teachers of the people, who can be compared to nothing else than barrel-organs, capable only of playing one tune. We have, to a certain extent, to put up with government by fads. That the look-out on board every ship that sails could not see a yard beyond his nose is nothing. The one point, and the only point to some is, Did he pass the Sixth Standard? The same with our artillerymen, our soldiers, and volunteers; to see clearly a mile off is nothing—Did they pass the Sixth Standard?

There are others who apparently seem to consider the whole of life to be summed up in the fact of not being vaccinated; the fact of thousands dying from small-pox goes for nothing. Others can see nothing but the one virtue of total abstinence. We were told by a well-known member of Parliament some time back that the Turks were bound to conquer the Russians because the former were total abstainers and

the latter drank spirits. The fact that the Turks did not win makes no difference. The Highlanders of Scotland drink spirits, the Bengalese do not; but is there the slightest doubt which is the superior race physically, mentally, and morally? This much is certain, England's battles were never fought and won by men who drank only water.

When will the public see that the cultivation and training of the senses comes first, and that education follows after? When also will they see that all the senses must be cultivated, and not one or two only?

On the 29th of January, 1885, the *Globe* made the following remarks on the subject of "Civilisation and Eyesight":—

"The observation is not a new one that savage races possess the faculty of vision in a degree of perfection never obtained by civilised men. It is a serious matter, however, if, as Mr. Brudenell Carter and other authorities maintain, modern civilisation is steadily injuring the visual powers of those who come under its influence. Perhaps the general use of spectacles among young people may be due in some degree to fashion; or it may be due to the recognition by parents and medical advisers of the danger that Mr. Carter points out. It is certainly a new thing for boys and girls to wear glasses as they do now, both in England and on the Continent. Mr. Carter affirms that short sight has been developed almost within living memory, and that it now affects about one-tenth of our population. These are asser-

tions the truth of which it is hard to test, but it is not difficult to agree with the alarmists that there are not a few circumstances in modern life, especially in towns, which must tend to affect the eyes injuriously. The smoky atmosphere itself is distinctly hurtful, as we all experience upon those days when the air is more highly charged with carbon than usual. Nor can our educational system be altogether exonerated. The over-pressure which affects the brain and nerves cannot but injure the eyes as well. This is a general cause of mischief, but there are very likely subsidiary causes, such as Mr. Carter speaks of, and which may be removed without a relaxation of the Code. Home lessons—the preparation of which by the miserable light that poor children can command must be a fruitful source of danger—are, it is to be hoped, on the way to abolition. Even in school, however, the arrangements are not always as good as they might be. The provision of lesson-books in larger type, which Mr. Carter looks upon as a most necessary reform, would be the source of some additional expense, but, considering what elementary education already costs, the extra outlay could hardly be very great. If England is to hold her own, either in the manufacturing world or, in these days of sharp-shooting, even on the field of battle, her people must not be a short-sighted or a weak-sighted race."

The youngest child feels pleasure in looking at any bright object, as well as gratifying its sense of taste. A neglected child has no eye for beauty, no ear for harmony.

The child, according to its creed, learns in early life to associate solemn thoughts and reverence with certain visible things, and that religion has the strongest hold on the mind which acts through the means the Creator has given us. A child can reverence the Bible, the crucifix, or a fetish, the rising sun, or a hideous idol, according as it is taught. But complete neglect of the cultivation of the senses in this respect leaves the mind in adult life with no sense of reverence at all.

The separation of all religion from education in childhood tends to raise up a nation of clever devils.

An important point is in early life to teach children the suitability of colours.

Why does a haphazard mixture of gaudy colour shock the eye? Simply because, possibly unknown to ourselves, in early life taste has been implanted by example.

One sees everywhere the hideous combinations of colours and shades characteristic of the unrefined in all their dress, which grates so harshly on the artistic eye of this cultured age.

Of all our senses, Sight is the one we value most. Few would hesitate were they compelled to choose between loss of hearing, loss of taste, loss of touch, loss of speech, and loss of sight, in retaining the latter sense at the expense of any of the former. Like little Prince Arthur we would say,—

> "If you will, cut out my tongue,
> So I may keep my eyes. O spare my eyes
> Though to no use, but still to look on you!"

In that charming little story, "Called Back," the horrors of becoming blind are graphically described. "Blind! Who but the victim can even faintly comprehend the significance of that word? Who can *read* this and gauge the depth of my anguish as I turned and turned upon my pillow, and thought of the fifty years of darkness which might be mine—a thought which made me wish that when I fell asleep it might be to wake no more?

"Blind! After hovering around me for years the demon of darkness had at last laid his hand upon me. After letting me for a while almost cheat myself into security, he had swept down upon me, folded me in his sable wings, and blighted my life.

"Fair forms, sweet sights, bright colours, gay scenes—mine no more! leaving me darkness, darkness, ever darkness! Far better to die, and, it may be, wake in a new world of light. 'Better,' I cried in very despair, 'better even the dull red glare of Hades than the darkness of the world!'"

CHAPTER III.

HEARING.

Great Value of Cultivating the Sense of Hearing in Childhood—A Musical Ear not necessarily a Quick Ear—Dr. Gall on the Hearing of Animals—The Hearing of the Dog– Judging Character by Step—James Mitchell, the Boy Born Blind and Deaf—Sagacity of Dogs—The Cultivation of the Sense of Hearing and Correct Speaking—The Acquisition of Foreign Languages in Early Life—Instances of Quick Hearing—The Cultivated Ear and Music—Ideas conveyed by Music to the Cultivated Ear.

THE great importance of the cultivation of the senses in early life is, perhaps, as obviously manifested in the sense of hearing as in either of the other senses. All know with what facility a child picks up and retains sounds that it hears. As there are some who have not the sense of the perception of differences of colour, and who have been before referred to as "colour-blind," so there are some born without the faculty of distinguishing one tune from another. These cases are of course the exceptions, not the rule ; the seat of the defect being in the brain rather than in the organ of the sense itself.

Though probably the appreciation of quality and the range of audible sounds is influenced by the

character of the tympanic membrane and the condition of the muscles, bones, and other structures of the middle ear, much no doubt depends upon the amount of culture bestowed upon a child's sense of hearing. A want of ear for music, or an indifferent ear for music in the adult, is often the result of the child's never hearing harmonious sounds in early life. On the other hand, those with a musical talent generally show the possession of this gift by beginning to hum tunes before they can talk. A case is on record of a wonderfully good amateur musician, one of the best now living, who in infancy is reported, on good authority, to have hummed with perfect accuracy several distinct tunes before he was able to articulate a single word. Here are two causes at work helping one another: first, the original gift of a musical ear; secondly, early cultivation in being, so to speak, early exposed to the effects of musical sounds.

There is, however, no connection between a musical ear and a quick ear. Quickness of hearing increases with practice, and it is found that savages who are obviously more dependent upon the exercise of their physical faculties than the ordinary run of civilised men, surpass these in quickness of hearing, as they do in the power of sight and of smell.

That acuteness of hearing is strengthened by practice is particularly noticeable in the case of the blind. A blind man is constantly on the alert for sound, and his sense of hearing becomes so in-

tensified that it seems almost to become another sense altogether. Acuteness of hearing has always been associated with the blind. In Shakespeare we read—

> "Pray you tread softly that the blind mole may not
> Hear a footfall; we now are near his cell."

Most animals, however, far surpass us in the acuteness of their sense of hearing. Birds hear even the faintest sounds. Writing on this subject, Dr. Gall observes: "Not only are the vestibule and semicircular canals proportionately larger in many brutes, but the acoustic nerve and all its apparatus are more perfect. The concha is much more developed in most brutes, and the great osseous cavities surrounding the labyrinth in many augment the resonance of the solid and elastic vaults. These cavities, which must not be confounded with the mastoid cells, must evidently increase the sound."

The most familiar instance of the quickness of hearing of animals is that of the dog, who seems to possess a power perhaps only shared among mankind by the blind. A blind man judges of a person's character by step and smell. This is one of numberless instances of a single idea being conveyed to the brain by different senses. Sounds which to the human ear are inaudible or meaningless, are to the dog pregnant with information.

Take the case of a good watch dog. He hears a footfall in the distance long before it becomes audible

to us. First he pricks up his ears. If he approves of the footstep, or recognises a friend, he is satisfied, he wags his tail complacently; if, on the other hand, his suspicions are aroused, if his master is with him he growls, to express his opinion; if alone he barks, to give the alarm. All who have had the care and affection of faithful dogs will confess that in every case of a dog showing a strong dislike, circumstances have followed which justified the dog's judgment.

Wardropp* describes a boy named Mitchell who was deaf and blind from birth, and therefore the sense of hearing could not in his case have helped the deficient sight. Consequently, as may indeed have been expected, the senses of smell and touch were remarkably developed. So powerful was his sense of smell, says the narrator, that "when a stranger approached him, he eagerly began to touch some part of his body, commonly taking hold of the arm, which he held near his nose, and after two or three strong inspirations appeared to form a sudden opinion regarding him. If this was favourable, he showed a disposition to become more intimate, examined more minutely his dress, and expressed by his countenance more or less satisfaction; but if it happened to be unfavourable, he suddenly went off to a distance with expressions of carelessness or of disgust."

* "History of James Mitchell," &c., by James Wardropp. London, 1813.

The marvellous faculty brought out in this case by the peculiar circumstance of two of the senses being wanting, is possessed by some of the brute creation, clearly by the dog.

A child's after life as well as language will depend upon the amount of attention paid to the early cultivation of the sense of hearing. A child trained among educated persons will speak a refined language; one brought up in the gutter will speak the language of the gutter. Its only language is the sounds it is accustomed to hear. Children learn to talk in the playground (often for them the streets) and their own homes, not in the schoolroom.

The following case is instructive. A child at an early age showed signs of vocal and musical talent, and was sent to sing on the stage, but never went to school. He was, owing to domestic circumstances, thrown almost entirely into the company of educated gentlemen, although his own education had been so terribly neglected. He learnt his songs by rote, like a parrot, from others reading them aloud to him. At the age of fifteen his voice broke, and he was sent to a cheap boarding-school in the country. Although put into the lowest class of the school, he soon made very rapid progress. The boy, who on arrival could scarcely read or write, was the only one in the school who spoke English correctly and like a gentleman.

The same result is strikingly evident in the case of children who are early sent to school abroad. They

rapidly acquire the pure accent of the foreign tongue, which is almost impossible of acquisition at all by adults.

Children who in early life have been accustomed to distinguish between the delicate variation of sounds in several languages have great advantages in after life over those who have been brought up within the sound of one language only, so far as facility of acquiring other languages is concerned.

The ability to distinguish slight variations of accent, and the ability to distinguish between slightly different shades of colour, are different faculties from being quick of hearing or quick of seeing. Quickness of hearing we expect to find in the savage and the mountaineer, or the sentinel. Possibly, too, poachers and burglars have an improved sense of hearing.

Quickness of hearing is illustrated best, perhaps, by Byron's reference to the Duke of Brunswick *—

> "Within a window'd niche of that high hall
> Sate Brunswick's fated chieftain, he did hear
> That sound the first amidst the festival."

Equally apt is the story of Jessie, the Scotch girl, at the siege of Lucknow, a story that brought tears into the eyes of all who read it. She of all others first caught the sound of the bagpipes in the distance, "The Campbells are coming!"

The faculty of imitation being so quick in children, it seems strange that parents often fail to see the im-

* "Childe Harold." Canto III., XXIII.

portance of not leaving them too long in the charge of illiterate servants.

There is an amusing anecdote told of a foreign potentate of the highest rank, many years back, speaking English fluently, but with a strongly marked Scotch accent. In his highness's early life his tutor was a Scotchman.

Few things affect the character through life more than early sacred music.

Through the ear various emotions can be conveyed to the soul. Martial music inspires courage; the tarantella excites for the dance; the passion of love is never so well made known as by a song with music suited to the idea.

Only in early life can reverence and worship be inculcated. Beautiful architecture, the sweet odours of flowers and incense, the strains of sacred music, each assist to raise the mind to something higher and nobler. What lasting effect is made on the population throughout Europe by the sacred music learnt in infancy! We use the word sacred advisedly, for to every cultivated ear there are various kinds of music.

These ideas, if not conveyed when young, are rarely conveyed at all. Yet when the sense is cultivated, how wonderfully can ideas be conveyed in good music! For instance, the barbaric sound of the music of the prophets of Baal in Mendelssohn's oratorio of *Elijah;* the chorus, "O Baal, hear us!" followed by the solo of Elijah descriptive of the purity of the Jewish worship; the clash and roar of

drums and trumpets, the swell of men's voices in some of those marvellous harmonies for which Mendelssohn is famed ; then the sudden pause, a moment's silence, and the solemn strain of the organ resounds through the building. The contrast renders the effects sublime, but only to those whose sense of hearing is cultivated.

CHAPTER IV.

TOUCH.

Definition of the Sensations of Touch—Thermal and Mechanical—Sensations of Touch and of Weight or Resistance—Hyperæsthesia and Anæsthesia—Delicacy of Touch augmented by Practice—Sir C. Bell on the Hand—Touch of Specialists—Touch and Strength—Touch and Sight—The Blind Boy Cured at Twelve Years; Curious Result—Touch and Cleanliness—Touch and Suitability of Fabrics.

By the sense of touch we understand the perception of those sensations induced by the contact of something with us; whether that something be totally extraneous, or other portions of our own body. These sensations are of two distinct kinds, namely, the thermal, by which impressions as to temperature are perceived—*i.e.*, whether the temperature of the substance touched is higher or lower than our own; and the mechanical, whereby the varying characters of the different surfaces touched are distinguished as regards their being rough, smooth, hard, soft, angular, rounded, and the like; while closely interwoven with the latter, so, indeed, as to be with difficulty, or frequently not at all differentiated, are

the perceptions of muscular effort, employed simultaneously often enough, by which the characters of weight and resistance are perceived and appreciated. The faculties are nevertheless distinct, as is illustrated by the simple experiment of laying the hand upon the table, and then placing a small weight upon it. The sensation of contact, *i.e.*, touch, is immediately perceived ; then, on slowly raising the hand from the table, the sensation of the muscular effort overcoming the weight is made manifest.

The main organ of touch is obviously the skin, which conveys—or at least permits the passage of—the sensations of contact to certain minute bulbs, known as "tactile corpuscles," contained within and beneath it, and which are, indeed, the ends or terminals of the sensory nerves. These nerves contain two sets of fibres, though their separation cannot be mechanically effected, namely, those which convey the impression of touch to the brain, and those by which the site of contact is localised. The same nerves and terminals serve for all the sensations of touch, thermal and mechanical alike. The surface of the body is not equally sensitive in its sense of touch, as is indicated by the application to various parts of it of two points, such as the points of a pair of compasses closely approximated, or of two bodies of nearly but not quite the same temperature ; its most sensitive places being the tip of the tongue and the palmar surfaces of the terminal phalanges of the fingers ; its least sensitive, the middle line of the chest and of

the back in the order given. The acuteness of the sense of touch is subject to great variations from the average or normal standard by the effects of disease. In some instances this sense becomes so exalted as to constitute a very distressing symptom, if not a malady *sui generis;* the very slightest contact being plainly perceived, while more than that becomes positively painful. Usually the condition is limited to the surface of one limb, or even a small portion of it; this is very noticeable in cases of acute gout or rheumatism, where the areas about the joints are those commonly affected; while, singularly enough, this affection of portions of the skin other than about the joints is not infrequently an accompaniment of a paralysis of the muscles of the limb. This condition, which is called hyperæsthesia, is, however, subject to very wide variations in degree.

The converse is also too frequently found to exist. In the disease known as "locomotor ataxy" the perception of the sense of touch is most remarkably dulled, particularly in the lower extremities; the patient can hardly tell whether he is standing or not, or in progression when his feet come in contact with the floor; in fact, without *seeing* that he is upon the ground, he cannot walk, for no sensation of standing is conveyed to the brain. On closing the eyes and attempting to walk, the patient falls; or being supported, feels that his body is suspended in mid-air. This condition of no sensation of contact is called anæsthesia.

The sense of touch is capable of being rendered exquisitely acute by practice; and is, indeed, so highly cultivated in the case of the blind that we, more fortunate in the possession of the inestimable blessing of vision, can but marvel at the delicacy and exceeding sensitiveness to which that faculty is brought and enjoyed by them. Evidently, then, the "soft snowy hand of a delicate girl" is by no means the most acute of the sense of touch, much as it is admired. Sir Charles Bell said, "A soft white hand is the first attribute of Beauty and Civilisation. It distinguishes man from the brute, and in society is an index not only of the body but the mind." Yet we know that though the hand of a man who is constantly judging of the quality of silk, or engaged in sorting wool, has a far more roughened skin than that of any of the "girls of the period," his sense of touch has been so quickened by cultivation that it is immeasurably the superior.

The importance of educating the sense of touch in early life, like that which we have already urged in the case of sight and hearing, cannot be overestimated.

Muscular strength, even great muscular strength, is not incompatible with extreme delicacy of touch, for we see man, the "stronger vessel," excelling in all the arts where this is essential, from the manufacture of hair-springs for watches to playing the violin or the pianoforte. The game of billiards, in which a

delicate touch is essential to good play, has for its present champion a man of great muscular power.

The persistence of an acute sense of touch is exemplified in the case mentioned by Carpenter* of a boy who was born blind, but upon whom vision was bestowed as the result of a successful operation. Even after a considerable period had elapsed, he found it easier to feel his way about the house than to see it. In fresh scenes his sight guided him; in familiar places, such as his own home, his touch still guided him from pure force of habit.

Just as cultivation of the eye and ear is necessary to the higher feelings of education known as refinement, so, too, is a cultivated sense of touch. For this purpose the skin must be kept clean in early life, and must be suitably covered. It has been well said that

> "E'en from the body's purity
> The mind receives a secret sympathetic aid."

Only those who have been brought up in the habits of cleanliness from early youth can really feel the value of, and the necessity for, cleanliness.

One very useful lesson in early life is, to teach not only the body but the fingers to distinguish accurately between very slight variations of texture. As we have before called attention to the necessity for cultivation of the eye in distinguishing slight shades of colour, and of the ear in noticing the

* "Human Physiology," p. 511.

difference in very slight modulations of tone and accent, so, too, should the sense of touch be trained.

There are, perhaps, no persons so much deceived as the very poor, the result of their inability to distinguish fabrics by touch. How important is it to teach persons to help themselves rather than to be dependent on others in such a simple matter as this! Not only should children be taught to distinguish between linen and cotton, but to notice the difference in the softness of different kinds of linen. So, too, they should have the difference explained between cotton velvet and silk velvet, they should learn to distinguish between material that *is* really all wool or only *warranted* all wool.

How useful is it to be able to pick a good silk, or a good cloth, and to know that we are not being cheated by disciples of those great teachers who inform us that adulteration is another form of competition!

CHAPTER V.

TASTE.

Connection of Taste and Smell—Dr. Vincent on Taste—The Organs of Taste—Dr. Nehemiah Grew on Taste—Dr. Gall on Taste—Francatelli on the Education of the Palate—National Tastes—Flavours grouped into Classes—Purity of Taste—Sir Henry Thompson on Little Dinners *versus* Large Dinners—Amusing description—Sir H. Thompson on Temperance and Tobacco—Gourmets or Tasters—English and Foreign Mineral Waters—Water-drinkers.

THE sense of taste in the general acceptation of this term is more intimately connected with the sense of smell than any of the other senses. Still, the special organs of these senses are quite distinct.

Dr. Vincent says that on touching the lips, inside of the cheeks, and the palate, with a very concentrated solution of common salt, with strong vinegar, and pure alcohol, their respective tastes were not experienced, while he instantly perceived the taste of each when brought in contact with the upper surface of the tongue.

In fact, it is now known that the perception of the taste of odourless substances, such as certain acids, alkalies, salines, sweets, and bitters, is limited to the posterior portion of the dorsum or upper surface of

the tongue, and slightly along its sides; that portion which in brief corresponds with the distribution of certain papillæ or elevations, which may be seen by any person examining the tongue protruded before a mirror. These elevations, of which the largest are about twelve in number, are arranged in two lines converging like a V, the apex backwards. These papillæ contain the end-organs, or actual sensitive extremities of the nerve of Taste, called the Glosso-pharyngeal nerve. The front portion of the tongue does not afford any perception of the sense of taste, it is supplied by the Lingual Nerve, formerly (erroneously, so far as its function is concerned) called the Gustatory Nerve; it is essentially a nerve of Touch, as distinguished from a nerve of Taste.

The number of different tastes or flavours are, of course, unlimited, though we shall later on endeavour to show that just as there are seven notes in music, and three primary colours, so there are a limited number of primary tastes and primary odours.

Dr. Nehemiah Grew,* in a lecture delivered before the Royal Society in 1675, endeavoured to show that there are at least sixteen different simple tastes, which he enumerated. We shall later on discuss the question of the primary or simple tastes.

The perception of the flavour of any substance is greatly increased by rolling it about in the mouth,

* A discourse of the diversities and causes of tastes, chiefly in plants, published with all his lectures by the Royal Society, in one folio volume.

whereby both it and the saliva charged by contact with it are brought into contact with the sensory papillæ above mentioned, and are in this way enabled to stimulate the nerve of taste. The impression resulting to us from the flavour of a given substance is curiously affected by another flavour immediately preceding it, being considerably intensified or, as is often said, "improved," if the flavour be one agreeable to the palate. The flavour of wines, following cheese or olives, is a case in point.

Dr. Gall argues against the common opinion that indulgence deadens the taste, and contends that this renders it more discriminating, and if by indulgence he means cultivation, then he is unquestionably right. He asks if our cooks distinguish savoury articles less perfectly than savages.

Francatelli, sometime *chef* to Her Majesty, observes in "The Modern Cook," "The palate is as capable and as worthy of education as the eye and the ear."

As with all the other senses, the education of the sense of taste must be commenced in early life, but the cultivation and proper education of the sense of taste cannot be said to be completed till the child has grown up into the adult.

The appreciation of or fondness for certain flavours varies widely among individuals, and is influenced by age, sex, and the influence of habit, which is really cultivation, this latter being most often brought about by climatic conditions. The Esquimaux enjoy

fishy oils, the Latin races relish garlic, some of the Asiatics eat asafœtida as a *bonne bouche*, the Anglo-Saxon finds his palate tickled with beef and beer. Individuals acquire a liking for particular flavours, which perhaps have at one time been even nauseating, such as those of caviare, laver, oysters, *sauer kraut*, &c.

The first great principle of education of the sense of taste is that the food should be simple.

Most young children like sweet things ; infants do so naturally, as the food that nature supplies for them is sweet.

The secret of educating the palate is *simplicity.* Francatelli observes that the bane of English cookery is excess in the quantity and variety of spices and condiments, to which cause he refers the want of appreciative palate prevailing among the English as a nation.

The various flavours which the palate, unaided by the sense of smell, can distinguish may be grouped into six classes, namely :—

I. Acid, exemplified by the diluted mineral acids.

II. Alkaline, exemplified by the carbonates and bicarbonates of soda and potash.

III. Sweet. Sugar, in all its various forms.

IV. Bitter. A large number of substances possess this characteristic.

V. Saline. Common salt (chloride of sodium).

VI. Pungent.

The character called astringent, possessed so remarkably by a few substances, such as alum, sulphate of zinc, and some other salts, and the various forms of tannin (catechu, rhatany, kino, &c.), being due to an action wholly distinct from excitation of the nerve of taste, is purposely not included in the above list. We now come to a group, in which the palate must be assisted by the sense of smell for the proper perception or identification of the substance tasted.

This we designate the Aromatic. It contains such as the following—viz., mustard, horse-radish, pepper, the rinds of various fruits, like lemon, orange, lime, the different spices, and numberless others, all containing, or yielding, an essential oil or attar; tea, coffee, &c. This subject will be found more fully discussed in the chapter on the Harmony of the Senses, and an extended list of sapid substances classified is given on page 150.

Sir Henry Thompson has lately published an admirable book entitled "Food and Feeding." He contrasts the nice little dinner for the few and the large dinner of ceremony, and gives a most graphic description of the latter. Sir Henry says:—

"First, there is the little dinner of six or eight guests, carefully selected for their own specific qualities, and combined with judgment to obtain an harmonious and successful result. The ingredients of a small party, like the ingredients of a dish, must be well chosen to make it 'complete.' Such are the first conditions to be attained in order to achieve the

highest perfection in dining. Secondly, there is the dinner of society, which is necessarily large, the number of guests varying from twelve to twenty-four.

"The characteristics of the first dinner are comfort, excellence, simplicity, and good taste. Those of the second are the conventional standard of quality, some profusion of supply, suitable display in ornament and service.

"Eighteen or twenty guests enter a room adapted at most to a dinner of twelve. It is lighted with gas, the chief available space being occupied by the table, surrounding which is a narrow lane, barely sufficing for the circulation of the servants. Directly —perhaps after oysters—appear turtle soups, thick and clear.

"A *consommé* is to be had on demand, but so unexpected a choice astonishes the servitor, who brings it after some delay, and cold; with it punch. Following, arrive the fish—salmon and turbot, one or both, smothered in thick lobster sauce; sherry. Four *entrées* promenade the circuit in single file, whereof the first was always oyster patties; after which came mutton or lamb cutlets, a *vol-au-veut*, &c., hock and champagne. Three-quarters of an hour at least, perhaps an hour, having now elapsed, the saddle or haunch of mutton arrives, of which gentlemen who have patiently waited get satisfactory slices, and currant jelly with cold vegetables or a heavy, flabby salad. Then come boiled fowls and tongue, or turkey, with solid forcemeat; a slice of ham, and so on, up to game, followed by hot substantial pudding; three

or four other sweets, including an iced pudding; wines in variety, more or less appropriate, to be followed by a *paté de foi gras*, more salad, biscuits and cheese.

"Again, two ices and liqueurs. Then an array of decanters, and the first appearance of red wine; a prodigious dessert of all things in and out of season, and particularly those which are out of season, and being the most costly. General circulation of waiters, handing each dish in turn to everybody under a running fire of negatives—a ceremonial of ten or fifteen minutes' duration, to say the least. Circulation of decanters, general rustle of silks, disappearance of the ladies, and first change of seat, precisely two hours and a half after originally taking it. It may be hoped that a charming companion on either side has beguiled and shortened a term which otherwise must have been felt a little long. Now the general closing up of men to host, and reassembling of decanters; age and quality of wine discussed, recommendation of vintages; coffee which is neither black nor hot. Joining the ladies; service of gunpowder tea, fatal to the coming night's rest if taken in a moment of forgetfulness; and carriages announced."

This description by Sir Henry Thompson of the modern dinner of good society of a few years back, but which he admits is now rarely to be met with "in any reasonable English circle," he still maintains with truth is the model of the public dinner of the present day.

Probably in time, when the sense of taste has become more cultivated, these old-fashioned absurdities will pass away. Still, it must be remembered that, as we have before said, to cultivate the sense of taste properly, due regard must be had to the suitability of the food for the recipient.

The importance of possessing a pure and cultivated sense of taste is very great in certain trades and professions, as, for instance, the occupation of a wine-taster, a tea-taster, a coffee-taster. These persons are all gourmets; the word gourmet signifying a taster, especially in connection with wine.

A real gourmet is one who can distinguish between various slight differences of flavours.

Those who are acquainted with the business of a taster will know how careful he has to be to keep the purity of his palate. But in all these instances taste and smell go together, and of the two the latter is perhaps the most important. It is only when these two senses act simultaneously that perfection is arrived at in the case of those substances which we have classed as aromatic.

On the subject of tobacco in its connection with the sense of smell we shall have more to say in a future chapter. Sir Henry Thompson writing on the topic observes :—

"Unquestionably tobacco is an ally of temperance; certainly it is so in the estimation of the gourmet. A relationship for him of the most perfect order is that which subsists between coffee and frag-

rant smoke. While wine and tobacco are antipathetic, the one affecting injuriously all that is grateful in the other, the aroma of coffee 'marries' perfectly with the perfume of the finest leaf. Among the Mussulmans this relationship is recognised to the fullest extent; and also throughout the Continent the use of coffee, which is almost symbolical of temperate habits, is intimately associated with the cigarette or cigar. Only by the uncultured classes of Great Britain and of other northern nations, who appear to possess the most insensitive palates in Europe, have smoke and alcoholic drinks been closely associated. By such, tobacco and spirits have been sought chiefly as drugs, and are taken mainly for their effects on the nervous system — the easy but disastrous means of becoming stupid, besotted, or drunk. People of cultivated tastes, on the other hand, select their tobacco or their wines, not for their qualities as drugs, but for those subtler attributes of flavour and perfume which exist often in inverse proportion to the injurious narcotic ingredients, which latter are as much as possible avoided, or are accepted chiefly for the sake of the former."

After all, those who drink water probably enjoy food more than those who drink wine. They have generally better appetite and digestion, and they certainly preserve an appreciative palate longer than the wine-drinker. Water is so important an element to them that they are not indifferent to its quality and source. As for the large class

which cannot help itself in this matter, the importance of an ample supply of uncontaminated water cannot be overrated. The quality of that which is furnished to the population of London is, generally speaking, inferior, while the only mode of storing it possible to the majority renders it dangerous to health. Disease and intemperance are probably largely induced by neglect in regard to these two matters. It would be invidious, perhaps, to say what particular question of home or foreign politics could be spared, that Parliament might discuss a matter of such pressing urgency as a pure water-supply ; or to specify what particular part of our enormous expenditure, compulsory and voluntary, might be better employed than at present by diverting a portion to the attainment of that end. But for those who can afford to buy water, no purer exists in any natural sources than that of the Malvern springs, and these are "aërated" and provided in the form of soda and potash waters of unexceptionable quality. Pure water, charged with carbonic acid gas, does not keep good so long as when a little soda or potash in the form of bicarbonate has been added; for this purpose six to eight grains in each bottle suffice—a larger quantity is undesirable. All the great makers of these beverages have now their own artesian wells; or draw from other equally trustworthy sources, so that English aërated waters are unrivalled in excellence. On the other hand, the foreign syphon, charged, as it often is, from the water

of the nearest source, is a very uncertain production. Probably our travelling fellow-countrymen owe their attacks of fever more to drinking water contaminated by sewage matter than to the malarious influences which pervade certain districts of Southern Europe. The only water safe for the traveller to drink is a natural mineral water, and such is now always procurable throughout Europe, except probably in very remote or unfrequented places. No admixture of wine or spirit counteracts the poison in tainted water, and makes it safe to drink, as people often delight to believe; but the simple process of boiling renders it perfectly harmless, and this result is readily attained in any locality by making weak tea, to be taken hot or cold, toast-water, barley-water, lemonade, &c. The table waters now so largely imported into this country from Germany and France contain a considerable proportion of mineral matter in solution, and while they are wholesome as regards freedom from organic impurities, are, of course, less perfect for daily use than absolutely pure spring-waters, such as those above referred to. Vaunted frequently as possessing certain medicinal properties, this very fact ought to prohibit their constant use as dietetic agents, inasmuch as we do not require drugs as diet, but only as occasional correctives. The natural Seltzer, Apollinaris, Gieshübel, and St. Galmier—though of this latter some of the sources are inferior to others, the best appearing now to be chiefly retained for Paris—are perhaps

among the most satisfactory within our reach. A dash of lemon juice, and a thin cutting of the peel, form sometimes an agreeable addition, and nothing keeps the palate cleaner or in better order for appreciating food.

We shall again refer to the intimate connection of the senses of taste and smell, but will first direct attention to the sense of smell itself apart from the other senses.

CHAPTER VI.

SMELL.

Most worthy of Cultivation—Dr. S. Piesse on Smell—Much Disease results from inability to detect Impure Water by Smell—G. Chaplin Piesse's Acute Sense of Smell—Dickens on Smell Recollection—Character Affected through Sense of Smell—Dr. Rush on the Effect of Odours upon the Moral Faculty—*Moniteur Scientifique* on Sense of Smell—Smell in Birds, Reptiles, and Fishes—Buckland on Smell in Salmon—Blumenbach on Smell.

WE now come to consider the sense of smell, which, though the most neglected, we claim to be the most important and the most worthy of cultivation of all the bodily senses.

Perhaps the most perfect extent to which the sense of smell is cultivated in human beings is to be found in the trade of the perfumer. In "The Art of Perfumery," page 46, the author of that work says :—

"To the 'unlearned' nose all odours are alike ; but when tutored, either for pleasure or profit, no member of the body is more sensitive. Wine merchants, tea brokers, drug dealers, tobacco importers, and many others, have to go through a regular nasal educational course. A hop merchant buries his nose

in a pocket, takes a sniff, and then sets his price upon the bitter flower.

"The odours have to be remembered, and it is noteworthy here to remark with what persistence odours do fix themselves upon the memory; and were it not for this remembrance of an odour, the merchants in the trades above indicated would soon be at fault. *An experienced perfumer will have two hundred odours in his laboratory, and can distinguish every one by name.* Could a musician, with an instrument of two hundred notes, distinguish and name any note struck, without his seeing the instrument?"

One of the most important uses of a perfectly refined sense of smell, coupled with an exquisitely delicate taste, is that of detecting impure water.

The amount of disease and misery caused by drinking impure water is simply incalculable, and so too are the causes of the water becoming impure. In the vast majority of cases water is supplied direct from the water company into tanks in towns, and in the country it is got from wells.

The water may become impure from a variety of causes, as we have said; but let any one, any householder or housekeeper, ask first himself, and then his neighbours, the following question, "When did you have your water tank cleaned out last?" The answer will be, "Eh?—what?—water tank—I am sure I don't know—I never thought about it."

Now and then, from some very obvious cause indeed, people find out that the water is bad, and

the tank is searched. Generally a dead rat or dead mouse will be found. But how often are there slight causes of contamination which escape the observation of all save those whose noses and palate have been properly educated.

As an instance in point we will mention the water from the ordinary kitchen boiler. Cooks in most houses fill the kettle from the boiler. The boiler is shut in; it is fitted with a steam pipe, and it fills itself. The following, however, is a fact. A large number of boilers—we may say, very large—contain dead blackbeetles, some of which probably have been daily boiled for years. Any one with a very delicate sense of smell, or rather with a highly cultivated sense of smell and taste, will be able to detect this common impurity. It is a nasty thought, but none the less true, that probably we all have repeatedly during our lives drunk a cup of tea made from water in which blackbeetles have been stewing.

As an instance of how highly the sense of smell can be cultivated, Mr. George Piesse, of the firm of Piesse and Lubin, 2, New Bond Street, assures us that he can with ease detect this taint in water where others can detect nothing.

How often will an odour recall some past and long-forgotten thought or sentiment to the mind. This is not strange in the case of those who have been brought up in some religious faith in which a sweet-smelling savour still formed a part, as in the worship of Jehovah ordered from Mount Sinai, the

precepts of which have been engrafted into the teaching and practice of the greater part of Christendom.

This strange recall of some past undefined thought —some remembrance of what never happened, to use a paradoxical expression—is by no means rare. We can give an excellent illustration of the *idea* by quoting a passage from a well-known work of fiction.* While little Oliver was lying wounded on his bed, the first heavenly ray of a woman's love and pity crossed his path as Rose Maylie's tears dropped on the child's pillow :—

"The boy stirred and smiled in his sleep as though these marks of pity and compassion had awakened some pleasant dream of a love and affection he had never known. As a strain of music, or the rippling of water in a silent place, of *the odour of a flower*, or even the mention of a familiar word, will sometimes call up sudden dim remembrances of scenes that never were in this life, which vanish like a breath, and which some brief memory of a happier existence long gone by would seem to have awakened, for no voluntary exertion of the mind can ever recall them."

That the sense of smell affects the character, or rather that the character is affected through the sense of smell, there can be no doubt. Those who dwell in close confined rooms, and are constantly breathing vitiated air, are affected not only bodily but mentally.

* "Oliver Twist," by Charles Dickens.

We have before pointed out how much the craving for stimulant is dependent on breathing air which, if our sense of smell were cultivated, we should not breathe.

The idea that odours affected the moral faculties is very old, and many strange superstitions have been held concerning the effects of certain ones upon the moral character. It seems even that the air of certain districts possesses curious properties, which might be addressed as Hamlet did his father's spirit:—

> "Be thou a spirit of health, or goblin damn'd?
> Bring with thee airs from heaven, or blasts from hell?"

That the idea is old is shown by the following passage. Dr. Benjamin Rush, Professor of the Institutes of Medicine and of Clinical Practice in the University of Pennsylvania, in a book published in Philadelphia in 1793, states:—

"Odours of various kinds have been observed to act in a perceptible manner upon the moral faculty. Brydone tells us, upon the authority of a celebrated philosopher in Italy, that the peculiar wickedness of the people who live in the neighbourhood of Ætna and Vesuvius is occasioned chiefly by the smell of the sulphur and of the hot exhalations which are constantly discharged from those volcanoes.

"Agreeable odours seldom fail to inspire serenity and to compose the angry spirits; hence the pleasure, and one of the advantages, of a flower garden. The smoke of tobacco is likewise of a composing nature,

and tends not only to produce what is called a train in perception, but to hush the agitated passions into silence and order. Hence the propriety of connecting the pipe or cigar and the bottle together in public company."

Also in the same book he says :—

"Let it not be suspected from anything that I have delivered that I suppose the influence of physical cause upon the moral faculty renders the agency of Divine influence unnecessary to our moral happiness. I only maintain that the operations of the Divine government are carried on in the moral as in the natural world by the instrumentality of second causes. I have only trodden in the footsteps of the inspired writers ; for most of the physical causes I have enumerated are connected with moral precepts, or have been used as the means of reformation from vice, in the Old and New Testaments. To the cases that have been mentioned I shall only add that Nebuchadnezzar was cured of his pride by means of solitude and a vegetable diet ; Saul was cured of his evil spirit by the music of David's harp."

Before entering into our own views on the subject of smell, it may be as well to give an idea of what has generally been thought by accurate observers on the subject. The following is the gist of an article which appeared in the *Moniteur Scientifique* :—

"The seat of the sense of smell is, as we know, in the lining membrane of the nostrils. This membrane has a mucous and irregular surface, over which spread

a number of nerves, with delicate terminations. It secretes a lubricating liquid. By means of muscles, the apparatus of smell is dilated or contracted, like that of sight.

"The mechanics of smell are, simply, the contact of odorous particles which are probably always in the gaseous condition, and the active or olfactic cells which constitute the terminals or 'end-organs' of the exceedingly minute ramification of the olfactory nerves. These particles are carried by the air into the nostrils. If, on the one hand, the nerve is injured, or even compressed; if, on the other, the air is prevented from passing into the nostrils, there is an absence of smell. The upper part of the nostrils is the most sensitive as regards odour, and this area is found anatomically to correspond with the seat of distribution of the olfactory nerves. The sense of smell varies much in different people. Some are entirely without it. These are called 'Anosmics,' while in others the sense of smell is exceedingly acute, these are designated 'Hyperosmics.' Persons are not unfrequently met who are anosmic for certain odours, and hyperosmic for others.

"Smell is sometimes voluntary, sometimes involuntary. In the former case, to obtain a lively sensation, we close the mouth and make a long inspiration, or a series of short and jerking ones. The muscles contract the orifice of the nostrils, and thus increase the intensity of the current of air. On the other hand, when we wish not to smell, we expire through the

nose, so as to drive away the odorous air, and inspire by the opened mouth. Smell and odours are closely connected with the phenomena of taste or gustation. Many savours perceived by us arise from a combination of sensations of smell with those of taste (*see ante*). Thus, when the olfactory membrane is diseased, the savour of food is altered. How do odorous substances act with reference to the matter which separates them from the organ of smell? It seems most probable that the odorous particles are dissolved by the watery secretion covering the olfactic cells, and are thus enabled to stimulate these by being brought into intimate contact with them. A substance which is absolutely insoluble in water is also absolutely odourless. In the morning, when the ground is moist, and the flowers are covered with dewdrops, there is a large exhalation of perfume. Similarly, after a shower of rain. In gustation we have described something analogous. The small particles dissolve themselves in the moisture, and diffuse themselves in air, which then becomes the vehicle carrying them to our nostrils. Some odours have a very great diffusibility. For example, ambergris, newly cast on the shore, is smelt a long way off; the odour of rosemary off the Spanish coast, where it is largely cultivated, is perceptible long before the land comes in sight; and so with the Plumeria of the West Indies. The degree of division of the particles is marvellous. A grain of musk will perfume an apartment. Haller mentions having kept for forty

years some pieces of paper perfumed with a grain of ambergris, and at the end of that time they still retained their odour. It is to be noted that the odorous particles are *sent out*, and the body emitting them does not act as a centre of agitation, giving rise to vibrations. It is thus a different case from those of light and heat. The odour is the odorous molecule itself; whereas light, as perceived, is not the luminous body. We cannot tell whether oxygen has some chemical influence on the particles; nor what kind of action takes place on contact of the particle with the nerve, whether a mechanical agitation or a chemical change. The division of the senses into *physical* (sight, touch, and hearing) and *chemical* (taste and smell) is a good and practical one. In the latter, contact is always implied. There are many cases of hallucination as regards smell; united, generally, with insanity on other points. Lunatics have been met with who constantly complained of a fœtid odour; others rejoiced in the most delicious, though imaginary, perfumes. It seems to be well authenticated that in lunatic asylums these delusions as to smell are very frequent. The intensity and delicacy of the sense of smell vary in different individuals and races. In some it is wonderfully sensitive. Woodwart tells of a woman who predicted storms several hours in advance from the sulphurous odour (due to ozone probably) which she perceived in the air. A young American who was deaf, dumb, and blind, became a

good botanist, simply by the sense of smell. It is, however, in some of the lower animals that we find the sense most highly developed; above all in the carnivorous mammifers. Smell is, with some of them, like an eye, which sees objects, not only where they are, but where they have been. The keen scent of the dog is well known.

"Humboldt mentions that when, in his travels in South America, it was desired to attract condors, all they had to do was to slaughter an ox or a horse, and in a short time the odour attracted a number of these birds, though none were visible previously. Of birds, however, the Grallatores, or Waders, have the largest olfactory nerves, but it does not seem to follow that their sense of smell is most highly developed.

"The olfactory organ in reptiles is large. Fishes also have an olfactory membrane; and fishermen have observed that they are driven away when certain odorous substances are thrown into the water. Sharks and other voracious fishes often gather from great distances when a carcase is thrown into the sea."

In reference to the power of smell in fish, the late Frank Buckland wrote in *Land and Water* as follows:—

"POWER OF SMELL IN SALMON.

"Upon the front part of the snout of the salmon will be seen on each side an opening, divided into two by means of a diaphragm of skin which run

across from side to side. This is the nostril, and a beautiful bit of mechanism it is. If the valve at its entrance, formed by the skin, be removed with a knife or pair of scissors, it will be seen that the bottom of the opening consists of a flooring of a delicate red substance. If the fish's head be then placed in water the red substance will be seen to consist of numerous folds, lying side by side, and all diverging from a common centre. These folds float about free in the water and receive the impressions of the smell of the water by means of the delicate nerve-fibres which are spread out upon them. The fish has in fact a nose made for smelling in the water, not a nose for smelling in the air. In a large salmon the flooring of the nostril is as large as a big pea in section."

Dr. I. F. Blumenbach, in 1830, in reference to the sense of smell observed :—"No external sense is so intimately connected with the sensorium and internal senses, nor possesses such influence over them, as the sense of smell." From this it will be seen that we are in accord with that learned man's views in stating that the sense of smell is the most important of all the senses.

CHAPTER VII.

SMELL—*continued.*

Linnæus arranged Odours into Seven Classes—Remarkable Instances of Acute Sense of Smell—Curious Mental Impression caused by Odour—Odours and Memory—Exceedingly Minute Quantities of Odorous Materials capable of being Smelled—Discussion of the Cause of the Sensation of Smell—Respiration Necessary for Smelling—Smelling through the Mouth—Audubon's Experiments—Smell in Disease.

WE will endeavour to give a short list of the opinions of some of the leading physicians and also a few established facts on the sense of smell.

There is a general consensus of opinion that the sense of smell is more acute in proportion to the relatively larger size and perfection of the sinuses.

Carpenter, writing on the subject of smell,* first calls attention to the fact that Linnæus arranged odours into seven classes: Aromatic (Laurel leaves), Fragrant (Jasmine), Ambrosial (Musk), Alliaceous

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* "Human Physiology," p. 715.

(Garlic), Fœtid (Stinking Goosefoot), Repulsive (Solanaceæ), and Nauseous odours.

This point, however, we shall discuss more fully in Chapter VII.

Dr. Carpenter goes on to give instances of marvellous powers of smell. He mentions the case we have already referred to in Chapter III. thus: "James Mitchell, blind, deaf, and dumb from his birth: smell was the principal means of distinguishing persons, and enabled him at once to perceive the entrance of a stranger."

He also quotes an incident recorded of a blind gentleman who had an antipathy to cats, and who was possessed of a sensibility of smell so acute in this respect that he perceived the proximity of one that had been accidentally shut up in a cupboard adjoining his room.

In savages the scent is almost as acute as in the lower mammalia; thus it is asserted by Humboldt that the Peruvian Indians in the middle of the night can distinguish the different races, whether European, American Indian, or negro; and the Arabs of the great desert are said to be able to distinguish the smell of a fire thirty miles off.

What sense was it that appealed to the feelings of Lady Macbeth; what sense was it that had been most instrumental in riveting on her mind the awful murder of the king? The sense of smell.

It was the smell of the king's blood that haunted her in her sleep and made her walk—

"Here's the smell of the blood still: all the perfumes of Arabia will not sweeten this little hand. Oh! oh! oh!"

A curious instance of the impressions made upon the mind by any peculiar odour is related by Dr. Potter, the obstetrician to the Westminster Hospital.

A short time back, he states, a lady had to undergo an operation somewhat similar to one she went through some ten years before. For the purpose of the operation it was necessary for her to be put under the influence of an anæsthetic. Ether was administered. She afterwards related that the moment she smelt the ether her mind was instantly carried back to its state during the previous operation, and the same confused dream was carried on from the point where it had broken off ten years previously.

All great writers have recognised the fact of odours being coupled with recollection—

"There's rosemary—that's for remembrance!"
Shakespeare.

In the "Christmas Carol" the spirit of Christmas Past has carried Scrooge and suddenly placed him in the old familiar place of boyhood, his old school—

"The spot
We ne'er forget though there we are forgot."

"He was conscious of a thousand *odours* floating in the air, each one connected with a thousand thoughts, and hopes, and joys, and cares long, long forgotten."

How often will it be found that our earliest recol-

lections are connected with the sense of smell. A friend relates that, as far as his memory goes back, the first impression he can recall was a desk, inlaid with a scented wood, belonging to his father, which impregnated with its odour all that came in contact with it. Some time ago he was turning over sundry old papers, &c., which reminded him of his father; when he came to one that had the old familiar smell, he then first recalled fully the past, and his eyes grew moist as the long-forgotten odour recalled the kindly face and loving looks of the old white-haired man, long since gone to his last resting-place.

A middle-aged lady states that her earliest recollection is of an old mahogany workbox, lined with mother-of-pearl, associated with the smell of a tonquin bean which it contained. Quite recently her thoughts flew back to the days of her infancy on smelling some tonquin beans.

The powers of smelling in man are very great, but far inferior to some of the lower animals. It is stated on good authority that the sense of smell in man is so exquisitely sensitive, that air containing a 200,000th part of bromine vapour will instantly be detected by it. It will recognise the 1,300,000th part of a grain of otto of roses, or the 13,000th part of a grain of musk.

Haller mentions that less than the two-billionth part of a grain of camphor has been distinctly odorous.

But what is this when compared to the power

of smell in the dog or the camel?—when we remember the bloodhound years back would be taken to smell a rag some poor wretched captive slave had worn, and then, with nose to the ground, would track the miserable fugitive for miles by simply smelling the ground the poor creature had run over.

A camel in the desert, surrounded by interminable plains of hot dry sand, will suddenly prick up its ears and hurry in a certain direction. After some hours it will arrive at the longed-for water, which though perhaps only some muddy pool, yet to the parched throat far surpasses in flavour the most delicious iced cup ever fashioned by the cunning hands of a Brunetti.

Dr. Elliotson observes: "The causes of the sensation of smelling are, as yet, unknown, and in the absence of positive knowledge on this subject philosophers have either avowed their ignorance or contented themselves with hypotheses destitute of proof." Among the opinions respecting these recondite phenomena which have at various times been advanced, three may merit our consideration. The advocates of the first designate by *spiritus rector*, or aroma, a principle independent of the substance which contains it, very volatile and expansible, imponderable and imperceptible to every sense excepting that of smell; and to the various modifications of this immaterial substance they attribute the varieties of odours; the second, and probably correct one, holds that there are particles which evaporate from the

odorous substance itself, and that the cause of the sensation of smell is therefore inherent in, and inseparable from, the odorous body. The third opinion is that olfaction is independent of the emanations of material particles, and is a simple dynamic action of the odorous body upon the organs of smelling similar to the action of sound on the hearing; but this we think is undoubtedly erroneous.

However this may be, odours, to become objects of sensation, must come in contact with the pituitary membrane covering the expansions of the olfactory nerve during the respiratory process. When the breath is held the most odorous substances may be spread in the interior of the nostrils without their perfume being perceived. This observation was first made by Galen. It has been frequently remarked that odours are smelt only during inspiration; the same air, when returned through the nostrils, always proving inodorous. But this is true only when the odour has been admitted from without by the nostrils, for when it is admitted by the mouth, as in combination with articles of nutrition, it can be perceived during expiration through the nose. A proof of this may be readily obtained by placing the open neck of a small phial containing an essential oil to the mouth during the acts of inspiration through the mouth and subsequent expiration through the nose; during the former no odour is perceived, but during the latter it becomes very manifest.

It was first recorded by Willis that, on placing certain sapid substances in the mouth, and at the same time closing the nostrils, the sensation of taste was suspended. This observation has since been frequently repeated, and has given rise to the generally prevailing opinion that a very intimate relation exists between the sensations of smelling and tasting, and that the same qualities of bodies simultaneously affect both of these senses. The fact is that the causes of taste and smell are totally distinct in their nature, and have been already more fully discussed (page 42).

Dr. Prout pointed out the distinction between taste and flavour. He conceived, however, that flavour was intermediate between taste and smell.

Not uncommon are instances of the loss of the power of smell from a fall on the head or other violent causes. Pure flavours, such as of substances in Groups I.—V., page 44, could be tasted as usual, but only the mechanical or pungent qualities of the Aromatics, Group VI., could be perceived, hence these could but imperfectly be judged or appreciated. The lesion in these cases would appear to be located about the olfactory lobes.

Some tribes of uncivilised men far surpass us in the power of smell. The American Indians have distinguished men of different nations by this sense. Dogs readily distinguish individuals by its means, and in many brutes of prey it is very powerful. Angelo Poliziano says that after a battle a flock of

famished vultures arrived the next day from a distance of 166 leagues to devour the bodies. But Audubon relates two experiments to show that vultures are indebted to acuteness of sight rather than smell. He stuffed a deer's skin with hay, allowed it to become as dry as leather, and placed it in a field. In a few minutes a vulture made for it, attacked it, tore open the stitches, and pulled out the hay. He then put a large dead hog into a ravine, and concealed it with cane. It putrefied and gave forth an intolerable stench, but the vultures, which were sailing about in all directions in search of food, never discovered it, although several dogs had been attracted and had fed plentifully on it. He next killed a young pig and covered it closely with leaves. Vultures soon saw the blood, descended to it, and by its means discovered the pig, which they devoured while still fresh.

In disease the power of smell may become surprisingly acute. T. Bartholin mentions the case of a person who could name the individuals in the next room by smell.

The acute sense of smell found in various kinds of dogs, however, far surpasses anything related of human beings, even when born blind, or when this sense has been unnaturally increased in power by disease; indeed, this power is so wonderful that some persons have imagined it to be a faculty in itself, independent of the sense of smell—in fact, a sort of sixth sense.

CHAPTER VIII.

"SCENT," OR HYPEROSMIA, AND ODOUR-SECRETING ANIMALS.

Scent in Dogs—The *Lancet* on Scent—The Breed of Dogs gradually Changimg—The *Globe* on "Scent"—The Fox, and Darwin's Hypothesis—Scent in Animals the Means of Propagating the Species—The Musk Deer—The Castor Beaver—The Civet Cat—Sense of Smell and Continuance of Species, in some Animals—Insects attracted to Flowers, by odours thereof—A Lesson to be learnt.

THE faculty of "scent" possessed by dogs is one that would perhaps be thought more of were it not so common.

That the sense of smell, judging by ourselves, should be sufficiently keen to enable any animal to follow for miles over the ground the course pursued, not long before, by another animal, which, it must be remembered, progresses by a series of leaps or bounding steps, certainly appears very wonderful; still the fact remains, notwithstanding occasional doubts by sceptics on the subject.

We should remember that all our senses either improve or deteriorate, according as we cultivate or neglect them from generation to generation.

Early in the present year,* on the subject of "scent" in dogs, the *Lancet* says:—"An attempt is being made to account for the remarkable powers exhibited by some dogs on the presumption that 'scent' is a faculty *per se* altogether distinct and different from the sense of smell. This is, as all physiologists must know, a misconception. The truth is that each species of animal has some specially developed faculty of relation by which it is, more than by other faculties, placed *en rapport* with the external world. The differences are great even among small classes of beings; for example, among dogs some use sight more than smell, as the greyhound. The sense of smell is, however, generally developed to a high pitch among those animals which have in a state of nature to hunt for their prey, or to avoid predatory enemies. There is nothing, that we can perceive, difficult to understand in the intelligence exhibited by the lower animals. The scientific doctrine of evolutionary development affords a satisfactory solution of every problem, and renders the facts plain to see."

It will probably be found that in all domestic animals the breed is gradually undergoing change, slowly improving in some respects and deteriorating in others. The breeds of St. Bernard and mastiff dogs, for example, becoming larger in build and more noble in countenance, for which qualities they

* 1886.

have been selected, while their "scent" becomes less acute from generations of relative neglect.

In April last a very interesting article on "Scent" appeared in the *Globe* newspaper, which we abstract:

"Hounds are as good this season as they were last, and huntsmen just as cunning; yet the unravelled mystery of '*scent*' has made all the difference between a good season and a bad one. The poet who wrote that the 'southerly wind and cloudy sky' proclaimed a hunting morning, started a fallacy that all the intervening years have failed to disprove. It used to be said in olden days that saturated round never carried a scent. There came a period of doubt when 'Cecil' told us that under the above condition scent had been known to lie; while now the saying that a wet season is a good one is generally accepted as true; and the truth of it was borne out in the seasons of 1852-3, 1876-7, and of course 1883-4. Yet rain is no certain guide. When Harry King hunted the Royal staghounds they had a wonderful run over the country about High Wycombe and Penn, when the ground was perfectly dry and so dusty that hounds and huntsmen were nearly concealed from sight. In Essex, too, hounds, both fox and stag, have run over the roothings as if they were tied to their fox, while the wind was raising clouds of dust; though, on the other hand, there is generally the best scent when horses are scarcely able to gallop through the deep ground. Speaking generally, hounds can run better

over herbage of some sort than over bare ground. When a fox crosses a turnpike road, or runs it, scent is commonly found to fail; it is, with rare exceptions, better on grass than on plough; while heather generally carries a good scent, as those who have hunted fox or stag on Exmoor will have noticed. Another fact in connection with scent, but from which no theory can be deduced, is that, in countries comprising hill and vale—like the Heythrop and Berkeley, for instance—there is rarely a scent on both kinds of ground. If they can run a fox in the vale they are pretty sure to lose him on the hills, and *vice versâ*. A good deal has been written about the effect upon scent of the evaporative and absorbent properties of the earth. But whatever may be the natural 'scenting' properties of a dog, it is certain that a great deal depends upon the nature of the land crossed. When hounds run over some of those undrained sedgey fields so often found in the neighbourhood of brooks or rivers, they can generally push their fox; but drained and dressed land is not so favourable. Then again, as far as the fox is concerned, it is a common idea that he leaves a better scent behind him if he be found and well bustled in covert before making for the open, than if he steal off unperceived, in which event the 'scent' is said to be indifferent. Further, the scent fails when a fox is getting beaten; hence, when a fox starts up wind, and is hardly pressed at the outset, he not uncommonly reaps an advantage when he turns down wind,

for the twofold reason that the scent is fainter and what there is is blown on in advance of the hounds. That 'scent' is shifted by the wind no hunting man needs to be told. The following is a striking instance of it: The Queen's staghounds were in Burnham Beeches, whence the deer came away into the open, and ran in the shape of a letter S. A minute or two later the pack came out of the wood, and there being a side wind, the hounds ran a letter S, as the stag had done, but about sixty yards to the left of the deer's actual line."

We have quoted this article in order to call attention to a theory that seems to have escaped the observation of writers on this subject hitherto.

Hunting men are apt to complain that hounds are not what they used to be. The remark is made, "Foxhounds seem to have no more 'scent' than a greyhound." There are, however, always two sides to every question, even that of evolution, and that, instead of the hounds possessing less "scent," it may be that the fox is gradually, year by year, losing in intensity that peculiar smell which makes it consequently more difficult for the hounds to track him.

Each year a large number of foxes are hunted and killed, and the breed of foxes is kept up by the survivors. In this case it is as well to first consider which survivors are the fittest. Not necessarily the strongest or the fleetest.

In countries abounding in game the fox has but little difficulty in obtaining food, and in the chase the

escape is often more due to the nature of the country than the speed of the fox. The survivor is the fox least likely to be drawn and chased—namely, *the fox that smells the least.*

Once admit that foxes smell unequally, and that the one that smells the strongest is more likely to be hunted than the one that smells the least, and it of necessity follows that so long as these conditions continue the breed of foxes will gradually alter till ultimately the fox ceases to have any smell at all.

On the other hand, were the hounds dependent on their scent for life, this power would probably increase in proportion as the smell decreased. It is only through a long series of ages that we may become cognisant of great changes in species.

In all quadrupeds the sense of smell is connected with the propagation of the species. Indeed, some animals appear to possess in a peculiar manner an odour that attracts the opposite sex. One of the most noted of these is the musk-deer, which supplies the perfumers with the well-known perfume of musk, so largely used in various combinations. The musk-deer is a native of the great mountain range which belts the north of India, and stretches far away to the north along the western border of the Chinese Empire. The musk is contained in a pod which grows in the male animal only. The male musk-deer lives generally a life of seclusion, but it is the peculiar smell of the musk that attracts at times the female deer.

The odour of musk is secreted by various other animals, such as the musk-rats called *ondatra* in Canada, *pilori* in the Antilles, and *desman* in Russia; the musk-ox (*ovibos moschatus*), &c., though none of these are available for the supply of the material for manufactures.

Another animal which possesses a peculiar odour is the castor beaver (*castor fiber*), which produces the substance known as castor, imported from Canada and those immense territories formerly belonging to the Hudson's Bay Company. Again, there are the several civet cat tribe, or Vieverras, one of which, the *V. civetta*, produces the material known as civet, mentioned by Shakespeare—

> "The courtier's hands are perfumed with civet."
>
> *As You Like It, III.* 2.

A good deal of the civet now brought to European markets is from Calicut, capital of the province of Malabar, from Bassora on the Euphrates, and from Abyssinia. In its pure state civet has to nearly all persons a disgusting odour, but when diluted to an infinitesimal portion its perfume is exceedingly agreeable.

Civet and castor, like musk, are largely used in the manufacture of perfumes, chiefly for the purposes of mixing, to give a permanence to the more fleeting odours derived from flowers.

These curious animal odours may, however, be considered as eccentricities of nature. In the case of

the castor beaver, the musk-deer, the musk-rat, and the civet cat, the distinctive smell of each is intimately connected with the propagation of their species, and the more we consider the subject the more we see that it is the sense of smell above all other senses that presides over that function, not only of the animal world, but probably extending to the vegetable kingdom itself, for it is likely to be the sweet perfume that entices the insect from flower to flower, they carrying the pollen accidentally adhering to them, and so impregnating the pistil, thereby causing infinite variety of plants from season to season.* Still we must not ignore the other senses; when we begin to neglect or ignore any one, we commence a retrograde motion in civilisation—in fact, take the first step towards relapse into barbarism

There are birds which attract by their plumage and others by their song. The senses of sight and hearing all play their part; but of all the senses, it is the sense of smell which, if removed from the earth, would mostly tend to send back the world into a state of chaos.

Of a very truth is it, that the breath of life of man, the highest of created beings, has been breathed into him through his *nostrils.*

* Sir J. Lubbock, Bart., M.P., has pointed out, as the result of his experiments with bees, that they are greatly influenced by the colours of the flowers in their search for nectar, they greatly selecting the bright reds and yellows, and he in this way accounts for the greater prevalence of these colours over the more sombre purples, blues, and violets.

Before passing from the subject of "scent" in animals, we would call attention to the lessons that may be learnt by civilised beings from the animal creation in a state of nature.

A law of creation is to admire sweet odours, to shun bad ones; a child properly brought up with "an educated nose" shrinks from the contamination of bad smells.

Indeed, in reference to the education of the sense of smell, civilisation seems to be confined to the few, the very few; while we firmly believe that a proper cultivation of the sense of smell will always be found the greatest ally temperance has yet known.

Are we indeed more truly advanced in these days of dress and luxury than in the days before the Christian Era?

CHAPTER IX.

THE CULTIVATION OF THE SENSE OF SMELL.

Prejudice against the Cultivation of the Sense of Smell—George Wilson, M.D., on Smell—Musical Notes and Odours—Dr. Piesse on Sound and Smell—Cultivation of Sense of Smell in Childhood—Sense of Smell Neglected—Infants Taught to Distinguish Sounds—Paradise and the Senses—Positive and Negative Education—Nurses and Children—Servants and Mistresses—Children should be Taught to Distinguish Food by Smell.

WE have already referred to the education of the eye, the ear, the palate, and the sense of touch, under their respective headings, and we now come to consider that equally important subject, the education of the sense of smell.

Unfortunately, there seems existent a prejudice on this subject. We see occasionally actions for damages in courts of law under the Public Nuisances Acts. A man, for example, complains of inconvenience caused by the smell proceeding from some manufactory, or dust-heap, or brick-kiln, &c.; and sometimes what may be called a "specialist" is called

in, who never fails to be the butt at which the gentlemen of the law exercise their wit.

Whenever a jury has to be appealed to, a counsel would never fail to take advantage of the popular ignorance and popular prejudice that exists on this subject, in order to weaken the evidence brought forward. A "cultivated nose," when mentioned as such, always provokes a smile. Writing in 1857 Dr. George Wilson observed :—

"Apart altogether from the question of delight or the opposite in the exercise of smell, the extent to which the nostril may be educated far exceeds what most imagine can be realised in connection with this despised sense. A foxhound, a pointer, or a terrier, as all acknowledge, may be trained to a more quick or precise scent ; *but to speak of educating our own noses provokes only a smile.*"

Dr. Wilson is here complaining of the folly of those who despise the idea that the nose can be educated. He proceeds :—

"In keeping with this, our nomenclature of odours is exceedingly restricted, and whether good, bad, or indifferent, we soon exhaust in every language our means of distinguishing them. Yet the chemist, who has, like the bloodhound, to trace out the poisoner, like the bloodhound, often hunts him down by the smell ; and it is not only poisons that he distinguishes by their varying odours, but a multitude of substances whose other characters enable him to identify them after the clue thus obtained.

"There are probably as many odours as there are colours or sounds; and the compass of one nose in reference to the first, likely differs as widely from that of another as the compass of the eye or the ear does in reference to the two last.

"The wine merchant, the distiller of perfumes, the manufacturer of drugs, the grower of scented plants, the tobacco dealer, and many others, have by long training educated themselves to distinguish differences of odour which escape an uneducated and unpractised nostril, however acute by natural endowment.

"Let those who doubt this visit a scientific chemist's laboratory and examine his specimens one by one, and they will easily satisfy themselves that a fac-simile of the largest church organ might be readily constructed, in which each organ-pipe, sounding a different note, should be represented by a phial exhaling, when opened, a different odour."

Dr. Wilson wrote thus in 1857, and it will be found that every writer who has thought much on the subject of "smell" has seen the intimate connection between sound and odour. My late father, Dr. Septimus Piesse, published in "The Art of Perfumery" a "Gamut of Odours," in which each of a series of odours (forty-six in number) is placed side by side against its equivalent note in music. We shall, however, refer to this particular subject more fully in a later chapter on "The Harmony of the Senses."

As Dr. Wilson observes certain tradesmen after a

time are enabled to distinguish differences of odour "which escape an uneducated and unpractised nostril, *however acute by natural endowment.*" The italics are our own, for herein lies the whole gist of the matter under consideration.

It may be urged by some that it is all very well to educate the sense of smell in those who are to be brought up to certain trades or professions, such as the wine merchant, the tobacco-dealer, the perfumer, the drug manufacturer, &c., but what is the use of educating the sense of smell in ordinary individuals?

We maintain that a certain amount of education is absolutely essential for all the senses, and all the gifts of the body. It is essential to the health of every one that the muscles should be exercised, irrespective of the fact that in mature life the persons will not have to gain their living by manual labour. An acrobat, a prize-fighter, a dancer, a professional sculler, would receive a superior muscular education; still, who would maintain that exercise was only necessary for those about to embrace these or similar professions?

Yet, practically, this is how we treat the sense of smell. A child's sense of smell is as a rule absolutely neglected. Degraded human beings mostly show their degradation by the absolute loss of all sense of smell, or its complete neglect. The slums of our big cities teach us this. Misery, wretchedness, and stink seem inseparable.

To a man with an educated nose death under a

sweet-smelling haystack would be preferable to life under the conditions that some seem to bear unconsciously, so entirely have they lost the talent once given them.

Nature has given us five senses, and also provided us with the purest, highest, and most delicious food for them. The more highly cultured are they, the more does enjoyment follow their exercise.

Men may object to sensualism, but should remember that our idea of the original Paradise is simply pure gratification of the senses.

We may rest assured that as we neglect to cultivate any one sense in early life, so shall be taken away from us future power of its enjoyment.

Unfortunately, as a rule, the education of the nose is left to chance. The eye and the ear have teachers, but the nose, too often, is wholly neglected unless self-taught.

To be practical, we would at once give a few hints, to those who have charge of the early education of the young, as to how the nose should be educated. The education must consist of two chief points which may be called negative and positive. It is equally important to prevent the child being exposed for long to bad smells, as well as to teach the child what is meant by good smells. It is also necessary to teach children to distinguish between differences of smells somewhat similar to one another.

Most educated persons are fully aware of the importance of fresh air, and of the danger of bad

smells, whether arising from drains, gas, close rooms, unwashed bodies, or other causes; few, however, realise that fresh air is one of the most powerful adjuncts in the education of the nose.

It will be found that some servants, though surrounded by all the conveniences and accessories of civilisation, fail to make use of them. We refer to this because too often the early life of children is very much at the mercy of these persons. Parents should bear in mind that the nurse's nose has most likely been far more neglected in its education than their own, and that the children will suffer accordingly.

It is not so much, however, the negative part of education to which we would refer as the positive.

We have before mentioned that children are taught to distinguish things by sight, by sound, and by taste; why not, therefore, teach them equally systematically to distinguish different substances by the smell? The rule too often is to let a child eat or taste, and to describe and teach on this point, and to leave the smell to chance; but we believe that throughout the day the "principles of smell" might be taught with beneficial results.

Practically, it is found that the more the senses of smell and taste are cultivated, the more do those persons appreciate simplicity and purity.

It is impossible to tell what good results may accrue in after years to those who as children had been trained to a proper sensitiveness in regard to the sense of smell. In the training of the nose, as

in everything else, the greater variety of smells and perfumes employed in the experiments the better—*i.e.*, it will be found far easier for a child to distinguish between different scents, who has the practice of a great number, than if only confined to a few.

Boys, when old enough to be presented with that most useful of all boys' toys, a tool-box, should be taught to distinguish between the different woods by their smell. There is, of course, a distinctive smell in nearly all woods, and yet there are probably many persons who would only recognise one, such as cedar or santal, of characteristically powerful odour. With practice it is possible to distinguish deal, mahogany, oak, rosewood, ebony, and, indeed, nearly all woods, by the smell. It is often very important to distinguish between two smells that are very much alike.

> "The santal-tree perfumes when riven
> The axe that laid it low."

The truffle has a most delicate *bouquet*, and how delicious is the flavour, yet there are many persons unable to detect them!

Often parents with all good intention reprove their children for making remarks on the nature of the food placed before them; but when children are at home they ought to be encouraged rather than otherwise to bestow well-merited praise or blame, as it indicates a refined and acute condition of the senses of taste and smell.

The *Lancet*, p. 1114, 1885, says: "The organ of

smell seems to be the best indicator of goodness or badness, agreeable odours being as a rule quite harmless."

Our natural instinct when the sense of smell is not neglected makes us shun bad odours, they being exceedingly nauseating. On the other hand, some odours are fairly pleasant, or at any rate not disagreeable, such as the smell of tar, seaweed, camphor, or the smoke of fine tobacco; the pleasant odours of roasting meats, fruits, &c., being agreeable to the senses perhaps more on account of what they suggest than pleasant in themselves. There is still another class of odours of which it may be said that they are a positive source of pleasure.

The chief of these are the beautiful odours of sweet-smelling flowers, such as the jasmine, the rose, plumeria, the honeysuckle, the wallflower, and the heliotrope.

CHAPTER X.

THE CULTIVATION OF THE SENSE OF SMELL—*continued.*

The Education of the Nose—Nature the Best Teacher—Nature's Scents Pleasant—Bad Smells the Result of Interference with Nature—Shakespeare and Smell—Lord Bacon on Smell—Lord Bacon on Gardens—Shakespeare on Scents and Sounds—Shakespeare's Sonnet on Flowers—Article on Perfumery in the *Encyclopædia Britannica.*

As in all branches of education much depends upon the teacher, it happens, fortunately, in that branch which appertains to the cultivation and education of the sense of smell, we have a reliable guide—viz., Nature.

It will be found that, as a rule, the natural odours are sweet and pleasant, excepting the exhalations and excretions of the animal kingdom, and the putrefactive smells of both animal and some vegetable substances—especially those containing compounds of phosphorus and sulphur in unoxidised forms—when undergoing that process of slow decay called erema-causis ; and when we meet with odours which are the

reverse, we shall generally find that we can trace the evil to the so-called civilising hand of man.

Even in the exceptions that Nature gives us to the rule that all her odours are sweet, we associate thə condition with an abode of evil far different from this earth. From time immemorial evil odours and sulphurous emanations have been connected with that which is bad:

> "There's hell, there's darkness, there is the sulphurous pit,
> Burning, scalding, stench, consumption."
>
> *King Lear.*

When, however, we write on the perfumes of Nature in connection with our subject of Olfactics, we may be well satisfied to continue, in King Lear's own words:

> "Give me an ounce of civet;
> Good apothecary, sweeten my imagination."

The best school to which to take our sense of smell for its education is a garden. Lord Bacon observes: "God Almighty first planted a garden; and indeed it is the purest of human pleasures, it is the greatest refreshment to the spirits of man."

He farther on gives the good advice that Nature is best when left alone; and we also feel glad that so deep a thinker had not failed to notice the natural affinity between sweet odours and sweet sounds. He says:

"And because the breath of flowers is far sweeter in the air (where it comes and goes like the warbling

of music) than in the hand, therefore nothing is more fit for that delight than to know what be the flowers and plants that do best perfume the air."

"In cultivating our sense of smell it is not, however, sufficient to enjoy the perfume of flowers generally, but we must teach ourselves to distinguish one flower from another equally by smell as by sight."

Harmony is the law of Nature, and if we wish to appreciate the harmony of the perfumes of flowers—for there is such harmony in perfumes as in music—we must first carefully learn our notes, then shall we be able to say with the Duke in "Twelfth Night":

> "If music be the food of love, play on.
> Give me excess of it; that surfeiting,
> The appetite may sicken, and so die.
> That strain again;—it had a dying fall:
> O, it came o'er my ear like the sweet sound
> That breathes upon a bank of violets,
> Stealing, and giving odour."

One of the most beautiful pieces of poetry in the English language is Shakespeare's 99th Sonnet devoted wholly, by innuendo as it were, to the praise of sweet-smelling flowers:

> "The forward violet thus did I chide;—
> Sweet thief, whence did thou steal thy sweet that smells
> If not from my love's breath? The purple pride
> Which on thy soft cheek for complexion dwells,
> In my love's veins thou hast too grossly dy'd.
> The lily I condemned for thy hand,
> And buds of marjoram had stolen thy hair;
> The roses fearfully on thorns did stand,
> One blushing shame, another white despair;

A third not red nor white, had stolen of both,
And to his robbery had annex'd thy breath;
But for his theft, in pride of all his growth
A vengeful canker eat him up to death.
More flowers I noted, yet I none could see
But sweet or colour it had stolen from thee."

The following article, which the author contributed to the "Encyclopædia Britannica,"* contains a short digest on the subject of perfumery generally:—

"Perfumery is the art of manipulating odoriferous substances for the gratification of the sense of smell. Perfumes may be divided into two classes, the first of which includes all primitive or simple odoriferous bodies derived from the animal or vegetable kingdom, as well as the definite chemical compounds specially manufactured, while the second comprises the various 'bouquets' or 'mélanges' made by blending two or more of the foregoing in varying proportions; toilet powders, dentifrices, sachets, and the like. To the former class belong (1) the animal products, ambergris, castor, civet, musk; (2) essential oils (more properly called attars), mostly procured by distillation; (3) the philicome butters or oils, which are either solid or liquid fats charged with odours by the processes of inflowering or maceration, to be shortly described; (4) the odoriferous gum-resins or balsams which exude naturally or from wounds in the trunks of various trees and shrubs, such as benzoin,

* "Encyclopædia Britannica." A. and S. Black, Edinburgh and London. Article "Perfumery." By C. H. Piesse.

opoponax, peru, tolu, storax, myrrh; (5) a few chemical bodies, similar in odour to or identical in odoriferous active principle with certain plants, *e.g.*, nitro-benzol, called attar of mirbane or false almond; vanillin (or methyl-protocatechuic aldehyde), coumarin or (coumaric anhydride), and a few others. Ammonia and acetic acid are used respectively as smelling salts and in the preparation of aromatic vinegar, but can scarcely be considered as perfumes. The second class contains the endless combination of tinctures for scenting the handkerchief sold under fancy names which may or may not afford a clue to their composition, such as 'comédie française,' 'eau de senteur,' 'eau de Cologne,' 'lavendre ambrée,' 'blumengeist.' These are sometimes made upon a quasi-scientific basis, namely, that of the odophone or gamut of odours of the late Dr. Septimus Piesse. Their numbers may be almost infinite; one large firm in London is known to manufacture several hundreds.

"There are only four substances of animal origin which have any commercial application for perfumery purposes—viz., ambergris, castor, civet, and musk.

"Ambergris, or ambre gris, is found floating in the sea, chiefly off the coasts of Madagascar, of Sumatra, and in the Malacca, though very widely distributed, for it has been found in almost every region. It is believed to be fecal matter from the sperm whale. It is usually greyish in colour, and has a very peculiar permanent odour, though not powerful. It is not a

very plentiful material, or it would probably be more largely used ; still such of it as comes to the London market finds a ready sale, its value being about 90s. per ounce.

" Castor is obtained from the *Castor fiber* or Beaver. It is a peculiar secretion contained in two membranous sacs placed near to the generative organs in the male animal. It is not much employed owing to the very dark colour of its tincture, which stains the handkerchief. It is valued at from 32s. to 35s. per pound.

" Civet is a special secretion obtained from the *Viverra civetta*, chiefly from the male animal, and is imported from Calicut and from Abyssinia, where it is obtained from animals kept in confinement for the purpose. The article as imported is probably very largely adulterated with butter-fat, and presents itself as a soft brownish paste possessing a very powerful odour, which in bulk is exceedingly unpleasant, though when diluted it is just as agreeable. It is worth about 9s. per ounce.

" Musk is a secretion contained in a diverticulum or follicle in the skin, near to the umbilicus of the male *Moschus moschatus*, a species of deer inhabiting the Himalayas high up near the regions of perpetual snow. The sac is removed whole from the slaughtered animal and sent thus into the market under the name of 'pod-musk.' The 'grain-musk' when emptied from the pods closely resembles moist snuff in appearance. Its odour is very powerful, and is

one of the most permanent known. Fine pod-musk fetches about £5 per ounce, and grain-musk proportionately more, being thus worth weight for weight more than pure gold.

"The sources of the attars are the different parts of the plants which yield them,—the wood (lign aloe, santal, cedar), the bark (cinnamon, cascarilla), the leaves (patchouli, bay, thyme), the flowers (rose, lavender, orange-blossom), the fruit (nutmeg, citron), or the seeds (caraway, almond). Some plants yield more than one, such as lemon and bergamot. They are mostly obtained by distilling with water that part of the plant in which they are contained; but some few, as those from the rind of bergamot (*Citrus bergamia*), lemon (citron zeste, from *C. limonis*), lime (*C. limetta*), by 'expression.' The outer layer of the cortex is rasped off from the unripe fruits, the raspings placed in a canvas bag, squeezed in a screw or hydraulic press. The attars so obtained are separated from the admixed water by a tap-funnel, and are then filtered. Certain flowers, such as jasmine, tuberose, violet, cassia, either do not yield their attars by distillation at all, or do it so sparingly as not to admit of its collection for commercial purposes; and sometimes the attar, as in the case of orange (neroli), has an odour quite different from that of the fresh blossoms. In these cases the odours are secured by the processes of inflowering (enfleurage), or by maceration. Both depend upon the remarkable property which fats and oils possess of absorbing odours.

Maceration consists in soaking the flowers in heated fat; in due time they are strained off and replaced by fresh ones, as in the enfleurage process. The whole of the necessary meltings and heatings of the perfumed greases are effected by means of water-baths, whereby the temperature is kept from rising too high. For the manufacture of perfumes for the handkerchief the greases now known as pomades, butters, or philicomes are treated with rectified spirit of wine 60° over-proof, *i.e.*, containing as much as 95 per cent. of absolute alcohol by volume, which practically completely abstracts the odour.

"The gum-resins have been employed as perfumes from the earliest ages; many are referred to in the Old Testament. They are largely used in the manufacture of perfumes, both for burning as pastilles, ribbon of Bruges, incenses, &c.; and in tinctures, to which they impart their characteristic odours, affording, at the same time, a certain fixity to other perfumes of a more fleeting nature when mixed with them. The chemical perfumes are relatively new; vanillin, the odoriferous principle of vanilla (*V. planifolia*), was first artificially prepared by Tielman and Hermann in Germany, who obtained it from the sap of certain kinds of fir, and established its composition. Their research was afterwards remarkably verified by Dr. C. R. Alder-Wright, who prepared it from crude opium. It is a pale straw-yellow crystalline substance, smelling exactly like vanilla, and said to be forty times stronger Its value commercially is about

23s. per ounce. Coumarin, the odoriferous principle of Tonquin beans (*Dipterix odorata*), is also artificially prepared. In appearance it resembles vanillin, and is valued at 9s. per ounce. Some similar bodies with fancy names, such as 'hemerocalle,' 'bromelia,' 'aubepine,' are in the market, but have scarcely yet found their way into the perfume manufactory. Nitro-benzol, before mentioned, is employed only for imparting an almond-like odour to inferior soaps. The various compound ethers called artificial fruit essences, from their resemblance to the odours of certain fruits (jargonelle pear, pine-apple, plum, &c.) find no place in perfumery, though largely in confectionery for flavouring.

"As before stated, the bouquets constituting the second class of perfumes are but alcoholic solutions *i.e.*, tinctures of some of the foregoing blended together in various proportions, of which the following well-known recipes are examples

'Rondeletia.'	
Ext. Vanilla	2 pints.
,, Musk	1 ,,
,, Civet	1 ,,
Attar Rose	1 oz.
,, Mitcham Lavender	1 ,,

'Bouquet du Roi.'	
Ext. Neroli	2 pints.
,, Rose	2 ,,
,, Musk	½ ,,
,, Vanilla	½ ,,
Attar Rose	1 dram.

"*The Odophone.*—The late Dr. Septimus Piesse endeavoured to show that a certain scale or gamut existed amongst odours as amongst sounds, taking the sharp smells to correspond with high notes, the heavy smells with low. He illustrated the idea by

classifying some fifty odours in this manner, making each to correspond with a certain note, one-half in each clef, and extending above and below the lines. For example, treble clef note E (4th space) corresponds with Portugal (orange), note D (1st space below clef) with violet, note F (4th space above clef) with ambergris. It is readily noticed in practice that ambergris is much sharper in smell (higher) than violet, while Portugal is intermediate. He asserted that to properly constitute a bouquet the odours to be taken should correspond in the gamut like the notes of a musical chord,—one false note among the odours as among the music destroying the harmony. Thus on his odophone, santal, geranium, acacia, orange-flower, camphor, corresponding with C (bass 2d line below), C (bass 2d space), E (treble 1st line), G (treble 2d line), C (treble 3d space), constitute the bouquet of chord C. See page 155.

"*Other Branches of Perfumery.*—For the preparation of *scented soaps* two methods are in use; both start with a basis either of fine yellow soap (which owes its odour and colour to the presence of resin), or of curd soap (which is hard, white, and odourless, and is prepared without resin). In one process the soap is melted by superheated steam, and while still hot and semi-fluid mixed by means of a T-shaped stirrer of wood with iron cross-bar, technically called a 'crutch,' with the attars and colouring matter. It is then removed from the melting pan to a rectangular iron mould or box, the sides of which can be removed by

unscrewing the tie-rods which hold them in position; when cold the mass is cut into slabs and bars with a thin brass wire. In the other, or cold process, the soap is first cut into chips or shavings by a plane or 'chipping machine,' then the colouring matters are added and thoroughly incorporated by passing the soap between granite rollers driven by steam-power; the tinted soap emerges in a continuous sheet but little thicker than paper. The attars are then added, and after standing for about twelve hours again sent through the rolling machine. The soap is next transferred to a bar-forming machine, which consists of an Archimedean screw with tapering thread revolving in a box; the soap in sheets is roughly squeezed through a hopper over the widest threads of the screw and is forced, as this revolves towards the distant end of the box, to an opening of the required size, through which it emerges in a continuous bar almost as hard as wood. Soap thus worked contains less than 10 per cent. of water; that prepared by melting contains 20 and even 30 per cent. The amount of attars added depends upon the nature of the perfume, and amounts usually to about 7 or 8 per cent. The finest soaps are always manufactured by the cold process. *Toilet powders* are of various sorts. They consist of rice-starch or wheat-starch, with powdered orris-root in varying proportions, and with or without the addition of oxide of zinc, oxide of bismuth, or French chalk. The constituent powders, after the addition of the attars, are thoroughly incorporated

and mixed by sifting through a fine sieve. Violet powder for the nursery should consist entirely of powdered violet root (*Iris florentinæ*), from the odour of which the powder is named. It is of a yellowish tint, soft, and pleasant to the touch. The white common so-called 'violet powders' consist of starch only scented with attar of bergamot, and are in every sense inferior. *Tooth-powders* consist for the most part of mixtures of powdered orris-root with precipitated chalk, and some other constituent destined to particularise it as to properties or flavour, such as charcoal, finely-pulverised pumice, quassia, sugar, camphor, &c. The perfume of the contained orris-root is modified, if required, by the addition of a little of some attar. *Tooth-pastes* are not much in vogue; they are formed of the same constituents as the powders, and are worked into a paste by the addition of a little honey or glucose-syrup, which are usually believed ultimately to have an injurious effect on the teeth. *Perfume sachets* consist either of a powder composed of a mixture of vanilla, musk, Tonquin beans, &c., one or other predominating as required, contained in an ornamental silk sac; or of some of the foregoing substances spread upon card or chamois leather or flannel after being made into a paste with mucilage and a little glycerine; when dry the card so prepared is daintily covered with various party-coloured silks for sale; where the ingredients employed in their manufacture are of good quality

these cards, known as 'peau d'Espagne' sachets, retain their odour unimpaired for years.

"*Adulterations.*—There is, as might be expected, considerable scope for the adulteration of the 'matières premières' employed in perfumery, and it is to be stated with regret that many unscrupulous dealers avail themselves of the facilities offered for this dishonourable practice. Thus, in the case of musk, the 'pods' are frequently found to be partially emptied of the grain, which has been replaced by hide or skin, while the weight has been increased by the introduction of lead, &c. In other instances the fraud consists in the admixture of refuse grain, from which the odour has been exhausted with spirit, with dried blood, and similar substances, whilst pungency is secured by the addition of carbonate of ammonia. Attar of rose is diluted down with attar of *Palma rosa*, a variety of geranium of only a quarter or a fifth of the value. The main adulterant of all the attars, however, is castor oil. This is a bland neutral body, practically odourless, and completely soluble in alcohol; it therefore presents all the requisites for the purpose. Its detection is difficult, even by chemical analysis, which is obviously inapplicable in most instances; the safeguard of the purchaser is the knowledge resulting from experience.

"*Statistics.*—In Europe flower-farming for perfumery purposes is almost exclusively confined to that triangular portion of the valley of the Var (France) which has Grasse for its apex and the Mediterranean shore

between Nice and Cannes for its base, with an area of about 115,000 English acres. It is here that the jasmine, tuberose, cassia, rose, and violet grow to such perfection, and that the processes of enfleurage and maceration are commercially worked. Subjoined is an estimate* of the weight of flowers annually employed:

	Tons.	Harvest Time.
Orange Blossoms	1860	20th April to 31st May.
Roses	930	May.
Violets.....	147	15th January to 15th April.
Jasmine	147	20th July to 10th October.
Tuberose..... ...	74	August, September, and October.
Cassia	30	October, November, and December.
Jonquil	15	February and March.

"Great praise is due to the pioneers of flower-farming in the British colonies of South Africa and Australia, and especially to Colonel Talbot in Jamaica, whose efforts in this direction bid fair to meet with complete commercial success.

"The attars from peppermint (*Mentha piperi*), thyme (*T. vulgaris*), and lavender (*Lavandula vera*), the finest in the world, are distilled from plants grown in the neighbourhood of Mitcham in Surrey. It is estimated that between 8,000 and 10,000 ounces of musk are annually imported from all sources; while the quantity of alcohol employed in the manufacture of perfumes is calculated to exceed 60,000 gallons."

* Kindly furnished by M. Bruno Court, head of the well-known house of *Notre Dame des Fleurs* of Grasse.

CHAPTER XI.

NATURAL PERFUMES.

Nature the Best Guide—Pure Air Non-existent in Nature—Varieties of Air—Impure Air—"Dust"—The Effect of Bad Odours on Health—Country and Town Life—Deodorants and Disinfectants—True Disinfectants—Ribbon of Bruges—Corean Mythology—Natural Odours of Individuals—Odours of the Earths.

ONE of the highest, if not indeed the highest use of the organ of smell, is that it presides at the portal of the lungs and, so to speak, mounts sentinel over the air we breathe.

Pure air does not exist in Nature; that is, there is no air over any portions of the earth's surface that does not contain some traces of compounds in addition to the original particles of the elements oxygen and nitrogen of which it is composed. We do not here refer to the universal admixture of carbonic acid and aqueous vapour that it contains, but to the addition of those infinitely minute quantities of compound gases which constitute what we may term the perfumes of Nature.

We speak of varieties of air, all of which deserve to be called pure, such as sea air, country air, mountain air, &c.

On the other hand, we refer to impure or unwholesome air, such as that in the neighbourhood of marshy districts, rich in the germs or principles of malaria or paludal fevers; or town air, overcharged with deleterious exhalations in gaseous form, from numberless living men and animals, and clouded with finely pulverised organic and mineral *débris* and the waste products of imperfect combustion, generalised in the word "dust."

The effects on those who are obliged to live in close or crowded atmospheres, and especially the terrible effect of constantly breathing air contaminated with bad odours, are indeed very serious, and too evident to pass unobserved. The person soon suffers.

No medicament is of any avail; but let the person be moved into the fresh country air, and the change at once begins visibly to take a beneficial effect.

It may be said that this difference is often owing to the different life persons generally lead in town and country.

What then is really the difference between pure country air and ordinary air—*i.e.*, air not necessarily contaminated with bad odours?

Is not the idea well worthy of consideration that pure country air owes its invigorating properties to the infinite number of minute particles floating in it

that may be described as Nature's perfumes? the suggestion that it is due to the presence of greater proportions of ozone notwithstanding.

There are two kinds of odours, pleasant and unpleasant to the nose, and we have the sense given for the purpose of distinguishing these two different classes of odours. We see that as a rule offensive odours have a bad effect on the human body. Does it not reasonably follow, or in any case is it not more probable than otherwise, that, on the other hand, agreeable odours have a good effect on the human body?

We may here mention a curious fact worthy of attention from the medical profession; it is, that men engaged in the trade of manufacturing perfumes are apparently remarkably protected from any species of infectious disease. We believe the same phenomenon has been observed in the case of those who are constantly exposed by the necessities of their vocation to the odorous emanations of coal-tar.

But we by no means wish to maintain the idea that a pleasant odour counteracts the injurious effects of a bad odour where this possesses a distinctly injurious character. This is a very common and, we believe, a very dangerous fallacy. For instance, suppose there is a *slight* smell of a drain. Some persons think that this can be removed by sprinkling a little Hungary Water about the room. Some think that a quantity of sweet-smelling flowers will "take away" the bad smell. This is of course, inaccurate; for, in fact,

though the evil odour may thereby be disguised, it is not destroyed. Still there are disinfectants and antidotes to bad smells which in themselves possess an agreeable odour.

The late Dr. Septimus Piesse, in "The Art of Perfumery," says :

"Pestiferous emanations are all of an alkaline if not ammoniacal character, and readily combine with the products of slow combustion,* all of which are acid, or have an acid character in their chemical reactions. Those subtle emanations which engender disease, whether derived from the malarious swamp, or as effete matter from the lungs of a disordered person, are at once destroyed by the odorous vapours resulting from slow combustion and its accompanying destructive distillation."

To us it appears that the phenomenon of disinfection by gases, vapours, or products of combustion is a far more complex process, and that it is difficult or impossible to make a satisfactory generalisation on the subject. In some cases all that is done is the masking of a bad odour by a wholesome one, or by one less bad ; but there is no disinfection properly so called. It is simply the temporary displacement of one odour by another more powerful, as before stated.

* By which we mean that they combine with those products of that destructive distillation which always accompanies the process of the slow combustion of compound bodies. Carbolic and cresylic acids, creasote, &c., are formed in this way from wood.

In other cases real chemical reactions take place between different odorous bodies, and new inodorous compounds are produced, as, for example, in the case of sulphuretted hydrogen when acted upon by sulphurous acid, or that of sulphide of ammonium or other sulphuretted compounds by sulphate of iron or moist oxide of lead.

Or there may be a purely physical condensation of the odorous gases — a property well known to be characteristic of the various forms of charcoal— whereby they are removed.

In other cases they may be completely destroyed, as is effected by chlorine, bromine, nitrous vapours, or a direct oxidising agent such as permanganate of potash.

One of the neatest inventions of modern times for the use of the sick-room is Piesse and Lubin's Ribbon of Bruges. This simply while smouldering gives off a copious scented smoke. The effect aimed at is first to neutralise the bad smell by smoke (particles of charcoal), and at the same time to produce an agreeable smell by means of scents, which objects it effectually secures.

The scents used in manufacturing this useful tape are—orris, gum-benzoin, gum-myrrh, musk, and otto of rose.

It should, however, be understood that the employment of this tape is not merely the disguising a bad smell by a good one, but a combination of two distinct processes; one the suppression of a bad odour by means of charcoal—*i.e.*, the condensation

and removal of an odorous body; the other the production of an agreeable odour.

In fact, the Ribbon of Bruges enables a person in a few seconds, and without trouble, to produce the same effect as would be obtained by burning a quantity of brown paper, and then sprinkling the floor with a delicious perfume.

There is indeed no difference in principle between burning this Ribbon of Bruges and burning ordinary incense. The origin of incense is not known, but probably the idea was first given in connection with sacrifice, the word perfume being derived from the idea of an agreeable odour by means of smoke (*per fumen*).

The poetical idea of Heaven is conveyed by sweet-smelling incense; of Hell, by foul odours and sulphurous flames.

> "My hour is almost come
> When I to sulphurous and tormenting flames
> Must render up myself."—*Hamlet.*

The perfumes of nature we believe to be one of the many means of giving health and enjoyment. In what way they act on the system cannot be decided, but that they do act in some way beneficially is abundantly evident.

The idea is by no means a new one. The *Standard* newspaper in a pleasing article which appeared in April, 1885, observes:—

"In Corean mythology Han-ra-San plays much the same part as Fusi Yami does in that of Japan. It is the Olympus of this region, and here Corean

children are taught that the three first created men still live in a perpetual youth, induced by the antiseptic properties of the Alpine air they breathe."

Among the "Natural Odours" should be mentioned those peculiar ones common, in general terms to groups of men, and animals of which each individual possesses his particular modification. Many persons even in civilised communities can distinguish and identify others by their odour; while we all know that a hound may have a doubt for a moment about a voice which may be his owner's, but never for even a second about his owner's smell.

Perhaps the most remarkable of natural odours are those odours of the earths, to which attention has frequently been directed by various writers. When dried clay is newly moistened, even so slightly as by being breathed upon, it exhales a peculiar odour; this, usually considered to be due to the alumina, is really more attributable to the contained sesquioxide of iron, which is an impurity, and confers the brown colour upon the common clay.

If some kaolin, which is a pure white china clay, be dried, and then moistened, the odour is almost imperceptible; the addition of some sesquioxide of iron renders the odour very marked. We notice the odour distinctly when after a period of warm, dry weather in summer a shower of rain falls, particularly over areas of clay soils. The odour of freshly mixed mortar is quite characteristic, and appears to be mainly due to the crude lime.

CHAPTER XII.

ANOSMIA.

Anosmia and Hyperosmia—False Impression about Hyperosmia—Instances of Hyperosmia—Acute Taste and Sense of Smell in Children—Scented Fops—Socrates and Beau Brummel on the Use of Perfumes—Excess v. Moderation and Simplicity—Progress the Law of Nature—The Musical Ear—The Eye for Beauty—Bad Odours the Cause of Pestilence—Drainage one of the Great Problems of the Future—Anosmia and its Attendant Evils Brought About by Persistent Evil Odours Neglected.

ANOSMIA means want of the power of smelling; Hyperosmia that that power is excessive. Before, however, proceeding further, we may explain that complete hyperosmia means, not merely the power of detecting very small quantities of odours, good or bad, but also that of discriminating between odours that are but faintly dissimilar.

Probably all persons would be agreed upon the point that it would be a great calamity to lose all sense of smell, but are all equally agreed that it is impossible to be too sensitive?

In regard to these two conditions it is remarkable that persons are rarely met with in whom they are complete. Persons who are completely anosmic usually are so as the result of violence, accidental or otherwise, as we have before stated, with consequent

injury to the olfactory nerves ; but very many persons are partially anosmic, that is, not that they possess, as it were, a dull sense of smell for odours in general, but that they are completely incapable of smelling some one, or it may be several, powerful and well-known odours. The writer, for example, though sensitive and almost hyperosmic to most odours, is unable to detect any odour whatever in the sweet-briar, nor ever has been able to do so, though he has tried numberless times under varying conditions. There may yet be other smells or perfumes for which he is anosmic, though he has not yet discovered them.

The hyperosmics are more numerous, as might be expected, for it is of course an indefinite though acute condition of the power of smell ; and it is one which can be acquired, in some degree at least, by cultivation. For since most, if not all of us, are gifted from birth with a power of smell, this power is one which can be improved by cultivation, and some do so cultivate it ; they become thereby in a measure hyperosmic, especially by comparison with those who do not, or have not cultivated it.

But hyperosmia, like its opposite, is not of necessity complete—*i.e.*, the power of smell is not acute for every odour or gradation of odour, necessarily because it is exceedingly acute for one or several. The purchasers of tea, of hops, of attar of rose, of musk, have an exceedingly acute power of smell each for their several commodities, but they would be quite incapable of changing places. It would be news to

most of us to learn that lunatics acquired a particular smell ; yet that high authority Sir J. Alderson, M.D., who evidently possesses not only a "cultivated nose," but a natural hyperosmia, said,* "I think I could distinguish an insane patient by the perfume she exuded."

Some thoughtless persons have been led to remark in reference to the sense of smell that "it must be a great drawback to be too sensitive." They appear to surmise that those whose sense of smell is keen are constantly exposed to annoyances from which others are free. Some fall into the error that a very keen sense of smell renders its possessor proportionately more liable to catch contagious diseases ; others believe that hay-fever is brought on through the sufferer having a too acute sense of smell. It is perhaps needless to remark that all such results and dangers are purely mythical, and utterly erroneous in fact.

We can admit that any one gifted with hyperosmia will, under certain circumstances, suffer more annoyance than one who is anosmic ; but a little consideration will prove this difference to be really such as exists between a man in good health and one paralysed.

A similar observation has often been made in reference to persons with a very sensitive palate, which is generally inseparable from an acute sense of

* Mordaunt *v.* Mordaunt, *Times* February 17th, 1870.

smell. Children particularly are often apt to be called dainty, when probably the real culprit is the nurse, who lacks astuteness of taste and smell ; really the child who first discovers the objectionable quality possessed by the food should be praised, and the food under ordinary circumstances changed.

There is no doubt that a prejudice more or less pronounced exists, and has existed for a lengthened period, against the use of perfumes by men. The habit had become associated with the idea of effeminate luxury. Now happily it is no longer so regarded, but rather viewed as a distinguishing sign of the higher culture; for indeed the just appreciation of delicate odours, like that of exquisite music, demands a cultivated sense from its votaries.

Two thousand years ago Socrates said, "There is the same smell in a slave and a gentleman when both are perfumed," while the celebrated Beau Brummel, who flourished during the reign of George III., used to observe that "no man of fashion should use perfumes, but send his linen to be washed and dried on Hampstead Heath."

Both these authorities, different as they were, and different as were the times in which they lived, point by these remarks to the same idea. During the semi-barbarous period of the former, perfume, if used at all, would be used in excess ; naturally that man of commanding intellect and mind far in advance of his age rebelled against the vulgarity ; while the remark of the famous Beau of comparatively modern times,

shows that he too was so far in advance of his age as to understand and appreciate the refinement of an educated nose, for were Beau Brummel's remark to be quoted by opponents of those who attach immense importance to the cultivation of the sense of smell, it could be pointed out that there is perhaps no illustration so good of what ought to be the power of smell of one who may fitly be called a gentleman. His idea was that this sense should be so cultivated that it could detect the difference in the odour of a piece of linen that had been perfumed by the sweet country air and the one that had failed to obtain this most delicate and exquisite of all perfumes by being washed in a town.

The man who can detect the slightest evil smell, and who enjoys that admixture of sweet odours, such as are met with in Nature, is the one of all others who would shun the fop reeking with "Cherry Blossom," or besprinkled with any malodorous compound which his uneducated nose has been unable to tell him is, in lavish excess, an evil rather than a blessing.

The heavily scented atmosphere of the ancients, the gorgeous feasts, and the disgusting gormandising that attended them, were but stepping-stones to that condition of more perfect appreciation of delicate delights which serve to gratify the senses, which in our day obtains, as the result of a still higher civilisation.

A man of really refined taste of the present age

would no more scent himself and surroundings to over-saturation, as was the custom in ages past, than he would induce emesis to enable himself to enjoy a second repast. But he is enabled, thanks to superiority of taste and cultivation, to enjoy those gifts of Nature which gratify both the senses of smell and taste to a far higher degree than did his predecessors.

The more highly the sense of smell is cultivated the better will the possessor of such sense be able to appreciate the luxury of moderation, without falling into that æsthetic extreme—total abstinence from the use of all perfumes, however delicate.

A perfect ear for music must suffer severely from the discord of sound of all music that is not perfect. The strains of most itinerant bands, and Italian organs, and the over-ambitious flights of many amateur performers in private life, must jar sadly on the refined ear. But who would argue hence that it were better to have an imperfect ear for music?

Yet this is not unfrequently the sort of argument used by some to complain of or to criticise the exquisite degree of refinement to which, by cultivation, moderation, and care, some men bring their sense of smell.

We learn, almost with awe, of a person possessing a marvellous ear for music, of another being a profound connoisseur of art, of a third possessing a perfect delicacy of touch, but should some unfortunate man have only his other two senses, taste

and smell, equally well educated and refined, he runs the risk of being called a dainty fop.

Fortunately these prejudices, which, after all, are but the offspring of ignorance and conceit, are fast passing away. Middle-class society, though it moves slowly, still does move. Fifty years ago a man might come semi-drunk to the drawing-room, but could not smoke in the streets for fear of losing all title to the name of a gentleman. At that period, too, the morning bath was by no means so universal, even among persons of refinement and wealth, as it is now with even the relatively poor. Perhaps fifty years hence a law may exist forbidding a house to be built without a bath-room, as is already the case in reference to water-supply.

It is evident that sooner or later the struggle for existence embodied in the Darwinian theory of the survival of the fittest will be a practical reality, if indeed such struggle has not already commenced. This great struggle will not take place among individuals but among nations; and it is not too much to say that the healthiest nation will be the fittest.

War may or may not cease. Modern science may soon so increase the powers of weapons of destruction that the whole human family will with one consent give up this relic of barbarism. But there is an army of diseases under the Demon Pestilence stalking among us, whom we all would readily dismiss were it in our power, and which has done far more to

destroy and depopulate the world than all the battles that were ever fought. The vanguard of that army is invariably Stink.

There is one way to meet the enemy, of olden simplicity—wash and be clean. Dirt and bad smells are inseparable, and where they are disease rapidly follows.

There has lately been a great outbreak of fever, and especially small-pox, in the south-eastern district of London. Some of the streets were half empty, the cause being the drains. Down the roads and streets open gratings have been placed to allow the sewer gas to escape, whereby the whole atmosphere of the neighbourhood in certain seasons is tainted. What follows? An outbreak of pestilence.

Now what is really the fount and origin of the outbreak? An indifference—we might almost say an apparently almost universal indifference—to *stink* on the part of the people. We use the coarse word "stink" rather than mince matters in the attempt to be nice at the expense of being open on a matter of such overwhelming importance.

There is no doubt that that nation will survive as being the fittest that best educates the sense of smell of its individuals. As populations get larger, and as people crowd more together, so will pestilence stalk the more easily among them unless met in the only way possible and efficacious.

The only way to get rid of "stinks" is to teach people to shun them. The problem of drainage is

certainly one of the most difficult and intricate with which the rising generation will have to grapple, but grapple with it they must if they wish to live. Owing to the rapid increase of the population in towns in many places, the drains originally laid down are not large enough to carry off the refuse. The natural consequence is increase in accumulations of filth, whose evil odours, aided by decomposition, pollute the atmosphere, and poison the wells, and so lead to a spread of every disease dependent on such conditions, and they are almost countless in number.

So long as the education of the sense of smell is neglected, so long will the people remain apathetic. Anosmia, and apathy in these matters, go hand in hand. Time and education, properly so called, will, we trust, however, work for good. Once let the manifold horrors of evil smells be grasped by the multitude, the demand for pure air become universal, and the problem will be solved.

In the mean time those who possess and usefully apply their powers of hyperosmia may with pride boast that they are pioneers in this good work.

It is not merely the foul odour of sewer gases that persons will learn to avoid, but all other bad odours, and more especially those only slightly perceptible. It is here that the great danger lies. Probably more sickness is caused by very slight but constant smells than by a mere whiff or even deep inhalation of intense ones, howsoever vile and nauseating.

The causes are almost infinite—neglected dust-

bins near the house containing decaying vegetable matter, dead and decomposing rats or mice under the boards, damp and mildew, defective gas fittings, dirty linen, and the thousand sources of filth inherent in a congregation of human beings, &c. What safeguard have we against constantly inhaling doses—infinitesimally small though they may be—of some of these foul exhalations? One only, and that is a highly cultivated nose.

The reason these bad odours are allowed to go on poisoning the air day after day and week after week is that they are unnoticed. The reason they are unnoticed is that the sense of smell, owing to the neglect of its education, becomes thoroughly blunted. Constant exposure to foul odours renders this sense less and less acute until the extreme point is reached, and a stage of nearly complete Anosmia is reached. The result is stamped on the squalid faces of the crowds who live, or rather exist, in the courts and alleys of our great cities.

The agricultural labourer who, as it were, ekes out existence on a mere pittance has as healthy a complexion as the country gentleman who lives a life of luxury. Evidently then it is not a question of food so much as of purity of air that is the cause of the remarkable difference in the appearance of the town poor and the country poor. The former are poisoned by foul odours and a vitiated atmosphere; the latter, no better fed, and often harder worked, breathe pure air.

CHAPTER XIII.

THE ANTIQUITY OF THE USE OF FRAGRANT SUBSTANCES.

Fragrant Substances used in Religious Rites—Incense in Ancient Egypt—Still in use throughout China, Japan, and India—Bloodless offerings in Ancient Greece.

SINCE perfumes in the shape of sweet-smelling flowers and fragrant groves of aromatic trees existed before man, there is every reason to believe that the earliest men would naturally take notice of the existence of sweet odours of various kinds, and bring the substances yielding them into some use in their everyday life.

Fragrant substances have indeed been used from time immemorial, a fact that may be learnt from the earliest historical records.

Thus we clearly see that with almost every form of ancient religious ceremonial, traces of which have come down to us, the use of perfume was intimately connected in one way or another.

As we pointed out in an earlier chapter, the word probably implies that the first perfume manufactured was by means of smoke. Of all religious rites, that of offering up sacrifice with burning incense seems to be the most ancient.

The granite tablet attached to the breast of the great Sphinx of Egypt formed the end of a sanctuary, and on it King Thothmes IV. is represented offering on one side incense, on the other a libation of oil or ointment.

Dr. George Wilson, late Professor of Technology in Edinburgh, writing thirty years ago on this subject, observes: "Take, for example, the Egyptians, to whom I refer because I know their habits best. In the scenes on the tombs we see continually represented a kneeling worshipper, holding a long-handled censer filled with incense under the nostrils of the god he seeks to propitiate; and on other occasions he lifts up toward him a fragrant flower. I need not particularise such cases, however, for it does not admit of question that centuries before the existence of the Hebrew people the offering of odorous vapour formed a sanctioned part of religious service. It is probably coeval with sacrifice, the most ancient of sincere religious rites, and as old, at least, as the days of Cain and Abel.

"The smoke indeed of every burnt sacrifice was an offering of incense, and to go no further back, let me recall that very ancient event in the human history of the world, the erection by Noah, when he left the

ark, of an altar, on which he offered burnt offerings. It is added (Genesis viii. 21), 'The Lord smelled a sweet savour.'

"To the children of Noah, the parents of the ancient nations, the use in religious worship of odorous vapours must thus have been quite familiar; and we need not wonder that we find it prevailing among all their descendants."

The close connection between the use of odorous woods, gums, resins, and the like, and all the ancient religions, with their fantastic ceremonies and sacrifices, of which we have any account is certainly remarkable and worthy of full investigation. We find incense used by the Egyptians, the Persians, the Greeks, the Hebrews, &c.; and we have before us the statement in Genesis above quoted by Dr. Wilson, that in some way a species of incense yielding a sweet-smelling smoke was used by Noah. All those who duly reverence the Hebrew records must admit that the employment of incense has an antediluvian origin. Nor are those who hold this view thereby shut out from the belief that the Egyptian idolatry was necessarily the work of Noah's descendants: it may have had an antediluvian existence. The great monuments of Egypt, from which have been gathered for us the materials of its early history, have survived the greatest of shocks. Lord Macaulay tells us that among the Arabs a fable is current that the great Pyramid known to us as the Pyramid of Cheops was

built by antediluvian kings, and that it alone of all the works of men bore the weight of the flood.

We see then, as the use of incense in religious worship from very early periods of man's history was almost universal among the different tribes then existing, that the custom sprung probably from some common origin. We find also to this day incense used in the temples throughout China, Japan, and India.

It is, indeed, remarkable to find that nearly all religions, however much they may appear to differ as to origin and doctrine, agree in one point, and that is the use of perfume in the form of incenses prepared from fragrant vegetable substances in their ritual. This single fact would seem to point to a common origin of these different varieties of creed.

In Pagan Greece and Rome, as well as, probably, from far earlier times in Egypt and all Asia, for century after century was incense offered up to the idols which represented gods or goddesses, or were considered as the deities themselves, and the idea of a sweet smell or savour in connection with supplication to any of these seems to have been universal.

Probably, too, perfumed oil and ointment were in use for ages before the time of Moses. This is shown in the burial of the dead, the traces of which even from that early period are still to be seen in Egypt.

Writing of the Hebrews, Dr. Wilson says: "Observe how great was the importance attached by them to the sacred employment of fragrant substances.

The altar of incense stood in a most conspicuous part of the Temple, and sweet incense was burned upon it every day. The High Priest was forbidden to enter the Holiest of All unless bearing in his hand the censer, from which clouds of perfumed smoke rose before the mercy seat."

"A portion of frankincense, consisting of a mixture of many sweet-smelling substances, was added to the sacrifices, and a richly perfumed oil was employed to anoint the altars and other equipments of the Temple, and the priests themselves, as a mark of their appointment to the service of God."

Later he adds: "Let it not be forgotten that a similar use of incense and of perfumes was practised all over the ancient civilised world, doubtless in obedience to a command of a Divine origin, handed down by the fathers of the great nations of antiquity, and variously obscured in the course of its transmission."

Possibly from very early days some clue to the antiseptic properties of perfumes had been discovered, and it may have been observed that the practice of burning incense resulted in more or less perfect protection against diseases of a spreading or infectious character.

It will be remembered that great importance was attached to the incense being kept in certain hands. Thus we learn in Numbers xvi. that Korah, Dathan, and Abiram, and their 250 followers were destroyed for burning incense in their tabernacle and thereby

endeavouring to set themselves up equal in authority with Moses by the usurpation of his priestly office.

It will be noticed that most of the teachings of Moses with regard to the forms, customs, and ceremonies to be observed by the people have relation to health; learned in all the wisdom of the Egyptians, he was well able to lay down rules which, if obeyed, greatly tended to protect the people from bodily harm.

The deities of ancient Greece and Rome were almost the same, and sacrifices were continually offered to them. These sacrifices were divided into two kinds—bloodless and bloody sacrifices.

"Bloodless offerings consisted for the most part of the first fruits of the earth (*frugum primitiæ*), of flowers, cakes (*liba*), honey, milk, wine, salt, and, above all, frankincense (*tus*), for without the perfumed smoke arising from fragrant gums no sacred rite was regarded as complete and acceptable."*

The earliest records of the Christian Church show that the use of incense ordered by Moses was continued. Dr. Rock, in his work entitled "Hierurgia," says (p. 519):—

"The primitive Christians imitated the example of the Jews, and adopted the use of incense at the celebration of the Liturgy. By the third of the Apostolical Canons we find it enacted that amongst the very few things which might be offered at the

* "A Manual of Roman Antiquities." By William Ramsay, M.A. London, 1876. Page 340.

altar whilst the Eucharistic Sacrifice was celebrating were oil for the lights and incense.

"The most ancient of the three Greek Liturgies is that of St. James, from whom it is esteemed by the Greeks and Syrian Christians of Jerusalem to have been originally derived. This Liturgy commences with burning incense, which the celebrant puts into the churible after he has approached the altar."

CHAPTER XIV.

THE UNIVERSAL USE OF PERFUMES.

In the Time of the Romans—Perfumes possibly used as Medicines—Reputed Health-giving Properties of Sweet Smells—Embalming—Mahometanism and Perfumes—General use of Incense.

WE have attempted to show in our last chapter that the use of perfumes, more especially in the form of incense, whereby they were distributed by means of smoke, was nearly universal throughout the whole of the semi-civilised world, from the very earliest times of which any records can be traced up to a date about A.D. 500.

It must not be imagined that, at least towards the latter half of the epoch mentioned, the use of perfumes was confined to the incense burnt in connection with religious rites, for among the Greeks and especially the Romans the use of perfumes in every-day life was most profuse.

They scented the air of their rooms, their baths, their beds, &c.; and Gibbon relates that even "the air of the amphitheatre was continually refreshed by

the playing of fountains, and profusely impregnated by the grateful scent of aromatics."

It is, however, evident that the universal use of perfumed smoke in their religious observances among the ancients must have had some stronger ground of origin than mere dim tradition, or at least there is a strong ground for supposing that this is so. The most probable cause of the sanctity attached to perfumes would seem to be that the patriarchs of the old world, the most ancient fathers of the human race, wherever they may have been, held those things sacred which they found by experience to be most useful and beneficial. The use of perfumes as a means of maintaining or of restoring health may be one of the arts that has been lost, whose sole representative is the modern method of administering volatile drugs in vapour by the process of inhalation.

Be this as it may, there existed an ancient belief that men could be made immortal by the use of some plant. The alchemists of scarce two generations back racked their brains to discover this lost Elixir of Life, described as a tree, which was kept guarded by an angel with a flaming sword.*

One of the first great blessings that ancient man discovered as he emerged from helpless barbarism was the use of fire, hence probably the origin of fire-worship, for there is an instinct in the savage

* Probably a traditional and distorted rendering of Gen. ii. 9, *et seq.*

breast to worship what is most useful. We may therefore readily believe that the widespread sanctity attached to the use of odours springs from a natural cause—the spread of fire-worship and the combustion of fragrant woods.

Some discovery, or revelation, made long anterior to events of which there is any graven record, seems to point to the health-giving properties of plants and odours, and we find evidences of the belief in the existence of such in traditions, such as the old one we have already mentioned on page 109, to the effect that the first created men still lived on the mountains immortality having been conferred on them by the antiseptic or perhaps the eternally rejuvenating properties of the air of the pine groves.

Probably this tradition has for its origin the Mosaic account of the tree of life,* of the fruit of which, we are told, even had fallen man partaken, he would have lived for ever.

Then we find the custom of using spices and odours in connection with the burial of the dead. The idea of embalming evidently had for its object an attempt to arrest the process of decay of the body after death by means of the only medicine knowledge of which was handed down by tradition as being able or likely to render man immortal—some kind or other of sweet odours.

This ancient custom and the beautiful tradition

* Genesis iii. 22.

still live among us, though modified. The last offerings of love in the present day are shown by the coffin covered with flowers, beautiful alike to sight and smell, and we see the emblem of the continuity of life in the tree or flower planted for fond memory's sake on the new-made grave.

With the birth of Mahometanism we have a new religion claiming fresh revelations direct from the angel Gabriel, and with it we still find an intimate connection between religious feelings and sweet odours. A short period back there appeared in the *Daily Telegraph* an article on the recent Mahdi; it would have served as an excellent sermon on the text that "there is nothing new under the sun," or Pope's aphorism—

> "That prophet ill sustains his holy call
> Who finds not heavens to suit the tastes of all."

Space will not permit more than a few extracts from the description there given of the Oriental heaven. We read, "The perfumes in the same way will glide imperceptibly from one fragrance to another, and each in turn will be new and exquisite." And again, "The stream of Salsabil close by, which runs between banks of jasper and gold, the fragrance, of a thousand perfumes—scent was one of the chief pleasures of Mahomet—the singing of birds, the luxury of couches of flowers, and so forth."

In the Mahometan worship incense is burnt not in censers, as in the ancient Jewish and modern Latin

churches, but in stands, which seems to afford strong presumptive evidence that to a very great extent the burning of incense in olden times was undertaken from a sanitary rather than from a purely religious point of view, and there is some reason for believing that in the pagan worship of the ancient Britons incense was burnt with this intention.

That the burning of fragrant substances formed part of the very early English pagan worship is shown by a very curious passage occurring in the works of one of the oldest Anglo-Saxon writers. Alcuin, one of the few learned Englishmen of the eighth century, and who survived the venerable Bede by seventy years, in writing of the worship of the Anglo-Saxon Christians, says (Alcuin ii. 550): "Besides the accustomed use of incense at certain parts of the Mass, in some churches an incensory or metallic vessel was suspended from the roof, and in it aromatic gums were kept burning during the whole of the service."

We see here evidence of the existence of the two customs. The incense burnt with the Mass was of course the Christian, then universal, custom of incense by means of the censer handed down from Moses, the hanging incensory being probably a remnant of the pagan custom which had its origin in the ancient belief that the use of odours was in some way inseparable from reverence in worship. Nor has this old belief even yet been altogether forsaken by the present generation, as witness the employment of

incense in churches throughout the whole Roman Catholic community.

In the Oriental churches perfumes in the shape of incense are constantly used; in the Western churches of Greece and Rome its employment, though general, is not so lavish; while in the Protestant or Reformed Church its use has been completely abandoned. In referring to this subject Dr. Wilson, whom we have before quoted, writes as follows:

"It is difficult for us to realise the immense difference between ancient and modern feeling and practice in reference to this; but we may imagine the emotions with which a Hebrew of the days of Aaron, or Solomon, or Herod would worship in one of our Protestant churches. It would startle him to find that the ear had become the most religious of the senses; that the eye was scarcely appealed to except to guide the ear, and that the nostril was not invited to take any part whatever in the service. He would be inclined to apply to the worshippers the words which one of his great poets applies to the gods of the heathen, 'Noses have they, but they smell not;' till, looking round, he chanced to observe that though the priests bore no censer, many of the female worshippers carried in their hands certain misshapen crystal vessels, which from time to time they offered to their nostrils, with the effect of rousing them to an animation such as the most eloquent passages of the preacher often failed to provoke. Yes, that is the only religious use the moderns make of perfumes,

and I leave you to picture to yourselves the contrast between the Hebrew altar of incense sending its rolling clouds of fragrant smoke to heaven, and a modern church smelling-bottle or snuff-box passed from hand to hand along a row of sleepy worshippers in a drowsy summer afternoon."

It must be remembered that these are the opinions of a Scotch writer, who probably refers to Scotch customs of thirty years ago, or even of an earlier period, as in England certainly the spectacle of a snuff-box passed from hand to hand in church is at any rate unknown nowadays.

CHAPTER XV.

THE EFFECT OF CLIMATE ON THE USE OF PERFUMES.

Warmth of Atmosphere increases the Employment of Perfumes—Anosmia in exceedingly Cold Regions—Dr. Wilson contrasts the Effects of Climate on the Use of Perfumes—Strange Idiosyncrasy.

PERFUMES are, it would seem, much more universally used by the Oriental races than by the Latin. Speaking generally, we think the rule will be found to hold that the warmer the climate the more widespread will be the use of perfumes. At least warmth of atmosphere certainly affects the habit: the Russians, with their cold climate and heated houses, use perfumes largely. Perhaps, too, in difference of race will be found an important factor. To a certain extent acuteness of the sense of smell is hereditary, just as is acuteness of any or all of the other faculties. Hence we may notice without surprise the almost entire absence of the faculty of smell—at least as regards the evil odours of their dwellings hung with drying fish and filled with smoke—of the

inhabitants of exceedingly cold regions, whose chief care for generations concerning their noses has been more often the prevention of frost-bite than regard for them as channels of pleasure or organs of discrimination, as compared with the really acute olfactic power possessed by the more favoured natives of the temperate zones, abounding as these do, moreover, in sweet-smelling flowers.

It is quite possible that an Esquimaux would be unable to associate anything pleasant with the perfume of the rose, the syringa, or the cassie, possibly because they are all virtually anosmics; while, on the other hand, an Oriental would be certain to find enjoyment.

Dr. Wilson, whom we have before quoted, draws attention to this contrast in the following eloquent terms :—

"If you wish for the extremest contrasts in this respect, take the Syrian, or Egyptian, or Italian, with his fountains of rose-water, his courts fragrant with jasmine and orange flowers, his scented tobacco, his aromatic coffee, and anointing oil saturated with sweet-smelling essences, and compare him with the Esquimaux, or the Kamschatkan, or the Samoyed, who cover up their nostrils from the bitter wind; who live in a region where there are no flowers unless for the briefest season; and where, if there were, their sweetness would be wasted upon an atmosphere so chill that it freezes every vapour, and therefore every odour, and under which the undecaying mammoth

remains fresh as on the day of its death a thousand years ago, when it was entombed in a glacier since become an iceberg, as antediluvian flies have been buried in sepulchres of amber."

There are persons, strange as it may seem, who are indifferent to or actively dislike perfumes and flowers exhaling odours usually considered delicious, yet who can dress a hare or other game when exceedingly "high," if not with pleasure, certainly without the least discomfort so far as it affects their sense of smell. These, probably, are merely examples of personal idiosyncrasy existing here and there all the world over, the peculiarity having no relation to race or climate.

CHAPTER XVI.

THE SIMPLICITY OF PREPARED PERFUMES AND THE IMPORTANCE OF THE PERFUME INDUSTRY.

Diminution of Prejudice against Perfumes—Manufacture of Perfumes—The Process of "Enfleurage"—Extraction of the Perfume from the "Pomade"—Liquid Perfumes—Compound Ethers never used as Perfumes—Perfumed Waters made by Distillation—The "Still-room" now Extinct—Perfumes must be Dilute—The Requisites for a Perfect Perfume—Perfumer's Bouquet.

THERE still exists in the minds of many persons a strong prejudice against the use of all kinds of scents. This prejudice, fortunately, is gradually passing away, thus indicating a gratifying advance in the appreciation of the use of the nose, as well as increased acuteness in the sense of smell among persons generally. Still there are relatively few persons who know how exceedingly pure and simple are the better class of prepared perfumes.

The art of manufacturing perfumes, now brought to a considerable degree of perfection, is one which requires a practical knowledge of the raw materials, or *matières premières* as they are termed,

employed, and an exceedingly acute "scent"—a hyperosmia in fact,—the result of long training of the olfactory organs. The manufacturer of perfumes is exposed, in his purchases of raw material, to endless frauds and impositions, in the form of adulterated articles offered as genuine, or placed in the open market for sale by auction without guarantee. In the present state of our knowledge of chemistry as applied to analysis most of these adulterations are undetectable, while often the enormous cost of the materials in question preclude the employment of quantities sufficiently large for the purposes of analytical investigation, to enable a reliable opinion of them to be formed by the analyst. Hence the purchaser has only his "nose" to guide him. A favourite article for treatment in the way of adulteration is grain-musk, which has the fabulous value of 110 shillings to 120 shillings per ounce. This is often found to be, as one might expect, sophisticated with the greatest ingenuity, and since analytical examination is out of the question, nothing but the most careful inspection—and the eye is after all often deceived—and the sense of smell are left available for the detection of the fraud. But the well-trained nose never errs; it detects not only the presence of added odorous materials, but also the absence of the genuine perfume.

The importance of perfumery as a manufacture in this country may be estimated from the fact that it affords direct employment to several

hundred persons in London alone. An estimate of the quantities of a few of the materials employed will be found on page 102. The following brief outline of the process called "enfleurage," or enflowering, used in the manufacture of perfumes from a large proportion of the 3,200 tons of flowers grown annually in the South of France for the express purpose, will, with our other observations, serve to show how exceedingly simple and pure are the prepared perfumes themselves. A number of frames, technically called "châssis," resembling window sashes though constructed of rather stouter woodwork, about three feet long by two feet six inches wide, and glazed like windows, are prepared. Upon each side of the glass a layer of fat, most carefully freed from all traces of areolar tissue, and consisting of a mixture of three quarters beef suet with one quarter lard, is spread about a quarter of an inch thick. One frame, having fat spread upon only one of its surfaces, is placed upon the floor, and upon the fat is thrown a quantity of fresh-gathered flowers; a second frame (having fat spread upon both sides of its glass) is placed on the first, thus enclosing the flowers in a sort of flat box having its floor and roof of fat. Fresh flowers being now placed upon the fat on the upper surface of the second frame, this is covered with a third, and so on, making a pile of forty or fifty frames.

The flowers are removed and replaced by fresh ones every morning or every second day for six weeks or more, the fat being cut and spread with a spatula to

expose a fresh surface during that period. At the end of that time the fat is found to be highly charged with the perfume of the flowers ; it is then scraped off the frames, melted, and strained through canvas to remove petals, pollen, &c., which have here and there become imbedded, and is then ready for the perfumer's use. Properly prepared it will keep unaltered for two years or more. For the manufature of perfumes about eight pounds of this fat—now called "pomade" —is soaked in one gallon of spirit of 60° over proof for a month, whereby the odour is almost completely abstracted and retained in the spirit. See also a mention of the process of "maceration" on page 96.

Liquid perfumes—other than scented waters—consist wholly of spirituous extracts obtained from perfumed fats prepared by one of these methods, or by dissolving one of the odoriferous attars, or by making tinctures of one of the animal products or the gum-resins mentioned in the article quoted on pages 92-102, and by mixing two or several of these in various proportions. Consequently fine and genuine perfumes are thoroughly pure tinctures merely. These perfumes, which are thus shown to be simply pure alcoholic tinctures, must not be confounded with certain strongly smelling chemical substances, used only in confectionery for flavouring on account of their resemblance to various fruits such as quince, jargonelle pear, pineapple, raspberry, and the like. They consist of mixtures, more or less impure, of various compound ethers or ethereal salts. They are

never used as perfumes, for not only are their vapours more or less anæsthetic, but if they should be so used they very rapidly produce headache, which the genuine perfumes do not.

Another very simple means of making perfumed waters is by distillation. The petals of the flowers are placed into a still with water; the still-head being then fixed on, the water is boiled vigorously, the steam which comes off being condensed by a suitable cooling apparatus; the distillate will be found to be strongly impregnated with the odour of the flowers, due to the fact that the odoriferous attars, volatilised by the heat, are condensed together with the steam, and dissolved in the water. When the attar so produced is more than the water can retain dissolved the excess floats to the top or sinks to the bottom, as the case may be, according to its relative specific gravity compared with water. This is the method employed for obtaining many attars used in the manufacture of perfumes and confectionery. In the case of roses, the yield of attar is very small, and so it is customary to use the same distillate again and again, whereby the loss of attar due to its solubility in water is avoided; but in the case of the more abundant yields, such as from lavender or peppermint—in which the whole plant excepting its roots is distilled—the waters are allowed to waste, the attars being separated from the water as this distils by means of a "receiver" into which the distillate runs. For the purposes of this industry, stills capable of containing as much as 3,000

to 5,000 gallons are employed in the neighbourhood of Mitcham and of Hitchin, the latter particularly famous for its fine lavender, grown and distilled by Mr. Perks, a well-known pharmaceutist. Some years back the "still-room" was a well-known institution in every well-regulated country house. The "still-room maid" is still a living being, though what her duties are in the present era it is difficult to define.

The fact is that the old duties of the still-room maid are past and gone. The *Times*, in an article on this subject thirty years back, said :—

"To expect the revival of this part of domestic economy would be absurd, yet we must say that a domestic laboratory attached to the conservatory would prove highly instructive and amusing. Those even who have no conservatory we would yet advise to set a room apart in their mansions with the title of 'laboratory' or the ancient one of 'still-room.' Here experiments may be made, scents distilled, and an acquaintance courted with 'common things' without interfering with other people of the establishment, or 'making a mess about the house.' The amount of instruction that can be derived from a private laboratory is far more than at first sight can be conceived, and the entertainment, changeable as a kaleidoscope, is, intellectually considered, immeasurably superior either to crochet or Berlin wool work."

The delicate manipulations of chemical experiments are even better suited to their physical powers

than to the sterner sex, and as a matter of fact practical scientific chemistry is already followed by some few ladies, whose theses, the result of original research, have from time to time been read before the Chemical Society of London.

One of the main endeavours of the perfumer is to keep the perfume as near as possible to Nature by not having it too powerful. To be really pleasant, even the sweetest odours must be dilute or attenuated.

A small hothouse full of orange-trees in full bloom would be overpowering, yet the scent of a single sprig of orange blossom held at some distance from the nose is delicious.

This holds true for all the attars from flowers without exception, though much more markedly so in some few cases, such as neroli, patchouly, lavender, thyme, mint, &c., for these become positively disagreeable unless properly diluted. The animal perfume civet is thoroughly nauseating as secreted, yet when attenuated to an infinitesimal degree it is beautiful as well as permanent.

In fact, the secret of perfect perfume is that only absolutely pure materials should be used in its manufacture; that every care should be taken to prevent alterations occurring during the processes of manufacture, either by oxidation or contact with extraneous substances; and last, that when the manufacture is completed the perfume produced should have as near as possible the same strength of odour as the natural flower.

It may, however, be urged by some that though attar of roses, of geranium, or of verbena may be the pure perfume of the flower itself, yet the majority of perfumes are mixtures of various things, and therefore different from these pure scents.

Our answer is that they are admitted to be mixtures, as is shown in the preceding paragraphs; for they are virtually and actually bouquets.

A bouquet, from the perfumer's point of view, is a collection of flowers placed together with a view to please not the sense of sight, but the sense of smell. Now the odours of some flowers clash, as it were, when placed side by side, just as the colours do in some, while others blend together. Hence in preparing a compound perfume his object is to mix together those primitive odours which blend harmoniously. Thus, for example, Ess Bouquet contains a mixture of the scents collected from the flowers of the rose-bush, the roots or rhizome of the orris plant, and the fruit of the lemon and bergamot trees. How well these different odours blend together is discovered by all who ever smell that popular and delicate perfume.

Of course choice in perfumes differs widely, some persons preferring one simple predominant odour, such as rose, verbena, geranium, musk, others selecting mixed or compound odours, such as the perfume we have just mentioned, Ess Bouquet, or one of the thousand others. When we come to mixtures, there is practically no limit to the number possible. New

mixed perfumes are being constantly added to the original stock, just as cooks are constantly inventing new dishes out of the old materials at their disposal. A new scent in the way of the perfume of a flower never before known would be almost as great a novelty as a new animal roasted and sent to table, for already nearly every flower that "breathes a fragrance" and perfumes the air around it has been marked and experimented on by those interested in the study of this branch of Olfactics.

CHAPTER XVII.

THE HARMONY OF THE SENSES.

One Idea may be Conveyed to the Brain through Various Senses—Four of Our Senses can be Stimulated by Seven Primitive Manifestations—Sound—Light—Colour and Musical Notes—Seven Primary Tastes.

IN Chapter I. we called attention to the fact that the real seat of the senses is the brain, and not the organ of the sense, and that it was also more than probable that the senses all have one common origin or *locus*. We observed that the same idea could be conveyed to the brain by different senses—*e.g.*, the smell of a lemon, the taste of a lemon, and the sight of a man sucking a lemon all producing a somewhat similar sensation on the brain, as indicated by the fact that they all excited a similar reflex action. This illustrates what we propose to discuss under the title of "*the harmony of the senses.*"

Bunyan says :—"The famous town of *Mansoul* had

five gates. The names of the gates were these: Ear-gate, Eye-gate, Mouth-gate, Nose-gate, and Feel-gate."

Now it will be found that all these gateways lead into one thoroughfare, and all have something in common, for it is evident that by the "Mouth-gate" and "Nose-gate" he intended his readers to understand that these were the "gates" of Taste and Smell.

It would seem that four at least of the senses, namely Hearing, Sight, Taste, and Smell, can be stimulated by seven primitive manifestations, with which we shall now deal.

It is established beyond doubt that sound depends upon rapid vibrations, or oscillations of a vibrating body; and that the pitch of a musical note is dependent upon the number of such vibrations performed in a given time. These vibrations are usually transmitted through the layer of air intervening between the vibrating body and the tympanum of the ear, which is thus made to vibrate synchronously with the sound-producing vibrations, and so to affect proportionately the auditory nerve; but any medium capable of vibrating will transmit them; thus a diver at the bottom of a stream will hear persons shouting from the bank, or the sound of a bell or gong struck beneath the surface of the water. A tuning-fork may, whilst vibrating, be heard by holding its handle firmly in the teeth, or by placing it on any part of the skull, the ears being meanwhile completely closed by the fingers, the fact being that the vibrations are

transmitted by the bones of the skull to the auditory apparatus. In a vacuum no sounds are transmitted. So too it is with light, the undulations of the imponderable ether occurring with almost inconceivable velocity, though their range is not so great as in the case of sound. These vibrations must be not less than 450 billions nor more than 780 billions per second to produce luminous effect, the less number corresponding with the red of the spectrum, the greater with the violet. Hence a correspondence between Light and Sound becomes apparent, the higher pitched note—*i.e.*, that resulting from the greater number of vibrations—corresponding with the blue or violet; the bass notes, resulting from fewer vibrations, with the red.

Dr. Septimus Piesse observed, "The analogy which exists between colour and sound has long been admitted."

The ancients felt their connection when they identified the musical gamut as the *chromatic* scale. Bacon has written upon this subject, and numerous writers since his time have attempted to show that the harmony of colours agrees with the melody of the scale.

G. B. Allen, Mus. Bac., in several papers which appeared in the *Musical World* on the analogy existing between musical scales and colours, states that all composers of merit have perception of this analogy, and which is apparent in all their works.

Field, in his "Chromatics," arranges the scale thus:

Blue	*Purple*	*Red*	
DO	RE	MI	
Orange	*Yellow*	*Green*	*Olive*
FA	SOL	LA	SI

and shows the analogy by the following argument:—

"As the three primary colours—blue, red, yellow—in combination or contrast produce the most perfect harmony, so do the sounds DO, MI, SOL. The metrochrome and the monochord also prove their exact agreement. By this first instrument we discover that in pure white light there are eight degrees of blue, five of red, and three of yellow; and by the latter that eight parts of a string will give DO, five MI, and three SOL. This agreement is curious, and proves the existence of some universal law of harmony."

While speaking of the seven primary notes of music, we may observe that the great musician, Cipriani Potter, who was known as the Nestor of British Music, observed the fact that all the notes of music of nature were the seven primary ones—*i.e.*, there were no half-notes, no flats or sharps in Nature, from the bellowing of a bull to the thrill of the nightingale.

We can scarcely be surprised if, therefore, we find that many persons believe that there are seven primary tastes and seven primary odours. Possibly the seven primary tastes and odours may contain three primitive harmonious ones, and may actuate our gustatory and olfactory nerves by means of

vibrations, and corresponding, could their velocity and amplitude be calculated, as closely with those of sound and light (which is vision) as do those two between themselves. Just as there are octaves in music, so too are there octaves in taste and octaves in odour. Some notes are in harmony and some in discord. So, too, we all know how certain flavours combine in harmony, while others, again, form discords in flavour—*e.g.*, acid and sweet combine, but not bitter and saline.

We cannot, however, enter fully into the various combinations and octaves of taste, for we are still in complete ignorance of their relative positions. We consider (see also page 44) the seven primary tastes to be—

Acid, Alkaline, Sweet, Bitter, Pungent, Saline, Aromatic.

Just as out of the seven primary notes of music we have an infinite variety of tunes, and out of seven primary odours an infinite number of different scents, so out of these seven primary tastes we have the infinite variety of flavours.

The following list, obviously incomplete, will serve to show the classification of the various substances named in the series of the seven primary tastes or flavours :—

List of Sapid Substances (some of which are poisonous) Classified.

Acid.—Dilute Mineral Acids—viz., Sulphuric,

Hydrochloric, Phosphoric, Nitric, Boracic—Tartaric, Citric, Malic, Oxalic, Benzoic, Lactic, &c.

Alkaline.—Caustic Fixed Alkalis and Alkaline Earths—*e.g.*, Potash, Soda, Lithia, Magnesia, Lime, &c., and some of their salts.

Sweet.—The various Sugars (*e.g.*, Grape Sugar, Cane Sugar, &c.), Honey, Glycerine, Mannite, Acetate of Lead.

Bitter.—Quinine, Strychnine, and the bitter principles of Colocynth, Gentian, Cocculus Indicus, Chiretta, Calumba, Angustura, Quassia. Sulphate of Magnesia (Epsom salts).

Pungent.—Pellitory, Alcohol, Capsicum, Cascarilla.

Saline.—Common Salt (Sodium Chloride); Potassium Chloride, Chlorate, and Bromide; Nitre, Sal Ammoniac.

Aromatic.—Sweet Fennel, Dill, Anise, Caraway, Cinnamon, Nutmeg, Juniper, Asafœtida, Pepper, Rhubarb, Allspice, Aloes, Cardamoms, Peppermint, Coriander, Buchu, Myrrh.

In the aromatic series of sapid substances we include all those of a compound character in respect of their possessing an odour, and therefore exciting the sense of smell as well as that of taste. In them it will be found that the sense of taste is gratified, or excited, in one or other, or even in several of the directions indicated by our series. Probably many of the bodies classed as aromatics owe their attributes to the presence of two or several different matters, some of which are odorous only, others sapid

only. Among such are hops, ginger, horseradish pineapple and many fruits, tamarinds. This is undoubtedly the case with many prepared substances—*e.g.*, wines. Thus in port wine we find pungent, due to the alcohol ; acid, due to tartaric and acetic acids ; sweet, due to sugar ; while the bouquet or odour is due to traces of ethereal bodies of undetermined character. Here, in parenthesis, it is singular to note that our appreciation of sapid bodies of this class is in proportion to the complexity of their taste-exciting powers.

But the class of pure aromatics is still a very large one, including as it does most, if not all, the attars, or essential oils, and many well-defined organic bodies, such as acetic, valerianic, butyric, and other acids ; chloroform, chloral hydrate, oil of garlic (sulphide of allyl), camphor, &c.

While on the subject of taste, we may briefly call attention to the existence of various edible substances which do not possess either taste or odour. Examples of these are found in gum tragacanth, gum arabic, white of egg (albumen), starch (the various kinds of arrowroot, cornflour, &c.), isinglass, gelatine.

It is of course extremely difficult to decide between different substances how far their distinctive properties are dependent upon the sense of taste or smell. As a rule, we know that when persons lose their sense of smell their sense of taste is lost too, or nearly so. When the sense of smell is gone a person might be able to distinguish between vinegar and

sugar, but not between port and sherry, or even between vinegar and any odourless acid, such as sulphuric, diluted to an equal strength. In fact our enjoyment of the sense of taste is very greatly dependent on the existence of that of smell. In reference to odours, Dr. Septimus Piesse says: "Scents, like sounds, appear to influence the olfactory nerve in certain defined degrees. There is, as it were, an octave of odours like an octave in music; certain odours coincide, like the keys of an instrument. Such as almond, heliotrope, vanilla, and clematis blend together, each producing different degrees of a nearly similar impression.

"Again, we have citron, lemon, orange-peel, and verbena, forming a higher octave of smells, which blend in a similar manner. The analogy is completed by what we are pleased to call semi-odours, such as rose and rose-geranium, for the half-note; petit grain, neroli, the half-tone, followed by fleur d'oranger.

"Then we have patchouli, santalwood, and vitivert, and many others running into each other.

"From the odours already known we may produce, by uniting them in proper proportion, the smell of almost any flower, except jasmine."

Charles Dickens, in *Household Words*, observes on this last statement:—

"Is jasmine, then, the mystical Meru—the centre, the Delphi, the Omphalos of the floral world? Is it the point of departure, the one unapproachable and indivisible unit of fragrance? Is jasmine the Isis of

flowers, with veiled face and covered feet, to be loved of all yet discovered by none? Beautiful jasmine! If it be so, the rose ought to be dethroned, and the Inimitable enthroned queen in her stead. Revolutions and abdications are exciting sports; suppose we create a civil war among the gardens, and crown the jasmine empress and queen of all."

The discovery, if such it may be called, by my late father of a gamut of odours, gave rise to a great deal of discussion in the press at the time. I will now give it in full, simply explaining that the highest note in the treble or G clef is the note F—civet, and that the lowest note in the bass or F clef is C—patchouli.

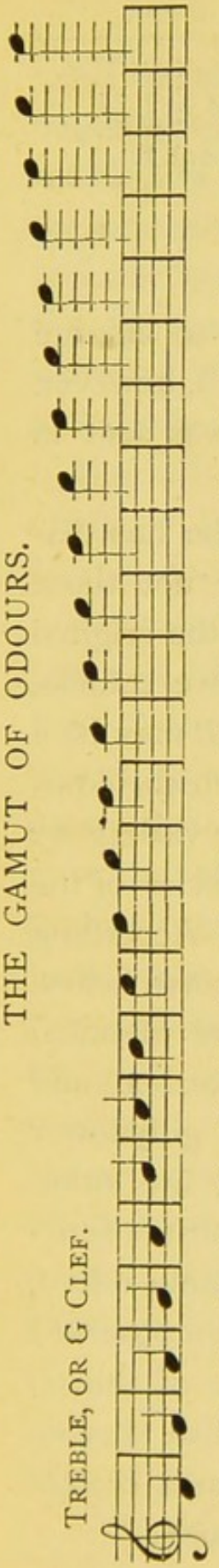
We will also state here that he believed the seven primary odours to be Camphor, Lemon, Jasmine, Rose, Almond, Clove, and Santal.

The following are three instances of making bouquets of odours in harmony, explaining that in the above scale the complementary of vanilla is citronella. It is understood that in making a bouquet every primitive odour must be brought to some standard of strength or "power of odour."

Bass. G—Pergalaria.
G—Sweet Pea.
D—Violet.
F—Tuberose.
G—Orange Flower.
B—Southernwood.
} Bouquet of Chord G.
Treble.

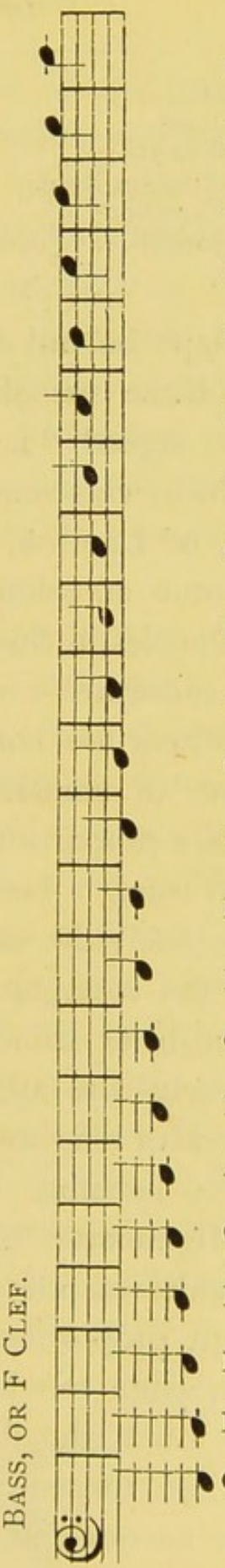
Bass. C—Santal.
C—Geranium.
E—Acacia.
G—Orange Flower.
C—Camphor.
} Bouquet of Chord C.
Treble.

THE GAMUT OF ODOURS.



TREBLE, OR G CLEF.

F Civet.
E Verbena.
D Citronella.
C Pineapple.
B Peppermint.
A Lavender.
G Magnolia.
F Ambergris.
E Cedrat.
D Bergamot.
C Jasmin.
B Mint.
A Tonquin Bean.
G Syringa.
F Jonquille.
E Portugal.
D Almond.
C Camphor.
B Southernwood.
A Vernal Grass (New Hay)
G Orange Flower.
F Tuberose.
E Acacia.
D Violet.



BASS, OR F CLEF.

C Rose.
B Cinnamon.
A Tolu.
G Sweet Pea.
F Musk.
E Orris.
D Heliotrope.
C Geranium.
B Stocks and Pinks.
A Balsam of Peru.
G Pergalaria.
F Castor.
E Calamus.
D Clematis.
C Santal.
B Clove.
A Storax.
G Plumeria Alba (Frangipanni Plant).
F Benzoin.
E Wallflower.
D Vanilla.
C Patchouly.

Bass.	F—Musk	}	Bouquet of Chord F.
	C—Rose.		
	F—Tuberose.		
	A—Tonquin Bean.		
	C—Camphor.		
	F—Jonquil.		
Treble.			

It would perhaps be out of place either to enlarge on or criticise these speculations. We will, however, quote a letter, signed "L. G. S.," that was sent in 1863 to a well-known scientific paper :—

"M. Piesse, of London, believes that he has discovered a gamut of odours; why may not those prosecuting inquiries in this direction find the original odours? As there are a very few primitive colours, of which all others are composed, so there may be a limited number of elementary odours which, combined in various proportions, produce the variety we meet with in Nature. The rose and a species of the peony have precisely the same fragrance. According to M. Piesse, the rose-geranium is an octave below. The sweet shrub or calacanthus has the identical scent of an early-ripe apple. The heliotrope and vanilla, the Persian lilac and nutmeg, the gillyflower and clove, the jasmine, lily and tulip, are other instances. Mignonette, grape-flower, spirits of-turpentine, and white raspberries have the same odour, but in different proportions. It has been observed by cooks that, when too large a quantity of the oil of lemon was used, the flavour of the dish was no longer lemon but turpentine. Quinces, in a certain state, have the flavour and odour of the onion.

"This identity of odour is not confined to the vegetable kingdom; the musk and musk-plant, the oyster and oyster-plant or salsify, the animal known to naturalists as the *Mephitis Americana*, or skunk, and the crown imperial, are obvious illustrations to the contrary. Who can say that in our future botanical works the essential oil scenting the flower will not be included in the description?"

We will conclude this chapter by quoting the words of Judge Grove when he was President of the British Association:—

"Professor Newman has remarked that there is a point at which all sciences osculate. This becomes more apparent daily. The chemist must be a mathematician, so must the thorough musician. Optics have lately come to the aid of chemistry; and the most recent discovery, the metal thallium, revealed itself to our knowledge by a line of intense green light upon the spectrum. Thus, again, chemistry aids astronomy; the spectrum analysis dealing with the solar and stellar light enables us at least to conjecture what elements exist in other spheres of the universe. What shall we say of Piesse's theory which finds close analogy between scents and musical notes? There is a 'continuity pervading the universe; everything gives proof of it.'"

FINIS.

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AND THE METHODS OF OBTAINING

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BY

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ANALYTICAL CHEMIST:

Juror Class 4 D at the International Exhibition, London, 1862;

Author of

"Chemical, Natural, and Physical Magic," "The Laboratory of Chemical Wonders," &c.

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