the amines, the pyridine series, the benzene group, have each a characteristic odour. Ramsay has advanced the theory that the sense of smell “is excited by vibrations of a lower period than those which give rise to the sense of light or heat,” and he points out a series of important facts in support of this view. He states that to produce the sen­sation of smell a substance must have a molecular weight at least fifteen times that of hydrogen. For instance, the specific gravity of marsh gas is eight (no smell), of ethane fif­teen (faint smell), of propane twenty-two (distinct smell). Again, prussic acid has a specific gravity of fifteen, and many persons fail to detect its odour. Further, Ramsay sup­poses that smell may be excited by vibrations, and suggests that the period of vibration of the lighter molecules is too rapid to affect the sense ; at last a number of vibrations is reached capable of exciting the sense organ ; and beyond an upper limit the sense is again lost. Graham pointed out that odorous substances are in general readily oxidized.@@1 Tyndall showed that many odorous vapours have a con­siderable power of absorbing heat. Taking the absorptive capacity of the air as unity, the following absorptions were observed in the respective cases :—

|  |  |  |  |
| --- | --- | --- | --- |
| Name of Perfume. | Absorption per 100. | Name of Perfume. | Absorption per 100. |
| Patchouli | 30 | Lavender | 60 |
| Sandal-wood | 32 | Lemon | 65 |
| Geranium | 33 | Portugal | 67 |
| Oil of cloves | 33∙5 | Thyme | 68 |
| Otto of roses | 36∙5 | Rosemary | 74 |
| Bergamot | 44 | Oil of laurel | 80 |
| Neroli | 47 | Cassia | 109 |
|  |  |  |

In comparison with the air introduced in the experi­ments the weight of the odours must be almost infinitely small. “ Still we find that the least energetic in the list produces thirty times the effect of the air, whilst the most energetic produces 109 times the same effect.”@@2

Venturi, B. Prévost, and Liégeois have studied the well- known movements of odoriferous particles, such as cam­phor, succinic acid, &c., when placed on the surface of water, and they have suggested that all odoriferous sub­stances in a state of fine subdivision may move in a similar way on the moist surface of the olfactory membrane, and thus mechanically irritate the nerve-endings. This ex­planation is too coarse; but it is well known that the odours of flowers are most distinctly perceived in the morning, or after a shower, when the atmosphere contains a considerable amount of aqueous vapour. It would appear also that the odours of animal effluvia are of a higher specific gravity than the air, and do not readily diffuse,—a fact which may account for the pointer and bloodhound keeping their noses to the ground. Such smells are very persistent and are apparently difficult to remove from any surface to which they have become attached. The smell of a corpse may haunt a living person for days, notwithstanding copious ablutions and change of clothes.@@3

*Special Physiology of Smell.—*It is necessary that the air containing the odour be driven forcibly against the membrane. Thus the nostrils may be filled with eau de Cologne, or with air impregnated with sulphuretted hydro­gen, and still no odour is experienced if the person does not breathe. When a sniff is made the air within the nasal passages is rarefied, and, as the air rushes in to equili­brate the pressure, it is forcibly propelled against the olfactory surface. The olfactory surface must be moist ; if it is dry, or is covered with too thick a layer of mu­cus (as in catarrh), the sense is much weakened or lost.

The first moment of contact is the most acute and the sense quickly becomes blunted. The first scent of a flower is the strongest and sweetest ; and after a few minutes' ex­posure the intensity of even a fœtid odour may not be perceived. This fact may be accounted for on the sup­position that the olfactory membrane becomes quickly coated with a thin layer of matter, and that the most intense effect is produced when the odoriferous substances are applied to a clean surface. The intensity of smell depends on (1) the area of olfactory surface affected, and (2) the degree of concentration of the odoriferous matter. It is said that musk to the amount of the two-millionth of a milligramme, and one part of sulphuretted hydrogen in 1,000,000 parts of air, may be perceived. If the two nostrils are filled with different odorous substances, there is no mixture of the odours, but we smell sometimes the one and sometimes the other (Valentin). Morphia, mixed with sugar and taken as snuff, paralyses the olfactory ap­paratus, while strychnine makes it more sensitive (Lichtenfels and Fröhlich).

The delicacy of the sense is much greater in many of the lower animals than in man, and it is highly probable that the dog or cat obtain information by means of this sense which a human being cannot get. Odours may excite in the minds of many animals vivid impressions, and they have probably a memory of smells which the human being does not possess. Even in man the sense may be greatly im­proved by exercising it. A boy, James Mitchell, was born blind, deaf, and dumb, and chiefly depended on smell for keeping up a connexion with the outer world. He readily observed the presence of a stranger in the room and he formed his opinions of persons apparently from their char­acteristic smells. In some rare cases, the sense of smell is congenitally absent in human beings, and it may be much injured by the practice of snuffing or by diseases of the nose affecting the olfactory membrane. Subjective im­pressions of smells, like spectral illusions or sounds in the ears, are occasionally, but rarely observed in the insane. Finally, it may be observed that the sense of odour gives information as to the characters of food and drink and as to the purity of the air. In the lower animals, also, the sense is associated with the sexual functions.

See art. “ Olfaction ” by François Franck, in *Dictionnaire Ency­clopédique des Sciences Médicales,* 2d series, where a full historical bibliography is given ; Hermann’s *Handbuch der Physiologie : d. Sinnesorgane: Zweiter Theil, Geruchsinne,* by Prof. V. Vintschgau, p. 226 ; Owen’s *Comp. Anatomy and Physiol. of Vertebrates* ; Bain, *op. cit.,* p. 147 ; Grant Allen’s *Physiological Aesthetics,* p. 77 ; Ramsay, *Nature,* vol. xxvi. p. 187 ; and for James Mitchell’s case, see Dugald Stewart’s *Works,* vol. iv. p. 300. (J. G. M.)

SMELT. See Salmonidæ, vol. xxi. p. 1.

SMETHWICK, an urban sanitary district of Stafford­shire, England, on the borders of Worcestershire and War­wickshire, is situated on the Birmingham, Dudley, and Wolverhampton Canal, and on branches of the London and North-Western and the Great Western Railway lines, 3 miles west from Birmingham, of which the town of Smethwick is a suburb. It possesses a public hall and a free library and reading-room. Within the limits of the district is the Soho foundry originated by James Watt ; and since its origin numerous other industries have been concentrated in the suburb, the more important being the manufacture of glass, chemicals, hydraulic jacks, patent nuts and bolts, and patent tubes. Many of the works are of great extent. The population of the urban sanitary district in 1871 was 17,158, and in 1881 (area, 1882 acres) it had increased to 25,084.

SMIRKE, Robert (1752-1845), subject painter, was born at Wigton near Carlisle in 1752. In his thirteenth year he was apprenticed in London with an heraldic painter, and at the age of twenty he began to study in the schools

@@@1 Bain, *Senses and Intellect,* 3d ed., p. 152.

@@@2 Tyndall, *Contributions to Molecular Physics in Domain of Radiant Heat,* p. 99.

@@@3 Liégeois, *Archiv de Physiol.,* 1868.