is stretched a network of tightly drawn strips of leather. At a convention held in Montreal on 30th December 1871 a rule was passed that a “ pair of racing shoes, including strings, shall not weigh less than 11/2 lb nor measure less than 10 inches of gut in width.” The motion of a snow- shoer in the distance is curious and resembles that of some ungainly web-footed animal. On using the implements the knees must be turned inwards and the fore part of the feet outwards to avoid wounding the ankles with the frameworks. At first the fatigue and consequent stiffness are great ; but with practice this wears off and the motions become easy. The speed attained as compared to that in skating is not quick. The following are the best recorded times in Montreal, Canada, with shoes of regulation size and weight :—100 yards, 12 sec.; 220 yards, 26 sec.; 1/4 mile, 1 min. 73/4 sec. ; 1/2 mile, 2 min. 33 sec. ; 3/4 mile, 4 min. 21 sec.; 1 mile, 5 min. 421/2 sec.; 2 miles, 11 min. 523/4 sec. ; 3 miles, 20 min. 18 sec. ; 4 miles, 27 min. 10 sec. ; 41/2 miles, 30 min. 36 sec. ; *5* miles, 33 min. 491/2 sec. The best history of the pastime and its records is *Montreal Snow-shoe Club,* sm. 8vo, Montreal, 1882.

SNUFF. See Tobacco.

SNYDERS, Franz (1579-1657), painter of animals and still life, was born at Antwerp in 1579. In 1593 he was studying under Peter Breughel, and afterwards he received instruction from Henry van Balen, the first master of Vandyke. He devoted himself to painting flowers, fruit, and subjects of still life, but afterwards turned to animal-painting, and executed with the greatest skill and spirit hunting pieces and combats of wild animals. His composition is rich and varied, his drawing correct and vigorous, his touch bold and thoroughly ex­pressive of the different textures of the furs and skins of the animals represented. His excellence in this depart­ment excited the admiration of Rubens, who frequently employed him to paint animals, fruit, and still life in his own pictures, and he assisted Jordaens in a similar manner. In the lion and boar hunts which bear the name of Snyders the hand of Rubens sometimes appears. He was appointed principal painter to the archduke Albert, governor of the Low Countries, for whom he executed some of his finest works. One of these, a Stag-Hunt, was presented to Philip III., who commissioned the artist to paint several subjects of the chase, which are still pre­served in Spain. Snyders died at Antwerp in 1657.

SOAP may in general terms be defined as a chemical compound resulting from the union of fatty oils and fats with alkaline bodies. In a scientific definition the com­pounds of fatty acids with basic metallic oxides, lime, magnesia, lead oxide, &c., should also be included under soap ; but, as these compounds are insoluble in water, while the very essence of a soap in its industrial relations is solubility, it is better to speak of the insoluble compounds as “ plasters,” limiting the name “ soap ” to the compounds of fatty acids with soda and potash. Soap both as a medi­cinal and as a cleansing agent was known to Pliny (*H.N.,* xxviii. 51), who speaks of two kinds—hard and soft—as used by the Germans. He mentions it as originally a Gallic invention for giving a bright hue to the hair (“ ruti­landis capillis ”). There is reason to believe that soap came to the Romans from Germany, and that the detergents in use in earlier times and mentioned as soap in the Old Testament (Jer. ii. 22 ; Mal. iii. 2, &c.) refer to the ashes of plants and other such purifying agents (comp. vol. x. p. 697).

Till Chevreul’s classical researches on fatty bodies (1811- 23) it was believed that soap consisted simply of a binary compound of fat and alkali. Claude J. Geoffroy in 1741 pointed out that the fat or oil recovered from a soap solution by neutralization with a mineral acid differs from

the original fatty substance by dissolving readily in alcohol, which is not the case with ordinary fats and oils. The significance of this observation was overlooked ; and equally unheeded was a not less important discovery by Scheele in 1783. In preparing lead plaster by boiling olive oil with oxide of lead and a little water—a process palpably analogous to that of the soap-boiler—he obtained a sweet substance which, called by himself “ Oelsüss ” (“ principium dulce oleorum”), is now known as “glycerin.” These discoveries of Geoffroy and Scheele formed the basis of Chevreul’s researches by which he laid bare the con­stitution of oils and the true nature of soap. (See Oils, vol. xvii. p. 740, and Glycerin, vol. x. p. 697.) In those articles it is pointed out that all fatty oils and fats are mixtures of glycerides, that is, of bodies related to the alcohol glycerin C3H5(OH)3, and some fatty acid such as palmitic acid (C16H31O9)H. Under suitable conditions

C3H5(OH)3+3(C16H31O2)H give C3H5(C16H31O2)3 + 3H2O Glycerin. Palmitic Acid. Palmitin. Water.

The corresponding decomposition of palmitin into palmitic acid and glycerin takes place when the glyceride is distilled in superheated steam, and similarly it can be realized by boiling in water mixed with a suitable proportion of caustic potash or soda. But in this case the fatty acid unites with the alkali into its potash or soda salt, forming a soap—

C3H5(C16H31O2)3 + 3NaOH = 3NaC16H31O2 + C3H5(OH)3 Palmitin. Soda Hydrate. Soap. Glycerin.

Of the natural fats or glycerides contained in oils the most important in addition to palmitin are stearin and olein, and these it may be sufficient to regard as the principal fatty bodies concerned in soap-making.

The general characters of a soap are a certain greasiness to the touch, ready solubility in water, with formation of viscid solutions which on agitation yield a tenacious froth or “ lather,” an indisposition to crystallize, readiness to amalgamate with small proportions of hot water into homogeneous slimes, which on cooling set into jellies or more or less consistent pastes. Soaps give an alkaline reaction and have a decided acrid taste ; in a pure condi­tion—a state never reached in practice—they have neither smell nor colour. Almost without exception potash soaps even if made from the solid fatty acids are “ soft,” and soda soaps, although made with fluid olein, are “hard”; but there are considerable variations according to the pre­vailing fatty acid in the compound. Almost all soda soaps are precipitated from their watery solutions by the addition of a sufficiency of common salt. Potash soap with the same reagent undergoes double decomposition—a proportion being changed into a soda soap with the forma­tion of chloride of potassium. Soap when dissolved in a large amount of water suffers hydrolysis, with formation of a precipitate of alkaliferous fatty acid and a solution con­taining free alkali. Its cleansing power is ordinarily ex­plained by this reaction ; but it is difficult to see why a solution which has just thrown off most of its fatty acids should be disposed to take up even a glyceride. It is more likely that the cleansing power of soap is due to the inherent property of its solution to emulsionize fats.

Resin soaps are compounds of soda or potash with the complex acids (chiefly abietic) of which coniferous resins consist. Their formation is not due to a true process of saponification ; but they occupy an important place in compound soaps.

Manufacture.—The varieties of soaps made are numerous ; the purposes to which they are applied are varied ; the materials em­ployed embrace a considerable range of oils, fats, and other bodies ; and the processes adopted undergo many modifications. As regards processes of manufacture soaps may be made by the direct combina­tion of fatty acids, separated from oils, with alkaline solutions. In the manufacture of stearin for candles, &c., the fatty matter is de­composed, and the liquid olein, separated from the solid fatty acids, is employed as an ingredient in soap-making. A soap so made is