The old is better.” And again in the Apocrypha, “ New friends are like new wine: when it is old, thou shalt drink it with pleasure.” There is little doubt that the beneficial effect of age on the character of spirits is due to the changes effected in the character and quantity of the by-products, but the exact nature of these changes is by no means clear. Such improvement as takes place is apparently connected in some way with the free access of air to, or rather the satisfactory ventilation of, the containing vessel; for spirits preserved entirely in glass undergo relatively little change, either in taste or in chemical composition, whereas cask storage materially affects both these factors.

Concerning the changes which take place during maturation, it was formerly believed that the higher alcohols decreased with age, and that the main reason of the improvement noticeable in mature spirits was due to this fact. The author has, however, shown conclusively that this is not the case, but that on the con­trary the higher alcohols generally increase during maturation. This decrease is not absolute, but only relative, and may be due to the fact that the higher alcohols are less volatile than ethyl alcohol. There is a decided increase during maturation of both the volatile and non-volatile acids. On the whole also the esters and aldehydes generally tend to increase, but not to so great an extent as was formerly believed to be the case. There is, however, a marked decrease in regard to furfurol. The type of cask exercises a marked influence on the course of maturation; and, as regards whisky, spirit stored in a sherry cask undoubtedly matures more quickly than that contained in a plain wood cask. The relative humidity of the cellar in which spirit is stored has a very great effect on the course of maturation. In a very damp cellar the spirit will lose alcohol very rapidly and as a result all those changes which are favoured by these conditions will take place with relative rapidity. On the other hand, in a very dry cellar the loss of alcohol is relatively smaller than that of water (cf. Schidrowitz and Kaye, *Journ. Soc. Chem. Ind.,* June 1905).

*Physiological Effects of Spirit By-products.—*The nature of the physiological effects produced by the ingestion of spirits varies considerably, not only according to the class of spirit *(i.e.* whether whisky, brandy, rum, &c.) consumed, but also with its condition *(i.e.* whether new or old, and so on) ; and there is no doubt that the causation of these phenomena is intimately connected with the nature and quantity of the by-products, to which, as has been already said, the character of the spirit is due. Commenting on a statement in Bailey’s *Book of Sports* to the effect that wine and brandy had a tendency to make a man fall on his side, whisky to make him fall forward, and cider and perry to make him fall on his back, Sir T. Lauder Brunton *(Evidence, Spirits Committee,* 1891) suggests that these state­ments—if correct—might indicate definite injury to various parts of the cerebellum. Thus, if the anterior part of the middle lobe of the cerebellum is injured, the animal tends to fall forward; when the posterior part is affected, the head is drawn backwards, &c. Brunton is inclined to believe that the varying action of different spirits may be due to the specific action of specific products on the separate nerve centres. Thus the cause of the epileptic convulsions produced by the injection of absinthe has been traced to the specific action of the chief flavouring agent of this liqueur.

In view of the doubt which modern research has thrown on the older theories, to the effect that the improved character of a mature, as compared with a new, spirit is due to the decrease in the quantity of the higher alcohols *(i.e.* the fusel oil), a discussion of the specific action and relative toxicity of these bodies may seem superfluous, more especially as they occur in quantities which are apparently incapable of producing serious effects. As, however, there is considerable reason for believing that the higher alcohols do influence, at any rate, the flavour of the spirit a brief reference to their physiological action seems to the author not out of place. Broadly speaking, the toxicity of the fatty alcohols increases with their molecular weight. Dujar-din- Beaumetz and Audigé found that the lethal dose for dogs was 5-6 grammes per kilo-body-weight for ethyl (ordinary) alcohol; 3·75 grammes for propyl alcohol; 1∙8 grammes for butyl; and 1∙5 grammes for n-amyl alcohol. It is interesting to note that the experiments of these investigators were conducted chiefly with the pig, as the digestive organs of the latter animal are very similar to those of man, and also because the pig is apparently the only animal which willingly takes alcohol with its food. With regard to the action of spirits generally, the investigators named above found that the digestive organs of pigs fed for thirty months with pure alcohol alone were not affected, whereas the animals treated with similar quantities of imperfectly purified spirit (whether derived from the beet, the potato or from grain) suffered considerably.

Of late years the attention of pharmacologists has been directed to furfurol especially, and the aldehydes generally, as being, at any rate in part, the cause of the unpleasant after or by-effects of certain spirits. Curci and others showed that furfurol in certain doses is poisonous to animals. Brunton and F. W. Tunnicliffe demonstrated a poisonous action of this sub­stance upon man, and, comparing the after-effects upon animals of spirits containing, and freed from, aldehydes, found certain important physiological differences between them. I. Guareschi and A. Mosso first drew attention to the fact that numerous samples of reputedly pure spirits contained small quantities of certain volatile bases of an alkaloidal nature. They apparently belong to the pyridine series, and have effects similar to those of strychnine. E. Bamberger and Einhorn discovered the presence of pyridine, dimethylpyridine and other bodies belonging to the same series, in commercial fusel oil. It is possible that the existence of these volatile bases in spirit may have given rise to the—on the face of it absurd—suggestion that tar bases have been used as adulterants of whisky. It appears likely that the formation of the bases in question is connected with the use of inferior or decaying grain or maize. Thus the spirit produced in Sweden in 1879 was particularly bad and had very curious effects, and it was found, on investigation by Μ. Husz, that it had actually been largely prepared from decomposing grain. More­over, C. Lombroso discovered an alkaloidal body in decayed maize, the action of which was not unlike that of strychnine. The quantities of these bases which have been found in spirits are very small, but it must be remembered that substances are known—such as abrine, for instance—which have marked effects in practically unweighable quantities. It is possible that these volatile bases may be responsible for some of the effects—very similar to alkaloidal poisoning—produced by crude spirits such as Cape “ smoke ” and the cheap Portuguese liqueurs.

Having described the nature and effects of spirit by-products, and the changes occurring in them during storage, the question that arises is: How is the knowledge gained by scientific research in this direction applied in practice? It may be said that the old adage “ prevention is better than cure ” holds good in the spirit industry as elsewhere, and the distiller, therefore, tries as far as possible to avoid the formation of those by-products which are objectionable, or at any rate to remove them during the course of manufacture. These methods for obtaining a satis­factory potable spirit are so far, however, only successful up to a certain point, and the distiller is therefore bound to have recourse to prolonged storage or to one of the many artificial processes of purification’ and maturing, the majority of which have been devised—with varying success—during recent years. Referring, in the first place, to what may be called the natural or “ preventive ” methods for the production of a well-flavoured spirit, it is necessary *(a)* that the water supply (for steeping, mashing, &c.) be a good one; *(b)* that no mouldy or inferior material be used; *(c)* that mashing heats be kept within reason­able limits; *(d)* that refrigerators be constructed so as to avoid bacterial infection; (*e*) that the “ souring ” of the wort be con­ducted on proper lines; *(f)* that a favourable and vigorous type of yeast be used; and (*g*) that stills, &c., be kept perfectly clean. Coming next to the methods ordinarily or frequently employed by distillers for eliminating the undesirable by-products, which, despite all care, are formed in the course of manufacture, the most important undoubtedly is purification by rational fractional distillation. By properly regulating the distilling heats, by