

## APPENDIX No. 3

the amount ranged from 0.04 per cent to as much as 0.160 per cent of the weight of the tobacco smoked. Of the thirteen examples of Virginian cigarette examined five showed 0.1 per cent and over, and four yielded 0.08 per cent and over of furfural. The rest gave figures close to 0.040 per cent. It is remarkable that the smoke which proved most pungent or irritating in the Virginian cigarettes invariably showed the largest proportion of furfural, and these also were, generally speaking, the cheapest in the series examined. The cheapest cigarette is nearly always Virginian tobacco. It is remarkable also that the Turkish cigarette yielded practically no furfural, and on the whole we think, that the general opinion of cigarette smokers is that Turkish tobacco yields a less irritating, a softer and more aromatic smoke (though this aroma may not be liked) than the Virginian cigarettes. They give, however, a higher proportion of nicotine in the smoke than do most of the Virginian cigarettes examined, while the nicotine in the smoke of the pipe and cigar is far greater than either.

## ' THE INCOMPATIBILITY OF ALDEHYDES WITH AMMONIA BASES.

'It is interesting to compare the yield of furfural in the smoke of pipe, cigar and cigarette with the corresponding yield of bases which may be regarded as bodies of the ammonia type. Generally speaking, furfural and ammonia do not occur simultaneously in tobacco smoke; when furfural is present, ammonia is usually absent, and vice versa. Thus the Virginian cigarette yields the least ammonia and the least nicotine, but the most furfural. Cigar smoke yields no furfural at all to speak of, but the amount of ammonia is relatively high. The pipe gives in general a small quantity of furfural, but a decided quantity of bases in the shape of ammonia and nicotine. Now, ammonia and aldehydes are antagonistic; ammonia is the antidote, so to speak, to aldehydes, for it forms with them an innocuous compound. The pharmacological action of aldehydes is said to depend upon their combining with the amido groups of the protein molecule. It is a fair presumption, therefore, that (1) when tobacco yields an excess of ammonia or bases any aldehydes formed would be neutralized, and (2) that, on the other hand, when the tobacco does not furnish aromatic basic compounds, aldehydes may pass to the smoker's respiratory apparatus raw and unchanged. In the first category may be placed the pipe, cigar, and probably Turkish or Egyptian cigarettes, and in the second, the Virginian cigarettes, and especially the cheaper kinds. Another interesting consideration is the enhanced formation of aldehydes, which may be brought about by the addition to the tobacco of sweetening agents—glycerine, oils, and the like—in the course of manufacture. It is obvious to the chemist that the presence of sugar, glycerine or oil in tobacco would encourage the production of irritating aldehydes during the destructive distillation of the tobacco. The manufacturer may have good reasons for adding these compounds to tobacco, but the process may, likely enough, give rise to fresh toxic factors in tobacco smoke. On the other hand, he may be alive to this possibility and add correctives in the shape of nitrates, ammonia or other basic substances to defeat the irritating property only, perhaps, to develop others which, while free from 'bite' may have toxic effects not referable to tobacco at all.

## ' GENERAL CONSIDERATIONS.

'Finally, it is a remarkable fact that in the countries in which laws exist for the prohibition of juvenile smoking the cheap Virginian cigarette is popular—for example, Great Britain and the United States; whereas in those countries where there are no restrictions at all—in Turkey, Egypt, Russia, and so on—where smoking is indulged in to great excess from the cradle to the grave—the tobacco known as Turkish or Egyptian (they are both Dubec tobacco) is first favourite. Yet both Virginian and Dubec