XXXVII. THE BACTERIAL DECOMPOSITION OF TOBACCO AS LEADING TO THE FORMATION OF BASES IN THE PRESENCE OF WATER.

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IN work published in this *Journal* Fodor and Reifenberg [1925] came to the following conclusions.

(1) Tobacco extracts are capable of decomposing nicotine into pyridine and amino-bases, during which process a gradual increase in alkalinity takes place.

(2) The nicotine-decomposing activity of fermented tobacco is found to be smaller than that of non-fermented tobacco.

(3) Tobacco leaves dried artificially and quickly at 30° proved to be less active in decomposing nicotine than leaves dried slowly and naturally.

(4) The well-known amelioration of the quality of tobacco due to fermentation is attributed by Fodor and Reifenberg to the decomposition of a part of the nicotine through the action of an oxidase into pyridine and amino-bases. They consider that the aromatic qualities of tobacco are thus affected while denying the formation of acids during that process.

Numerous experiments are quoted with tobacco of different brands and origin which, however, appear to be hardly comparable among themselves, thus leaving the last three conclusions open to objection.

The first finding was confirmed by the writer, though this fact had to be differently interpreted in view of other discordant results.

For instance, the important rôle attributed by Fodor and Reifenberg to the decomposition of part of the nicotine into pyridine and amine with development of alkalinity is, in fact, quite insignificant for tobacco fermentation as demonstrated in the following preliminary qualitative tests. These tests rather indicate that the splitting up of nicotine and the subsequent increase in alkalinity gradually impair the quality of tobacco.

EXPERIMENTAL.

(a) To 10 g. of cigarette tobacco 90 cc. of water were added. After leaving the mixture to stand for 2 hours the macerate was separated from the tobacco by squeezing the latter in a cloth. All macerates so treated gave without exception an acid reaction to litmus paper. The acidity of macerates of

different brands varied from 15–20 cc. $N/10$ NaOH for 100 cc. of tobacco macerate.

(b) If a tobacco macerate is left to stand for a long time at room temperature (17–20°)—no matter whether filtered or not—then the acidity gradually begins to fall off and the macerate turns alkaline after about 30 hours' standing.

(c) On addition of 2 cc. chloroform to 10 cc. of a still acid tobacco macerate, kept in a well-stoppered bottle in order to prevent evaporation of chloroform, the reaction remains acid, while in another stoppered bottle the same macerate without addition of chloroform turns alkaline after a certain length of time.

From the foregoing experiments (a), (b) and (c) we learn that fermented cigarette tobacco (for cigarettes consist exclusively of fermented tobacco) does not become alkaline during the dry fermentation process, but does so if brought into contact with water. Such basic reaction should be attributed to bacterial action rather than to oxidase, for it is a well-established fact that chloroform does not interfere with enzymic reaction but arrests bacterial activity [Faitelowitz, 1910].

(d) Treatment of cigarette tobacco:

40 cc. of water are added to 10 g. of cigarette tobacco. The mixture is kept in a covered vessel at room temperature till the reaction turns basic. Then the pulp is spread out in a wide open dish and left to stand for some time (2–3 days) till the macerate shrinks as the water evaporates. It is then left until a perfectly air dry condition is reached. Tobacco so treated becomes black, gives a basic reaction to litmus paper and evolves an odour probably due to pyridine and amino-bases. The tobacco is then unpleasant when smoked and has no value as cigarette tobacco.

As regards the dry curing process it will be the object of a further detailed study to determine the rate of development of acidity and catalase content in freshly cut tobacco leaves, in leaves dried slowly but not yet fermented, and in already fermented leaves. Should an increase of catalase and acidity be found in fermented leaves, then it would become apparent that tobacco fermentation is a similar process to milk fermentation where acid-forming bacteria produce lactic acid and catalase [see also Isajeff, 1904].

SUMMARY.

1. The formation of pyridine and amino-bases from nicotine with a resulting basic reaction does not occur to any appreciable extent in the dry fermentation process.

2. In the presence of moisture the decomposition of tobacco leads to a basic reaction, but this condition reduces the quality of tobacco for the purpose of smoking.

3. The decomposition of the tobacco leaf in the presence of water is not due to enzymic action but most probably to the action of bacteria, since, in the presence of chloroform which eliminates bacterial action, the reaction of tobacco remains permanently acid.

REFERENCES.

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