

acid, ammonia, and other substances less known are chiefly, if not entirely, derived from the products of the decomposition of albuminoids. The substances that cause the objectionable pungent smell in tobacco are formed from the broken-up constituents of these high combinations. The conditions under which these bad-smelling combinations originate are not properly known; but it is probable that they are developed with, and under the same conditions that cause the formation of, ammonia, as the disagreeable pungent flavour is found generally in tobacco that has undergone fermentation to a great extent. It is believed that the conditions that favour the development of nicotine are also conducive to the formation of albuminous substances in the leaf, viz. fresh nitrogenous manure, bad physical state of the soil, &c.

According to Nessler, the quality of tobacco depends to a great degree on the amount of cellulose it contains. He found that a good tobacco invariably contained more than a bad one, Havana yielding as much as 46 per cent. The fact that tobacco burns better after being stored for a time may be partly due to an increase of cellulose in it.

Every tobacco contains more or less fat, gum, ethereal oil, &c. It is not properly known in what way fatty matters affect the quality of tobacco. Many other organic matters exist in tobacco in combination with substances from which it is most difficult to separate them; they have not as yet been quantitatively ascertained, and are therefore little known. Most of them are only developed during the drying and fermenting

of the leaf; their presence, however, considerably affects the quality of the tobacco.

The amount of ash constituents in the tobacco is considerable, varying between 16 and 28 per cent. There cannot be said to exist a definite relation between the total amount of ash in the tobacco and its quality, as tobaccos yielding much ash are sometimes of good, and at other times of bad, quality; a good tobacco may yield much or little ash. The relative proportion in which the ash constituents exist is, however, of the greatest importance. It has been ascertained that the presence of some special mineral elements modify to a great extent the quality of the tobacco. Of all ash constituents, potash (K_2O), more correctly speaking potassium carbonate (K_2CO_3), affects the quality of tobacco in the highest degree. Schlösing has pointed out that the good burning qualities of a tobacco depend on the presence in it of potash in combination with a vegetable acid; that a soil deficient in potash is unfit to produce tobacco of good quality. Numerous analyses have tended not only to corroborate the assertion made by Schlösing, but to demonstrate also, that it is not the total amount of potash, but the potash found as a carbonate, which existed in the plant in combination with a vegetable acid, that is the constituent chiefly affecting the combustibility of a tobacco. The complete analyses of Nessler have shown that, although a tobacco may contain a great amount of potash, it does not necessarily follow that the tobacco burns well. He found that some German tobaccos contained more potash than Havana, although the latter burned much better than the former; and that

a great amount of potash did not always indicate a great amount of carbonate of potash. Although tobaccos yielding a great amount of carbonate of potash in their ash generally burn well, there may be conditions which neutralize the good effect of this combination, as a large proportion of albuminoids. It may therefore be said that the combustibility of a tobacco is improved in proportion as its ash yields more carbonate of potash, other conditions being equal.

Among the minor salts, the chlorides deserve most attention. It has been found that they generally retard the burning of tobacco, and that as they increase, carbonate of potash decreases. Lime is invariably found more or less in the ash, but it has not been ascertained to what extent its presence affects the quality of the tobacco; good tobacco may contain much or little, so that its presence is probably not of great importance. The same may be said of soda, magnesia, and phosphoric acid. According to Nessler, their proportions may vary thus:—Potash, 1.95–5 per cent.; lime, 6.5–9.2; soda, 0–1.63; magnesia, 0.12–0.99; phosphoric acid, 0.57–1.39.

In connection with the chemistry of tobacco, and the rational manuring of the crop, the name of Prof. S. W. Johnson, Chemist to the Connecticut State Board of Agriculture, must be placed in the foremost rank. Indebtedness is acknowledged to Prof. Johnson for a copy of his valuable report, quoted in the Bibliography at the end of this work.

In November, 1884, a paper was read by Dr. John Clark, on the composition of tobacco, before the Society

of Chemical Industry, which is sufficiently interesting to be quoted at length.

Dr. Clark remarks that the "tobacco plant is very extensively cultivated in various parts of the world, and after it has reached its maturity it is cut and dried on poles. When the plant is in proper condition, the leaves are stripped from the stalk, sorted and cured, by which means they are converted into the tobacco of commerce. The good leaves are called 'wrappers,' and the infirm or defective ones, which are separated from the others, are called 'mediums and fillers.' The term 'strips' is applied to tobacco leaves, from which 20 to 25 per cent. of the stem or midrib has been removed to suit the requirements of manufacturers in this country more especially. Tobacco is largely imported into the United Kingdom, partly in the manufactured state, but principally in the unmanufactured or leaf form.

"Through the kindness of a well-known firm of tobacco manufacturers, I have been furnished with authentic samples of the principal varieties of leaf tobacco, imported into this country, and the accompanying table gives the proportions of mineral matter or ash, alkaline salts, and sand, which these contain. For the sake of comparison the results are all stated in the dry tobacco, and in order to ensure greater accuracy, the analysis was, in each case, made with several leaves, which were separated into laminae and stem, and the whole of each incinerated. The difference in the composition of the laminae and the stem is very marked, especially as regards alkaline salts, and is of importance more especially to the snuff manufacturer.

COMPOSITION OF VARIOUS KINDS OF LEAF TOBACCO.

	Whole Leaf. Dried at 212° F., per cent.			Laminae. Dried at 212° F., per cent.			Stem. Dried at 212° F., per cent.		
	Ash.	Alk. Salt.	Sand.	Ash.	Alk. Salt.	Sand.	Ash.	Alk. Salt.	Sand.
U. S. Kentucky	19.11	6.84	2.57	18.93	5.43	3.06	21.69	13.51	.68
do.	18.50	6.68	1.82	15.50	2.77	2.39	26.07	16.68	.38
do.	25.99	9.69	3.51	24.88	6.70	4.17	29.36	20.01	1.10
do. Strips	15.73	4.31	2.61	15.57	4.07	2.71	16.95	6.35	1.37
U. S. Missouri..	20.96	5.07	4.63	20.46	2.62	5.27	22.61	12.72	1.90
do.	22.01	6.32	3.51	21.36	4.96	3.88	23.62	12.37	1.53
do.	18.88	4.81	2.61	17.18	2.88	3.21	22.17	10.68	.92
do.	18.36	4.60	3.44	17.05	2.50	4.07	22.39	11.10	1.49
U. S. N. Carolina	14.50	5.99	.63	12.98	3.92	.74	18.64	11.72	.23
Paraguay ..	30.80	8.15	12.32	31.07	6.37	14.41	30.37	14.78	4.91
Brazil—Carmen	20.54	7.81	.42	20.42	7.24	.46	20.86	9.37	.31
Holland ..	21.83	11.37	.13	20.16	8.99	.55	25.15	17.20	.12
Turkey—Cavallo	13.79	5.05	3.06	12.47	2.94	3.45	18.14	11.76	1.87
do. Latakia	19.50	7.19	.55	21.86	8.28	.72	15.44	7.73	.24
do. Samsoun	18.39	6.98	.49	17.59	5.32	.44	21.72	13.42	.60
Japan	15.67	6.86	.50	14.60	5.59	.54	19.84	11.55	.35
China	18.58	2.40	6.30	17.94	1.66	6.94	20.57	5.27	3.61
Havana	20.99	8.19	1.02	20.91	7.51	1.04	21.02	10.33	.92
Manilla	21.80	6.54	.14	21.25	5.49	.13	22.50	9.09	.14
German	22.27	3.76	1.79	22.12	2.78	1.87	23.13	4.63	1.39
Sumatra	18.61	7.20	.13	18.71	6.59	.09	18.14	9.11	.28

	Average of Whole Leaf, per cent.	Average of Laminae, per cent.	Average of Stem, per cent.
Ash or Inorganic	20·32	19·21	21·92
Alk. Salts	6·47	4·98	11·41
Sand	2·48	2·86	1·15

“The unmanufactured tobacco which is imported into this country, is converted into roll or spun tobacco, cut tobacco and cigars, and the refuse is used for making snuff. Roll tobacco is the staple manufacture in Scotland and Ireland, and cut tobacco the staple article in England.

“In the manufacture of roll tobacco, the leaves are moistened with water, spun into various sizes of twist, made up into rolls, and pressed. The liquid or juice which exudes under pressure is used as a sheep dip. Cut tobacco is made by moistening the leaves, cutting them into the desired size, and drying on plates. Sometimes it is made into cakes in the first instance, and afterwards cut.

“When we compare the composition of roll and cut tobaccos with that of the leaf from which they are made, we find that the difference lies almost entirely in the amount of moisture, and as manufacturers are not allowed to add anything but water and a little oil to tobacco, you will not err very much in assuming that as a rule the cheapest qualities of roll and cut tobaccos contain most water. Thus in 15 samples of the cheapest roll tobacco I found an average of 41·66 per cent. of water.

“The lowest qualities of cut tobacco, such as are

largely manufactured and consumed in England, contain as much water as the cheapest roll tobacco, whereas the finer qualities of cut tobacco contain as a rule from 14 to 22 per cent. Cigars, even the cheapest, are comparatively dry, and contain, as a rule, only from 10 to 12 per cent. of water.

“The difference in cheap cigars is due chiefly to the weight of the material, but also to the quality of the tobacco and the labour, machinery being used in the manufacture of the lower qualities, whereas the higher qualities are nearly all hand made.

“The large quantity of water contained in the cheapest tobacco, and which frequently amounts to about 50 per cent., is not, in my opinion, introduced to please the palate of the working man, but simply on account of the keen competition between rival manufacturers, and the low price at which tobacco is sold; and in the interest both of the working classes and of tobacco manufacturers themselves, I think it is very desirable that some limit should be placed to the amount of water which may be sold as tobacco.

“Snuff.—I stated that the refuse tobacco was employed in the manufacture of snuff. This refuse consists of stems, tobacco smalls, and sweepings. These are moistened with water, subjected to a process of fermentation, which lasts from about six weeks to two months, then ground, mixed with alkaline salts to preserve the snuff, and flavoured when desired. Nothing is allowed to be added to snuff except the carbonates, chlorides, and sulphates of potash and soda, and carbonate of ammonia. It is also provided by Act of Parliament that any snuff

found to contain, after being dried at 212° F., more than 26 per cent. of such salts, including those naturally in the tobacco, will be liable to forfeiture and a penalty of 50%. From my table of analyses you will observe that not only does the proportion of alkaline salts vary in different tobaccos, but the stem contains a much larger proportion than the leaf. On this account it is necessary that the snuff manufacturer should know the quantity of alkaline salts in his snuff material, in order to obtain an article of uniform composition. Some manufacturers go by rule of thumb, and in attempting to work close to the legal limit, they run a serious risk of unintentionally incurring the penalty. As a matter of fact, three samples of snuff, in 1883, were condemned by the Somerset House authorities because they contained an excessive proportion of alkaline salts, and the manufacturers were prosecuted. The more intelligent of the snuff manufacturers, however, analyse their snuff material, and are thus able to keep within the legal limit.

“The principal alkaline salts which are added to snuff are chloride of sodium or common salt, carbonate of potash, and carbonate of ammonia, all of which are allowed by Act of Parliament, and therefore no exception can be taken to their addition, so long as the total quantity does not exceed 26 per cent. in the dry snuff. In addition to alkaline salts, snuffs usually contain from 25 to 45 per cent. of water, with the exception of a kind of snuff called ‘High Toast or Irish Blackguard,’ which is very dry and contains from 5 to 8 per cent. Sometimes they also contain a considerable quantity of sand. In the several hundred samples of snuff which I have had occa-

sion to examine for different manufacturers the average quantity of sand was about 5 per cent. in the dry snuff, and sometimes fell as low as a half per cent., but in many samples the quantity exceeded 10 per cent., and in one case I found as much as 30·94 per cent. of sand in the dry snuff. The greater part of this sand is probably derived from the sweepings of tobacco, on which duty has been paid, and I have no doubt the snuff manufacturer considers himself justified in selling it as snuff. But it appears to me to be very desirable in the interest of snuffers, that some limit should be placed on the quantity of sand which may be sold as snuff: more especially as the particles of sand are frequently very sharp, and have a tendency to produce inflammation of the mucous membrane of the nose, and it is to this, probably, that we owe the popular notion that snuff is sometimes mixed with ground glass to give it additional piquancy.

“When from any cause snuff is spoiled, the manufacturer may export it, and obtain a drawback of 3s. 7d. per lb. on the real tobacco which it contains.

“The Government standard for tobacco is as follows:

					Per cent.
Organic matter	..	..	..	..	70·52
Inorganic	..	..	..	..	15·48
Water	..	..	..	..	14·00
					<hr/>
					100·00

“This is equal to 18 per cent. of ash or inorganic matter in the dry tobacco. This standard is in my opinion too high, as the average percentage of inorganic or ash in the dry leaf tobaccos which I have examined is

20·32, and the stem from which snuff is largely made contains still more. The result is that the tobacco manufacturer not only loses the value of the tobacco over and above the duty, but also a part of the duty which he has paid. This matter concerns the tobacco manufacturer alone, but I would point out that the authorities in Somerset House in fixing such a high standard for tobacco are benefiting the public at the expense of the manufacturer, whereas in the case of milk the low standard which they employ is a loss to the public and gain to the dishonest dealer."

CHAPTER VII.

ADULTERATIONS AND SUBSTITUTES.

It is said that in Thuringia, over 1000 tons yearly of dried beetroot-leaves are passed off as tobacco. These leaves, and those of chicory and cabbage, are similarly employed in Magdeburg and the Palatinate. Many of the *Vevey* cigars of S. Germany are entirely composed of cabbage- and beetroot-leaves which have been steeped in tobacco-water for a long time. Other leaves, such as rhubarb, dock, burdock, and coltsfoot are also used. These are all principally for cigars. For smoking-tobacco, chamomile flowers, exhausted in water, then dyed and sweetened with logwood and liquorice, and dried, have been mixed with tobacco in such proportions as 70-80 per cent. In America, a specially-prepared brown paper, saturated with the juice expressed from tobacco-stems and other refuse, is most extensively used, not only for the "wrappers" of cigars, but also for "filling." Various ground woods, starches, meals, and pigments are introduced into snuff.

A New York paper mentions that a great quantity of brown straw paper lately reached Havana, which was to be employed in the manufacture of Havana cigars. Straw paper impregnated with the juice of tobacco stalks is wound up with the leaf in such a way that it is often impossible to detect the adulteration. Dr. Jacobson, writing in the *Industrie Blätter*,

remarks that there is no difficulty in escaping detection, if the paper be specially prepared for the purpose out of suitable raw materials. It has long been known that cigar paper soaked in a solution of soluble glass gives forth no smell of paper on being burnt.

Patent No. 210,538, issued from the United States Patent Office, December 3, 1878, states the ingredients of a "substitute" to be—spikenard, red clover, hyssop, hops, slippery-elm bark, tarred rope, pennyroyal, mullein leaves, kinnikinic, wild cherry bark, and ginseng. This is an ingenious combination intended to approach in effect, appearance, and aroma, tobacco; and in so far it might be said to be a success: as mullein leaves are reputed to be feebly narcotic, hops are known to possess anodyne properties, clover and hyssop are pectoral in effect, and slippery-elm febrifuge. Ginseng is aromatic and pungent, and has a great reputation among the Chinese as a stimulant and restorative. The tarred rope, we presume, is intended to add to the pyrognostic value of the mixture. The great point in selecting material for the fabrication of a mixture of this description is to get leaves containing a fair percentage of nitrate of potass, as does tobacco; on this depends its pyrognostic value, and that, next to aroma, is everything.

"Tobacco, like those who smoke it, is credited with many sins of which it is guiltless. The 'loss of health' so often laid at its door is probably due in many instances not to tobacco itself, but to some villainous compound bearing its name. A story told by the principal of the laboratory of the Inland Revenue Department in his report for the past year shows how easily this may

happen. The supervisor at Birmingham, observing that an article was being sold at a very cheap rate in packets, under the name of 'smoking mixture,' sent a sample to the Inland Revenue laboratory for examination, and it being found to contain a large proportion of vegetable matter resembling the broken-up heads of camomile flowers, further inquiry led to the discovery of the manufactory. The process of manufacture consisted in exhausting the bitter principle of camomile flower-heads with water, and then dyeing and sweetening them with a solution of logwood and liquorice, which brought them, when dried, somewhat to the colour of tobacco. The heads, when broken up, were then mixed with from 20 to 30 per cent. of cut tobacco, according to the price at which the mixture was to be sold. The mixture was supplied to retailers in packets labelled 'The New Smoking Mixture, Analysed and Approved,' and as agencies had already been established in several towns, an extensive trade would no doubt soon have arisen had the manufactory not been suppressed at an early stage of its existence."

The United States Consul at Smyrna puts the following statement in his report of January 15, 1883.

Since the establishment of the tobacco monopoly in Turkey, snuff may be said to be one of the several articles that undergo the most unscrupulous adulteration. Owing to the high amount of duties imposed on tobacco by the Turkish Government, and the large profits licensed manufacturers expect to make on the same, the poorer classes cannot afford to use the products of doubtful purity coming from the factories, and so are altogether

at the mercy of the clandestine manufacturer and retailer, who, in order to make the most he can of his vile industry, adulterates his snuff to such an extent that it can be safely said that his products contain on an average from 60 to 70 per cent. of inferior Persian tobacco (tumbeki), fragments of country tobacco leaf, and tobacco of cigarettes picked up in the streets by beggars, the 30 to 40 per cent. consisting of walnut sawdust, terra umbra, fine sifted sand, and scum of lead (lead oxide), covered with inferior black writing-ink.

The snuff is manufactured in Smyrna, as follows :

The conscientious manufacturer uses Persian hookah tobacco (tumbeki) and the fragments of country tobacco leaf coloured with black ink. These tobaccos, ground as fine as possible and mixed with grape molasses, are put in a covered barrel to ferment. Two or three days later the snuff is taken out and spread in the sun to dry partly, and then rubbed with the hands and passed through iron wire sieves to be granulated.

The product is afterwards scented with powdered orris root, tonka beans, and geranium oil ; the superior qualities are scented with essences of roses and jessamine and put up in packages.

The adulterated article is manufactured in the same manner with the addition of the above-named substances.

The only persons using genuine snuff in this city are the Catholic priests, who import it directly from France, Italy, Spain and Holland, and enjoy the privilege of paying no custom-house duties.

CHAPTER VIII.

IMPORTS, DUTIES, VALUES, AND CONSUMPTION.

A COMPARISON of the taxation of the chief nations of the world for the consumption of tobacco has been published in the *Imperial Statistics of Germany*. Of the countries where the sale is a Government monopoly, France last year stood first, the gross duty, with profits, amounting to 7s. 1½d. per head of the population annually, the net revenue from the article being 5s. 8¼d. per head. In Austria the gross was 5s. 5¾d., the net, 3s. 5d.; in Hungary, the gross 3s. 3½d., the net 1s. 7d.; in Italy, the gross 3s. 11d., and the net 2s. 8¼d. In Great Britain, the duty and licenses brought in 4s. 10¾d. per head of the population for the year, and in the United States 4s. 4½d. In Germany, on the other hand, where the duty was very light, the average was no more than 7¾d. per head of the population.

The duties on unmanufactured tobacco are 3s. 6d. a lb. when it contains 10 per cent. or more of moisture; 3s. 10d. a lb. when it contains less than 10 per cent. of moisture. Snuff containing no more than 13 per cent. of moisture, 4s. 10d. a lb.; 13 per cent. and upwards, 4s. 1d. a lb. Cigars pay 5s. 6d. a lb. Cavendish of foreign manufacture pays 4s. 10d. a lb.; that manufactured in bond, 4s. 4d. Other sorts, including cigarettes, pay 4s. 4d. a lb.

The approximate relative values in the London market are as follows:—Maryland, fine yellow, fine, and good