Persia. Teymbeki is smoked in a special apparatus known as the narghileh.* The apparatus is found in every coffee-house and even in a great number of private houses. It resembles somewhat the wash bottle used in laboratories for washing filters with distilled water, but is often made of metal. The teymbeki is placed in a small reservoir on the top of the flask and burns in contact with a piece of incandescent charcoal. The vapour is drawn through the tube, which passes to the bottom of the water and collects above it, whence it is inhaled through the longer tube.† It is in fact a water-pipe.'

"Having ascertained then that tumbeki was a species of tobacco, I sought for further confirmation of the statement that it is the produce of *N. persica*, and wrote on the subject to Professor Hausknecht, who is well known as one of the best authorities on the botany of Persia. He kindly replied as follows:—

"'Tumbeki is the produce of *Nicotiana rustica*, and is almost exclusively used for the water-pipes called kalian or narghileh. The plant is cultivated throughout the whole of Persia, especially in Ispahan and Shiraz, whence the best kind comes.'

"But the statement of M. Zanni that tumbeki contains more alkaloid than tobacco, and that of Professor Hausknecht that tumbeki is the produce of *N. rustica*, seemed to conflict with the statements in books that *N. rustica* is less active than *N. Tabacum*.

* So called from its resemblance in shape to a *narghil* or coconut.

† A full and interesting account of the forms and uses of the varieties of the kalian and narghileh is given in the 'Land of the Lion and the Sun,' p. 29.

"In the 'Commercial Report,' No. 25, 1883, p. 1056, under 'Smyrna,' Consul Dennis confirms M. Zanni's statement concerning tumbeki. He says:—'It is much stronger than ordinary tobacco, and cannot be smoked in the usual way, therefore it is exclusively used for the narghili.' He also adds that a large quantity is consumed in the district of Smyrna, but much is also re-exported to Egypt and other parts of Turkey. It is imported from Persia, both through Trebizonde and Bushire on the Persian Gulf.

"Mr. J. B. Fraser, in his work on Persia (1826), remarks, 'The tobacco smoked in the kalian is called tumbaku in distinction to tootoon, or that smoked in pipes or cigarettes. It is sold in the leaf, which is packed dry in layers, and is preserved in bags sewn up in raw hide. It improves by age, but is quite unsmokable the first year. The best comes from Jaroum, south of Shiraz.'

"In an interesting article in 'Harper's Magazine' (January 1886, p. 224) on the 'Domestic and Court Customs of Persia,' the writer remarks concerning tumbeki:—'The kaliân or water pipe differs from the Turkish narghileh by having a short straight stem. In it is smoked the tobacco called tumbakee—a species grown only in Persia. That of Shiraz is very delicate in flavour and is the best. The tumbakee must be first soaked in water and squeezed like a sponge or it will cause vertigo. A live coal, made from the root of the vine, is placed on the tobacco, and the smoke is drawn through the water with a gentle inhaling, depositing the oil in its passage through the water.'

"In De Candolle's 'Prodromus,' vol. xii., pt. 1, p. 567,

it is stated under *Nicotiana persica*, that it yields the celebrated tobacco of Shiraz. This species closely resembles *N. Tabacum* in the form of its leaves, which are, however, rather acute than acuminate; but the flowers are different both in shape and colour. In *N. Tabacum* the stem leaves are sessile, and the corolla is funnel-shaped or inflated below the limb, and is of a pinkish-red colour; in *N. persica*, the tube of the corolla is club-shaped and the limb more spreading; the colour is white inside and greenish outside. When in blossom, therefore, the two plants are easily distinguished. *N. rustica*, on the other hand, has *stalked* cordate leaves and a short yellowish corolla, with the tube and limb both short.

"The leaves of tumbeki which I have received from Trebizonde and Constantinople both correspond with *N. persica* in character, but not with *N. rustica*, since they have no trace of a petiole. So far as it is possible to ascertain therefore, in the absence of flowers, the weight of evidence is in favour of tumbeki being the produce of *N. persica*. In order to ascertain the correctness of the statement that tumbeki is stronger than tobacco, I handed some specimen to Messrs. E. J. Eastes and W. H. Ince for chemical examination, which they kindly undertook at my request."

Following is the report of these gentlemen on the chemistry of the subject:—

"Four samples of tumbeki were brought under our notice by Mr. Holmes, Curator of the Museum of the Pharmaceutical Society, being of interest on account of their reported greater strength in nicotine as compared with tobacco. The following are the results of our in-

vestigations. We may state that so far as we have been able to ascertain no previous researches have been undertaken on the subject.

"Preliminary Examination.—The presence of an alkaloid was demonstrated on the addition of the usual reagents to the acid infusion.

"Isolation of Alkaloid for Physical Examination.—The powdered tumbeki was placed in a retort with milk of lime and steam passed through it till the distillate was no longer alkaline. Alkaloid in abundance was found in the distillate, which had a distinct odour of nicotine. The distillate was then extracted with ether, and the ether slowly driven off. The residue obtained was a light straw coloured oily liquid of powerful odour, giving off irritating fumes when heated.

"Estimation of Nicotine.—In the estimation of nicotine much difficulty was experienced, owing to imperfect knowledge of the alkaloid, and to the imperfect methods recommended in various papers on the subject. The only method we found reliable was by using a standard solution of Mayer's reagent, obtained by mixing 13·546 grams of mercuric chloride in solution with 49·8 grams of potassic iodide, in solution, and adding water to make 1 litre.* One c.c. of this solution represents ·003945 grams of nicotine, the precipitate having the formula $C_{10}H_{16}N_2I_2.HgI_2$.

"The method we adopted of working with this solution was as follows:—One or more grams of dried and powdered tumbeki were treated with diluted sulphuric

* Dragendorff, 'Chemische Werthbestimmung starkwirkender Droguen,' § 63, p. 52 *et seq.*

acid (2·5 per cent.) for several hours on a water-bath, filtered, and the leaves washed with hot 1 per cent. acid till the filtrate was colourless.

"The filtrate was then either evaporated to a low bulk and extracted with alcohol, to get rid of albuminous matters which interfered with the reaction, or neutralized with sodic hydrate and the alkaloid extracted with chloroform, the chloroformic solution being shaken with diluted sulphuric acid as in the ordinary methods of alkaloid extraction.

"The objection to the first method is that the alcohol has to be driven off before the Mayer's reagent can be added, which is troublesome and lengthens the process.

"The solution of the alkaloid in excess of sulphuric acid having been obtained, Mayer's reagent was carefully added till no more precipitation was observed, the end of the reaction being ascertained when on filtering some of the nicotine solution into a watch-glass and adding a drop of the reagent, no precipitate was formed. With careful manipulation concordant results were obtained.

"Other methods tried were as follows:

"Volumetric method.—Ten or more grams of powdered tumbeki were distilled with a solution of sodic or potassic hydrate, the distillate being passed into a known volume of decinormal standard solution of sulphuric acid, and the amount of acid neutralized by the nicotine was determined by a standard decinormal solution of soda and the nicotine calculated.

"By this method the results obtained were invariably too high owing to an appreciable quantity of ammonium

salts contained in the leaves. Dr. Kissling * has also noticed the high percentages obtained by this method of estimating nicotine.

"Kosutány treats the leaves with milk of lime till all the ammonia is driven off, and then extracts with water; shakes the aqueous solution with petroleum ether and proceeds as before.

"This method was not found to give good results, for though the ammonium salts do not interfere with the reaction, yet the petroleum ether does not extract the whole of the alkaloid, and thus a low percentage is obtained.

"Extraction by Ammoniacal Ether.—This consists in extracting the powdered leaves in an upright extractor, by an ethereal solution of ammonia, and either driving off the ether and weighing the residue as nicotine; or volumetrically estimating the residue by decinormal solution of sulphuric acid, or precipitating the alkaloid by platinum perchloride. In either case, whichever way the residue is estimated, the results are too high, owing to the difficulty of entirely getting rid of the ammonia.

"The following are the percentages of nicotine in the tumbeki:—

'*Ispahan.*'—I. By Mayer's Reagent.

A. (midrib)	8·156	per cent.
B. (leaf)	5·508	" "
C. (leaf and midrib)	5·589	" "
D. (leaf)	5·3865	" "
	5·4945	per cent. average.

* The 'Analyst,' January 1886, p. 16; 'Chem. Zeit.,' ix., 1886.

II. By Volumetric Method.

By working on 10 grams = 7·2 per cent.
By working on 50 grams = 7;228 „ „

'*Hidjaz.*'—I. By Mayer's Reagent.

A. (leaf and midrib)	2·025	per cent.
B. (leaf and midrib)	2·268	„ „
C. (leaf and midrib)	2·028	„ „
D. (leaf and midrib)	1·863	„ „
	2·046	per cent. average.

II. By Volumetric Process.

A. .. .. 2·37 per cent.

III. By Ethereal Solution of Ammonia.

3·6 per cent.

'*Kechan.*'—By Mayer's Solution.

A. (leaf and midrib)	2·835	per cent.
B. (leaf and midrib)	3·0375	„ „
C. (leaf and midrib)	2·85525	„ „
	2·90925	per cent. average.

'*Shiraz.*'—By Mayer's Solution.

A. (leaf and midrib)	5·8725	per cent.
B. (leaf and midrib)	5·7975	„ „
	5·835	per cent. average.

"Estimation of Saccharoid Matter; calculated as cane sugar.—The fermentation process was the one adopted, not that we consider it by any means a good one, but because it was the only one practicable. Fehling's solution was inadmissible, owing to the precipitation of colouring and other matters, and the polariscope gave no

indication. The objections to the fermentation process are due to the small amount of alcohol produced in the relatively large bulk of liquid. This renders the solution liable to acetification, and the ultimate distillate obtained is very weak in spirit, making it extremely difficult to obtain the correct specific gravity; the specific gravities obtained were always between ·998 and unity.

"We worked as follows:—200 grains of dried tumbeki were exhausted by repeated infusion in boiling water. The filtered liquid when cool was mixed with 100 grains of German yeast and allowed to stand three days in a warm place to ferment.

"About one-third was then distilled, the distillate being redistilled and three successive fractions of 500 fluid grains collected, the alcohol in each being estimated; the third portion contained little if any spirit.

"It being stated that basic acetate of lead removes saccharoid matter from the kindred plant tobacco; we tried its action on the infusion of tumbeki.

"At the onset it was found impossible to thoroughly wash the bulky precipitate caused by the lead; so, to ensure a definite result, sufficient basic acetate of lead was added to the infusion of 200 grains of tumbeki and the whole made up to 30 fluid ounces with distilled water and well mixed. An aliquot part (20 fluid ounces) was then filtered off, excess of lead removed by sulphuretted hydrogen, the sulphide filtered out, the solution boiled to drive off the sulphuretted hydrogen and the infusion, when cool, was fermented in the usual way. But acetic acid was necessarily present from the decomposition of the lead salt by the sulphuretted hydrogen, and this on

distilling would tend to raise the specific gravity. To remedy this, slaked lime, or preferably potassic hydrate, was added before redistilling, but considering that from one to three per cent. of ammoniacal salt is contained in the original tumbeki, it is probable that some might still remain and by the action of the fixed alkali furnish a trace of free ammonia which would lower the specific gravity, and thus apparently raise the percentage of alcohol. As far as we can judge basic acetate of lead does not seem to remove fermentable matter from infusion of tumbeki.

	I.		II.	
		Pb treatment.		Pb treatment.
Ispahan ..	2·64	2·67	—	2·35
Hidjaz ..	3·00	2·8	2·7	—
Kechan ..	5·58	5·33	—	—
Shiraz ..	3·48	3·88	3·23	3·1

"Ash.—The following bases and acids were uniformly found in the ashes:—Sodium, potassium, lithium, magnesium, calcium, iron, aluminium, silica, chlorine, phosphoric acid, sulphuric acid, carbonic acid.

General Table of Results.

	Ispahan.	Hidjaz.	Kechan.	Shiraz.
Nicotine	5·4945	2·046	2·909	5·835
Saccharoid matter	2·64	2·85	5·58	3·355
Saccharoid matter after Pb treatment	2·51	2·80	5·33	3·49
Soluble in water	42·0	42·3	39·9	55·6
Insoluble in water	58·0	57·7	60·1	44·4
Ash	22·0	28·5	28·5	26·15

"The foregoing work has been carried out in the laboratories of the Pharmaceutical Society."

Philippines.—The soil and climate of the Philippines are eminently suited to tobacco culture; but the unjust Spanish monopoly cripples the industry, and it is declining. Next to the Cuban (Vuelta abajo) and a few prime Turkish sorts, Manilla tobacco is admitted to be the best. Most of the Philippines produce it. According to the quality of the produce, the provinces rank as follows:—(1) Cayagan and Ysabel, (2) Ygorrotes, (3) Island of Mindanáo, (4) Bisayas, (5) New Ecija. On the average, over 400 million cigars, and a quantity of tobacco sufficient to bring up the total weight to 56,000 cwt., are annually exported. The advantage of the plantations in Cayagan lies in the annual deposit of alluvial matters by the overflowing of the large streams. The cultivation in Bisayas promises to become extinct, whereas if the natives were free to sell in the best market, the industry would increase immensely. The yield of the Cebu district in 1878 was 8780 *quintals*, the whole of which went to the cigar factories of Cadiz and Alicante. The exports from Manilla were:—in 1877 17,526,700 lb. tobacco, value 525,801*l.*; 87,007,000 cigars, value 243,619*l.*; 1878, 15,630,400 lb. tobacco, value 468,918*l.*; 136,835,000 cigars, value 383,136*l.*; 1879, 9971 *quintals* (of 101½ lb.) tobacco leaf to Great Britain, and 74,490 *quintals* to Spain; cigars, 10,571,000 to Great Britain, 6,557,000 to Australia, 44,586,000 to the Straits Settlements and India, 25,861,000 to China and Japan, 693,000 to the United States, 100,000 to California, 1,521,000 to Spain and the Continent; the total values

amounted to 480,263*l.* The exports of tobacco from Yloilo were 25,454 *piculs* (of 133⅓ lb.) in 1878, and 20,600 *quintals* (of 101½ lb.) in 1879, all to Spain.

Roumania.—Tobacco was extensively cultivated at one time, with success, near Macin and in other parts; but the monopoly has greatly affected the condition of the industry.

Russia.—As regards the production of tobacco, Russia ranks second among continental countries, but the consumption is less per head than in other lands. Consul Stanton says that smoking began in the latter part of the sixteenth century, and the habit steadily increased, notwithstanding the fact that it was punished by the knout, slitting of the nostrils, and banishment to Siberia. It is most extensively cultivated in Tshernigoff, Poltava, Bessarabia, and Samara. In Poland, the production is not large, and is mainly confined to the vicinity of Warsaw. It is chiefly cultivated by the peasants and is often their only occupation.

In 1883, Riga exported 70,722 *pouds* of leaf tobacco, valued at 194,486 *rubles.* Sevastopol shipped 59 *pouds*, value 1100 *rubles.* Tobacco is now cultivated largely in all parts of the Crimea, and is likely to become an export of considerable importance. In Taganrof plantations are on the increase, and the culture promises well.

San Salvador.—The exports of tobacco in 1884 were 16,113 dollars' worth of leaf, 5898 dollars' worth of manufactured, and 826 dollars' worth of other sorts.

Servia.—It is estimated that there are 4000 acres under tobacco culture in Servia.

Spain.—The port of Cadiz is a great centre of the

tobacco industry. The imports here in 1878 were:—123 *kilo.* from Germany, 304,538 *kilo.* from the United States, and 6,776,900 *kilo.* from Spanish colonies; the exports were 15,600 *kilo.* to Germany, and 213,846 *kilo.* to France. Corunna exported 58,280 *kilo.*, value 87,420 *pesetas*, in 1884. Cadiz exported 514,817 *kilo.*, value 2,574,085 *pesetas*, in the same year.

Sumatra.—This great island is assuming a first-rate importance in the tobacco industry.

The year 1883 was an exceptionally favourable one, as the harvest in Sumatra was very good, while prices for Java tobacco were higher than of late years, in consequence of the short harvest of 1882.

Large quantities of Sumatra tobacco found buyers in the United States, in consequence of the protectionist measure introduced in that country in favour of the home tobacco producers. The duty was raised from 35 c. to 75 c. per lb. on and after the 1st July, 1883, and great efforts were made to import as much as possible at the lower duty before that date.

The principal owners of the plantations are Dutchmen, and the labour employed is Chinese coolies, brought to the island principally from the Malaya peninsula. The crop, according to one of these successful planters, is scarcely ever reared two years in succession on the same lands. The jungle is first cleared, and then the seed planted. After the first crop of tobacco is gathered, it is the next season used for rice, or something else, and tobacco is not planted again until the sixth or seventh year after the jungle is cleared. By adopting this method, a better result is obtained.

The drying-house is thus described by a recent visitor to the island:—

"The interior is very much like a rick-yard, with tobacco stalks instead of hay-ricks, among which a perfect army of half-clad Chinese coolies, 400 strong, are hard at work sorting, ranging and stowing. So overpoweringly strong is the scent of the half-dried tobacco leaves that a smoker would have nothing to do but to take in an empty pipe with him and enjoy a good hard smoke gratis, merely by inhaling the air through it. But the Chinamen, whether habituated to it by long use, or fortified against it by the superior power of opium, breathe this perfumed atmosphere as easily as if it were the purest air of the sea. 'That is how we measure the heat, you see,' says our host, calling our attention to the hollow bamboos thrust through the heart of each stack, with a stick inside it, which, when pulled out, is almost too hot to touch. 'It must never be above or below a certain point, you know. Instead of stripping off the leaves at once, we hang up the whole plant to dry, and do not strip it till it is quite dried. The Sumatra tobacco, however, will not do for cigars. It is only used for what we call the 'deckblatt' (cover leaf), which covers the outside of the cigar.'"

Consul Kennedy reports that "the main cause of the prosperity in Deli is the tobacco, the first crop of which was shipped in 1869.

"The crop for 1884 will turn out about 122,000 bales, valued at 2,080,000*l*.

"The accompanying table shows the export during the last 11 years:—

Year.	Bales.	Value.
		£
1873	9,238	208,333
1874	12,811	250,000
1875	15,147	291,666
1876	28,947	520,833
1877	36,167	541,666
1878	48,155	750,000
1879	57,544	875,000
1880	64,965	937,500
1881	82,356	1,187,500
1882	102,032	1,750,000
1883	92,000 [Estimated.]	1,583,333

NOTE.—One bale equals 176 English lb.

"Prices for Deli tobacco have ruled on the whole fairly high, the special quality of the leaf lying in the fact of its being light and elastic in texture, with thin fibres, so that it is admirably adapted to serve as cover-leaf, and as such is a good substitute for Havana tobacco. As a smoking-tobacco it lacks flavour. There is a pretty general concurrence of opinion that the seed of the Deli tobacco was indigenous, and obtained from Batak tribes in the interior; and although many experiments have been made with seeds from Java, Manilla, and other places, the planters have invariably come back to the original seed, finding that the new kinds develop a coarseness of leaf attributed to the extraordinary richness of the virgin soil, a soil partly alluvial and partly volcanic, but covered throughout with dense forests.

"The tobacco estates consist of grants of land taken out by individuals or companies, and are as a rule of such an extent that every year a new district can be cleared and

used for the coming crop, and this state of things will continue for many years to come; indeed, hitherto only a small portion of the ground cultivated (not one-fifth) has borne two crops, although it is expected that, unless fresh ground is taken up by the planters, a time will arrive when use must be made of old fallow lands, and then guano will be required.

"The planters consist of three or four large companies, principally Dutch—such as the Deli Company, the Amsterdam Deli, and the Batavia Deli—as well as of individual planters of many nationalities, Germany and Switzerland being strongly represented, while there are also a good sprinkling of Englishmen, the principal English firm being the Langkat Plantations Company, with its headquarters in London.

"The grants of land are taken direct from the chiefs before mentioned, and are only valid after confirmation at Bengkalis. The term is for 75 years, and for such a grant a sum of money, by way of premium, amounting to from 1 dol. to 2 dol. per bouw (equal to an acre and two-thirds), is paid in cash, while an annual rent of 40 c. a bouw, payable at the expiration of the fifth year, is also reserved. Such at least are the terms of the last recognised agreements. The whole of the conveniently-situated land in the three districts before-mentioned has now been taken up, and it is only in the outlying regions that fresh ground can be obtained; but as in such outlying regions settled government is not so well established, the Dutch authorities are now very chary in confirming grants in places where the tobacco-growing community would be less under control.