PITCH COAL IN COOS

It Is Associated With the Coal Mined on the Bay.

PROBABLY RELATED TO ASPHALT

Has a Foliated Structure and Readily Splits Into Plates—Yields a Smoky Flame.

Associated with the coal that is mined at several points in the Coos bay coal field is a coaly substance generally known in that region as pitch coal. It was observed and samples were collected by a party of the United States geological survey at two localities—Ferrey's mine, at Riverton, and the Newport mine, at Libby—but it has been reported from other places. These two occurrences are about 12 miles apart, and associated with different beds of coal in different basins. The coal is so crushed that its relation to the pitch coal could not be clearly made out, but the pitch coal appears to occur as irregular masses, veins or partings in the coal, varying from two inches to three feet in thickness.

The principal occurrence is in the Newport mine, where it is not uncommon. The best specimens were collected from a small vertical seam, which passes directly through both benches of coal as well as the mining and cap rock. The seam, or rather vein, is about two inches in diameter, with well marked sides, sharply defined against the coal and associated rock. Its mode of occurrence is therefore in strong contrast with that of the lignite, and suggests that it is related to asphalt rather than coal, for the latter very frequently occurs in tissues.

The pitch coal has a dark-brown color with brown streak and lighter brown powder. It is rather soft and very brittle, with irregular, angular fracture. One of its common physical feature is a foliated structure, by reason of which it splits into small, thin plates. This structure in the best specimen that has been examined is perpendicular to the walls of the vein. It readily ignites from a match, melts with strong intumescence, and yields a very smoky flame. This easy ignition, fusion and combustion again suggests that pitch coal is related rather to asphalt than to coal. It is evident that if the pitch coal is an asphalt it belongs to a group of compounds of which petroleum is a member, and may be more closely related to petroleum than to coal in origin. To discover more fully the chemical nature of the pitch coal and its relation to the Newport coal, samples of both were referred by J. S. Diller, of the United States geological survey, to Professor William C. Day for special chemical investigation, and his report follows. His investigation shows conclusively that the pitch coal is an asphalt, and that its origin is independent of that of the coal with which it is associated.

The occurrence of asphalt in the oil regions of California is not uncommon, and its genetic relation is a matter of much interest. Professor I. C. White, state geologist of West Virginia, who is one of the highest authorities in this country on coal, oil and gas, calls attention to a deposite of grahamite in Ritchie county, W. Va., described by Professor William M. Fontaine and lately by himself. It fills a fissure three feet wide, and was once extensively mined for use in manufacturing gas. The elementary composition of this West Virginia asphalt as given by Fontaine and that of the pitch coal as reported by Day are shown in the accompanying table, where they are seen to be quite closely related:

ASPHALT.	Carbon, per cent.	Hydrogen, per cent.	Oxygen, per cent.	Ash, per cent.	Nitrogen, per cent.	Sulphur, per cent.
West Virginia	76.45	7.83	13.46	2.26	Tr.	Tr.
Oregon	72.17	7.90	14.61	4.30	0.58	0.52

The special interest growing out of this similarity is to be found in Professor White's theory of the origin of the West Virginia asphalt. He says, in a letter to Mr. Diller, dated February 14, 1898:

"It is simply the residuum of petroleum. The fissure extends down through underlying oil sands, and when the crack was opened petroleum oozed up and the tarry matters in solution finally plugged up the exit, just as they will do in an oil well if not interfered with by the torpedo man. The fissure has been traced for over a mile and runs about N. 13 deg. W., being at right angles to the great volcano anticline which extends through that region, and the upthrust of the latter evidently caused the rent."

The proof of the correctness of Professor White's view is found in the fact that "a great deposit of petroleum has lately been developed in the immediate vicinity of the fissure and 1800 feet under the surface." While the presence of pitch coal in Oregon contains interesting suggestions with reference to the occurrence of petroleum, too little is yet known of the facts to warrant any predictions.

Coal and Pitch Coal.

Mr. Day has this to say of the coal and pitch coal of the Newport mine:

"The questions at issue are: First, is the pitch coal a variety of asphaltum? Second, was it derived in any way from the coal or is its origin different from that of the coal? And, if the latter, is not the presence of material of the nature of petroleum or allied substance indicated as the original mother substance from which the pitch coal was formed?

"Briefly stated, my conclusions are that the pitch coal is a variety of asphaltum, and that it has not been formed from the coal alone with which it is associated, although vegetable material similar to that which yields coal may have formed some of the original material which, by a process of distillation, was converted into the pitch coal. From the nitrogenous bodies which I have found in the pitch coal I judge that animal matter has been in part, if not entirely, the source of the pitch coal. In short, the pitch coal has in all likelihood been formed in the same general way, as other asphalts in California which are believed to have been the result of the distillation of animal and vegetable remains in presence of hot water or steam. This is the view entertained by Professor S. F. Peckham, who has studied the petroleums and asphalts of California in much greater detail than any other investigator. Peckham's views are summed up in the following quotation from a paper by him on the nature and origin of petroleum:

The circumstances of my life have brought me into personal contact with deposits of bitumen over a very wide area and under such conditions as have afforded me very unusual opportunities for a careful study of all the phenomena attending the appearance of bitumen at the surface of the earth, the result of which has been to confirm the opinion that I have heretofore expressed—that, in the majority of instances, bitumens, from natural gas to asphaltum, are, where we now find them, distillates.

"I believe, then, fully that the pitch coal and the associated coal are perfectly independent of each other and are of entirely different origin, the pitch coal being formed by methods ascribed to the asphalts, while the coal is formed from wood, according to the generally accepted views of the formation of coal.

"There are various theories in regard to the origin of petroleum, natural gas, and the asphalts, but it is not necessary to discuss those theories here, the questions being, rather, whether the pitch coal is an asphalt, and whether it could have been formed in situ from the coal.

"The facts considered in drawing conclusions include analytical data pertaining to the pitch coal and the coal, results of experiments upon the distillation products of both, comparisons with similar products obtained by the distillation of gilsonite, and finally the action of a number of solvents which are customarily employed in investigations and analyses of the asphalts generally."

Appended are analytical data pertaining to pitch coal and associated coal of the Newport mine. For the elementary analysis the specimens were dried at 105 deg. C. for two hours:

	Per cent. Pitch coal.	Per cent. Coal.
Carbon	72.17	58.54
Hydrogen	7.90	5.03
Nitrogen	0.58	1.13
Sulphur	0.52	0.82
Ash	4.30	6.38
Oxygen	14.61	29.23

Determinations of moisture, volatile matter, fixed carbon and ash:

	Per cent. Pitch coal.	Per cent. Coal.
Moisture at 105° C., 1 hour	2.24	10.71
Volatile matter	83.69	44.48
Fixed carbon	11.41	39.02
Ash	2.66	5.79

The percentage of ash in the asphalt varies somewhat from one sample to another; different samples also vary slightly in color when powdered. The ash of the coal appears to be constant in all samples so far as examined.

The following analyses made by W. F. Hillebrand are inserted here for comparison:

	—Per cent— No. 1.	No. 2.	No. 3.
Moisture at 105° C., 1 hour	2.000	2.080	11.220
Moisture over H_2SO_4 in vacuo, 48 hours	2.010	2.020	12.920
Volatile combustible, less moisture in vacuo	83.880	82.910	44.310
Fixed carbon, less ash	12.060	10.450	36.770
Ash	2.050	4.620	6.000
Sulphur	0.620	1.000	1.960
Phosphorus	0.002	0.006	1.310

The coke of the pitch coals (1 and 2) was in hard, black lumps, adhering to the crucible, while that of the coal (3) was loose sandy. The ash of both pitch coals and coal was nearly white.

No. 1 is pitch coal from Newport mine.

No. 2 is pitch coal from Ferrey's mine at Riverton.

No. 3 is coal from Ferrey's mine at Riverton.

Determinations of silica, iron and alumina in ash:

	Per cent. Pitch coal.	Per cent. Coal.
Silica, SiO_2	33.39	16.92
Ferric oxide, Fe_2O_3	4.26	11.63
Alumina, Al_2O_3	7.72	11.79

Determinations of solubility in carbon bisulphide, ordinary ether and petroleum ether:

	Per cent. Pitch coal.	Per cent. Coal.
Carbon bisulphide—		
Insoluble	36.45	Nearly all
Soluble	63.55	Trace
Ordinary ether—		
Insoluble	34.21	Nearly all
Soluble	65.79	Trace
Petroleum ether—		
Insoluble	89.34	All
Soluble	10.66	None

Consideration of Analytical Results.

"An inspection of the figures obtained as the result of elementary analysis of pitch coal and coal shows marked differences in the percentages of carbon and of oxygen, the pitch coal being much higher in carbon and lower in oxygen than the coal. The percentages of ash do not differ greatly in the two, but, as is evident from the analyses of the two ashes, there is a very marked difference in their composition as well as in their appearance.

"In the quantity of moisture given off at 105 deg. C. a much larger proportion is evident for the coal than for the pitch coal, while under strong heat the latter gives off a much higher percentage of volatile matter than the former.

"The figures of the elementary analysis of pitch coal do not resemble those of the analysis of any one of 65 different coals considered in Dana's 'Mineralogy.' Comparing the same figures with those of asphalt analyses, however, they do agree fairly well with those of asphalt from Auvergne, which are as follows:

	Per cent. Asphalt.	Per cent. Pitch coal.
Carbon	77.64	72.17
Hydrogen	7.86	7.90
Oxygen	8.35	14.61
Nitrogen	1.02	0.50
Ash	5.13	4.30

"Most of the recorded analyses of asphalts are open to question, and there is much need of revision.

"The figures for the Oregon coal agree fairly well with those of a brown coal from Meissen, Saxony, as follows:

	—Per cent— Meissen coal.	Oregon coal.
Carbon	58.90	58.54
Hydrogen	5.36	5.03
Oxygen	21.63	29.23
Ash	7.50	6.38

"I have been unable to find any analysis of an asphalt which bears any resemblance to the analysis of the coal just given; the percentages of carbon in asphalts are always much higher than 58.

"When I first observed the ashes of the pitch coal and the coal, I was much impressed with their different color, and the presence in the pitch coal ash of sharp, angular particles which were entirely absent in the ash from the coal. The color of the pitch coal ash was nearly white, while that of the coal ash was brown, indicating a larger percentage of oxide of iron. These observations led me to make determinations of silica, iron and aluminum in the two ashes. Comparing the results obtained, it is evident that the percentage of silica in the pitch coal (33.69) is just about twice the amount present in the coal (16.92); on the other hand, the figures for the combined oxides of iron and aluminum in the coal ash are about twice those obtained for the pitch coal ash. The two materials, then, so far as ash can serve to indicate, are not of the same origin, since we should hardly expect such marked difference in mineral constituents if the pitch coal had been formed from the coal or from the woody matter which seems to have given rise to the coal. I am inclined to give considerable weight to the evidence furnished by this comparison of the two ashes.

"A most marked difference appears between pitch coal and the associated coal when we consider the action of the solvents carbon disulphide, ether, and petroleum ether or naphtha. The coal, as would be expected, is almost entirely insoluble in the liquids named, while the pitch coal dissolves to a greater or less extent in all three, 63.55 per cent being soluble in carbon disulphide, 65.79 per cent in ether and 10.66 per cent in petroleum ether. In short, so far as the action of solvents is concerned, the pitch coal acts like an asphalt, while the coal shows no such conduct.

Products of Dry Distillation.

"A quantity of pitch coal was placed in a hard glass retort and heated. It very soon melted, forming a thick, black liquid, which promptly gave off moisture, accompanied by a dense white smoke. Soon afterwards, oil was noticed condensing in the upper part of the retort and running back to the heated liquid. The dripping of oil into the receiver soon began; it was at first dark and turbid looking and mixed with a small amount of moisture. After a time the color became lighter and took on a greenish cast; later still, and toward the end of the distillation, it became dark red and so viscous that it would hardly flow.

"The general conduct of pitch coal in distilling is very similar to that of gilsonite under the same treatment, except that 'foaming' takes place in distilling gilsonite, while pitch coal shows very little tendency to foam in distillation, which is regular and uniform throughout. The odor of the oil from pitch coal is of the same character as, but not identical with, that from gilsonite. As in the case of gilsonite, ammonia was quite freely evolved toward the end of the distillation, as shown by strong odor and immediate action upon wet litmus paper. The distilled oil was next subjected to distillation with steam; i. e., it was put into a flask with water, and the latter was boiled, and the steam and volatile oil were condensed in an ordinary Liebig's condenser.

"The oil thus volatilized came over with the steam as a yellowish-green oil floating on the surface of the condensed water. After a time the oil becomes darker in color. The volatilization of oil with steam after a time comes to a definite and rather abrupt end, leaving undistilled a dark, rather viscous, and tarry liquid of disagreeable odor floating on the water in the distilling flask.

"The conduct of this oil in distilling with steam is identical with that of oil from gilsonite when similarly distilled with steam, except that the odors are different enough to distinguish one kind from the other, although they are of the same character.

"On shaking the oil, volatile with steam, with dilute sulphuric acid, the latter acquires, on settling off, a flesh-colored tint, showing that something has been dissolved; neutralization of this acid with an alkali (potassium hydroxide solution) gives at once a light, nearly white precipitate, which is again readily soluble in dilute acid. This conduct again is exactly like that which distillate from gilsonite shows. This action of dilute acids upon asphalt oil or petroleum was first noticed, so far as I know, by Professor S. F. Peckham, in connection with California petroleum. He has shown that the crude petroleums of California contain esters made up of basic oils in combination with an exceedingly viscous, feebly acid, tar. When the crude oils are treated with dilute acid, this acid radical forms a hydrate which produces with the other constituents of the petroleum an emulsion from which the aqueous acid solution of the basic oils is separated with much difficulty. He also claims that the basic oils belong to the pyridine and quinoline series. Peckham's description of the conduct of California petroleum fits very perfectly, indeed, my experience with gilsonite from Utah and the pitch coal now in hand. Similarity in origin is therefore suggested, although, of course, it can not be regarded as proved.

"A quantity of the Oregon coal was also subjected to heat in a retort in the same manner as the pitch coal. The conduct of the coal was most decidedly different; there was no melting or even apparent softening; moisture was promptly and quite freely given off, but the only distillate obtained was a very small quantity of thick, black coal tar, such as is usually obtained in greater or less degree from the destructive distillation of various kinds of coal, as in the manufacture of illuminating gas. Most of the volatile matter given off appeared to be gaseous and uncondensable. There was too small a quantity of this distilled tar to do anything further with it."

ANALYSES OF COOS BAY COAL.

Number	Moisture at 105 deg. C., one hour	Rapid heating: Volatile matter	Rapid heating: Fixed carbon	Ash	Sulphur	Physical properties of coke.
1	9.78	42.57	44.19	3.46	0.91	Sooty, partly coherent.
2	11.94	41.48	37.85	8.73	1.32	Sooty, noncoherent.
3	15.45	41.55	34.95	8.05	2.55	Will not coke.
4	17.27	44.15	32.40	6.18	1.37	Will not coke.
5	9.66	43.50	35.02	11.82	3.08	Will not coke.
6	14.84	32.60	50.21	2.35	....	....
7	14.78	35.20	40.25	9.77	....	....
8	10.05	41.55	44.50	2.90	....	Does not coke.
9	15.49	36.87	44.59	4.05	....	....
10	16.30	33.46	42.67	7.57	....	....
11	10.42	42.21	43.18	4.19	0.69	Sooty, very slightly coherent.
12	9.56	49.85	35.98	4.61	0.94	Does not coke.
13	9.54	42.37	43.90	4.19	1.85	Does not coke.
14	13.90	35.70	45.40	5.00	....	....
15	10.30	55.37	26.50	7.83	0.38	Does not coke.
16	10.43	66.71	13.23	9.63	0.37	Does not coke.
17	8.10	38.95	43.18	9.77	4.28	Does not coke.
18	10.59	50.05	33.89	5.47	0.56	Will not coke.
19	9.58	44.66	40.06	5.20	1.12	Will not coke.
20	11.65	66.18	17.31	4.86	0.59	Will not coke.
21	11.30	41.04	43.63	4.03	2.10	Will not coke.
22	11.54	49.13	33.76	5.57	0.49	Will not coke.
23	12.06	60.92	16.23	10.79	4.38	Will not coke.
24	7.94	41.91	46.95	3.20	0.28	Will not coke.
25	10.27	45.69	42.74	1.30	0.94	Coke fair.
26	11.03	44.97	31.99	12.01	2.01	Will not coke.
27	9.00	44.92	41.74	4.34	1.97	Will not coke.
28	8.53	42.52	44.43	4.52	0.82	Will not coke.
29	6.88	48.69	32.05	12.38	1.50	Will not coke.
30	10.03	53.63	29.70	6.64	3.06	Will not coke.
31	.79	48.90	26.58	13.73	6.25	Coke good.
32	14.24	55.60	22.64	7.52	0.32	....

In all the analyses of this table made by Mr. Steiger the volatile matter was determined by heating seven minutes over a Bunsen burner flame 18 centimeters high, the crucible being placed 8 centimeters above the burner. The results are given in the columns under "rapid heating."

Localities of Coals of Which Analyses Are Given in the Table.

1. Newport mine, shows distinct woody structure.
2. Newport mine.
3. Newport mine, upper bench.
4. Newport mine, lower bench.
5. South Marshfield mine, middle bench.
6. Beaver Hill coal, middle bench, Garden Gulch, Dean & Co., owners.
7. Beaver Hill coal, lower bench, Garden Gulch, Dean & Co., owners.
8. Beaver Hill coal, middle bench, Dean & Co.'s property.
9. Beaver Hill coal, middle bench.
10. Beaver Hill coal, lower bench.
11. Beaver Hill coal, Beaver Hill mine.
12. Beaver Hill coal, Beaver Hill mine, middle bench, 300 feet beneath surface.
13. Beaver Hill coal (?), near western line of section 19, T. 27 S., R. 13 W.
14. Urquhart's coal, by river, one-half mile southwest of Riverton.
15. Lyon & Co.'s mine, middle bench, 1½ miles south of Riverton.
16. Bunker coal, 28-inch bed, near Bunker, of Bandon Block Coal Company, at Riverton.
17. Bunker coal, Urquhart's opening on 24-inch bed, one-half mile south of locality 16.
18. Peterson's coal, near the line between sections 9 and 16, T. 28 S., R. 13 W.
19. Beaver Creek mines (Utter mines), one mile southeast of Coaledo, coal of upper bench B.
20. Top bench of lower coal, 2½ miles northeast of Coaledo.
21. Middle coal.
22. Top coal.
23. Coal 1¼ miles northeast of Henryville.
24. Southport coal, five miles south of Marshfield.
25. Norton's coal, on Catching slough.
26. Steva's coal, five miles northeast of Marshfield.
27. Near South slough.
28. Coal at Aiken's cabin.
29. Parker's coal, on Seven Mile creek.
30. Near Dr. Cook's.
31. Coal reported from Shasta Costa creek, near Rogue river.
32. Reservoir coal, near Marshfield.

A VISIT FROM A GRIZZLY.

A Yellowstone Park Hotel Defended by a Man With a Hose.

In the closing installment of his "Biography of a Grizzly" in the January Century, Mr. Seton Thompson describes the singular experience of a Yellowstone Park hotel-keeper:

Many years ago a wise government set aside the headwaters of the Yellowstone to be a sanctuary of wild life forever. In the limit of this great wonderland the ideal of the Royal Singer was to be realized, and none were to harm or make afraid. No violence was to be offered to any bird or beast, no ax was to be carried into its primitive forests, and the streams were to flow on forever unpolluted by mill or mine. All things were to bear witness that such as this was the West before the white man came.

The wild animals quickly found out all this. They soon learned the boundaries of this unfenced park, and, as every one knows, they show a different nature within its sacred limits. They no longer shun the face of man, they neither fear nor attack him, and they are even more tolerant of one another in this land of refuge.

Peace and plenty are the sum of earthly good; so, finding it there, the wild creatures crowd into the park from the surrounding country, and are found there in numbers that are not elsewhere to be seen.

The bears are especially numerous about the Fountain hotel. In the woods, a quarter of a mile off, all the kitchen garbage is dumped, and each year a greater number of bears gather there during the months that the hotel is running, for the sake of the abundant feed on the garbage heap. It is a common thing now to see a dozen bears feeding there at one time. They are of all kinds—black, brown, cinnamon, grizzly, silver-tip, roachbacks, big and small, families and rangers, from all parts of the vast surrounding country. All seem to realize that in the park no violence is allowed, and the most ferocious of them have here put on a new behavior. Although scores of bears roam about this choice resort, and quarrel among themselves, perhaps, over the best feeding and drinking-places, there has never yet been a man hurt by any one of them.

One day the owner of the Palette ranch came through the park. During his stay at the Fountain hotel he went to the garbage dump to see the bears. There were several black bears feeding, but they made way for a huge grizzly that came about sundown. . . .

"That," said the man who was acting as guide, "is the biggest grizzly in the park; but he is a peaceable sort, or Lud knows what'd happen."

"That!" said the ranchman, in astonishment, as the grizzly came hulking nearer and loomed up like a load of hay in the pine woods. "That! if that is not Meteetsee Wahb, I never saw a bear in my life. Why, that is the worst grizzly that ever rolled a log in the Big Horn basin."

"It ain't possible," said the other, "for he's here every summer, July and August, an' I reckon he don't live so far away."

"Well, that settles it," said the ranchman; "July and August is just the time we miss him on the range; and you can see for yourself that he is a little lame behind and has lost a claw of his left front foot. I know now where Wahb puts in his summers, but I did not suppose that the old reprobate would know enough to behave himself away from home."

The old grizzly became very well known during the successive hotel seasons. Once only did he really behave ill, and that was the first season he appeared, before he fully knew the ways of the park.

He wandered over to the hotel one day, and in at the front door. In the hall he reared up his eight feet of stature as the guests fled in terror; then he went into the clerk's office. The man said: "All right; if you need this office more than I do, you can have it," and, leaping over the counter, locked himself in the telegraph office, to wire the superintendent of the park: "Old grizzly in the office now; seems to want to run hotel; may we shoot?"

The reply came: "No shooting allowed in park; use the hose." Which they did, and, wholly taken by surprise, the bear leaped over the counter, too, and ambled out the back way, with a heavy thud thudding of his feet and a rattling of his claws on the floor. He passed through the kitchen as he went, and, picking up a quarter of beef, took it along.

This was the only time he was known to do ill, though on one occasion he was led into a breach of the peace by another bear. This was a large she black bear, and a noted mischief-maker. She had a wretched, sickly cub that she was very proud of—so proud that she went out of her way to seek trouble on his behalf. And he, like all spoiled children, was the cause of much bad feeling. She was so big and fierce that she could bully all the other black bears, but when she tried to drive off old Wahb, she received a pat from his paw that sent her tumbling like a football. He followed her up, and would have killed her, for she had broken the peace of the park, but she escaped by climbing a tree, from the top of which her miserable little cub was apprehensively squealing at the pitch of his voice. So the affair was ended; in future the black bear kept out of Wahb's way, and he won the reputation of being a peaceable, well-behaved bear. Most persons believed that he came from some remote mountains, where were neither guns nor traps to make him sullen and revengeful.

His Place.

Catholic Standard and Times.

Father—So you've resigned your situation again?

Son—Yes, sir; it was too hard.

Father—Too hard! Don't you know that no situation is perfectly easy?

Son—Yes, sir. That's why I want no situation.

A series of experiments made at Kiel during the last two years have shown that of all metals used in shipbuilding an amalgam of iron and zinc is least subject to deterioration from the influence of sea water.

COTTON OF TURKESTAN

PLANTS AND METHODS IMPORTED FROM AMERICA.

How the Industry Has Grown—Definite Limits to the Increase of Production There.

ON THE TRANSCASPIAN RAILWAY, July 21.—Cotton is the chief product of Turkestan. Even before the Russians came considerable quantities of the fiber were raised and manufactured locally, and since the conquest the industry has been extended with great rapidity. In accordance with the Russian policy to obtain the best information on all subjects wherever it may be found, the government has sent several of its most competent students to the United States to study the methods of cotton cultivation in the Southern states, and upon their return has placed them in charge of important experimental stations in the Central Asiatic provinces, where their new information could be applied practically. I have met three or four Russian agriculturists who have gained their experience in the United States, and who, remembering the courtesy and the assistance they had there, are anxious to aid me and inform me in every way in their power.

FRUIT SELLERS AT FEDCHENKE, PROVINCE OF FERGHANA.

Mr. Rauner, the attache of the minister of agriculture, whom I met in St. Petersburg and with whom I was to travel through Turkestan, is one of these. He has studied the cultivation of cotton, tobacco and sugar in the United States, with special reference to the arid regions of Turkestan. Now he is the chief of the administration of agriculture and crown domains in Central Asia, and is sharing in the work of developing the great estate of the emperor of Russia near Merv, which is to obtain its water supply from the extensive irrigation works now nearing completion on the Murghab. Incidentally I might mention that I am leaving Central Asia without meeting Mr. Rauner again, after all the appointments made in St. Petersburg and our efforts to meet this side of the Caspian. He reached Tashkend the day I left, and we exchanged calls in haste, each failing to find the other at home.

No cotton is grown in European Russia, but in Turkestan the plant has been an important factor of industry for hundreds of years, and the increase in production since the Russian occupation has been constant. Even in the early period after cotton came into Turkestan from Southern Asia, while it was becoming acclimated far to the northward of its place of origin and was developing into several local varieties, it was an article of export into the neighboring countries. Farmers did not devote themselves exclusively to the one crop, however, but practically diversified agriculture and mixed cotton fields in with those for wheat, barley and other staples.

Russia had been the chief customer for Turkestan cotton for many years before the conquest, the condition of the Russian market being the most potent influence in regulating the production year by year. During the civil war in America, Russia was unable to obtain the normal quantity of cotton, so that the demand on Turkestan increased rapidly, prices went up and the industry advanced to its highest development. Bokhara, Khiva and the other khanates of Central Asia rose to the emergency in a manner to surprise the world, and brought the Russian mills through their crisis without much distress. During the years of fighting which ended when the Russian occupation of Turkestan was complete the production was materially reduced, but after quiet came to the khanates again Russian energies were directed toward restoring the industry. At that time the empire was buying all the cotton for its mills from the United States and Egypt, and it was evident that the establishment of the industry on a commercial basis would be quite as important for Russia as for Central Asia.

Introduced American Cotton.

The first step was to introduce the American cotton plant, which was superior to the native varieties. Ten years of unsuccessful experiment proved that sea-island cotton could not stand the dry climate of Turkestan. Then efforts were directed toward the acclimatization of American upland cotton. The result was faverable in every way, and since 1880 all the progress of the industry has been with this variety. An experimental plantation was established in Tashkend under the direction of Russian agriculturists who had studied in America; pamphlets were printed in Russian and in the native languages of Central Asia instructing farmers in the methods of cultivation of this cotton, these being distributed free in large numbers; American seed was distributed free of charge to all who would apply for it, and the sale of cotton from American seed was guaranteed.

As was to be expected, these measures soon showed results. Planters who had divided their land among various crops began to devote their attention to cotton. American gins were ordered, and with the introduction of American methods of cleaning and assorting the fiber the price of American cotton grown in Turkestan soon rose far above the price of the product in the Russian markets. With those conditions in effect there has been no interruption in the annual increase in the area under cultivation, and the production of cotton either in Russian Turkestan proper or the semi-independent khanates of Bohkara and Khiva.

There is no doubt that the Russians have learned most of the knowledge of cotton cultivation which they possess from the United States and that consequently there is not much which we can learn from them about it. Nevertheless, its rapid extension as a profitable commercial industry and the share it may have in competition with American cotton in European markets give it a definite American interest.

Methods of cultivation of the cotton plant in Turkestan are not yet invariably fixed. There are still pioneers in the industry who are trying experiments in the effort to improve the quality and quantity of the yield and to reduce the expense of production by improved methods. These experiments run usually to different systems of preparing the soil, of sowing and of irrigating. Most of this experimentation, however, is done by Russian planters who have gone into the enterprise as a commercial proposition, and there has been little change in the methods of the Asiatic planters themselves. The large Russian plantations are more numerous in the neighborhood of Tashkend, with others in the region of Samarkand and the Ferghana territory, through which the latest extension of the railway runs. Most of the local planters break the soil with primitive Asiatic wooden plows, with cast steel shares, harrow the field with a single board, cover the seed by hand, apply fertilizer only in exceptional cases, pay no attention to the choice of seed, sow broadcast, and altogether use the most primitive methods throughout. In spite of this, the conditions of soil and climate are so favorable that the harvests are satisfactory. When people adopt modern methods, as they are certain to do in time, the cotton of Turkestan will become an important portion of the world's production.

The most difficult information to obtain in Russia is that which involves recent figures, and I have no statistics at hand later than those for the crop of four years ago. At that time, however, the area planted to cotton in the three provinces of Turkestan proper—Sir Daria, Samarkand and Ferghana—was approximately 500,000 acres, with a total yield of raw cotton of about 120,000 tons. This was more than double the area under cultivation in 1890, and the yield was increased in the same time from some 25,000 tons to nearly 120,000 tons. If to this is added the annual crop of the khanate of Bokhara, amounting to some 32,000 tons, and the 8000 tons of Khivan cotton, all of which goes to the Russian market, the total of approximately 160,000 tons is reached for the central Asiatic yield of 1895. Since that time the province of Transcaspia has begun to add appreciable quantities to the total and the increase has been constant in the other provinces, though perhaps not as rapid as from 1890 to 1895. Transcaspia, indeed, is counted on by the Russians to contribute generously to their cotton production as soon as several notable irrigation works now under way are completed, and considerable money already has been invested in cotton enterprises in that arid territory.

Further Extension Limited.

Russian authorities here in central Asia are proud of the remarkable development of the industry in their territories, but they are frank to say that further extension has its very definite limits. Comparatively few lands suitable for growing cotton remain unoccupied, and an increase of the irrigation systems is necessary if the limit is not to be reached within a few years. It is planned, therefore, to use more intelligently the water supply that comes down from the mountains into the Sir Daria river, as well as the Amu Daria, for this purpose. The Grand Duke Nicholas, cousin of the late emperor, has one of these great works under way on the Sir Daria, not far from where the railway to Tashkend crosses the river, and the emperor himself, when his immense estates on the Murghab are fully developed by irrigation from the Sultan Bent dam, will be the greatest cotton planter in Transcaspia. However, with all this work completed and the production brought to its maximum, Russian statisticians calculate that the total cotton yield of Turkestan and Transcaspia, with the khanates of Bokhara and Khiva, is not likely to pass 400,000 tons annually.

The varieties of American upland cotton most commonly grown in Turkestan are those known in the United States as New Orleans, Ozier silk, Peterkin, Texas, Dixon and Duncan's mammoth prolific. The local Asiatic plant is grown in several different varieties, but in the trade it usually bears the name of the place of its origin, as, for example, Tashkend and Khokand cotton. The number of irrigations varies with local conditions, but there are usually two or three after sowing, one in the fall and one in the spring just before sowing. Autumn plowing is not generally practiced. Sowing is begun as early as April 1, but the average season for sowing is nearer the end of the month.

The cotton crop is dependent upon exceedingly various causes, of which the condition of the weather in the autumn months is the most important. If the autumn is warm and there are no frosts the harvest may continue till December, but frosts in September reduce the quality and the quantity of the yield. In consequence of the greater frequence of these frosts the crop is not as certain in the northern cotton fields around Tashkend as in Ferghana. Rains are not a matter of concern to the planter, as the weather is usually clear and dry throughout the entire period of growth.

Modern agricultural implements are found only in those places where Russian cotton planters are settled. With the mass of the native population the omatch and the ketmen are still in use. The omatch is a wooden plow of the simplest construction, with an iron plowhead, but without a moldboard. By harnessing bulls, horses or camels, and sometimes all three, to the long yoke, the earth is turned up to the depth of about one foot. It is heavy, inadequate and extravagant in labor, but it costs not more than a dollar, so the peasant makes up for its deficiencies by repeated plowings. The ketmen is a sort of handpick with which the natives do everything that a plow will not do.

TRUMBULL WHITE.

NEW RAILWAY RATES.

Controversy Between Railroads and Interstate Commission.

Baltimore Sun.

The Railway Age is at pains to show that the chief object of the shippers who engaged the interstate commerce commission in an inquiry into the new classification of freight by the trunk lines was to induce the commission and attorney-general of the United States to take the position that the concerted action of the railroads in agreeing upon a freight classification was a violation of the Sherman anti-trust law. The commission declined to interfere or take action until the new classification had taken effect and proof of actual injustice under it was shown. The attorney-general has just refused to get an injunction against the operation of the new classification, and affirms that the anti-trust law does not apply to it. The remedy of the shippers, if one be needed, lies, he suggests, with the interstate commerce commission. As the new classification—increasing rates somewhat on certain articles by reason of the increased cost of labor, iron and other material—took effect yesterday, there will be an early opportunity, it is intimated, for injured parties to get justice under the existing laws.

It is noteworthy that the interstate commerce commission has long been trying to get the railroads to make a uniform classification applying to the entire Union. Senator Cullom, in his bill to amend the interstate commerce regulation law, requires the railroads to formulate a "national" or uniform classification. Both the commission and the reputed father of the commission approve, it appears, in principle the joint classification that the trunk lines have made, and would like to see a like agreement covering the railroads of the whole United States. The Age naturally thinks the proposal of the shippers to prevent any two railroads from agreeing to observe an identical cassification of freight absurd, since without agreements every railroad might have its own classification, and the aggregate cost of sending merchandise from Baltimore to San Francisco could be ascertained only by adding together the local rates of a dozen different classifications, each subject to constant variation. That would be reverting to old ways with a vengeance, the Age thinks, and abolishing "through" rates—which would be folly.

But the milk in the cocoanut is not so much, perhaps, the new classification as the fact that under it freight rates on certain articles are advanced. If it resulted in a new reduction of rates, the shippers would not, perhaps, have objected. They had two strings to their bow—to prove that each increase of rate is excessive and unjust, or get the whole classification set aside as in violation of existing law. Having failed in the latter course, they still have admirable fighting ground in the rates themselves. If it be true that the railroads are trying to obtain excessive remuneration for their services as freight-carriers, the interstate commerce commission, which has never been accused of partiality to the railroads, may be trusted to detect the fact and bring pressure to bear in the proper place. It is not unlikely that here and there some article has been unduly advanced. But this cannot be assumed, the commission says, in advance of a specific complaint and inquiry. The railroads, it is to be observed, complain for their part that iron, steel rails, locomotives, cars, wages and all kinds of material cost much more now than they did 18 months ago, so that increased remuneration is but reasonable. The shippers, they say, are getting increased profits and are prosperous and ought to be willing to give the railways a share of prosperity. Time will show which side is in the right.

Wild Fruits.

Longman's Magazine.

The cultivation of currants and gooseberries was unknown among the Greeks and Romans, and dates only from the 16th century. It has been a matter of dispute whether these shrubs should be considered as genuine natives of Great Britain, but in the light of further research, this claim to be indigenous, at least in the north of England, will now hardly be denied. In the southern counties, though the species are now common enough in woods and thickets, it is possible that they may be escapes from cultivation. It is interesting to notice that the illustrious John Ray speaks of black currants as "squinancy berries," a name which shows that they were commonly used then, as now, in cases of sore throat. He also mentions the bush as growing wild "here in our neighborhood by the Hoppet bridge, near Braintree," in Essex, where, however, it is no longer to be found.

The fruit of the wild elder, which, says old Culpeper, need not be described, "since every boy that plays with a popgun will not mistake another tree instead of elder," is still gathered by country people for the purpose of making elderberry wine, which is held to possess considerable medicinal virtue. "If," says John Evelyn, "the medicinal properties of the leaves, bark and berries of this tree were thoroughly known, I cannot tell what our countrymen could ail for which they might not find a remedy from every hedge, either for sickness or wound." These so-called natural remedies are now seldom employed; it is therefore the more interesting to notice that elderberry wine is still frequently used by poor people in country places.

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