The Bacteriological Analysis of Japanese Oysters.

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For a number of years suspicion has at various times attached to oysters as a cause of certain diseases, particularly typhoid fever and other intestinal infections. There are so many instances that the evidence has been conclusive when the circumstances were carefully investigated since the first record made by French physician PASQUIER,¹⁾ 1816. The most extensively known epidemic of typhoid fever attributed to oysters occurred so many times such as at Wesleyan University, Conn., U.S.A.,²⁾ 1894; Southampton and Winchester, England,³⁾ 1902; major cities of New York, Chicago, Washington and other cities, U.S.A.,⁴⁾ 1924-'25; Kumamoto prefecture, Japan,⁵⁾ 1926, and other numerous instances. On the contrary, attempts to isolate the typhoid bacillus from polluted oysters have met with but very little success. KLEIN⁶⁾ was able to isolate from oysters an organism that culturally and serologically answered all the tests for *bacillus typhosus*. FULLER⁷⁾ cites an instances in which the isolation of *bacillus typhosus* from oysters was reported at the meeting of physicians at Constantinople, JOHNSTONE⁸⁾ states on one occasion he was able to isolate bacillus typhosus from mussels, also STILES⁹⁾ isolated from oysters an organism that was identical culturally with *bacillus typhosus*. Above four instances are the only ones recorded in literature where investigators have been able to isolate *bacillus typhosus* from oysters and mussels under natural conditions. Since 1925, oysters were collected from principal oyster producing prefectures in Japan and test was being made as to whether they contain typhoid bacillus or not. Up to now, about 18,000 oysters had been tested, but no typhoid bacillus was certified even for once in our laboratory¹⁰⁾¹¹⁾.

On the bacteriological analysis of Japanese oysters, I collected from such principal oyster producing prefectures in Japan as Miyagi, Tiba, Siduka, Aiti, Mie, Hyôgo, Hirosima and Kumamoto from November 1932 to March 1933. The oysters collected in each prefecture, were transported by train without any ice even in the case of analysis held in a few days later of sampling. The bacteriological examination started as soon as possible after the receipt of the samples by two methods such as American Public Health Association Method¹²⁾ and KLEIN's Method¹³⁾¹⁴⁾ which is most extensively employed in England. In Dr. KLEIN's method, I took six oysters

instead of ten according to his original method and the interpretation of the results followed to the standard of the Fish Mongers' Company of London¹⁵⁾

The bacteriological results of the examination of Japanese oysters collected from above mentioned oyster producing areas on forty one times of shell oysters and nineteen times of shucked oysters are as follows :

Table I. Results by American Standard Method.

	Num- ber of tests	<i>B. Coli</i> Score																	
		0	1	2	3	4	5	14	23	32	41	50	140	230	320	410	500	1400 & over	
Shell oyster	41	15	3	4	6	1	2	3	2	1	0	0	1	1	1	1	0	0	
Shucked oyster	19	2	0	2	1	1	0	4	0	1	0	2	2	2	1	1	0	0	

Shell oyster, <i>B. Coli</i> Score	0	36.6%
"	under 5	75.6%
"	under 50	90.2%
"	over 50	9.7%
Shucked oyster, <i>B. Coli</i> Score	over 140	21.0%
"	under 140	78.9%

Table 2. Results by English Method.

	Number of tests	Clean	Satisfactorily clean	Passably clean	Doubtful	Not clean	Not fit for human consumption
Shell oyster	41	24	11	2	1	2	1

%	58.5	26.8	4.8	2.4	4.8	2.4
		90.1		7.2		2.4
					9.6	

Shucked oyster	19	12	2	0	2	2	1
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%	63.1	10.5	0	10.5	10.5	5.2
		73.6		21.0		5.2
					26.2	

It is difficult to arrive at a conclusion with such a small number of experiments as above mentioned, but we can guess the tendency of Japanese oyster's cleanliness. According to the above results, the score of shell oysters under *B. Coli* score 50 equal to 90.2% of the total, including 36.6% of coli score 0 and also 75.6% of the total number of experiments of score under 5 and the remaining 9.7% of the total belong to the score over 50 by American

standard. On the contrary, the results of shucked oysters is exceedingly inferior to those of shell oysters. The score of shucked oysters under 140 is 78.9% and about 21.0% of the total number of experiments is over 140. Nearly the same results acquired by English method such as 90.1% of shell oysters belong to the group which are allowed to be sold without further comment, and 7.2% to the one needing further analysis, and only 2.4% of the total belong to the condemned group and also the results of shucked oysters are inferior to those of shell oysters, just the same as in the case of the American method: 73.6% belong to the clean group, 21.0% belong for further analysis and 5.2% to the group finally condemned.

As a whole, about 90.0% of shell oysters of Japan are suitable to be sold without further comment, but nearly 10.0% of them belong to the group for further analysis and condemnation. In other words, 36.6% of shell oysters of Japan belong to the oysters of *B. Coli* score 0 and 75.6% to the *B. Coli* score under 5 by the American standard and also only 2.4% of the total belong to the condemned group according to the English standard.

If we compare Japanese oyster with Americans such as the results investigated by GORHAM¹⁶⁾ on the oysters from Providence and Warren rivers, R.I.; PARSON¹⁷⁾ from Jamaica and Raritan Bays, N.Y.; New Heaven Harbor, Conn. and Hampton Bar. Va.; CALMERIA¹⁸⁾ from Inwood, Longisland, N.Y.; PERRY¹⁹⁾ from Chesapeake Bay, Md.; PEASE, DOWD and GLANCY²⁰⁾ from West Sayville N.Y., we found that Japanese oysters are far more safe from the hygienic point of view. If we summarize the above 527 times of American oysters analysed by many persons described above with our oysters, the result is as follows:

Table 3. Comparison of Japanese and American oysters.

Investigators	<i>B. Coli</i> Score			
	0	under 5	under 50	over 50
GORHAM, PARSON, CALMERIA, PERRY, PEASE, DOWD and GLANCYU.S.A.	13.8	54.0	82.9	17.0
TOHYAMAJapan.	36.6	75.6	90.2	9.7

Such an exceedingly high grade of cleanliness of Japanese oysters, I suppose, is chiefly due to the superior method of cultivation which was originally devised by Japanese called "Hanging method of oyster culture" and I think this is a unique method of culturing the oyster from the hygienic view point an account of using the clean deep sea far from the land instead of shallow sea water near the land where oysters are apt to be exposed to constamination which human excreta from near by sources.

In closing this report, I wish to express my hearty thanks to all prefectural authorities, and to the other parties concerned for their having afforded me several facilities and help in the execution of my experiment.

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