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For some time past we have been engaged in examining samples of ice-creams from various districts of London. The samples were obtained either from shops or from street barrows. The number of ice-creams vended and consumed on the streets is enormous. It is a familiar sight to see the barrows surrounded by children greedily consuming these "delicacies." Young children are particularly liable to affections and disturbances of the digestive tract. And there are few in the poorer districts of London who do not at some time or other purchase and consume these ice-creams. The ice-creams are hawked about without any control on the part of the Sanitary Authorities. Their preparation and sale are mainly carried out by the poorest members of the Italian colony in London, amidst an utter absence of cleanliness in their persons and surroundings. The condition of these ice-creams has an important bearing on the health of the community, as the sources of possible contamination are so numerous.

We were, therefore, led to devote some time to a careful examination of these commodities, and the results will be shortly

summarised in this report. The results obtained prove that the conditions at present existing constitute a source of danger to a most helpless and unprotected class—the children of the poor.

We were careful to obtain the samples from as many sources as possible, and to make our observations not only during the summer months but also during the autumn and winter.

The samples were collected in suitable tin boxes and kept in an ice-chest previous to examination. The ice-creams were collected from a wide area. We obtained samples from the following districts :—Holborn, Clerkenwell, Islington, Strand, St. Luke's, St. Giles', Lambeth, Southwark, Hoxton, and Whitechapel. The number obtained and examined was eighty.

We had, therefore, ample material on which to base our report, and to justify any general conclusions we might come to.

The main constituents in the ice-creams are corn-flour, eggs, milk and sugar. Some flavouring matter is added, generally stalk-vanilla. These are mixed, boiled, and then frozen.

A certain number of the ice-creams were submitted to a chemical analysis. The chemical analysis, however, proved secondary in importance to the microscopical and bacteriological examination. It will be sufficient to give a few samples of the results obtained. The following eight analyses are taken indifferently from a large number made :—

	Total Solids	Fats.	Albumenoids.	Sugar.	Starch.	Ash.
I.	27·79	4·47	4·49	12·27	6·19	0·37
II.	26·95	2·13	3·79	13·46	7·19	0.38
III.	24·74	2·58	4·56	11·83	5·28	0·52
IV.	28·87	3·74	5·17	12·02	7·40	0.54
V.	26·83	3·86	3·92	11·83	6·58	0.64
VI.	27·15	4·04	4·96	13·02	4·61	0·52
VII.	27·68	3·95	4·31	14·00	4·80	0·62
VIII.	25·32	3·82	4·04	12·19	4·99	0·58

From these figures it will be seen that chemical analysis failed to show anything objectionable.

A search for chemical preservatives and toxic bodies of the nature of Tyrotoxicon gave negative results. This being the case,

most attention was paid to the microscopical and bacteriological investigations.

Microscopical examination.—The fresh ice-cream was examined directly under the microscope. A portion was also suspended in sterilized water, allowed to stand for twenty-four hours, and the sediment then examined. Any visible foreign bodies were removed and mounted in glycerin for microscopical examination.

All the samples examined were swarming with bacteria, motile and non-motile. The bacteria included cocci, bacilli and spirilla. In some instances amœboid organisms were present. The worst samples were those derived from street barrows.

The following list gives a good idea of the nature of the objects found by us in the various ice-creams :—Bed-bugs, legs of bugs, fleas, fragments of straw (? bed-straw), fragments of wood, human hair, hairs of the cat and dog, charred organic matter, coal-dust, woollen and linen fibres, tobacco, piece of copper, solder, pieces of vanilla, epithelial scales, muscular tissue, and inorganic matter.

The grosser impurities were again mainly found in the samples from street barrows.

The microscopical examination was in itself sufficient to condemn the ice-creams. The presence of human parasites, epithelial scales, &c., showed distinctly the direct contamination that had taken place from human beings.

Bacteriological examination.—A minute quantity of the ice-creams was added to nutrient beef broth. The beef broth tubes were kept at 20 degrees C. and at blood heat. Gelatin plate cultures were also made from each ice-cream. One series of gelatin plate cultures was used for estimating the number of bacteria present. A second series was made for the purpose of isolating and determining the nature of the bacteria present.

It would occupy too much space to give the results of all the examinations made. All the street samples examined were, bacteriologically, highly impure. We were hardly prepared for the consistently bad results obtained. Not only the number of bacteria present, but also their nature, was sufficient to condemn

the samples from a hygienic point of view. The shop samples varied much in quality—some were fairly pure, others highly impure. The figures given below furnish a fair presentation of the results generally obtained :—

NUMBER OF BACTERIA PRESENT IN ONE CUBCM. OF SHOP ICE-CREAMS TAKEN FROM DIFFERENT DISTRICTS.

Sample	1	340,000	bacteria.	Sample	25	784,000	bacteria.
,,	4	439,300	,,	,,	27	930,000	,,
,,	10	119,000	,,	,,	28	254,000	,,
,,	11	363.000	,,	,,	40	420,000	,,
,,	12	440,000	,,	,,	41	1,340,000	,,
,,	20	1,200,000	,,	,,	50	470,000	,,

NUMBER OF BACTERIA PRESENT IN ONE CUBCM. OF STREET ICE-CREAMS TAKEN FROM DIFFERENT DISTRICTS.

Sample	1	1,400,000	bacteria.	Sample	20	5,200,000	bacteria.
,,	2	1,800,000	,,	,,	31	4,240,000	,,
,,	3	1,200,000	,,	,,	41	5,300,000	,,
,,	4	3,430,000	,,	,,	54	625,000	,,
,,	5	3,100,000	,,	,,	55	2,125,000	,,
,,	6	6,540,000	,,	,,	56	7,132,000	,,

It will be seen that, whilst the shop samples contained large numbers of bacteria, the street samples were infinitely worse in this respect. The figures seem to show very clearly that the gravest contamination occurs when the ice-creams get into the hands of the street vendors. They are then exposed to pollution from their persons and their dwellings, and on the streets.

The beef broth that was inoculated directly with small quantities of these ice-creams became quite putrid in the majority of cases.

The next step was to determine the nature of the bacteria present in the ice creams. A large number of microbes were isolated and the majority identified. The gelatin plate cultures made in the usual way from the ice-creams contained such a large number of liquefying bacteria that isolation of the individual organisms was impossible. It was necessary to greatly dilute the ice-creams with sterilized water in order to obtain serviceable plate cultures. In some instances carbolized gelatin was used, or the liquefying colonies of bacteria were arrested in their growth by means of Formalin.

Special attention was devoted to the detection of organisms likely to be met with in the human subject and in sewage. We succeeded in isolating the Bacterium coli commune from five samples of street ice-creams. This organism is constantly present in the digestive tract and in sewage. We also found large numbers of putrefactive bacteria in the ice-creams.

The Proteus group of organisms were frequently met with. They are generally found in decomposing organic matter and also in sewage.

The Bacillus fluoresceus liquefaciens was ubiquitous and gave much trouble, owing to its energetic liquefying action on gelatin.

The great variety of bacteria isolated furnished a further indication of the impure condition of the ice-creams. For example, we isolated twelve different species of micro-organisms from one ice-cream.

We append a list of the micro-organisms actually identified by us in the various samples :—

1. Bacterium coli commune.
2. „ lactis ærogenes.
3. Bac. acidi lactici.
4. Bac. subtilis.
5. Bac. mycoides.
6. Bac. fluorescens liquefaciens.
7. Bac. „ non liquefaciens.
8. Proteus vulgaris.
9. Proteus zenkeri.
10. Bac. erythrosporus.
11. Bac. mesentericus fuscus.
12. „ „ vulgatus.
13. M. aurantiacus.
14. M. flavus liquefaciens.
15. Bac. ureæ.
16. Bac. liquefaciens.
17. Various sarcinæ.
18. Yeast forms.
19. Various moulds, including Oidium lactis.
20. A streptococcus, not identified.

The water used for rinsing out the vessels in which the ice creams are sold was also examined by us. The samples obtained were very dirty, and contained a flocculent slimy precipitate They were teeming with bacteria—cocci, bacilli, and spirilla. Putrefactive microbes were present in large numbers. One sample of the water contained 4,100,000 and another 5,300,000 bacteria in 1 cubcm.

The facts that the above report bring out hardly need emphasizing. The enormous number and the variety of bacteria found prove how grossly impure these ice-creams are. They swarm with putrefactive organisms, and contain bacteria found in the human subject and in sewage. The suspended matter also furnished evidence of human contamination. These conclusions are based on observations extending over a year, and on an examination of samples from ten districts in London. The chief source of pollution undoubtedly occurs through the agency of the street vendors, and it is in their dwellings that the ice-creams become mainly infected, and thus furnish likely channels for the transmission of the germs of disease.

It is to be hoped that the manufacture and sale of these commodities will speedily be placed under adequate sanitary control on the part of local authorities.