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Foodborne and Waterborne Disease in Canada - 1981 Annual Summary

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ABSTRACT

In 1981, a total of 647 incidents, comprising 505 outbreaks and 142 single cases, caused illnesses in 4,804 persons. There were 14.8% fewer incidents and 32.5% fewer cases than recorded for 1980. *Salmonella, Staphylococcus aureus, Clostridium perfringens* and *Bacillus cereus* were the main bacteriological agents to cause illness, but there were far fewer incidents of salmonellosis in 1981 (36) compared with 1980 (64). Etiologic agents *Coxiella burnetii, Listeria monocytogenes* and *Taenia saginata* were reported for the first time in these summaries. Animal agents: paralytic shellfish poison, scombroid poison and insects had also been documented in 1980 and previous years, but the plant agents were new - taro leaves and tablets made from *Spirulina* alga. The number of incidents caused by chemical agents (51), mainly extraneous matter, rancid compounds, metals and monosodium glutamate, were the same as for 1980. Some of the more unusual chemical poisonings were lead in herbal capsules, mercury in yogurt, ammonia in frog legs and laxative in a cake. Ten foodborne disease related deaths occurred mainly in infants infected by *Listeria* and in elderly patients with salmonellosis in a home for the aged. About 33% of incidents and 41% of cases were associated with meat and poultry. Mishandling of food took place mainly in foodservice establishments (33.1% of incidents, 62.4% of cases), homes (13.4% of incidents and 9.5% of cases) and food processing establishments (13.1% of incidents and 2.9% of cases). Food processing problems resulted mainly from chemical contamination, particularly extraneous matter. Most incidents occurred in Ontario (41.3%), British Columbia (19.6%) and Alberta (11.6%), but on a 100,000 population basis incidents were highest in British Columbia (4.6), Nova Scotia (4.4), Alberta (3.4) and Ontario (3.1). Narrative reports of seven previously unpublished foodborne disease problems are presented. Eight incidents of waterborne disease, caused by *Giardia lamblia, Campylobacter, Salmonella, Pseudomonas aeruginosa* and an undetermined agent, are double the number recorded for both 1980 and 1979. However, the number of cases was far fewer in 1981 (178) compared with those for the previous year (1,124). The largest outbreak (46 cases) was caused by *Pseudomonas* infecting the skin and ears of whirlpool bathers in a motel. All the other incidents were from contaminated water obtained on camping trips (3), from *Giardia*-infected municipal water supplies, two from abroad (3) and from non-chlorinated wells contaminated with *Salmonella* (1).

Annual summary reports from 1973 to 1980 have already been published *(16-23)*. In addition, detailed summaries for these years and for 1980 are also available *(2-9)*. Summaries for years up to 1978 can be obtained from the author. Subsequent summaries (1979 onward) can be purchased from Polyscience Publications Inc., 555 Legendre E., Suite 24, Montreal, Quebec, H2M 1G2, Canada (English and French versions).

FOODBORNE DISEASE DATA

Six hundred and forty seven incidents, comprising 505 outbreaks and 142 single cases, occurred in 1981 with a total of 4,804 persons ill (Table 1). Compared with data for 1980, fewer incidents (14.8%) and cases (32.5%) were recorded, although the proportion of single cases rose slightly (2.9%). The number of incidents caused by most etiologic agents fell during 1981 compared with 1980, but the greatest decrease was for episodes of salmonellosis (64 in 1980 to 36 in 1981) (Table 2). However, for the third year in a row, the number of *Staphylococcus aureus* incidents was 29, although there was a slight drop in cases (224 in 1979, 254 in 1980 and 219 in 1981). There were 15 incidents caused by *Clostridium perfringens,* eight incidents by *Bacillus cereus,* five by *Campylobacter* sp. and three by *Clostridium botulinum*. The organisms responsible for 72.9% of cases of microbiological origin were *Salmonella* (1073) and *C. perfringens* (396) with the median number of cases per outbreak of 20 and seven, respectively.

This was the first year that illnesses from *Coxiella burnetii* and *Listeria monocytogenes* had been recorded in the Annual Summaries. *C. burnetii* had been the cause of late abortions of sheep in southern Ontario since March, 1980. Nineteen of the cases had contact with goats and some of these had drunk raw goat milk. It was not possible to say which of these were infected through handling of the animals and which through consumption of contaminated milk, but an estimate was made of five cases of milkborne Q fever. The *Listeria* outbreak in the Maritimes, lasting from March to September, was the

TABLE 1. *Number of foodborne incidents and cases in 1981 and 1980.*

	Number of outbreaks		Number of single cases		Total Number of incidents		Percentage of incidents		Total number of cases		Percentage of cases	
Etiology	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980
Microbiological	84	118	38	43	122	161	18.9	21.2	2052	4019	42.7	56.4
Parasitic	1	1	3	3	4	4	0.6	0.5	5	11	0.1	0.2
Animal	4	11	7	6	11	17	1.7	2.2	16	48	0.3	0.7
Plant	1	1	3	-	4	1	0.6	0.1	6	2	0.1	0.0
Chemical	11	21	40	30	51	51	7.9	6.7	73	98	1.5	1.4
Total known	101	152	91	82	192	234	29.6	30.8	2152	4178	44.8	58.7
Unknown	404	469	51	56	455	525	70.3	69.2	2652	2944	55.2	41.3
Total	505	621	142	138	647	759	100.0	100.0	4804	7122	100.0	100.0

first major foodborne incident involving the organism to be documented *(10)*. There were 41 cases with six infant deaths. Coleslaw was the contaminated food. The manure of infected sheep was used to fertilize cabbages which were harvested and stored over winter in a cool area before being made into coleslaw. The *Listeria* probably grew on the cabbages during the cool storage period.

There were four episodes of apparently multiple bacterial origin. These were *S. aureus* and *B. cereus* (two incidents), *S. aureus* and *Salmonella* (one incident) and *Salmonella, Vibrio parahaemolyticus* and *V. cholerae* NAG (one incident). Twenty incidents were suspected of being caused by molds and yeast, six fewer than in 1980. In none of these was the agent specifically identified.

The number of parasitic incidents remained the same as for 1980 (4), except that three were caused by *Trichenella spiralis* and one by *Taenia saginata,* whereas in the previous year trichinosis was the only foodborne parasitic disease recorded.

There were fewer problems associated with animal etiologic agents than in 1980, but more with toxic plants. The animal agents were the same as before: paralytic shellfish poison and insect infestation (five incidents each) and scombroid poison (one incident). In 1981, calcium oxalate in taro leaves, solanine in potatoes and *Spirulina* blue-green alga were responsible for four incidents (7 cases).

Incidents of chemical origin were the same for the two years (51), although the number of cases in 1981 (73) was three quarters that in 1980 (98). The chemical agents causing most incidents were extraneous matter, including glass and metal objects (23), rancid compounds (10), metals, mainly tin (7), and monosodium glutamate (3). Some of the more unusual events that led to illness were lead in herbal remedy capsules, mercury in yogurt, ammonia in frog legs, laxative deliberately added to a cake and a steel screw in biscuits.

In 1981 there were ten deaths, six from listeriosis (infants), three from salmonellosis and one from paralytic shellfish poisoning; there were also four stillbirths and five spontaneous abortions caused by *Listeria*. This is the highest number of deaths so far recorded. The *Listeria* deaths were a result of interuterine infection from the mothers. Protein milk supplement, with cracked raw eggs as an ingredient, was contaminated with *Salmonella enteritidis* and infected 52 patients and staff at a home for the aged. Three elderly patients with debilitating illnesses died as a result of their infection. One of two patients who ate clams contaminated with paralytic shellfish poison in the Gaspé Region of Quebec died in hospital.

The types of foods associated with illness in 1981 were little different from previous years (Table 3). Meat (19.8% of incidents, 23.5% of cases) and poultry (12.7% of incidents, 17.9% of cases) were the foods most often involved. Mishandling of foods that led to their contamination occurred mainly at foodservice establishments (33.1% of incidents, 62.4% of cases); these involved restaurants, hotels, fast food facilities, institutions and catering groups, but to a lesser extent than in 1980 (Table 4). Incidents associated with mishandling in homes and retail food establishments were also lower but those for food processors were higher. Details of these last are listed in Table 5. Forty-two of these incidents (49.4%) involved drinks of some kind - fruit juice, canned or bottled soft drinks and beer, infant formula, milk and egg nog. Thirty-nine incidents (45.9%) were caused by chemical agents, particularly extraneous matter. In addition, poor seaming of canned mushrooms was associated with a single case of *C. perfringens* gastroenteritis, and pepperoni containing high levels of *S. aureus* (>1 million/g) caused enterotoxin intoxication in ten cases. Incidents occurred in every month of the year but most often in November and December and least often in April.

Ontario recorded the greatest number of incidents (267, 41.7%). It was less than the previous year's figure (333, 43.9%), but the percentage in relation to other provinces and territories had not changed substantially. In fact, the percentage of incidents on a regional basis was little different from the percentages for 1980 (Table 6). The number of incidents per 100,000 population was greatest in British Columbia (4.6), Nova Scotia (4.4), Alberta (3.4) and Ontario (3.1), and least in New Brunswick (0.4).

EXAMPLES OF INCIDENTS

Salmonellosis associated with a transatlantic flight

On a visit to France a family from Elliot Lake, Ontario, traveled to and from Paris by the same airline. On

TABLE 2. *Number of persons ill in foodborne incidents by specific etiology in 1981 and 1980.*

Etiology	Number of incidents		Number of outbreaks		Number of cases in outbreaks		Number of cases/outbreaks Range		Number of cases/outbreaks Median		Single cases	
	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980
MICROBIOLOGICAL												
Bacillus cereus	8	11	5	8	77	48	2-66	2-17	2	4	3	3
Campylobacter spp.	5	3	5	2	51	43	2-28	3-40	3	21.5	-	1
Citrobacter freundii	-	1	-	-	-	-	-	-	-	-	-	1
Clostridium botulinum	3	3	1	1	2	3	NA[a]	NA	NA	NA	2	2
Clostridium perfringens	15	18	12	17	396	752	2-150	2-160	9	38	3	1
Coxiella burnetii	1	-	1	-	5	-	NA	NA	NA	NA	-	-
Listeria monocytogenes	1	-	1	-	41	-	NA	NA	NA	NA	-	-
Salmonella spp.	36	64	30	62	1073	2601	2-125	2-450	20	13	6	2
Staphylococcus aureus	29	29	23	18	213	243	2-38	2-110	3	3	6	11
Yersinia enterocolitica	-	1	-	-	-	-	-	-	-	-	-	1
multiple bacterial species	4	5	3	5	149	253	2-48	2-137	49	19	1	-
suspect mold and yeast	20	26	3	5	7	33	2	2-24	2	2	17	21
total	122	161	84	118	2014	3976	2-150	2-450	5	8.5	38	43
PARASITIC												
Taenia saginata	1	-	-	-	-	-	-	-	-	-	1	-
Trichinella spiralis	3	4	1	1	2	8	NA	NA	NA	NA	2	3
total	4	4	1	1	2	8	NA	NA	NA	NA	3	3
ANIMAL												
insect infestation	5	5	-	3	-	6	-	2	-	2	5	2
paralytic shellfish poison	5	7	4	7	9	34	2-3	2-10	2	4	1	-
scombroid poison	1	2	-	1	-	2	-	NA	-	NA	1	1
other animal	-	3	-	-	-	-	-	-	-	-	-	3
total	11	17	4	11	9	42	2-3	2-10	3	2	7	6
PLANT												
algae	2	-	-	-	-	-	-	-	-	-	2	-
Amanita spp.	-	1	-	1	-	2	-	NA	-	NA	-	-
solanine	1	-	1	-	3	-	NA	-	NA	-	-	-
taro	1	-	-	-	-	-	-	-	-	-	1	-
total	4	1	1	1	3	2	NA	NA	NA	NA	3	-
CHEMICAL												
cleaning solutions	2	1	-	-	-	-	-	-	-	-	2	1
extraneous matter	23	10	4	2	8	4	2	2	2	2	17	8
metal	7	11	-	7	-	33	-	2-20	-	2	7	4
monosodium glutamate	3	2	2	1	4	4	2	NA	2	-	1	1
penicillin	-	1	-	1	-	2	-	NA	-	NA	-	-
rancid compounds	10	19	1	7	2	16	NA	2-4	NA	2	9	12
solvents	1	2	-	1	-	2	-	NA	-	NA	1	1
other chemicals	7	5	4	2	19	7	2-7	2-5	4.5	3.5	3	3
total	51	51	11	21	33	68	2-7	2-20	2	2	40	30
TOTAL KNOWN	192	234	101	152	2061	4096	2-150	2-450	4	5	91	82
TOTAL UNKNOWN	455	525	404	469	2601	2888	2-222	2-577	3	2	51	56
TOTAL	647	759	505	621	4662	6984	2-222	2-577	3	3	142	138

[a]NA = not applicable

TABLE 3. *Food associated with foodborne incidents and cases in 1981 and 1980.*

	Incidents[a]				Cases			
	Number		Percentage		Number		Percentage	
Food	1981	1980	1981	1980	1981	1980	1981	1980
Meat	128	165	19.8	21.7	1126	1711	23.5	24.0
beef	36	35	5.6	4.6	754	510	15.7	7.2
sausages	23	22	3.6	2.9	64	54	1.3	0.7
hamburger	31	44	3.2	5.8	77	173	1.6	2.4
ham and pork	15	30	2.3	4.0	41	384	0.9	5.4
other or unspecified	33	34	5.1	4.5	190	590	4.0	8.3
Marine foods	45	54	7.0	7.1	216	243	4.5	3.4
fish	22	25	3.4	3.3	66	59	1.4	0.8
shellfish	20	27	3.1	3.6	144	144	3.0	2.0
fish and shellfish	3	2	0.5	0.3	6	40	0.1	0.6
Poultry	82	96	12.7	12.7	860	1923	17.9	27.0
chicken	62	73	9.6	9.6	435	1164	9.1	16.3
turkey	19	22	2.9	2.9	423	745	8.8	10.5
other or unspecified	1	1	0.2	0.1	2	14	0.0	0.2
Eggs	4	6	0.6	0.8	12	29	0.2	0.4
Dairy foods	33	29	5.1	3.8	299	165	6.2	2.3
cheese	6	3	0.9	0.4	15	65	0.3	0.9
milk	12	12	1.9	1.6	200	73	4.2	1.0
ice cream	7	5	1.1	0.7	19	11	0.4	0.2
other	8	9	1.2	1.2	65	16	1.3	0.2
Bakery products	47	54	7.3	7.1	137	145	2.9	2.0
cakes, pastries, bread, muffins and doughnuts	9	12	1.4	1.6	31	37	0.6	0.5
pizzas	16	23	2.5	3.0	56	64	1.2	0.9
pies, puddings, and pasta products	13	11	2.0	1.4	27	25	0.6	0.3
other	9	8	1.4	1.1	23	19	0.5	0.3
Infant foods	10	12	1.5	1.6	10	18	0.2	0.3
Confectionery	10	9	1.5	1.2	21	20	0.4	0.3
Vegetables and fruits	84	65	13.0	8.6	171	162	3.6	2.3
processed acid vegetables and fruits	32	28	4.9	3.7	50	86	1.1	1.2
processed low acid vegetables and fruits	9	7	1.4	0.9	17	14	0.4	0.2
raw products or wild plants	3	5	0.5	0.7	6	9	0.1	0.1
other	40	25	6.2	3.3	98	53	2.0	0.8
Chinese foods	37	61	5.7	8.0	103	185	2.1	2.6
Salads	19	17	2.9	2.2	387	47	8.1	0.7
Sandwiches	17	20	2.6	2.6	165	91	3.4	1.3
Beverages	35	32	5.4	4.2	53	65	1.1	0.9
Multiple vehicles	10	14	1.5	1.9	73	158	1.5	2.2
Other foods	19	35	2.9	4.6	97	327	2.0	4.6
Unknown	67	90	10.4	11.9	1074	1833	22.4	25.7
TOTAL	647	759	100.0	100.0	4804	7122	100.0	100.0

[a]All incidents whether associated with a specific etiological agent or not.

flights, snacks in plastic bags handed to boarding passengers were the only foods offered. No problems were encountered during or after the outgoing flight, but nausea was felt by the wife about 24 h after eating food on the returning flight, and the following day had abdominal cramps, diarrhea and chills. She was confined to bed for 6 d which affected her business affairs. A physician prescribed medication and had her stool checked for pathogens. *Salmonella typhimurium* was subsequently identified as the causative agent. The snack items on the flight to Montreal consisted of cake, cheese, sliced turkey and pâté. The husband and son ate only the first two items but the wife, being hungry, consumed the meat as well. Because the family ate common foods at other meals before and after the flight, the wife thought that the turkey was the most likely source of her illness. The snacks were unrefrigerated when given to passengers and could only be stored at room temperature during the flights. Although there was no direct laboratory evidence to link the food served by the airline and salmonellosis,

TABLE 4. *Places where food was mishandled in foodborne incidents in 1981 and 1980.*

Establishment	Number of incidents		Percentage of incidents		Number of cases		Percentage of cases	
	1981	1980	1981	1980	1981	1980	1981	1980
Foodservice establishments	214	313	33.1	41.2	2997	5294	62.4	74.3
hotels and restaurants	126	179	19.5	23.5	926	1228	19.3	17.2
fast food facilities	38	52	5.9	6.9	117	187	2.4	2.6
institutions and schools	20	24	3.1	3.2	1067	1179	22.2	16.6
catering groups	19	30	2.9	3.9	706	1997	14.7	28.0
others	11	28	1.7	3.7	181	703	3.8	9.9
Homes	87	120	13.4	15.8	456	429	9.5	6.0
Food processing establishments	85	77	13.1	10.1	141	623	2.9	8.7
Retail food establishments	32	32	5.0	4.2	43	137	0.9	1.9
Other	13	8	2.0	1.1	328	58	6.8	0.8
Unknown	216	209	33.4	27.5	839	581	17.5	8.2
TOTAL	647	759	100.0	100.0	4804	7122	100.0	100.0

TABLE 5. *Incidents of foodborne illness caused by mishandling of food processing establishments in 1981.*

Etiology	Vehicle		Number of Incidents	Number of Cases
MICROBIOLOGICAL				
Clostridium perfringens	mushrooms, canned		1	1
Staphylococcus aureus	pepperoni		1	2
mold, undefined	beer, bottled		1	1
mold, undefined	beer, canned		1	1
mold, undefined	raspberry yogurt		1	2
mold, undefined	cola, bottled		3	5
mold, undefined	apple juice, canned		2	2
mold, undefined	root beer, bottled		2	2
mold, undefined	apple juice, bottled		1	1
mold, undefined	ginger ale		1	1
yeast, undefined	soft drink, bottled		1	1
yeast, undefined	malt beer, bottled		1	1
yeast, undefined	cola, bottled		1	1
yeast, undefined	cola, canned		1	1
mold and yeast, undefined	grape juice, bottled		1	2
		subtotal	19	24
ANIMAL				
histamine	tuna, canned		1	1
insects	cereal snack bar		1	1
		subtotal	2	2
PLANT				
toxic alga (species unknown)	protein supplement		2	2
CHEMICAL				
lead	herbal remedy		1	1
mercury	yogurt		1	1
tin	orange juice, canned		2	2
tin	pineapple, canned		1	1
tin	oranges, canned		1	1
rancid compound, undefined	margarine		1	2
rancid compound, undefined	corn chips		1	1
rancid compound, undefined	infant formula, canned		2	2
mineral oil	cola, bottled		1	1
chemicals (unspecified)	bread		1	5
caustic soda	cola, bottled		1	1
solvents, undefined	soda water, bottled		1	1
sodium hypochloride	soft drink, bottled		1	1
chloramine	2% milk		1	3
dough	tortillas		1	1
dark brown material	tortilla chips		1	2

burnt food	infant formula powder, canned		1	1
burnt food	wheat		1	1
steel screw	buttermilk biscuits		1	1
metal fragments	potato chips		1	1
glass	tomatoes, canned		1	1
glass	apricot jam		1	1
glass	chocolate spread		1	1
paper	apple juice, bottled		1	2
paper	beer, bottled		1	1
grease	ginger ale, bottled		1	1
grease	potato chips		1	2
dark petroleum material	beer, bottled		1	1
extraneous matter, undefined	strawberry yogurt		1	1
extraneous matter, undefined	beer, bottled		2	2
extraneous matter, undefined	cola, bottled		3	3
stone	chocolate nut bar		1	1
		subtotal	37	47
UNKNOWN				
probably bacterial	mushrooms, canned		5	13
probably bacterial	pizza		1	1
probably bacterial	whipped cream		1	1
probably bacterial	beef steak		1	24
probably bacterial	lobster, canned		1	1
probably bacterial	peaches, canned		1	1
probably bacterial	liver pâté		1	2
probably bacterial	egg nog		1	1
probably bacterial	peas and carrots, canned		1	1
probably mold	beer, bottled		1	1
probably yeast	beer, bottled		1	1
probably yeast	apple juice, canned		1	1
probably yeast	cherry juice, bottled		1	4
probably tin	mango and payaya juices, canned		1	2
probably tin	pâté, canned		1	2
probably iron	green beans, canned		1	1
probably iron	ginger ale, canned		1	2
probably metal	pineapple, canned		1	2
probably chemical (unspecified)	raspberries, canned		1	1
unknown	muffins		1	2
unknown	raisin pie		1	2
		subtotal	25	66
TOTAL			85	141

the storage conditions were certainly conducive to growth of pathogens. Both the wife and Medical Services Branch of Health and Welfare Canada contacted the airline expressing their concerns over the way potentially hazardous food was stored and served. Salmonellosis acquired from foods served on aircraft has been documented before, although the rapid dispersal of passengers at the termination of flights makes investigation difficult, and many outbreaks undoubtedly remain undetected. The largest so far documented occurred in March 1984 when an estimated 2,747 passengers and crew were infected by *Salmonella enteritidis* after eating foods coated with contaminated aspic *(15)*.

Recall of canned mushrooms

In January and early February, there were at least four episodes of gastroenteritis associated with canned mushrooms imported from China. No agents were identified as causing the illness but there were double seam defects, including knocked down flanges, droops and false seams, that could have allowed bacteria to reach the mushrooms. As a result of the investigation a public recall was initiated and 35% of the lots were detained or refused entry into Canada. This represented $1.5 million worth of inventory. Because of the seriousness of the problem, the Peoples Republic of China met with Canadian government officials and it was agreed that the defects observed were unacceptable. As a result of these discussions, a delegation of canning experts visited four canneries and five government inspection bureaus in China to help determine how the defects had occurred. Although the canneries were well laid out and had good sanitation programs, there was excessive manual handling of the cans and a certain lack of training by the laboratory staff in interpreting their can tear-down findings. In addition, cases were not containerized on board ship and much of the damage was caused during transit. Full cooperation of Chinese officials helped improve the situation, and the

TABLE 6. *Regional distribution of foodborne incidents in 1981 and 1980.*

Province or Territory	Number of incidents		Percentage of incidents		Number per 100,000 population[a]	
	1981	1980	1981	1980	1981	1980
British Columbia	127	165	19.6	21.7	4.6	6.2
Alberta	75	80	11.6	10.5	3.4	3.7
Saskatchewan	27	27	4.2	3.6	2.8	2.8
Manitoba	22	24	3.4	3.2	2.1	2.3
Ontario	267	333	41.3	43.9	3.1	3.9
Quebec	97	84	15.0	11.1	1.5	1.3
New Brunswick	3	8	0.5	1.1	0.4	1.2
Nova Scotia	13	23	2.0	3.0	4.4	4.5
Prince Edward Island	2	3	0.3	0.4	1.6	2.4
Newfoundland	9	8	1.4	1.1	1.6	1.4
Northwest Territories	2	2	0.3	0.3	1.5	2.7
Yukon	–	1	–	0.1	–	4.5
Foreign country acquisitions	3	1	0.5	0.1	NA[b]	NA
Canada	647	759	100.0	100.0	2.7	3.2

[a]Based on 1981 and 1980 estimates by the Census Division, Statistics Canada.
[b]NA = not applicable.

quality of canned mushrooms reaching Canada since then has been satisfactory.

Case-cutter damage

Case-cutter damage in canned food that leads to illness has been reported every year in the Annual Summaries since records began for 1973. Five episodes that occurred in 1981 are discussed below. In all of them there was a cut in the can up to 13 mm long that allowed air and possibly microorganisms to enter. These types of cut are usually made by a utility or similar type of knife when cardboard cases are opened to remove the cans for display on retail store shelves. Cut marks on cans are frequent and complete penetration of the metal is not rare. In none of these incidents was the cause of the illness completely identified, although in two of them mold was a contaminant. In others, corrosion of the tin lining by oxygen and acidic food components could have caused tin poisoning. *(a)* In the first episode canned wax beans had a burning taste according to the complainant who also became dizzy 30 min later. The liquid had an oily appearance. *(b)* Two children ate some chili made with canned kidney beans after it had simmered for 2 h. Although one child did not mention any adverse effects, the other complained of malaise beginning 8 h later and lasting 48 h. The mother tasted some of the chili 3 h after the children had eaten it and noticed that the chili had 5 cm of froth on top and had an acid tinny taste that lasted in her mouth until the following morning. She also felt nauseous. Even that taste was enough to convince the mother that the chili was not good and she discarded it. Subsequent examination of cans of kidney beans showed a case-cutter problem at the retail store. *(c)* One individual felt nauseous and eventually vomited a short time after eating heated canned spaghetti. He subsequently examined the can and found a hole and a lump of green material which was later identified as mold. *(d)* A father used canned evaporated milk to prepare infant formula, even though it appeared thick and lumpy. The infant was sick 5½ h after eating this food and was taken to hospital but was released after having an examination. The empty can had a blue cheese smell and contained black lumps, subsequently found to be mold growth. *(e)* A few mouthsful of unsweetened orange juice was drunk by an adult who felt nauseated afterwards. He noted that the juice was brownish in color and it had a metallic taste. The sides of the can were severely corroded and probably the acid juice and the air oxidized the tin coating to toxic stannous oxide. These episodes show that because usually only one can in a lot is cut through the metal, the number of persons ill is small. Superficial investigation could easily overlook the cause of such a problem and case-cutter related illnesses may be more common than realized. This type of damage will continue to occur in cans until better ways of opening cartons are used.

Poisoning from uncooked taro leaves

The taro plant is widely used as a staple food in southeast Asia, Pacific islands, South America and Africa. The most frequently eaten plant is the underground corm but leaves are also consumed as a spinach-like vegetable. Unfortunately, the plant contains calcium oxalate that produces an unpleasant taste and can cause intestinal problems especially if large doses are taken *(1)*. Those used to eating this and other food plants that contain the oxalate normally boil or bake the edible portion to destroy the chemical. A British Columbia resident purchased taro leaves in a retail store and immediately after having eaten some of the leaves raw, developed a numbness of the mouth. The investigators felt that adequate instructions to boil or bake the leaves should have been given to consumers not normally familiar with this product and if this had been done in this case the illness probably would not have occurred.

Spirulina-*associated illness*

Spirulina is a blue-green alga that is used as a protein supplement, especially for persons on diets. The product is harvested from freshwater or brackish ponds in the wild and the dried algal powder formed into tablets which are sold in health food stores. A state-controlled company in Mexico produces 1000 tonnes/yr; this product tends to have fewer extraneous matter particles than the alga gathered in the wild. Two British Columbia women claimed that illness occurred from eating these tablets. In November, a nurse ate three tablets on an empty stomach and 2 h later experienced nausea, vomiting, retching, diarrhea and weakness, recovering after 5 h. Two weeks later she took two tablets, also on an empty stomach, and 1½ h later developed symptoms similar to the previous occasion. Although she took anti-nausea suppositories she did not feel better for over 12 h. In early December, another woman took five tablets and other protein supplements on an empty stomach (this would be normal because the tablets were meant to replace other foods in order to reduce weight) and in less than 30 min developed severe cramps and diarrhea. This action was repeated the next day with similar results. She thought the problem might be ulcers even though antacids were not helping. Her physician disagreed and suspected the *Spirulina* tablets as the source of the problem. To check this possibility, the next day she took the tablets only and the same reaction occurred, and the following day did so again but this time on a full stomach and the symptoms were much milder (some diarrhea). She contacted the health food store owner who removed the lot from sale. The tablets consumed by the two cases were from different lots made by the same manufacturer, probably in Mexico. Laboratory tests showed that the tablets were virtually sterile and did not contain bacterial toxins. However, insect fragments and other vegetable matter were found. Crushed tablets injected into mice intraperitoneally did not cause acute toxicity associated with some toxic algal strains, but two mice became inactive and died 2-3 d after having been given tablets from the bottle causing illness in one of the complainants. These slow deaths were most likely bacterial in origin. However, they were not like the rapid onset of acute symptoms experienced by the two victims. Some persons consuming single cell protein, including algae, have developed nausea, vomiting and diarrhea, probably because of high protein, high nucleic acid and high uric acid levels, but it is not certain why *(11)*. Although the cause of illness is uncertain, it was noted that tablets consumed on an empty stomach had a more noticeable effect than those taken after a meal.

Mouth injuries caused by glass

Broken glass appears to occur in 0.03% of bottled products (Health Protection Branch data), but the size of the particles is usually small and probably would not cause much injury except perhaps to infants. The Health Protection Branch considers any particle greater than 2 mm in diameter is a health hazard. Illnesses associated with larger pieces of glass (up to 13 mm in diameter) have already been reported in these Annual Summaries (1975, 1976, 1977, 1979). Three more episodes occurred in 1980 where damage to the mouth was recorded. A Toronto woman ate imported apricot jam taken from a jar and bit a piece of glass that punctured her tongue in two places. The glass piece was similar to the lip of the imported jar. Although laboratory examination of nine jars from a retail store did not show any glass fragments, other complaints concerning glass in the product were received. Consequently, the importer agreed to screen his next shipment by laboratory testing. Another Ontario resident, a 16-year-old boy, chipped a tooth and required dental work costing $200 when he bit a piece of glass found in chocolate spread imported from Italy. This piece of glass also matched the jar and was considered a valid complaint. As a result of this incident, the manufacturer agreed to install a machine that would detect extraneous matter. The source of the glass in the third problem was more difficult to determine because the product containing the glass was in a can. A woman cut herself in the mouth with an amber-colored piece of glass 13 × 3 × 2 mm after eating canned tomatoes. The follow-up to a similar complaint involving a different manufacturer indicated the possible source of the glass. Beer bottles thrown on the tomato fields were broken during mechanical harvesting and glass pieces may have become embedded in some of the tomatoes.

Chlorine disinfectant contamination of milk

A teenage boy drank a glass of milk and immediately vomited because of the chlorine-like taste. His throat, mouth and lips felt burnt and blisters developed in his mouth and on his lips. Other consumer complaints had also been received by the dairy and a sample of milk was sent for laboratory analysis. An investigation of the dairy showed that Multichlor disinfectant containing chloramine T had accidentally contaminated 3,175 kg of 2% milk and a recall was commenced at 11:00 a.m. the next day with a public announcement at 4:00 p.m.

Because human error was involved the responsible employee was instructed and the problem did not recur. Other chlorine compounds have contaminated milk and in the United States there have been two recent problems concerning Heptachlor. This compound has restricted use as a pesticide, but was found in milk from dairy cattle fed on pineapple greenchop feed in Hawaii in 1982 *(12,13)* and also from cattle in three midwest states fed on grain and mash produced by a gasohol production plant in 1986 *(14)*. No acute or subacute effects were detected in milk drinkers exposed to Heptachlor in these two situations.

WATERBORNE DISEASE DATA

Eight incidents of waterborne disease were reported in 1981, double the number for 1980. In all, there were 178 cases (Table 7). In 1980 three large outbreaks contributed

TABLE 7. *Waterborne incidents for 1981.*

Inc. no.	Etiology	Onset	Suspected water acquired from: Locality	Establishment	Where water mishandled	Vehicle	Lab. data[a] P V	Clinical data: No. ill (at risk)	Incubation period	Duration	Symptoms[b]	Comments
BACTERIAL												
1.	*Campylobacter jejuni*	?	Kamloops, British Columbia	camp	camp	drinking water	X	5(?)	?	?	?	
2.	*Pseudomonas aeruginosa*	April 3-5, 9-11	Fort McMurray, Alberta	motel	motel	recreational whirlpool	X	46 (76)	?	?	rash, F., ear infections	
3.	*Salmonella typhimurium* phage type 10	March	St. Antony, Newfoundland	homes	homes	drinking water	XX	18 (?)	?	?	C.D.F.	3 cases (all infants) and 15 asymptomatic carriers. Wells not chlorinated
PARASITIC												
4.	*Giardia lamblia*	April 11-May 28	U.S.S.R. or Finland	hotels	municipal water supply	drinking water	X	42 (71)	?	2-30 days, median 5 days	N.C.D.F., gas, weakness, loss of appetite	school tour to 4 cities in U.S.S.R and Finland from April 10 to 21. Illness not recognized until return to British Columbia
5.	*Giardia lamblia*	April 27-30	U.S.S.R or Finland	hotels	municipal water supply	drinking water	X	14 (32)	?	7 days	N.C.D.F., gas, weakness loss of appetite	similar school tour to no. 4 except from April 17 to 27 and originated in Alberta (Lac La Biche). Cases drank 1½ glasses tap water per day more than well persons
6.	*Giardia lamblia*	early July	Kapuskasing, Ontario	wilderness camp for scouts	wilderness camp	river water	X	3 (14)	up to 2 weeks	?	?	untreated river water drunk on camping trip
7.	*Giardia lamblia*	August-September	100 Mile House, British Columbia	homes	municipal water supply	drinking water	X	≥25 (?)	?	?	C.D., gas, weight loss	unfiltered chlorinated water from a creek is used as a municipal water supply. Beaver and muskrat found in the creek were positive for *Giardia*
UNKNOWN												
8.	?	August 4	Calgary, Alberta	canoeing trip for naval cadets	wilderness camp	river water		25 (28)	24 h	10 days	V.D.F.	no water taken on trip, so river water drunk at locations near zoo and below sewage plants

[a]p = patient, V = vehicle.
[b]C = cramps, D = diarrhea, F = fever, N = nausea.

to the much larger total of 1,124 cases. The 1981 outbreaks consisted of three of bacterial origin, four caused by the parasite *Giardia* and one of unknown etiology. All but one involved contaminated drinking water. In three of these, unchlorinated water was drunk in camping situations (incidents nos. 1, 6 and 8). In one of these (no. 8) naval cadets were on a wilderness camp trip and neglected to bring water with them. Most of them were so thirsty that they drank from the river near the zoo and city sewage outlets and 24 h later experienced vomiting, diarrhea and fever caused by an undetermined agent. In another three incidents (nos. 4, 5 and 7) municipal water supplies were affected. In two of these, separate school trips to the USSR and Finland resulted in approximately half the visitors becoming ill and being diagnosed on their return to Canada as having giardiasis. In incident no. 5, cases drank 1½ glasses more tap water per day than well persons. The largest outbreak reported in 1981 was a skin rash arising from infection by *Pseudomonas aeruginosa* in a motel whirlpool. Some people also had ear infections and fever.

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