generally; and that our chief line of defence is the maintenance of resistance by every means conducing to a vigorous state of health.

[NOTE.—I did not see Dr. D. M. Dunlop's address on "Modern Views in the Prevention of Tuberculosis," in the *Journal* of December 24, 1938 (p. 1298), until the day after the proof of this article reached me. It supplements the train of thought I have endeavoured to convey, and may well be read in conjunction with it.]

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The Director-General of Health, New Zealand, in a report covering the year ended March 31, 1938, states that the period under review was memorable for an outbreak of poliomyelitis, ranking, from the point of view of magnitude and severity, with the major epidemics of 1916 and 1925. An account of the incidence of this disease during the last fifty years in New Zealand is given in a special appendix. With regard to the vital statistics as a whole the death rate rose to 9.08 per thousand from 8.75 in the preceding year. In view of the increasing number of people of advanced years now resident in New Zealand this rise was not unexpected, and a further rise is thought probable in the near future. A substantial reduction is recorded in the number of deaths from puerperal causes, excluding septic abortions. The proportion of confinements in maternity hospitals now exceeds 86 per cent., and although accommodation is adequate at present it is felt that saturation point will soon be reached. European births have been increasing by approximately one thousand per annum and every year a larger proportion desire a hospital confinement. The Maori women are also appreciating the advantages of this procedure.

EPIDEMIC NAUSEA AND VOMITING

BY

J. D. GRAY, M.D.

Miller and Raven (1936) recorded the outbreak of an acute infectious disease termed "epidemic nausea and vomiting" in a boarding-school for girls in Thanet. Their description followed that of a similar epidemic which took place in 1935 in Denmark, where the disease was first described as a clinical entity.

Towards the end of 1938 an outbreak occurred in South Hampshire. It is proposed to describe this epidemic, to show that the Thanet outbreak was not an isolated incident, and to suggest the probability of the widespread incidence of the disease. With the entity of the disease established and its symptoms remembered, medical officers of health may be saved the trouble of investigating food supplies, drains, kitchens, and stools in future institutional outbreaks. Lastly, it may be possible to rescue another disease from the conglomerate called "gastric influenza."

In general the picture is as follows: The illness is short, lasting about two days. The patient complains of dizziness, nausea, and vomiting. Less frequently, dizziness and nausea alone may occur. It is usually afebrile. In the South Hampshire epidemic frontal headache and occasionally bradycardia were also noted. In common with the Danish outbreak, diarrhoea was encountered in our epidemic, and a higher incidence of mild pyrexia was seen as compared with that in Thanet. As the epidemic occurred in an institution and the surrounding country at the same time, it will for convenience be given under separate headings.

The Epidemic in School A

This school is situated on Hayling Island and has eighty-two girls, boarders and day pupils. The staff, including servants, amounts to a further twenty. The health of the school before the epidemic had been good: the common cold was not unduly prevalent. The first case appeared on September 27, 1938, and the last on October 25. The spread of the disease is tabulated as follows:

Date	Dizziness, Nausea, and Vomiting		Dizziness and Nausea only	
	Children	Adults	Children	Adults
September 27 ..	1	—	—	—
" 28 ..	1	—	—	—
October 8 ..	1	—	—	—
" 12 ..	18*	—	—	—
" 13 ..	1†	—	—	—
" 15 ..	11	3‡	—	—
" 16 ..	1	—	—	—
" 17 ..	—	—	2	—
" 18 ..	3	—	—	—
" 19 ..	1	—	—	—
" 20 ..	3	—	—	1
" 21 ..	—	—	1	—
" 25 ..	1	—	—	—
Totals ..	42	3	3	1=49

* Included in this total are two day girls. Forty-eight hours after their attack the parents of each girl developed the disease.

† This child vomited during a Brownie class. Forty-eight hours later eleven other girls, two mistresses, and a maid in the room all developed the disease.

‡ One of these three cases developed diarrhoea.

Dizziness was present to some extent in all cases. It was most marked, however, in the three children who did not vomit. These patients could not sit up in bed without feeling faint. The best description they could give was that they felt "sea-sick." Six of the forty-two patients had bradycardia. Five of them had temperatures averaging 99.6°, lasting about a day. Twelve complained of a transient frontal headache. All except one were fit for school in three days; this patient took five days to recover, then relapsed, the relapse lasting three days. The medical officer of health for the district inspected the school with a view to tracing the cause of the outbreak. Food, milk, drains, etc., were all checked and absolved from suspicion. In pursuing his investigations six throat swabs from active cases were taken for culture and were reported on as follows: non-haemolytic streptococci, pneumococci, and sarcina in four swabs; the fifth contained a heavy growth of staphylococci, and the sixth haemolytic streptococci.

The Epidemic in the Countryside

The general health of the population on Hayling Island at the time of the epidemic was good. The usual number of autumnal colds were noted. In the cases described below, unless indicated, the physical examination was negative.

Case 1; September 26.—Adult male. An attack of acute nausea and vomiting at 3 a.m. with some epigastric tenderness. Apyrexial. Diarrhoea started at 6 p.m. the same day, and lasted twenty-four hours. No giddiness. Duration thirty-six hours.

Case 2; October 4.—Adult female. Dizziness, nausea, and vomiting of acute onset; diarrhoea set in during last twenty-four hours of attack. Apyrexial. Duration thirty-six hours.

Case 3; October 5.—Adult female. Dizziness, nausea, and vomiting of acute onset; temperature 99.4°; diffuse abdominal tenderness. A mild diarrhoea set in during the last day of illness. Total duration three days.

Case 4; October 8.—Adult female. An acute attack of nausea and vomiting. No giddiness; apyrexial. No diarrhoea. Duration twelve hours.

Case 5; October 10.—Male child. An acute attack of nausea and vomiting, starting at 2 a.m. No dizziness; apyrexial; no diarrhoea. Duration twenty-four hours.

Case 6; October 10.—Female child. An acute attack of nausea and vomiting lasting one day, followed by a mild diarrhoea lasting two days. No giddiness. Apyrexial. Duration three days.

Cases 7 to 10; October 12.—An adult female and her three children. The children all complained of dizziness and nausea; this was followed by vomiting. The attack set in during the night. It was apyrexial in all three and there was no diarrhoea. The mother complained more of nausea and vomiting than of dizziness. Diarrhoea set in during the last twenty-four hours of the illness. Apyrexial. Total duration two days. These four comprised all the members in the house.

Case 11; October 12.—Adult male. An acute attack of giddiness, nausea, and vomiting. Apyrexial. No diarrhoea. Duration twelve hours.

Case 12; October 13.—Adult male. Dizziness, nausea, and vomiting which lasted all night. In the morning, with the cessation of the nausea and vomiting, diarrhoea set in which lasted throughout the day. Apyrexial. Duration twenty-four hours.

Case 13; October 13.—Adult male. Dizziness, nausea, and vomiting. Apyrexial. No diarrhoea. Duration thirty-six hours.

Cases 15 to 20.—These cases represent another house infection. The description is in more detail, as it illustrates the

variation of symptomatology that occurs. The first patient was the eldest daughter. She awoke at 2 a.m. on October 15 feeling very dizzy, got up, and promptly vomited. The dizziness, nausea, and vomiting lasted till noon of the same day. During this stage she had a right frontal headache. She was apyrexial. Total duration twenty-four hours. The second patient was the father of the first. He was attacked on October 17 with acute nausea and vomiting, and was apyrexial. There was no dizziness or headache. On the 18th the nausea had gone, but diarrhoea supervened that lasted till the 19th. The duration of the illness was two days. The next case was that of the wife. Her illness started on October 18 with an acute attack of vomiting accompanied by a frontal headache. Apyrexial; no diarrhoea; no dizziness. Duration eight hours. On the 18th the second daughter was attacked. She awoke at 4 a.m. with giddiness and anorexia, but did not vomit. This giddiness lasted two days. During the second day a mild diarrhoea supervened, which also lasted about two days. The giddiness was accompanied by a slight pyrexia (99°). There was no headache. Total duration three days. The fifth case was that of a cousin living in this household, who on October 17 awoke with intense giddiness and nausea; this was followed by vomiting. Apyrexial; no diarrhoea. Duration twenty-four hours. The sixth and last of this series was the mother of the preceding patient. On October 17 she began to feel giddy and nauseated. During the day this wore off, only to recur the following morning. This lasted for five days; on the sixth and seventh days diarrhoea occurred. On the eighth day the patient was quite well, but felt "washed out." No headache; apyrexial. Duration one week.

Case 21; October 15.—Female child. An acute attack of nausea and vomiting lasting five hours. Apyrexial; no dizziness or diarrhoea.

Case 22; October 15.—Female child. Dizziness, nausea, and vomiting; temperature 99.2°; diffuse epigastric tenderness. The attack passed off as the day advanced, but recurred the following morning, ceasing at midday. Duration thirty-six hours.

Case 23; October 17.—Adult male. Dizziness, nausea, and vomiting occurred acutely during the night. Diarrhoea set in during the morning, and lasted for twenty-four hours. Apyrexial. Duration thirty-six hours.

Case 24; October 17.—Adult female. Dizziness, nausea, and vomiting lasting twenty-four hours. Diarrhoea set in on the second day. Apyrexial. Duration two days.

Case 25; October 24.—Adult female. Dizziness, nausea, and vomiting; no diarrhoea; apyrexial. The attack lasted seven days, waxing and waning in intensity. Treatment was without effect.

Case 26; October 31.—Adult female. Frontal headache followed by giddiness, nausea, and vomiting; apyrexial; no diarrhoea. Headache lasted twenty-four hours and giddiness three days.

The total number of cases was twenty-six. Thirteen were females, six males, and seven children. The first case was seen on September 26 and the last on October 31. Nineteen patients complained of giddiness, twenty-four vomited, and all had nausea. Eleven had diarrhoea, three had slight temperatures, three had frontal headache, and three had abdominal tenderness.

Discussion

Miller and Raven, in reporting their epidemic, noted that it differed from the Danish syndrome in: (1) the Danish epidemics were not institutional; (2) the English epidemic had no relapses, whereas in the Danish this feature was seen; (3) diarrhoea was present in the Danish and absent in the English. In all other respects the epidemics were identical. The Hayling epidemic bridges the difference between the Danish and first English outbreaks in that the points not seen in the latter were present in our epidemic. Thus the disease may or may not be institutional. The common symptoms are nausea, vomit-

ing, and giddiness. Less commonly diarrhoea may follow the vomiting, and more rarely a pyrexia may be met with. Another symptom which was encountered here and apparently not noted before was that of frontal headache. Of the twelve cases of diarrhoea eleven occurred in adults.

As the disease is of such short duration it is difficult to decide what particular system is attacked. Earlier papers suggest either the gastro-intestinal or the nervous. So far, in all examinations made no organisms known to cause gastro-enteritis have been found. The greatest argument against a food or water contamination is the type of spread in families. Instead of the whole community going down at once there is a gradual peripheral spread from the first case noted in the institution or family. This can be well seen in our epidemic. In the school cases two children went home, and two days later both parents contracted the disease. In Cases 15 to 20 of the country epidemic the passage from one individual to others in the family is clearly shown. Evidence would suggest that it is a person-to-person infection with at least a two-day incubation period. As Miller and Raven suggest, the probabilities point more to an acute infection of the central nervous system, possibly of a virus type. All the symptoms except the diarrhoea may then be explained. Presumably a droplet infection is the mode of spread. It is difficult to assume that the attacks heretofore reported are isolated incidents; more probably the syndrome is kept alive by sporadic cases occurring about the country and only flaring to epidemic proportions when the environment is ripe.

The importance of this disease does not lie in its manifestations, which are mild, but in the possibility of its being confused with an outbreak of food poisoning or Sonne dysentery when it occurs in institutions. The latter are more serious matters than epidemic nausea and vomiting.

Summary

An outbreak of epidemic nausea and vomiting is reported.

It is suggested that the disease is endemic in this country and capable of assuming epidemic proportions at any time.

The possibility of confusing it with mild dysentery or food poisoning is noted.

I am deeply indebted to Drs. A. J. May and T. G. Anderson for permission to report their cases, and to Dr. W. S. Slater, medical officer of health for the district, for his kind help.

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A. Turchetti (*Minerva med.*, 1938, **29**, 570), who records an illustrative case, states that he has found only one other example on record of peritonitis due to meningococci. This was reported in 1917 by Moeltgen in a man, aged 21, who developed this complication in convalescence from cerebro-spinal fever; laparotomy showed a diffuse purulent peritonitis from which a pure culture of meningococci was obtained. Turchetti's own patient was a man, aged 29, who was suddenly seized with severe abdominal pain, which diminished in a few days, leaving a diffuse abdominal discomfort. Three months later the pain became worse again and he developed a circumscribed fluctuating swelling in the left flank; aspiration produced a creamy greenish pus from which one pure culture of meningococci was obtained. Complete recovery took place. The case was of interest owing to the rarity of its causation and its resemblance to pneumococcal peritonitis.

SPORADIC INFECTIONS DUE TO B. TYPHOSUS

BY

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Recent epidemics of typhoid fever have focused attention on a disease hitherto infrequently met with by the majority of younger practitioners. It may be anticipated that one result of these epidemics will be to increase the number of typhoid carriers in this country, and that sporadic cases, or localized outbreaks, may be expected. Isolated cases are more likely to be missed in the early stages of the disease if only for the reason that the practitioner may not give prominence to typhoid fever in his differential diagnosis.

The following account of ten non-epidemic cases of typhoid fever seen during the last four years in two relatively small areas (population approximately 45,000 each) may serve to illustrate the protean nature of the disease in regard to its clinical manifestation, infectivity, and transmission. Unfortunately it is not always possible to prove conclusively the source of typhoid infections, and the investigator's deductions in this respect may be taken as those which appeared most likely from a mass of circumstantial evidence.

Case Histories

Case 1.—A schoolgirl aged 9 was notified as suffering from acute tuberculosis of a few days' duration. She was said to present symptoms similar to those shown by her brother (Case 2), who had died three weeks previously of "miliary tuberculosis." The salient features of the case were pyrexia, furred tongue, and constipation. Blood culture and subsequent Widal reaction confirmed an infection by *B. typhosus*. The patient made a good recovery.

Case 2.—In view of Case 1 the circumstances attending the illness of Case 2 (aged 8) were investigated, and it was found that the patient had eaten raw cockles from the foreshore three to four weeks before his death. The Widal reactions of the immediate contacts of Cases 1 and 2 were negative, and accordingly samples of cockles from the reported gathering-ground were examined. They were found to be heavily contaminated by sewage from an outfall, but no actual typhoid organisms could be demonstrated. No further cases arose as a result of these two cases.

Case 3.—A schoolgirl aged 12 was seen in consultation as a possible case of tuberculosis. Moderate pyrexia, constipation, and malaise were the only obvious findings. The Widal reaction, however, established the diagnosis of typhoid fever. The contacts gave no evidence as to the source, and food and water did not appear to be implicated. It transpired that the father had recently been employed in scraping the woodwork of a pier, which was contaminated by sewage organisms. His working clothes were so offensive that he was wont to remove them in the scullery, where they were hung up beside a sink. It was just possible that infection was conveyed by a towel, drinking-mug, or hands which came in actual contact with the contaminated clothing. The patient recovered and, so far as is known, did not infect others.

In the foregoing three cases a sewage outfall was suspected to be the vehicle of infection. The area served by the sewer was outside the observer's jurisdiction, but the investigations made failed to bring to light any other cases or carriers.

Case 4.—This case was discovered during a visit paid on receipt of information from the Department of Health for Scotland that a refugee from Spain had arrived in the area. The man, who was aged 20, had returned a week previously after service with