II.

COMMUNICABLE DISEASE

Catharine Barry

Introduction

"Common Communicable Disease" was chosen as a thesis in order to not only review the general textbook facts but also to become acquainted with the latest and most up to date opinions on the subject. The object of the research was to be as well informed on these topics as possible so that the general public can obtain a satisfactory answer to its questions. Thus: This thesis served as an "excuse", so to speak, for delving into both new and old methods of approach and the result of the action taken. It gave me a chance to form opinions of my own based on those things that were regarded as fact by some doctors and nurses and as theory by others. I definitely feel that the research I have done has given me a much better understanding of health in general and such knowledge has already proved valuable to me in meeting the general public since I am better able to interpret the reasons backing the information offered to them.

Through practical experience in dealing with the public, both in the hospital and in the field, I was able to anticipate the questions that lay people will expect the nurse to known something about. I used my field work especially as a basis for selection of material.

Scarlet Fever

The disease, Scarlet Fever, is an acute infectious toxemice, highly contagious, which displays a very characteristic scarlet rash. Scarlet fever, and incidentally its synonym Scarletina, is caused by a type of streptococcus hemolyticus found in the throat, nose and pharynx in most cases during the first week of illness and in many cases throughout the disease. Loxins are absorbed into the blood stream from the throat causing the general symptoms and the rash. However, many of the complications and are due to the presence of the bacteria themselves in the various organs as well as the effects of the toxemia.

The disease develops in susceptible individuals when they are exposed to either active or convalescing cases. It is especially prevalent in children up to the tenth year but may occur in older children and adults and is one of the most fatal illnesses of childhood, ranking fifth among the diseases that cause infant mortality. Sisceptible individuals may be immunized by repeated infections of gradually increasing doses of the toxin and antitoxin of streptococcus hemolyticus. Also, proper use of scarlet fever antitoxin may prevent the occurrence of complications after the individual has contracted the disease. The Dick test is a skin test made by intracutaneously injecting a small amount of the toxin, which is obtained by growing the organisms in broth and making a sterile filtrate of it.

The result of this test designates the immunity or susceptibility of the individual to the disease. A negative Dick test in Scarlet Fever does not depend on the presence of antitoxin in the circulation as is the case with the Schick test and diphtheria antitoxin. According to Stimson's book, "Common Contagious Diseases", published in 1936, only one percent of infants under six weeks of age have been found sensitive to the skin test doses of scarletinal toxic filtrate yet. 60% of new born infants have been shown not to have circulating antitoxin. Furthermore, negative Dick tests occur commonly in convalescence from scarlet fever after the disappearance of the rash yet before antitoxin can be demonstrated in the blood.

Scarlet fever is not as contagious as measles and chickenpox from direct contact but, inasmuch as the virus is longlived, many instances have been reported of toys, book, bed clothes, etc. having carried the disease. Serious epidemics borne by milk have frequently been reported and domestic pets may carry the disease. Like diphtheria carriers, there are otherwise healthy individuals who are carriers of virulent schrlatinal streptococci and in any epidemic of scarlet fever, cases of tonsillitis and mild pharyngitis occur side by side with the cases of scarlet fever. Bacteriological examination of the throats of these individuals, as well as healthy carriers, yields the same type of hemolytic streptococcus as do the scarlatinal

cases.

The incubation period may be from one to seven days, usually about four days. Blumgarten, in his "Textbook of Medicine", recommends that the patient should be isolated for from five to six weeks, or from three to four weeks after the temperature has reached normal, and until desquammation is complete. After recovery, the patient should be kept away from other children as long as he has any discharge from the nose, ear or a wound. It seems to be a cold weather disease, there being about twice as many cases in winter as in summer, and there is a fairly well recognized tropical insusceptibility. Also, negroes and eskimos, are relatively immune. The diagnostic features of the affliction are the strawberry appearing tongue and the characteristic rash which usually appears on the second day and lasts from four to seven days, being followed by a period of desquammation. It is an intense scarlet red eruption which may or may not itch and gets darker from day to day. It is made up of very small red points, not raised and occurs first on the neck and chest, then spreads rapidly over the entire skin except the face.

The disease begins suddenly, usually with vomiting and a temperature from 103 to 106 which persists throughout the acute stage of illness with slight morning remissions and gradually subsiding within a week. The pulse is rapid in proportion to the temperature, about 120 to 140, and the

patient has all the usual symptoms of fever, dryness of skin, flushed face, coated tongue, headache, loss of appetite, and a feeling of illness in general, scanty and high colored urine. The fever usually subsides when the rash disappears and when unusually high will probably be accompanied by delirium. Tests used to differentiate scarlet fever from other rashes include the Leeds-Rumpel test in which the upper arm is constricted by a rubber band and if scarlet fever is the case spontaneous hemorrhages will occur into the skin at the fold of the elbow. Another test is the Schultz-Charlton Test which is made by injecting into the skin of the patient the serum of a person who has recovered from scarlet fever. If the patient has scarlet fever, the rash, in an area about the size of a dollar, will disappear, and the skin will become blanched.

Complications of scarlet fever may be varied and quite extensive. It is one of the diseases that demands the best of nursing care in order to alloy disastrous consequences. Some times a few of the unusual forms of the disease may be encountered such as the mild form in which there is a very slight rash but the throat symptoms are typical and the skin desquamates; the malignant form which is very severe and characterized by high temperature, extreme prostration, delirium, restlessness, convulsions, and coma. In this form there are numerous small hemorrhages into the skin and it is usually fatal, occurring in feeble children;

anginoid form in which the rash is very slight but the throat symptoms are very prominent, the tonsils and throat being severely inflamed and covered with a thick membrance resembling that of malignant diphtheria. The tonsils and other throat areas may become gangrenous and this type also is often fatal; septic form characterized by severe general symptoms of toxemia and the lymph glands in the reck become inflamed and enlarged.

The most common complications are acute nephritis, arthritis, ear complications, adenitis, heart complications and rarely broncho-pneumonia and a relapse. The most common of these, acute nephritis, occurs in two forms, the acute hemorrhagic which appears suddenly early in the disease and slowly developing acute nephritis; the hemorrhagic form is characterized by suppression of urine and urine that is sometimes bloody and contains albumin and casts. Acute uremia, or the accumulation of urine constituents in the blood, may develop with vomiting and convulsions. When nephritis develops gradually, during the third or fourth week of illness a diminution of the daily quantity of urine may be noticed and albumin appears in the urine also. Puffiness of the eyelids and edema or swelling of the extremities may appear and, if the patient is not in the hospital, these symptoms should be described to the parent or whoever is caring for the patient so that they may be reported to the doctor immediately in order to

avoid, if possible, the development of a chronic nephritis. Arthritis in the small joints of the hands and feet, may develop about the second or third week of the disease but only occasionally does infection of these joints become severe. Otites media, an inflammation of the middle ear, due to extention of the throat infection, is a rather common complication and in severe cases the lymph glands in the neck also become involved and pus may even form in some of the glands so that they may require incisions. Another complication caused by scarlet fever is an inflammation of the heart which usually develops slowly, the chief symptoms being pain around the heart, a rapid irregular pulse, or shortness of breath. Of course, symptoms of broncho-pneumonia should always be watched for and a relapse, in which the patient goes through the same course as the original illness, should be guarded against during convalescence.

In one of the textbooks there is a statement of the objectives of treatment which seems to be all inclusive and is as follows: to insolate the patient adequately, to administer specific treatment, to keep the patient on a suitable diet, to conserve the function of the kidneys, to use nursing and other measures to prevent complications, to treat the complications as they arise. Since there aren't nearly enough nurses available to these patients, the public health nurses part here is chiefly to interpret the proper

care of the disease to the person who is to attend the case in the simplist and most precise way she knows how. She should encourage the family to ask questions freely and always be on her toes to give a satisfactory answer in order to establish a reliance of the individual on the health department which will thus gradually be reflected throughout the community. Perhaps the ideal attitude for the nurse to take would be to regard each visit she makes as though it were goings to be her last visit to that family and do all she could to introduce the available services to them. Of course, there is a limit to what may be taught them in one visit but the chief idea is to make the individual and his family realize that the health services are ready and available for them and make them feel that they will be given individual consideration and not treated as one insignificant member of the thousands of people who have the same complaint. For instance, in scarlet fever, a little reassurance will go a long way and be willingly accepted by the patient and his family in cases where a heart involvement occurs since usually they are very frightened and sometimes even to the extent of panic. Even in communicable diseases the mental well being of all those concerned is important to the physical well being of the patient; these same points apply to communicable diseases as a whole.

The symptomatic treatment of scarlet fever, which are the measures employed to relieve the symptoms of the disease and prevent complications; include keeping the patient in bed

about two weeks after the fever has subsided. If his fever becomes very high it may be reduced by cold sponges and alcohol rubs taking care at all times not to over expose him or allow him to be in a direct draft. However, it is advisable to consult a doctor before carrying out this proceedure if possible. A physician may sometimes order a warm bath of about 80 degrees F. to bring out the rash. Forcing fluids at this time is all important. Since nephritis is one of the most common complications and also one of the most severe, the nursing care for its prevention and treatment should logically be considered here. The urine should be examined frequently to recognize the disease as soon as possible and the patient should be kept on a diet containing a minimum of protein to conserve kidney function. If this complication seems evident the quantity of fluid and a salt content should be limited to relieve edema. Retention of protein waste products is treated by stimulating excretion through the skin and gastrointestinal tract by diluting the poisons and sometimes by divretics ordered by the doctor. To increase perspiration, hot packs or electric heat cradles are used or pilocarpone may be administered hypodermically. To increase excretion by the gastrointestinal tract saline purgatives are given such as epson salt, sodium sulphate or citrate of magnesia in sufficient doses to cause liquid bowel movements. Some physicians order gastric lavages and colon irrigations. Also, normal saline solution is some-

given by hypodermoclyses or Murphy drip to dilute the poisons. If otitis media and mastoiditis develop they should be treated immediately by the usual medical or surgical measures as the doctor sees fit. Cardiac complications can usually be avoided by early treatment with scarlet fever antitoxin but if they do develop rest is essential and protein foods and salts especially should be taken sparingly. The persistent high blood pressure, which is a constant symptom of chronic nephritis, gradually causes the changes in the heart and blood vessels. Increased resistance causes gradual enlargement of the heart and thickening of the left ventricle and as the disease progresses the heart often becomes dilated, murmurs develop and sometimes decompensation with shortness of breath, cyanosis and edema of the extremities develops. The patient should be dressed warmly and the daily output of urine should be noted. The specific remedy is streptococcus antitoxin and if given during the first three days especially it seems to be curative, the symptoms fading suddenly.

In preventing the spread of this disease, good isolation as described following the report on Marion County for the year 1939 is very effective if resorted to early enough but is not altogether dependable since the disease may be spread by carriers as in diphtheria and typhoid. They may be perfectly well individuals showing no symptoms of the manifestations of the disease but who are actually harboring the germs in their nose and throat from whence it is passed

to other unsuspecting individuals. Of course, isolation is always indicated in this disease not only as an aid in preventing its spread but also as a protective measure for the patient himself in that he is better able to rest and his chances for a quick recovery are increased. By means of the Dick test the susceptible individuals may be singled out and in case of an epidemic an immediate passive immunity lasing between one and two weeks may be obtained by injection of scarlitinal antitoxic horse serum, but owing to the frequent occurrence of severe serum reactions the protective or prophylactic use of scarlet fever antitoxin is hardly ever justified.

Case Reported by	Age	Nurse's 1st visit	Date of Diagnosis	Date of Onset	Exposure	Suspected Source	No. in Family	Sanitation No. of Rooms	Economic Conditions	Total No. Cases in Fam.	Recurrence Date	Recurrence Age	Isolation Instruction
Dr. Douglas	9	11-20	11-20	11-17	—	F	6	5	P	2	12-2	11	—
Douglas	C	12-14	12-14	12-12	—	—	6	(G)	G	1	—	—	yes
Douglas	C	12-22	12-22	12-18	—	—	8	(G)	G	1	—	—	—
Wood	16	3-19	3-19	3-18	—	—	2	(F) 5	F	1	—	—	yes
Campbell	13	—	9-24	—	—	—	—	—	—	1	—	—	yes
Backstrand	12	10-16	10-16	10-15	—	—	3	(G) 5	F	1	—	—	yes
Kurtz	28	1-16	1-16	1-11	—	—	5	(G) 5	—	3	2-3 2-3	4 A	no
Douglas	7	11-30	12-2	11-29	—	—	8	(F) 8	P	1	—	—	—
Ramage	16	4-2	4-2	4-1	3-26	Bassets	4	(F)	P	1	—	—	yes
Douglas	7	1-5	1-6	1-4	—	—	8	(F) 6	F	4	1-4 1-25 1-25	9 3 11	4th case
Campbell	25	6-26	6-26	6-23	—	—	9	(F) 2	F	1	—	—	—
VanWinkle	8	—	—	3-30	—	—	5	(G) 5	F	1	—	—	yes
Douglas	8	2-11	—	2-9	—	—	2	(F) 3	F	1	—	—	yes
Myers	20	4-8	4-9	4-6	—	—	4	(P) 3	P	1	—	—	yes
Beaucamp	14	1-8	—	1-6	—	—	6	(G) 5	G	1	—	—	yes
Beaucamp	14	2-16	—	2-12	—	—	3	(G) 4	G	1	—	—	—
Titus	—	2-24	In Convalescent Home.										
Miller	6	1-19	1-19	1-17	—	—	3	(G)	G	1	—	—	yes
Pemberton	7	1-28	1-28	1-6	—	—	5	(G) 5	G	1	—	—	yes
VanWinkle	4	4-4	—	3-22	—	—	7	(P) 5	P	1	—	—	—
Follis	6	1-16	—	1-6	—	—	4	(G) 6	G	1	—	—	—
Douglas	12	10-19	10-19	10-18	—	Bassets	7	(P) 2	P	2	11-3	16	—
Purvine	20	12-29	—	12-27	—	—	2	(F) 2	F	1	—	—	—
VanWinkle	8	12-26	—	12-20	—	—	4	(F) 4	G	1	—	—	—
Steeves	10	4-8	4-8	4-2	—	—	4	(F) 2	P	1	—	—	—
Beaucamp	2	1-11	1-11	1-7	1-7	Ch.	4	(F) 4	F	1	—	—	—
Douglas	7	7-30	—	7-28	—	—	5	(F) 4	F	1	—	—	—
Beaucamp	7	2-21	—	2-17	—	Sch.	5	(F) 4	G	1	—	—	yes
Douglas	12	2-11	2-11	2-9	2-2	Th.	5	(F) 5	F	4	2-14 2-17 2-19	15 mo. 18 40	—
Waltz	3	9-25	9-25	9-21	—	—	4	(G) 6	P	1	—	—	—
Foster	2	—	—	1-17	—	—	4	(G) 6	G	1	—	—	yes
Myers	8	2-17	—	2-12	—	—	5	—	—	1	—	—	yes
							4	(G)	—	2	5-15	7	—

Case Reported by	Age	Nurse's 1st visit	Date of Diagnosis	Date of onset	Exposure	Suspected Source	No. in Family	Sanitation No of Rooms	Economic Conditions	Total No. Cases in Fam.	Recurrence Date	Recurrence Dep.	Isolation Instruction
Dr. Anderson	2	4-6	—	3-30	—	—	5	(F) 4	P	3	4-6	3	—
											4-6	6	
Pemberton	1	1-21	1-22	1-19	—	—	4	(G) 6	F	1	—	—	yes
Donnelly	1	1-4	—	1-1	—	—	9	(G)	—	1	—	—	yes
Anderson	1	1-9	1-9	—	—	—	9	(P) 4	P	1	—	—	—
Douglas	3	2-20	—	2-12	—	—	5	—	F	3	2-12	4	—
											2-16	39	
Beaucamp	9	1-7	—	—	—	—	4	(G) 6	G	1	—	—	—
Downs	12	1-17	1-17	1-14	—	—	4	(G)	G	1	—	—	yes
Titus	11	1-16	—	1-9	—	—	9	(P) 3	P	6	1-16	1	—
											1-16	4	
											1-16	6	
											1-16	4	
											1-19	33	
Beaucamp	25	1-7	1-7	1-1	—	—	1	(G) 8	G	1	—	—	yes
VanWinkle	15	4-18	—	—	—	—	1	—	—	1	—	—	—
VanWinkle	5	2-14	—	2-9	—	—	1	—	—	1	—	—	—
Pemberton	9	12-6	12-6	12-4	12-6	—	4	(G) 6	F	1	—	—	yes
VanWinkle	30	3-5	—	3-3	—	—	3	(F) 3	F	1	—	—	—
Douglas	7	9-30	10-1	9-29	10-1	—	5	(F) 5	F	1	—	—	yes
Douglas	—	1-24	1-24	1-21	1-24	—	5	(P) 3	P	1	—	—	—
Campbell	11	5-1	—	4-25	—	—	3	(G) 6	F	1	—	—	yes
Robertson	9	9-25	9-25	—	9-25	—	6	—	F	1	—	—	yes
Backstrand	6	10-22	—	10-21	—	—	4	(G) 7	G	1	—	—	yes
Thorne	Taken to Deaconess Hospital												
Pemberton	C	3-4	3-4	3-3	3-4	—	3	(G)	G	1	—	—	yes
VanCleave	4	5-8	5-1	4-29	5-1	—	8	—	—	1	—	—	—
Fallis	11	2-3	2-2	1-30	2-2	—	4	(G) 5	F	1	—	—	yes
Douglas	10	10-22	12-22	12-18	12-22	—	9	(P)	P	4	1-2	16	yes
											1-2	5	
											1-2	25	
Douglas	10	2-18	2-18	2-18	2-18	—	4	6	G	1	—	—	yes

Abbreviations: Fam. = family; C: child; Ch = church; G = good; F = fair; P = poor; (G)(F)(P): sanitary conditions; Mo. = month; A = adult; Sch = school; Th = theatre.

SCARLET FEVER IN MARION COUNTY, YEAR 1939

I have chosen Scarlet Fever as a typical communicable disease because it will be common to any locality in which I might be working and the underlying principles employed in dealing with it can be applied to any of the other diseases in this category when they are the concern of the general public. Of course, the specific factors regarding the individual diseases would be substituted in their turn.

As a basic research problem for dealing with this topic, I have examined the records for the previous year, 1939, and have tried to tabulate the deductions and results as I saw them.

I. Doctors who reported:

	No.
Van Winkle	6
Steeves	1
Beauchamp	6
Douglas	27
Waltz	1
Foster	1
Myers	2
Garnjobst	2
Anderson	4
Pemberton	4
Donnelly	1
Downs	1
Titus	7
Purvine	1
Thome	1
Robertson	1
Follis	2
Wood	1
Backstrand	2
Van Cleave	1
Ramage	1
Campbell	3
Kurtz	2
Buren	1
Miller	1

II. Number of nurses who reported:

Date of exposure	3
Date of onset	72
Date of first visit	75
Date of diagnosis	31
Isolation instruction	28

One gave instruction on fourth case.
One case in a convalescent home.
One case in a hospital.
Source of infection 5

III. Numbers in the household:

No. of families:		No. of persons:
3	with	2
6	"	3
17	"	4
11	"	5--Two of these families with 2 recurrences and two with three recurrences.
4	"	6--One recurrence in one of these families.
3	"	7--One recurrence in one of these families.
4	"	8--Recurrence to three members of one of these families.
5	"	9--Recurrence to three in one of these families and to five in another.

There was a recurrence in nine families--isolation instruction in one of these.

IV. Economic Condition:

Good in 16 families
Fair in 18 families
Poor in 13 families

Deductions:

After interviewing the nurses, I found that some of them felt that a visit to a case of suspected communicable disease automatically called for instruction in isolation technique, therefore, they might or might not note such instruction on the record card. However, I also learned that some gave this information to all such families regardless of economic conditions, housekeeping ability, mental ability to follow instructions, or even an antagonistic attitude on the part of the parents, while others felt that where the family gave the impression that they would not pay any attention to such instruction it would be a wasteof time to make the attempt. Judging from these personal attitudes it would be impossible to get an accurate check on the number of reported cases who had or had not received instruction. Statistical consideration of the value of isolation last year reveals the fact that only one family out of the group of families which experienced a recurrence of the disease had received instruction on isolation technique. There were twenty-three recurrent cases among the reported families. Out of all the families reported for the year 1939, the economic condition of 29% was considered good, 32% was considered fair, and 23% was considered poor, while the economic standing of 16% of the families was not noted. The number of families reported was 58 and the number of cases 81. In twenty-three instances the family was visited by the nurse within two days after the onset of the disease and twenty-one additional cases were seen within the first week.

Some of the doctors declare that the Health Department quarantines patients too long and therefore they won't report the case so that the Department will have no authority to keep the children out of school. Of course, there is also the point that a doctor's private patients will have "hurt feelings" and the like against him if he is responsible for

their being quarantined because they expect him to "cater" to them, so to speak. There is still an objectionable feeling on the part of many of the lay people regarding the word "quarantine" whenever it is applied to their own families. One or two doctors actually stated that they didn't know that the disease should be reported.

As to the printed form itself, there appears to be a few tabulations that are not made use of consistently and are merely "taking up space." Evidentally, either these "blank spaces" are unnecessary or their importance has not been made known sufficiently. For instance, during the year 1939, the DATE OF EXPOSURE was reported in only three instances while the DATE OF ONSET was noted for seventy-two cases. The DATE OF DIAGNOSIS was recorded in less than half the cases and notations regarding isolation technique instruction in even fewer instances. If these tabulations are important statistically or otherwise to the Health Department, perhaps merely mentioning their value at a general staff conference would employ the cooperation of the personnel toward more uniform and beneficial recording.

Isolation:

The John Hancock Life Insurance publication entitled "Home Care of Communicable Diseases" has many helpful suggestions regarding the care of a communicable disease patient in the home which I think are worth mentioning and which are important in protecting both the family and the attendant and are also a benefit to the patient. Some of them are enumerated in the following list:

1. Provide a bright, easily ventilated room, completely screened and free from unnecessary furniture, for the patient only, if possible. In one instance, a family crowded into a one room house, roped off one corner of the room and were able to carry out pretty good isolation, only the attendant going within the rope boundary.

2. A table just inside the sick room for the attendant's use, equipped with pitcher, basin, hand brush, soap, and towel.

3. A second table for the patient's articles with wash basin and a tray holding tissue paper or soft cloths, toothbrush, comb, soap, mouth wash, thermometer, cream for lips.

4. Supply of newspapers to be folded into paper bags for waste.

5. Small squares of newspaper to be used in handling contaminated articles when attendants hands are clean.

6. Newspapers conveniently situated just outside the isolation room on which contaminated articles to be removed from the room may be placed until they can be cared for. After the attendant leaves the sick room she may reach under the paper, fold it together, and burn it without contaminating herself.

7. Toilet or container for liquid waste should be left open before entering the room. The container should be one that could be covered as soon as the attendant leaves the sickroom.

8. A smock or enveloping apron, with rubber bands around the wrists of long sleeves, should be hung just inside the door. Also some sort of mask to cover nose and mouth.

Suggestions to be used by the attendant in carrying out the isolation technique itself:

1. Take all necessary articles into room before she dons apron to care for her patient.

2. Wash her hands thoroughly both when she enters the room, before she dons her apron, and after caring for the patient. It is well to cover her hair or pin it back as further precaution.

3. Be careful to turn away from patient's face when he coughs or sneezes.

4. Keep hands away from face and mouth at all times.

5. Should be alert for new symptoms to be reported to the doctor promptly.

6. When ready to leave, and before she takes off her gown, she should straighten the room and put all waste paper, food, etc. in their respective locations so that they may be gathered and destroyed.

7. In removing linen, a second person may hold the clothes bag open so that the linen may be put in without contaminating the outside of the bag.

8. All dishes may be boiled 15 minutes before being washed with the family dishes.

9. Mattresses and other articles that cannot be boiled may be spread in the sun for several hours.

10. Bed linen may be boiled or sunned before being added to the family wash.

11. Disinfect urine (in cases where the disease germ may be found in urine) by mixing with equal amounts of 5% chloride of lime for ½ hour. Also vomitus and bath water.

12. Disinfect feces (in cases where the disease germ may be found in feces as in Typhoid Fever and Poliomyelitis) by covering it with 5% chloride of lime and letting it stand ½ hour. Solid portions should be broken into smaller pieces.

It is not necessary for the attendant to put on her apron or smock every time she enters the sick room of most communicable disease cases if she is just going to hand something to the patient, give him a drink, etc. However she should be careful not to contaminate her clothing while she is in the room.

The patient may also be taught the principles of isolation so that he may help visitors, if they are allowed and the rest of his family remember to keep themselves free from possible contamination.

Any contaminated article may be handled with the newspaper squares without risk of spreading the disease if the attendant is careful. She should not neglect washing her hands frequently in plenty of soap and water while caring for her charge and it would be wise for her to use a good hand lotion often to avoid unnecessary breaks in the skin.

This discussion of isolation technique sounds complicated but after it has been followed through once it seems simple especially to a conscientious and thinking attendant. Its general principles may be carried out alike in both hospital and home although a little improvising is often necessary.

Smallpox

Smallpox, also known as Variola, may be defined as an acute, infectious, and contagious disease which is characteristically recognized by a specific rash. It dates back to the early Egyptians making it one of the earliest diseases known and is easily traced down through the ages by the characteristic pock-marks that result. The severe epidemics, especially those of the middle ages, in which thousands of people were killed during each seige, are recounted over and over in history today but it is hard to realize the significance of such a statement since specific preventive methods of control through vaccination have eliminated the possibility of such an occurrence in our modern civilization. Persons who have not been vaccinated almost invariably develop the disease when exposed to it while those who have been vaccinated are usually immune. One of the most interesting stories of our nation is the story of the discovery and introduction of vaccination into the United States and the account of the support given the issue by Thomas Jefferson who was president at the time. Vaccination itself consists of artifically producing a pustule on the skin by innoculation with the contents of cowpox or vaccine pustules. The accidental discovery, through the observations of Sir Edward Jenner, that persons working around cattle would sometimes get a mild attack of smallpox and when later exposed to the disease did not contract it,

is a familiar story to most of us.

The cause of this disease is unknown but the infectious agent is present in the dried crusts may form a powder and become attached to clothing and various other articles which allows the disease to be transmitted from person to person by individuals contacting a victim of the disease. Smallpox may also be transmitted to unsuspecting persons by an unrecognized case. The germ circulates in the blood stream and produces a typical vesicular rash on the face, body, mouth, palate, thorax and lungs, and typical inflammatory changes in the spleen, which becomes enlarged, and in other structures. Those pus forming bacteria infect the vesicles and well as the skin around them, causing a secondary fever. They are constantly present in the skin or mucous membranes.

The incubation period is usually about twelve days but may be from nine to fifteen days. The disease attacks suddenly and often severly with all the symptoms of fever, 100 to 104 degrees, and chills, vomiting, marked pain in the back, headache, rapid pulse and nervous symptoms such as restlessness and delirium. Frequently in children convulsions occur. A profuse rash may be present on the abdomen, inner thighs or on the thorax during this stage. During the next phase of the disease the eruption occurs on the face, forearms and wrists and may become entirely absent on the chest and abdomen. The temperature drops and rash, which appears about the fourth day, consists of small

elevated and red spots or popules, rather firm and hard, and feel like small buskshot. In the next day or two the small elevated spots form blisters containing clear serum and because they have a small dimple in the center and call umbilicated vesicles, a characteristic feature of smallpox, rash. The final stage of the disease usually begins about the eighth day when the aacteria of the skin gains entrance. This bacteria goes into the vesicles transforming them into infected pustules. At this time of secondary infection the temperature again rises to 103 or 105 degrees and severe toxic symptoms may be noted such as delirium, excessive thirst, increased flow of saliva and diarrhea. This lasts for several days and the patient may go into a coma and die. The crusts gradually dry up and fall off in two or three weeks leaving small depressions or pits in the skin, pock-marks.

Three uncommon forms of smallpox may occur and they have been entitiled confluent, hemorrhagic and mild forms. The first is a severe form consisting of groups of pustules fused together with severely inflamed swollen skin in between. The hemorrhagic form, also called "black smallpox", displays severe toxic symptoms and is very often fatal. The eruption is characterized by hemorrhages into the skin or into the pustules and sometimes blood also occurs in the urine. The mild or varioloid form occurs in persons who have been vaccinated but so long ago that they are no longer immune. The pustules are very few and the rash is confined

to the face and wrists. It begins in the usual way but the general symptoms and fever are slight and the rash disappears rapidly, rarely having pits. This form is frequently unrecognized and may be the means of transmitting the disease.

Surprisingly enough, complications are few regardless of the severe infection. The most common complications are conjunctivities, ear infections, bronchopneumonia and hemorrhages into the lungs. Even these are seldom severe except in cases where the bronchopneumonia becomes extensive and in such cases death may result. Scepticemia, albuminuria and fibrinous pleurisy should be watched for.

Early recognition, especially of mild and a typical cases, vaccination at frequent intervals and during an epidemic are important factors in prevention and control of this disease. These mild cases are the ones who most frequently spread the disease since they are up and about during the first stage when the disease may not be recognized and the fever not striking enough to be of particular notice. According to Stimson, in his book entitled "Common Contagious Diseases" published in 1936 the death rate varies in different epidemics ranging from 20 to 50 per cent or more and is seemingly very high among primitive people, particularly the black race. Some of the factors that may influence the severity and prognosis of the disease include presence and age of previous vaccination; nature of current epidemic, whether the varioloid or ture smallpox type; nature of the stage of invasion, a mild onset usually being followed by mild course; nature of exantham,

confluent eruptions being much more serious; presence of hemorrhages; presence of such complications as general sepis, pneumonia, erysiphelas, pregnancy or abortion and alcoholism; and age of the patient.

Infinite patience on the part of the nurse cannot be stressed too much in caring for this disease since the patient's recovery depends on it. Objectives of the nursing procedures are to maintain strictest isolation, relieve disconforts of rash and prevent petting, to care for eyes, mouth, and throat and to relieve the associated symptoms of fever and delirium. It would be well for the patient to be cared for in a hospital. During the acute stage a nourishing diet, chiefly milk and fruit juice is advised, eliminating eggs, meat and meat juices and giving large quantities of water, usually as much as four to six quarts a day. In cases of severe vomiting glucose may be given intravenously or by rectum; a full diet isn't usually advisable until the temperature has subsided.

Care of the skin is highly important and since a regular cleansing bath cannot be given at the height of the disease, the patient sometimes may be submerged in a warm 95 degree continuous bath of plain water or water containing bicarbonate of soda. Cold or hot compresses may relieve itching and burning also ointments and oily substances, such as vaschore or sweet oil with three to five per cent carbolic acid sometimes added. Of course, scratching must be avoided as in the case of all is cases accompanied by skin

eruption. It is usually necessary to the children's hands or splint their elbows to prevent scratching of the face particularly. Calamine or zinc lotions are sometimes prescribed for application on the vesicles, and also compresses of potassium permangenate, bichloride of mercury, and other mild antiseptics, preferrably covered with oiled silk.

Severe inflammation of the eyes may be relieved by normal salt or boric acid solutions and by covering the eyelids with cool compresses of boric acid to soften the crusts and exclude the light which is irritating. Eye drops may include 20 per cent orgyrol or zinc sulphate.

In caring for the moth and throat it should be remembered that the causative germ and typical rash are usually present in this region. Antiseptic mouth washes such as potassium chlorate solution are used to keep the mouth clean and for the throat local applications of 1 per cent mercurochrome or 1.4 hexylresorcinol are made.

To reduce fever, cold sponges, colon irrigations or coal tar drugs may be ordered and various sedatives, bromices or morphine are often ordered for delirium.

Chicken Pox

Chicken pox is a highly contagious disease characterized by papules and vesicles on the skin. The infecuous agent, which has never been isolated, is contained in these skin lesions and possibly in secretions of the nose and throat early in the disease. The filtrakle virus which has been called the exciting organism of the disease occurs in the form if "elementary bodies" which are constantly found in great numbers in vesicle fluid and resemble the elementary bodies found in vaccinia found in smallpox. The discovery of these elementary bodies has not yet led to the production of immune sera or prophylactic vaccines.

The length of time from exposure to the first appearance of the eruption is usually fairly close to fourteen days but it may be anywhere from ten to twenty days. During this period there are usually no evidences of ill health nor is the patient able to transmit the disease until perhaps the last half day.

The period of invasion is usually absent in young children but in older children and adults there is commonly a period of twenty four to thirty-six hours before the period of exanthum during which the patient is apt to have a considerable amount of headache, malaise, anouxia, and perhaps fever up and to 101 or 102 degrees F. In the greatest number of cases there are mild constitutional symptoms and the eruptions of papulas and vesicles, which develop in

in clumps and dry up in a few days leaving a granular scab.

The period of exanthum is usually very sudden in onset. Occasionally lesions may be found on the mucous membranes of the soft palate or inside the cheek some twelve or twenty-four hours before they appear on the epidermis. Another characteristic of this disease is that all stages and sizes of lesions may be found present at the same time and in the same vicinity. Lesions usually appear first on the skin of the body and the scalp where they are frequently discovered as small lumps against which the comb strikes. A number of these lesions also may appear on the extremities and even on the palms of the hands and soles of the feet but in general chickenpox may be considered centripetal in character, while smallpox, which particularly involves the face and exptremities, is centrifugal.

The disease begins with a slight chill, vomiting, pain in the back, and slight rise in temperature. The fever lasts two or three days when the characteristic rash develops, beginning as groups of small red papules which rapidly form small blisters containing a slightly cloudy fluid. In thirty-six to forty-eight hours the contents of the blisters change to pus and these pustubles shrivel up forming brown crusts in a few days that fall off without leaving any scar.

Typical cases of small pox are easily distinguished from typical cases of chickenpox but mild small pox and severe chicken may so resemble the other disease as to be confusing.

In Small pox there are usually very definite prodromal symptoms beginning with chills and considerable fever, severe aching pains in the head and back, nausea and vomiting, and marked general malaise lasting two or three days--severity varying with ensuing eruption, These symptoms then abate to be followed during the ensuing development of skin lesions by a secondary rise in temperature which lasts a week or more until the pox have begun to dry. In contrast to the above, prodromal symptoms in chichenpox rarely appear in children but in older children and adults there may be headache, malaise and moderate anorexia and perhaps fever to 100 to 102 degrees F. However, there is usually no vomiting and these symptoms last only twenty-four to thirty-six hours. There is no secondary rise of temperature in uncomplicated chicken pox.

The vast majority of cases of chicken pox follow their normal course without complication but occasionally a child may infect a pock by scratching and a superficial staphylococcus infection may develop. Impetigo may also develop and in either case, these infections of chickenpox lesions are apt to be followed by scarring. Such other pyogenic conditions as ottis media, suppurative lymphadenitis, cellulitis and erysipelas have been reported, especially in institutional cases, the offending organism usually being a Beta hemolytic streptococcus gangrene of the skin at and around the site of the large pocks may take place in severe cases of chickenpox,

and particularly in marantic infants or those debilitated by any wasting disease, and fatal cases have been reported where this complication has occured.

Although some authors state that it is transmissible only by direct contact and very rarely by the third person, Dr. Stimson in his book on common contagious diseases, says that it is probably the disease which most successfully defies isolation by medical aseptic technique. The infecting virus may be air-borne for a short distance and it quite difinitely can be carried by infected articles and by a third person.

There is no specific serum or drug for the treatment of this disease.

The patient should be kept in bed during the presence of the elevation of temperature and twenty-four hours more. Throughout the contagious period, lasting from twenty-four hours before the appearance of the eruption until about seven days after its appearance, the patient should be isolated from non-exposed susceptible children, though not necessarily indoors. The utmost pains should be taken to prevent secondary infection of the pocks as by the patient's scratching. Thus the fingernails should be kept scrupulously clean and trimmed very short. If itching is marked and scratching uncontrollable, white wash gloves may be kept on the patient's hands or it may be necessary to splint the elbows or use aluminum mits. Itching itself may be relieved by applications of calamine and zinc lotions or by various ointments such as carbolated vaseline. Daily cleansing

sponge or tub baths should be given with great caution, care being taken not to rub the scabs off the pocks. Keeping the pocks greased also helps to keep the scabs adherent, otherwise the treatment is entirely symptomatic. If boils develop, they should be treated surgically.

Diphtheria

Diphtheria, an acute infectious, toxemic disease, is one of the diseases that whole books have been written about but of course, it is highly impractical to go into any lengthy discussion here.

It is caused by the diphtheria or Klebs-Loeffler bacillus and is especially common in young children although adults not infrequently develop it. We now have a means of discovering susceptible persons of this disease by use of the Schick test. It is usually transmitted by the secretions of the throat of a diphtheria patient but is also transmitted by carriers who are persons that have recovered from the disease but their throats and nasal secretions contain living diphtheria bacilla. The latter, of course, are extremely important in incidences of epidemics.

The incubation period is from one to five days and the disease usually begins suddenly. According to health departments rules, apparently in most cities, each patient must remain in strict isolation until three successive cultures of the throat are free from diphtheria bacilli. These cultures are taken at an interval of two days.

Certain cases of diphtheria particularly where the infection involves the nasopharnyx, are accompanied or followed by usual evidences of toxemia. The patient appears markedly prostrated and apathetic and the skin seems pale, rather smooth and shiny and even waxy in appearance. The

symptoms and signs of toxemia are very much the same as those of early heart failure in diphtheria. The pulse becomes rapid and very thready or even impreceptible at the wrist. The heart is almost never enlarged, and on auscultation the sounds are surprisingly forceful and indicate the labored condition of the heart. The first sound heard seems to be everywhere, soft and blurred, the second loud and booming. A loud systolic murmur is usually present, best heard along the left sternal border and sometimes nowhere else.

An enlarged and painful liver is one of the first signs of failing circulation and vomiting is apt to occur. As the toxemia progresses a cardiac arrhythmia and diastolic gallop rythm become manifest. Evidences of heart-block may appear clinically with a pulse rate dropping suddenly to below 60 or even below 40. Multiple petechias or purpuric discolorations may appear and when they do, give an especially grave prognosis. Although these patients gradually grow weaker, the blood pressure remains normal nearly to the end; then, as the toxemia progresses the patients laps rather suddenly into unconsciousness and die within an hour or so during which period the blood pressure falls.

Occasionally cases are seen where the local reaction to the infection is unusually severe. Often the underlying factor in these septic cases is secondary infection with strptococcus setting up an aggravation of the diphtheria toxin. The membrane is unusually extensive and piled up

and is especially foul in odor. The underlying tissues are markedly swollen and inflamed as are the cervical lymph nodes together with the adjacent tissues of the neck making the neck so markedly enlarged as to warrant the name "bull-neck". There is often an extension to the middle ear spaces and hemorrhages from the nose and throat are not uncommon. The temperature is septic in type with noticeable daily fluctuations and the pulse is usually rapid and thready. The prognosis is bad, especially since the patients are apt to be not only septic but also toxic.

The most common complications of diphtheria are affections of the heart, the nerves or the kidney and the result from the effect of diphtheria poison on these organs. Besides the heart complications, which so frequently result in death when the patient attempts to sit or walk, there may also be severe nerve complications. The diphtheria poison frequently affects the nerves of the muscles of the palate and eye and the vagus nerve. When the motor nerves of the palate are affected the palatal muscles become papalyzed so that food comes through the nose during the act of swallowing because the paralyzed muscles are unable to close the back of the nose, and act necessary in swallowing. When the nerves of the eye muscles are affected some of the muscles become paralyzed and the patient becomes cross-eyed. This paralysis of the palate or eye muscle is usually temporary but lasts several weeks.

Some of the other complications of this disease include nephritis, an acute inflammation of the kidney which sometimes develops in severe cases, and bronchopneumonia, which is an acute inflammation of the lungs and often develops into laryngeal diphtheria from the extension of the diphtheritic membrane into the bronchi and lungs.

Diphtheria may be prevented by determing susceptible persons by means of the Schick test and immunizing those found to be susceptible, when diphtheria is prevalent exposed persons are often immunized without determing susceptibility as an extra precaution. Every diagnosed case are usually every suspected case is rigidly quarantined and carriers are isolated and treated so as to destroy the diphtheria bacilli in the throat or nose.

The disease itself is treated by injections of diphtheria antitoxin, a specific remedy which cures the disease. This serum is obtained from horses which have been immunized against diphtheria toxin and the remedy is usually given as soon as the physician has determined, by means of a throat culture, that the patient has diphtheria, when it is impossible to obtain the report of a culture soon enough, in country practice for instance, or when delay would be dangerous, antitoxin is given whenever there is a reasonable suspicion of diphtheria. No case is considered hopeless and antitoxin is often curative even in severe cases. It is infected intramuscularly or intravenously depending on the severity of the case and is given repeatedly until the

membrance in the throat disappears and the symptoms of the disease subside. The membrane in the throat begins to loosen generally within twelve hours after injection of the antitoxin and the temperature subsides, the pulse becomes slower and the prostration and feeling of illness disappear. In very severe cases which apparently don't respond well to treatment intubation may have to be resorted to for re-leaving obstruction of the larnyx.

Sometimes an anaphylactic reaction may occur from one half hour to four or five days following injection of the antitoxin and due to the individual reaction of the patient to horse serum. This reaction should be particularly watched for in persons who have an degree of asthma or hay fever, and injectious of adrenoline, epinephrine or atropine. This reaction consists of hives or uticaria, typical large or small elevated wheels or red spots that tich intensely.

In severe heart cases the usual cardiac remedies are given while prolonged rest is necessary for either severe or mild heart cases. The patient is not allowed to be up until exertion causes no change in the character of the pulse. Paralysis of the palate is treated by diet to avoid regurgitation of food through the nose. The patient is fed carefully with small quantities of food and if this method is not effective the patient is fed by duodenal tube or by rectum. The condition usually improve in several weeks.

The objectives of nursing care are to maintain an effective quarantine and isolation (described following discussion of scarlet fever) to relieve discomfort of the

throat, to administer a suitable diet, to conserve the heart action and prevent heart and other complications, to apply local remedies effectively and to take throat cultures when ordered. This enumeration may be found in Blumgarten's Textbook of Medicine, 2nd edition.

Difficulty in breathing may be relieved by frequently ventilating the room but avoiding drafts, and by steam inhalation generated by a croup kettle. Sore throat may be relieved by throat irrigations or various local applications which the physician may prescribe. Restlessness and insomnia may be relieved by regulation of the room temperature, by cold applications to the head and sedative drugs when prescribed. It is also up to the nurses to see that the patient avoids any undue movements to prevent heart complications.

The diet in diphtheria is the usual fever diet consisting principally of milk, gruels and plenty of water because swallowing is painful. Nutritious foods and a moderate amount of fruit juices and fluids are added because of the toxemia.

When a tracheotomy has been performed the nurse must see that the tube is always in place and covered with clean gauze. The miner tube should be removed and cleaned whenever necessary. She should be alert for symptoms of shortness of breath, coughing or cyanosis which may mean that the tube has become clogged by the membrance. When this occurs the tube should be removed immediately and the the physician

notified at once. It is important for the nurse to see that cups or glasses with liquid contents be kept away from the patient as he may suddenly take a drink and some of the kind of liquid enter the trachea. Great care must be taken in feeding these patients so as not to allow anything to slip into the trachea or enter the lung.

Again, isolation care of these patients is the same as that discussed with the disease scarlet fever. Particular emphasis should be given to the care of secretions from the nose and throat.

Typhoid Fever

Typhoid fever is an acute, specific, infectious disease cause by the Bacillus: typhosus of Eberth. This disease is sometimes called Enteric Fever or Typhus abdominalis, but should be distinguished from Typhus fever or Typhus exanthematicus.

The Typhoid bacillus is a short thin bacillus which can be seen moving about when a drop of typhoid culture is examined with a microscope. It is essentially a disease of poor sanitation and consequently occurs more often in the country than in the city. It is more common in the fall and thus is sometimes called Autumnal Fever. It is more prevalent in young people, especially between the ages of fifteen to twenty-five.

Typhoid fever is transmitted by contaminated water, food, especially shellfish and milk and by typhoid carriers. It may result from drinking the water or using the ice of a stream or well which has been contaminated by the stools of a typhoid fever carrier. Another method of contracting this disease is by eating oysters or other shellfish which have been grown or "fattened" in a contaminated stream in this case "carriers" are persons whose stools contain a living typhoid bacilli as a result of a previous attack of typhoid fever. They are common souces of infection, especially when employed as cooks, waiters, dairymen, or in other occupation where food is handled. Special care should be taken to prevent the spread of typhoid fever from persons

to other persons by direct contact, and much may be gained by simply carrying out everyday health practices such as washing the hands frequently before and after meals as well as throughout the day. Flies are important agents for spread of the disease by carrying typhoid bacilli from the stools, urine, or dishes of the patient to other patients or to normal patients. Linens or dishes that have not been properly sterilized are another source of direct transmission from the patient. Even the nurse or physician may contract the disease if they do not sterilize their hands when handling typhoid patients.

Typhoid bacilli enter the body through the intestinal tract in contaminated water, penetrate the wall of the intestines and enter the bood stream where they grow and multiply rapidly. The germs finally disappear from the blood in about two weeks and lodge inthe intestinal tract, especially in the Pyer's patches or lymph follicles in the small intestines. The follicles and lymph glands draining them become swollen and inflamed and some of the patches become ulcerated. In the process of ulceration blood vessels may be opened and hemorrhage results. Sometimes the ulcers are so deep that they extend through the intestinal wall causing a perforation. The spleen is usually inflamed and enlarged and other organs such as the heart, liver, blood vessels, nervous systems, and kidneys are also inflamed.

The incubation period is from eight to fourteen days, but it has been known to be as long as twenty-three days.

Typhoid fever begins very gradually with mild, rather indefinite symptoms for about a week. The patient complains of a general feeling of a fatigue, which gets steadily worse, laziness or inaptitude for work and sometimes headache, nosebleed, pain in the lower part of the abdomen, constipation or diarrhea. The temperature gradually rises from day to day, being about a degree higher every evening. The pulse is usually normal and sometimes slow. At first these symptoms are so mild that they give no indication of the severe infection that they initiate, but they grow steadily worse until the patient becomes so ill that he has to go to bed.

The essential symptoms of typhoid fever are a continuous fever associated with a characteristic indifference known as a "typhoid state," and intestinal symptoms. The fever lasts three weeks or longer, and the symptoms get worse from week to week. At the end of that time the temperature subsides by lysis, that is very gradually, and convalescence is established slowly. There is usually no objective sign until the end of the first week when the characteristic rash may appear, which consists of tiny rash-colored spots("rose spots",) which disappear on pressure. They occur principally on the abdomen and some times on the back and come out in small scattered spots

lasting only for a day or two. As these symptoms progress the pulse is rapid, 120 to 130 degrees, the abdomen becomes more distended, and the patient gets progressively weaker and looses considerably in weight. In severe cases the patient is usually delirious, and has tremors of the hand and picks at the bed clothes, a symptoms known as "subsultus tendinum." In most cases convalescence begins during the fourth week and the patient's condition returns rapidly to normal while some cases last five or six weeks or longer. In the latter case, the symptoms of the fourth and fifth week are merely a continuation of those of the third week, and convalescence is prolonged.

A positive diagnosis of typhoid fever can be made by examination of the blood stools in ureine. When the symptoms and signs are not typical, these are the only methods by which the nature of the disease can be determined.

The most common complication of typhoid fever is tymparites while the most serious complications are hemorrhage and perforation. Other complication which may occur in the course of the disease are: relapse, phlebitis, cholccystitis, bedsores, bronchopneumonia, acute nephritis, meningismus, cardiac complications, cystitis, arthritis, periostitis, typhoid spine. Post-typhoid septicemia is a rare complication following prolonged cases. Typhoid fever may be prevented by proper sanitation, isolation of patients and carriers, and inoculation with typhoid vaccine. The water supply and handling of such foods as milk, oysters, and

uncooked vegetables should be supervised; typhoid patients should be isolated in the usual manner; carriers should not be employed as waiter, cooks, milkmen, or in any occupation in which food is handled until properly treated. A specific preventive measure is typhoid inoculation in which typhoid vaccine containing dead typhoid bacilli are injected. This vaccine is give in three doses at intervals of a week and is usually followed by a characteristic reaction is about for to six hours or longer. There is redness and swelling at the site of injection, a feeling of illness, headache, and chilly sensations, pain in the limbs, a rise in temperature, and sometimes nausea and vomiting. Sometimes this reaction is quite severe and the temperature may reach 102 or 103 degrees F. The symptoms usually disappear in twenty-four to forty-eight hours.

Dr. Besredka of the Pasteur Institue in Paris recently devised a method for immunizing the intestines which consist of giving by mouth, capsules containing several billion dead bacilli and ox bile, of intervals of a week, for three weeks; vaccine given in this manner makes the mucous membrane of the intestine immune to typhoid bacilli so that if food containing the germs enters the intestines the disease does not develop.

The treatment of typhoid fever consists principally of relieving the symptoms of the disease since there is no effective specific remedy. When the temperature is excessive,

coal tar drugs such as pyramidon, phenacetin and similar substances are sometimes ordered. Most physicians usually order colon irrigations to prevent tympanites. Sometimes sedatives, such as luminal, bromides, and so forth are given for delirium. When diarrhea occurs the diet is modified and bismeth preparations or opium or morphine arcordued and sometimes saline irrigations are given to remove putrefactive material. For constipation, mild non-irritating enemas are ordered.

Medically, complications are treated individually. Tymparites is usually treated by change in diet by reducing quanities of food often eliminating milk and substituting lactose for cane sugar. Hot applications of turpentine stupes may be applied to the abdomen and colon irrigations are commonly given both for prevention or treatment. Turpentine, asafetida enemas or cathartic enemas are sometimes ordered and in severe cases pituitrine or eserin are ordered hypodermically.

When hemorrhage occurs the diet is changed at once and the patient is given only small quanities of liquids, or feedings may be stopped entirely. An ice bag is usually applied on the abdomen and ice pills are given by the mouth. Here again each doctor may order anyone of a selection of drugs.

The treatment of a perforation is early operation and the sooner the patient is operated upon, the better are the chances for recovery. Symptoms of perforation should

be carefully watched for at all times.

Phlebitis is treated by complete rest in bed and the leg or affected part of the body should be moved as little as possible. An ice bag is kept constantly over the affected area until the tenderness and pain subside. The swelling of the leg, however, may persist for sometime.

When cholecystitis develop, the patient is put on a very light diet consisting principally of warm fluids. A hot water bag may be applied to the region of the gall bladder and the doctor may order morphine atropine be given by mouth.

Cardiac complications are treated by heart stimulants such as digitalis, adrenalin, camphor, and etc. as ordered by the doctor.

Various drugs may be ordered by the doctor in the treatment of cystitis and if severe bladder irrigations with various antiseptic solutions such as acriflavire or silver nitrate may be ordered.

Typhoid spine is treated by vaccines, by sedatives, and in severe cases by a plaster cast to immobilize the spine.

Nursing care of typhoid fever is the most important and the most effective method for treating the disease and it includes attention to details which means everything to the typhoid patient. The patient must be placed in the best possible mental and physical condition to withstand the invasion of the bacteria and their toxins. Special attention should be given the care of the skin and frequent baths should

be given, unless otherwise indicated, not only to maintain a healthier skin thus making the patient more comfortable but also to relieve nervous symptoms and fever. It is important that the nurse guard against bronchopneumonia and decubitus ulcers and she must assume full responsibility for prevention of these two diseases herself since the patient is usually stoo sick and too miserable to be other than indifferent to the possibility of complications. The effect if fever and toxins, poor circulation, low blood pressure, profound illness make even slight pressure of precipitating cause of bed sores. Thus the patient must be kept absolutely clean and dry and his position should be changed frequently. A brisk alchol rub after the bath helps to toughen the skin and painting the skin over pressure points with tincture of benzoin or tanic acid and silver nitrate has been found helpful in warding off bedsores. Blumgarter, in his Textbook of Medicine suggests that the patient should be placed on a water bed when the case runs an unusually long course.

The typhoid patient will derive a great deal of comfort from a clean mouth and I feel that my supervisors were absolutely right when they said, "Any nurse whose patient is found with an unclean mouth is certainly a disgrace to the profession." There are many practical mouth washes, such as equal parts of hydrogen peroxide and water, sodium bicarbonate paste, albolene, and boric acid and lemon juice and they are equally

efficacious in removing the heavy coating from the tongue, gums, and teeth.

When a hemorrhage is suspected or present the foot of the bed is elevated, pillows are removed, all liquids and foods are withheld, ice packs are applied to the abdomin, and the patient should be kept as quiet as possible.

Convalescence is usually established gradually and when the patient is allowed out of bed he should avoid all strenuous movement, excercise, and mental excitement. Frequent rest periods are essential until the strength returns. The diet is gradually increased by the addition of new foods.

When female patients are annoyed at the falling out of hair the nurse should reassure them that the hair will grow back again.

Measles

Measles, are defined by Blumgarten, is an acute, contagious and infectious disease characterized by a specific rash and a tendency to affect the upper air passages. It is a widely prevalent communicable disease characterized by fever, cough, coryza and conjunctivitis, Koplek's sports (small red spots on the mucous membrance of the mouth in early measles) and a marked tendency toward secondary infection.

The cause of measles is unknown except that a filtrable virus is thought to be the agent. This virus is apparently of slight viabelity, and is present during the catarrhal stage in the secretions of the upper respiratory tract, the eyes, and also in the blood.

Infants under four to six months of age whose mothers have had the disease are immune but all other persons who have not already had the disease are extremely susceptible, except for very few rare examples. Somewhere around fifty per cent of the cases occur between the ages of five to fourteen years and almost as many in infants and preschool ages while only about two per cent of the cases occur during the age group over fifteen years of age.

This disease is usually spread by direct contact with the patient during the stage of invasion (the second week), by droplet infection through contact with articles very freshly soiled by the secretions of the nose and throat, and by a third person coming directly from the patiant, as in a

hospital ward. It is easily carried from bed to bed in a ward or from room to room but it is practically impossible for a third person to carry the measles infection from one building to another through fresh air due to the limited viability of the virus.

A small round-cell perivascular infiltration causes exudation in the tissues which results in general swelling of the skin, especially noticeable in the face, occurs in measles. Koplik's spots are a manifestation of this infiltration, congestion, and necrosis, and occur on the mucous membranes. The inflammatory sprocess is followed by desquamation of the epithelium of both the skin and mucous membranes. Early in the febrile stage the lungs become congested and the bronchioles fill with a purulent exudate. The walls of the bronchioles and adjacent cappillaries become thickened so that the result appears to be many small areas of consolidation. Secondary infection, usually with a streptococcus, is often super-imposed on this congestion and infiltration and often leads to a diffuse patchy bronchopneumonia which is usually the cause of death in measles.

The average and customary time from a single exposure to the onset of the first symptom, fever, is seven to fourteen days and usually is sometime during the ninth or tenth day in the majority of cases. The period of invasion is usually of three or four days duration and is calculated from the first evidence of ill health, most often a fever, to the onset of the exanthem or rash in the skin.

Stimson, in his book on Common Contagious Diseases,. presents an effective scheme for descripting the onset of measles when he says, "In general, the features of this period may be most readily remembered by associating them with the fingers of the outspread hand. Beginning with little finger is the first symptom, fever. About twelve hours later comes the ring finger or puffiness of the lower eyelid and some congestion os the peripheral conjuntiva together with the first sign of the enantheur or rash in the throat. Approximately twelve hours later, or middle finger come the evidences of catarrh, also known as the three "C's viz., conjunctivitis, coryza, and cough. Another twelve hours later, on the forefinger, are found Koplik's spots. Then thirty-six hours later, or as far from the forefinger to the thumb as it is from the little finger to the forefinger, come the rash or exanthem; and for the palm of the hand we have a certain amount of headache and considerate malaise throughout this period."

On the average the eruption of measles appears about fourteen days after the exposure, three to four days after the onset of fever, and thirty-six hours after the appearance of Koplik's spots. This eruption usually lasts about five days but in some extreme cases has lasted one or two weeks. The rash is accompanied by a certain amount of edema or puffiness, especially around the face, and the affected skin is apt to burn or itch.

Following this period of exanthem there is usually a fine branny desquamation especially of the face and trunk,

lasting two or three days.

During the convalescent period, in uncomplicated cases the temperature remains normal after its rapid fall and the evidences of the disease clear up rapidly. Following an attack of measles children usually regain their normal strength very quickly but an adult is apt to feel fatigues for some days after the other evidences of the disease have disappeared.

Complications in measles are usually those of some secondary infection superimposed on an already inflamed mucous membrane, and the presence of such should be considered whenever the fever fails to return to normal after the complete appearance of the exanthem. The most common secondarily infecting organism is a streptococcus and may give rise to otitis media, bronchopneumonia, cervical lymphadenitis, laryngitis, encephalitis, various types of nephritis and albuminuria, commonly found in patients with high fever.

Under ordinary circumstances the older the child the less dangerous is measles. Accordingly no child should be wilfully exposed to the infection and if a child is known to have been exposed to the disease, the other children in the family should be removed before the end of the first week of his incubation period in order to avoid exposure to him should he develop the disease. This is particularly adviseable for infants and those alder children in whom measles might be expected to take a severe form--those suffering from anemia,

malnutrition, tuberculosis and other infectious diseases. With measles, also, nearly 100 per cent of susceptible children exposed at home will develop the disease.

The treatment and care of these patients automatically falls under four headings: the confort of the patient and general management, the isolation of the patient with the prevention of the spread of the infection to other people, the prevention of secondary infections, and the treatment of complications as they arise.

The patient should be kept in bed from the onset of the fever until three days after the return of normal temperature. Fluids should be forced throughout the illness and often doctors will advise a teaspoonful of sodium bicarbonate in a glass of water each day. The bowels should move daily and for those who have dificulty regulating them the doctor will usually advise plenty of fresh fruit, stewed prunes, or figs, etc, and if the diet is not effective daily enemata will doubtless be ordered.

The diet during the fever should be largely fluids and starches to avoid extra strain on the then sluggish digestive system. Such a diet may include orange juice, buttermilk, broth thickened with rice or barley, beaf tea, cooked cereal, toast, zwieback, junket, apple sauce, and the like. As a rule children with a fever do better without meat, eggs, or fat. After the temperature has returned to normal, cooked vegetables, cooked fruits and simple desserts are next given and some doctors may suggest cod liver oil as a tonic.

The patient's head should be turned toward the light or the eyes may be protected from bright light by boric acid compresses or dark glasses, but many doctors now feels that the shades should not be drawn as is customary. Borated vaseline may be applied to the lid margins to prevent sticking. Also for the comfort of the patient it is desirable to suppress the cough which is usually non-productive and therefore, valueless. Codeine, paregoric, brown mixture or Dover's powder in small doses may prove helpful, the last also being useful in assisting to bring out the rash, and when headache and malaise are marked and the cough not sufficient to warrant the doctors prescription for codeine, aspirin is helpful in small repeated doses or in combination with phenacetin and caffeine, Wrapping the patient in blankets helps occationally to bring out the exanthem. Itching may be quite troublesome so that the attending physician may advise using bromides or the application of calamine and zinc lotion for relief. Temperatures of around 104 degrees F. or over may be relieved by cooling sponges or an ice bag on the head but quite often alcohols is disturbing on an exanthematous skin. In general, cleanliness, rest, warmth, light, fresh warm air, good food, and good nursing are essential.

Passive immunity in measles is of two types. One type is acquired by the injection of the specific serum from convalescent patients to induce a temporary immunity lasting from two to five weeks; the other type of passive immunity is the inherited immunity of a new born baby whose mother has had

measles and regardless of whether or not the baby is breast fed. This second type of immunity last until the baby is from four to six months old. The third kind of immunity, active immunity, is that which arises when the individual has the disease itself and it is almost invariably permanent in duration, although a few authentic instances of second attacks of measles have been reported. The presence of natural immunity to measles is very unusual and its occurrence is even denied by many authorities.

Whooping Cough

Whooping cough is an acute, specific, and highly contagious disease, involving the repiratory tract and is characterized by spasmodic at tacks of hard coughing, which end with a characteristic inspiratory whoop and the expulsion of a very stringy tenacious mucus from the trachea. The disease is caused by the Bacillus pertussis of Bordet and Gengou.

In the catarrhal stage of the disease, even from the first day of cough when the blood count may still be normal, cough droplet cultures are positive in approximately 80 per cent of cases; during the first week of the paroxysmal stage in about 60 per cent, during the second week in 30 to 35 per cent; during the third week in 15 to 20 per cent and during the fourth week, in 2 to 5 per cent. After the fourth week of the paroysmal stage the organisms are rarely recovered. The bacillus grows luxuriantly among the cilia and causes inflammation of the epithelium and subjacent tissues resultnigm the production of large amounts of the stringymucus.

Since the bacillus can be found in the secretions of the trachea, not only in typical cases but also in abortive whooping cough without typical paroxysms, the disease is spread by these secretions, and thus by direct contact with recognized and unrecognized cases and by means of cough droplets. As to healthy carriers of this disease, they have been identified but only in members of families in which there has been an active case of whooping cough. Also it is probable

that the bacillus can be readily carried on the clothes or by other freshly contaminated articles.

The blood picture in the majority of cases of whooping cough is quite characteristic. There is an increase in the total number of leukocytes and a large relative increase of small lymphocytes; for instance, 15,000 white blood cells with 60 per cent small lymphoctes in a four year old child.

A congenital immunity may exist in some cases during the first few months of life, but it is probably rare, since whooping cough is much more commonly met in the early months of life than are the so called virus diseases or diphtheria or scarlet fever. Some people do seemingly have a natural immunity to the disease and never catch it although they are repeatedly exposed and, on the other hand, some people have such mild cases that they are never recognized as whooping cough. One attack of the disease, whether mild or severe is following by an acquired immunity which usually lasts for life. So called relapses or recurring attacks of the disease are usually not due to infection with pertussis bacillus, and therefore are ordinarily noncontagious, however, a few authentic second attacks with positive plate cultures have been reported. The only method of demonstrating serologically an immunity to whooping cough is by the height of the complement-fixation titer, a complicated procedure. (Miller). The effect of "shots" for whooping cough is still a controversial matter with most doctors, it seems.

The onset of the first sign of the ill health in a case

of whooping cough occurs usually, sometimes early in the second week after exposure, and occasionally appears as early as the fifth or sixth day. An exposed child may be considered not infected if no cough has developed by the fifteenth day but of course there are exceptions to that rule too.

The first or catarrhal stage of whooping cough may last from one to two weeks and is characterized by symptoms of inflamation of the upper respiratory tract such as rhinitis and sneezing, a slightly red pharynx with a tickling sensation, a rather tight dry cough, and sometimes a slight fever with slight malaise and lack of energy. Occasionally all symptoms are lacking with the exception of the tight dry hacking cough. Then in the course of a few days the cough becomes more marked and particularly troublesome at night but the physical signs of bronchitis are characteristically absent. In uncomplicated cases the rhinitis and fever may disappear after the first week but the cough still persists.

With the development of the characteristic cough the second stage is reached, the paroxysmal stage, in which the cough begins to appears in series of from five to ten or more tight coughs during one expiration, followed by a tight sudden deep inspiration with a characteristic crowing sound or whoop. The next expiration is apt to be accompanied by another series of coughs in turn followed by a whoop, so that a paroxysm may contain from one to six whoops. The child frequently has a sensation that a paroxysm is approaching and becomes much alarmed,

very restless, and apprehensive. During the paroxysm the face is apt to become livid, the tongue protrude from the mouth, and there may even seem to be a considerable exophthalmos, or abnormal protrusion of the eyes. As a result of the coughing a plug of tenacious glairy mucus is usually expectorated and with it there is apt to be vomited whatever has been eaten recently. Following frequent attacks of this sort, the face may become swollen, puffy, and pale except for shadows under the eyes. There is a general expression of fatigue and exhaustion and the entire appearance, especially of a very little child, is quite pathetic. This second stage is variable and may last from one to six or eight weeks. It usually lasts four to six weeks. The paroxysms gradually become less frequent and less severe and finally vomiting and whooping disappear.

The convalescent stage is usually considered to begin at the cessation of vomiting and whooping but patients are apt to have the tight cough for some weeks after and many children apparently develop the habit of whooping with every cough. Even vomiting may recur but the patient is considered non-contagious. The entire duration of an average case of whooping cough is usually two or three months and is thought to take about two weeks to develop, four weeks to run, and thru weeks to fade away.

Otitis media is always liable to complicate any disease of the upper respiratory tract. Convulsions may also occur, particularly in infants and very young children and is second

only to bronchopneumonia in cause of death in this disease. Acute dilitation of the heart, particularly of the right side, is present during the paroxysmal stage in more instances than is generally suspected. Hemorrhages from the nose aren't at all uncommon. A tendency to hernia, especially at the umbilicus, may be increased.

After the symptoms of whooping cough have once begun no pertussis vaccine is of accepted value but experience with the use of Krueger's pertussis U.B.A. indicates that the majority of children who receive this antigen will have milk attacks of the disease. When the antigen is given before the onset of the cough or even earlier. Mild cases will run their course without very great distrubance to the patient even though there be no medical treatment whatever but when the case is very severe the treatment given may not only make the patient vastly more comfortable but may be the determining factor whether or not the patient survives the disease.

The daily hygiene should be carefully checked and supervised, so that there shall be no constipation, uncleanliness, fatigue and excessive loss of sleep, or lack of fresh air to militate against the childs' chance of normal recovery.

The kind of food eaten by many of the older children while they have whooping cough seems to make little difference in the frequency or amount of vomiting but there are some children who appear to vomit invariably after eating certain foods. For infants, concentrated foods, such as thick cereal

feeding, are usually better retained than dilute formula preparations and because of the unfavorable influence of rickets on the prognosis, vitamin D should be stressed. In general, frequent small meals are less apt to be vomited than infrequent large meals and after a paroxysm accompanied by vomiting, there is often a latent period during which a moderate amount of food will be readily taken and retained by the patient.

The nursing technique is that of strict isolation. The child should be kept as quiet as possible since excitement and overexertion often produce a fit of coughing. He should be kept out-of-doors when the weather is warm but should not be permitted to romp and run, and since they are imitative it is best not be place them with others that whoop.

Sedatives are frequently ordered but their administration requires no special nursing procedures. Some physicians order an abdominal binder of flannel or other material, firmly applied in order to help prevent vomiting by forestalling free play if the abdominal muscles, and to assist in preventing hernia. If the paroxysm is prolonged, Gladys Sellew, in her book entitled "The Child in Nursing", suggests that relief may be obtained by pulling the lower jaw forward with both hands as in anesthesia.

Bibliography

Blumgarten, A. S.; M.D.; "Textbook of Medicine", 2nd Edition, Published by Mac Millan Co., New York, in 1937.

Budd, Wm., M.D.; "Typhoid Fever"; Published in New York, In 1931.

Cooley, R. A.; "The Rocky Mountain Wood Tick"; Montana State College; 1932.

Dick, Geo. F. and Dick, Gladys H.; "Scarlet Fever"; Copyrighted 1938, Published by the Yr. Book Publishers, Chicago, Ill.

Fox, Carroll, M. D.; "Insects and Diseases of Man"; P. Blackiston's Son and Co.; Philadelpha, 1925.

Hilmy, Ahmad Bey; "Smallpox in Egypt"

Harmer, Bertha; "Principles and Practices of Nursing"; 3rd Edition, revised, Published by Mac Millan Co.; New York, 1935.

Mc Cullough, G. T.; M.D.; Missoula, Montana, "Spotted Fever"; (Paper red before the Montana State Medical Society, Anaconada; May 21, 1902).

Moore, H. H.; "Public Health in United States"; Published by Harper and Brothers, New York and London; Printed in U.S.A.; Copyrighted in 1923.

Moore, J. T.; "Typhoid Fever"; Published by G. P. Engelhard and Co., Chicago, 1902.

Schamberg and Kolmer; "Acute Infectious Diseases"; Published by Lea and Febiger, Philadelpha, 1928.

Sellew, Gladys, Ph D. B.S. R.N.; "The Child in Nursing"; Published by W. B. Saunders Co., Philadelpha, 1938.

Spencer, R. R.; "Rocky Mountain Spotted Fever"; Hyienic Laboratory; Washington, D. C.

Stimson, Philip M.; "Common Contagious Diseases", 2nd Edition, revised, Published by Lea and Febiger, Philadelpha, 1936.

Stricker, Frederick, M.D.; "Prevalency and Distribution of Rocky Mountain Spotted Fever in Oregon"; Medical Sentinel for June, 1923; Portland, Oregon.

Wu, Lien Teh; "Plague"; Nalt. quarantine Service, Shanghai Station-China; Chicago Medical Book Company; 1936.

Bulletins:

"Studies on Rocky Mountain Spotted Fever"; Bul #154; U. S. Treas. Dept; Public Health Service, Washington D. C.

"Rocky Mountain Spotted Fever"; Bul. June, 1923; Montana State Board of Health.; Missoula, Montana.

"Montana State Board of Entomology"; Ninth Biennial Report.-1931-32.

THE BUBONIC PLAGUE AND ROCKY MOUNTAIN SPOTTED FEVER

To conclude this series of communicable diseases I have prepared a review of two of the less common but more spectacular diseases. One, Rocky Mountain Spotted Fever, is believed to be quite unique in its occurrence on this side of the Rocky Mountains while the other disease, the Plague, is famous the world over. Discussion of these two diseases will probably be somewhat technical compared to the treatment of the preceding diseases. However, the histories are very interesting, and I repeat spectacular, and, especially in the case of the Rocky Mountain Spotted Fever, a good nursing technique is highly undeveloped and only of recent discovery in effectively caring for stricken individuals. The more renowned of these two diseases will be dealt with first.

The Bubonic Plague

In the earliest available records many of the "pestilences" spoken of, it is believed, were outbreaks of Bubonic Plague but due to the insufficient description of the ravages of these diseases no proof of this presumption has been established. As early as 1320 B. C. disease epidemics considered as true plague were mentioned. A somewhat improved description of apparent plague was found in the writings of Rufus, a physician of 100 A. D. regarding the outbreaks in Libya, Egypt and Syria and, in 1883, Hirsch told about the history of plague starting in lower Egypt and spreading "to the ends of the

inhabitable world" and told how it depopulated towns and turned the country into desert. The number of victims for from fifty to sixty years was estimated as a hundred million people* although it is not certain that all of these fatalities were due to Bubonic Plague. From A. D. 680, probably due to the association of disease with evil spirits and the like, information is almost completely lacking for more than a century. The second and most notable pandemic occurrence of the disease, also the most notable, was known as "The Black Death" and exhibitied symptoms of pneumonic manifestations with bloody sputum, cyanosic characeristics and frequency of skin hemorrhages. Boccaccio, an eye witness of the disease, said it showed itself by black or blue spots appearing on the arms of many and on the thighs and every other part of the body, the spots being "great and few in some cases and in others small and thick". The disease seemed to often start as the pneumonic type and go to the bubonic type but was chiefly bubonic in nature. Also this disease didn't always spread with lightning rapidity as may be generally supposed and sometimes took years to bo from one town to the next which is generally attributed to the greater distances then existing between towns and the limited means of transportation. The total number of victims in Europe from "The Black Death" was estimated at about twenty-five million* or one fourth of its population and in Westminister Abbey there was a marble

* Wun, Lien. "Plague" Chicago Medical Book Company, 1936.

slab erected stating that twenty-six monks died and were buried below it of plague in 1348.

During the fifteenth, sixteenth and first two-thirds of the seventeenth century the plague held full sway over Europe and upset the whole social system, but in the fifteenth century doctors did more than just attributing it to the evil spirits and stars and substantial progress was made in diagnosis and prophylaxis and exanthematic Typhus often confused with plague was set apart. During the sixteenth century this disease spread throughout the Roman empire and during the past thirty years or so has occurred annually in India and China. It is only in recent years that plague has been causing any very serious problem in the United States, Porto Rico, the Philippine and Hawaiian Islands, Australia, South Africa, Peru, Ecuador, etc.

Introduction of this disease into a country is made possible through the migratory habits of rats resulting in their being transported from place to place by these rodents and practically every port of entry is open to the danger of introduction of the infection. This disease may occur and be transmitted to all rodents but the rat is given most consideration from the standpoint of prevention.

Although it had been noticed that epidemics in rats occurred preceding and coincident to the epidemic in man the true re-;ation between the disease in man and rat was not understood until a number of years after Yersin discovered the plague bacillus in 1894. The British Indian Plague Commission, as

well as other investigations have proved conclusively that the flea is responsible for transmission of the causative organism through numerous and extensive experiments. They permitted a plague rat and a healthy rat to contact each other with and without the presence of fleas and found that if the fleas were absent the rat remained well. They also found that a single flea was sufficient to produce the disease. Also, only in rare cases, a healthy rat acquired the disease by eating the carcass of a plague infected rat.

Another experiment consisted of putting healthy guinea pigs in houses from which plague cases had been taken where the pigs contracted the disease, except when they were put in cages above the jumping distance of fleas or by surrounding the cage with sticky fly paper.

Plague bacilli were readily demonstrated in the stomach, intestine and fecal discharge of fleas having bitten a septicaemic plague rat when innoculation of the material into rats or guinea pigs produced the disease. Plague organisms taken into the stomach of the flea undergo multiplication but do not penetrate the stomach walls and therefore do not gain access to the body cavity, salivary glands or reproductive organs, thus they are not transmitted to the second generation nor passed out in the salivary juices. The flea gradually rids itself or plague bacilli through the peristalic movement of the stomach and intestine. This causative organism, bacillus pestis, is a non-motile, gram negative bacillus, characteristically

staining at the poles and sometimes taking on a coccoid form in the tissues. It is found in the plague pustule when that is present and in the bubo in great numbers, in the blood, spleen, liver and in focci of infection in the lungs.

There are three clinical forms of Plague, namely, Bubonic, Scepticaemic and Pneumonic. It is true that some forms of the disease are so mild that the patient may be ambulant not realizing what is the matter with him. Bubonic plague is the most common form characterized by the bubo formed in one of the glandular regions. In the scepticaemic form, a scepticaemia develops from the beginning and the primary bubo is absent or the patient may die early before the characteristic bubo manifests itself. In fact, the bubo often is not disclosed until at autopsy. Practically every type of plague is scepticaemic sometime or other. In the Pneumonic type the condition is primarily a pneumonia caused by the plague bacillus. It is spread directly from man to man as any other disease of the upper respiratory tract. A secondary plague pneumonia is often a complication of one of the other forms and under suitable conditions may easily start an epidemic--a low atmospheric condition, tightly closed rooms with a high degree of relative humidity. The disease is communicable as long as a scepticaemia exists and the suitable insect host is present. Plague fleas carried on the clothing is a very unusual mode of transmission.

The disease develops rapidly with a sudden rise in temperature reaching 103° or 104° Fahrenheit in two or three days after which it is more or less irregular. There is severe

headache, the eyes are infected and the facial characteristics are that of extreme illness. There is profound early prostration delirium also appears early. The characteristic lesion, the bubo is usually sufficiently pronounced by the second day to be readily detected, the most common sight being the femoral or inguino-femoral region, then the axillary region, cervical ilia and popliteal regions. Cedema sppears over the enlarged glands causing great tenderness but the individual lymph nodes cannot be palpated. This swelling forms the primary bubo and secondary buboes may appear in other parts of the body but in these the glands are not matted together.

There are four forms of skin eruption which occur in this disease: a petechial eruption, ecchymosis, a subcuticular mottling and plague pustule. Just before death there is a subcuticular mottling somewhat resembling cadaveric lividity due to the intense toxemia which produces changes in the blood, and walls of the smaller capillaries. In about a week, if the patient survives, the bubo breaks down leaving an ulcer which heals very slowly. The spleen becomes enlarged and swelling of the kidneys and heart muscle and congestion of the liver occurs. In suspected cases the laboratory furnishes a ready means of early diagnosis since plague bacilli may be easily recovered. The case fatality is from 30 to 70 per cent.

Treatment has consisted of large doses of Yersins serum, 150 c.c. to 200 c.c., subcutaneously or intravenously administered daily until decided improvement is noticed and seems to do some

good reducing the fatality rate some 10 to 15 per cent, but unfortunately this serum is higher in bacteriocidal than antitoxic properties and destroys the bacteria, likerating the endotoxin which is not then completely neutralized because of the toxins weak antitoxic properties. Ten cubic centimeters is a prophylactic close given subcutaneoesy but the local reaction is sometimes annoying and a general reaction sometimes follows. Then too, the passive immunity this produces is very fleeting and probably doesn't last more than a week. Although, theoretically, the Haffkine prophylactic, consisting of dead plague bacilli, should produce and active immunity of longer duration than the passive immunity following the use of serum it is not recommended in Dr. Foxe's book (1) because it is doubtful whether any success is obtained following its use and the time, trouble, and expense following its administration.

When atmospheric conditions are favorable, moist atmosphere and moderate temperature, the flea may survive for a considerable time unfed. Like Rocky Mountain Spotted Fever, the Buboric Plague is most prevalent in the late spring or early summer and attain their greatest number in the late summer or fall months. The north Atlantic sea coast of the United States, so far as known, has never been visited by the disease.

The object of all methods of control is to place the environment in such a condition that man and rat or its fleas will not come into contact and the presence of the rat be discouraged. It is quite possible to reduce their number by trapping and poisoning them and to keep them out by proper

(1) Fox, Carroll, M. D. "Insects and Diseases of Man", P. Bladeston's Son & Co., Philadelphia, 1925.

rat proofing procedures, at the same time abolishing all conditions for harboring, breeding and feeding them. All the campaign for extermination of these rodents, of course, should be all be well organized and, according to Dr. Fox, should have a central office, a laboratory and a field force. At headquarters policies should be adopted and educational measures instituted, statistical information collected and compiled and general supervision maintained over the entire work. In the laboratory, rats sent in are examined, post mortems are performed on human cases and rats and flea surveys are carried on. In the field, rats are trapped and poisoned and transmitted to the laboratory. All orders relative to rat proofing and similar requirements should come from headquarters but the fulfillment of these orders and careful education toward them must be carried on by the district officer for even thinking business men and city officials object until they realize that without adequate measures their business may be placed in jeopardy. Preliminary to issuing proofing orders, clear evidence must be procured of the conditions and any case is liable to be protested in court. Photographs are valuable evidence and there should be at least two witnesses.

Rocky Mountain Spotted Fever

Early explorers found the tick in Montana but no particular importance was attached to it until 1906 when Dr. Ricketts showed, by letting the tick bite a guinea, pig, that it was the agent responsible for the disease Rocky Mountain Spotted Fever in man. Dr. T. D. Luttle, secretary of the State Board of Health, then requested the president of the Montana State College to make a study of the life history of the tick. Since the problem was and is a health problem, the funds for such research could not be appropriated on an agricultural basis and the entomologist fund was then only five hundred dollars. However, some assistance was obtained from the United States Bureau of Entomology and the United States Bureau of Biological Survey. In 1913 a law was passed creating the Montana State Board of Entomology and was appropriated a sum of five thousand dollars. No change was made in the board from 1913 to 1931 so that marked progress was made in the study of the tick since all members of the original board were extremely interested in the study. Since then they have cooperated with many other agencies such as the United States Public Health Service, Harvard Medical School and the Rockefeller Foundation.

The tick itself, commonly known as the "wood tick" is well known and recognized by those living in the Rocky Mountain regions. An entirely different tick, called the

wood tick also, was at one time found in the Eastern states but doesn't transmit Rocky Mountain Spotted Fever. It has been confused with the sheep tick which commonly occurs in the same regions as the "wood tick," however, the sheep tick has never been found to transmit any disease and is apparently harmless. The sheep tick differs from the wood tick in habit, structure, and classification but both are blood suckers. Also, the sheep tick remains on the host throughout its entire life.

*The disease has been reported from Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, Northern California and the extreme western part of the Dakotas and Nebrasha. Cases have been reported from New Mexico, but were either brought into the state after contracting the disease elsewhere or have not been confirmed by competent authorities. The presence of the tick is a necessary but not the only factor involved in the maintenance of the disease in nature. The disease has a tendency to localize in certain foci but there are many areas where ticks are abundant and the infection is absent. Also the irrulence of the infection varies with the locality being * 5% mortality in the Snake River Valley, Idaho, and 76% to 89% mortality in adults in the Bitter Root Valley, Montana. In Oregon, the disease has been confined to the Eastern part and it seems to be confined to the

* "Rocky Mt. Spotted Fever;" R. R. Spencer; Hygenic Lab; Wash. D. C.

the valleys, and especially in or near the foothills of the mountains. This variation in virulence and localization of the infection has never been satisfactorily explained. The tick itself is not affected by the virulence of the disease nor is the potency of the infection changed by passage through ticks from various localities and ticks from areas of low virulence or areas where the disease is absent have been shown by us to transmit the virulent strains without perceptible loss of potency.

The reporting of cases has never been complete but it has always been estimated that about * 250 to 500 cases occur annually and there is some evidence that the disease reaches its greatest prevalence every seventh year--corresponding roughly to a similar increase in the number of rodents, chiefly rabbits. The disease seems to occur speradically and whether a general increase, such as the one which occured in 1915, is due to a recrudescence of old foci or an actual spread is not known. It is possible that the disease may be maintained in rabbits by means of the rabbit tick without the occurrence of human cases since this tick does not bite man.

The cousative agent, Dermacentroxenus rickettse, is described as a gram negative, pleomorphic intracellular, rickettsia, like organism described by Wolbach who kept it alive for 28 days when super imposed on living tissue cultures. This organism can usually be demonstrated in

* Rocky Mt. Spotted Fever"-R. R. Spencer; Hygienic Lab; Wash. D. C.

infected ticks at one stage or another and with some difficulty, in tissues of infected animals, however, organisms morphologically indistinguishable from those described by Wolback have been found in proved noninfected ticks. Also, in ticks containing a high concentration of virus, rickettsiae are frequently absent. From these observations came the conclusion that the organism undergoes a cycle with one stage which is not readily atainable. Three stages of the life cycle, based on studies of behavior of the virus in animals and ticks and not on merphological changes have been described as the noninfectious, highly infectious and irrulent, and mammalian blood or tissue-virus phases.

The noninfectious phase is believed to occur in the hibernating fasting ticks and is not capable of producing the typical disease unless stimulated by blood or heat, but which will fewquently immunize when injected into guinea-pigs. The second, a highly infectious and virulent phase, occurs in nymphs and adults following this feeding. There may be a very marked increase in the occurrence of the organism throughout the tissues or a failure to find the organism at all in this stage but is is in this stage that the protective vaccine can best be prepared.

The mammalian blood or tissue virus phase is the third phase described and in this phase the virus seemingly lacks the power of penetration or aggressiveness and very likely

possesses the protective quality when treated with phenol.

(2) The incubation period in experminental animals varies with the method in inoculation, the virulence, and the animals used, from 24 hours up to 4 or 5 days after innoculation. The average incubation in man following natural infection is 4 to 7 days.

All ages and both sexes of man are apparently susceptible to infection by the tick and man possesses very little in any imunity to the disease. Children always withstand the infection better than adults and is most unusual, in areas of high mortality especially, for a man over fifty years of age to withstand the attack of the disease. (1) In thirteen Rocky Mountain States the mortality rate of some 4,260 cases up to 1928 was approximately 17.11 per cent and Dr. Mc Cullough in his paper read before the Montana State Medical Society in 1920 cited several specific statistical reports obtained from hospitals as: out of 15 cases in St Patricks Hospital at Missoula, Montana, only three recovered; out of 16 cases under observation of Dr. Hanbidge of Victor, 12 terminated fatally; and thirty out of forty cases under the care of another physician resulted in death.

The activity of adult ticks determines the seasonal prevalence of the disease in man. They appear with the first warm days in the spring or as soon as the snow melts on the

(1) "Rocky Mt. Wood Tick"; R. A. Cooley; Montana State College; 1932

(2) "Rocky Mt. Spotted Fever" R. R. Spencer; Hygienic Lab; Wash. D. C.

the south slopes of the canyons, and the season is usually considered over by July 15th when the ticks become dormant due to the severe heart of the summer sun.

The virus of Rocky Mountain Spotted Fever apparently requires a warm-blooded and a cold-blooded host, therefore, either the tick or the susceptible rodent host may be considered as its source. Peculiarly enough, the adult tick invariabley seeks a large animal as its host while the nymph and immature tick seeks the smaller rodents. It has been shown many times that infected female ticks transmit the infection to a part of their progeny so that it is assumed that such transmission is partly responsible for the maintenance of the disease in nature.

The disease itself closely resembles Thphus Fever but there is no enlargement or tenderness of the regional lymph glands. Also, no secondary infection. The patient usually experiences a prodromal stage of one or two days characterized by listlessness, vague aches and pains, loss of appetite, general malaise and perhaps a slight fever, but the onset may be marked by a sudden and severe chill and dizziness, with high fever following, associated with intense soreness seemingly of the entire muscles of the body. The temperature may rise to 104 F. or higher and remains high for 7 to 10 days, with morning remissions, after which it gradually falls by lysis, reaching normal after 2 or 4 days.

Severe frontal headache and backache especially in the lumbar region are pronounced symptoms and delirium usually manifests itself being either low and muttering or perhaps only a mental habitude, the patient being partially rational. Jaundice accompanies the majority of cases and is spread over the entire body but is especially well marked in conjuntiva, a glazed appearance comes over the face, which is almost copper colored and has a bluish or dusky hue as the disease advances.

The skin also is sensitive, even to the touch of the bed clothes. Commonly the patient will have a slight short cough and frequent nose bleeds. The majority of patients are constipated and extreme restlessmess and insommia are invariable symptoms and tend to exhaust him.

A very prominent feature of the disease is the accompanying eruption which usually appears from the third to the sixth day, more frequently upon the back at first, or simultaneously with the ankles and wrists and extends over the entire body, presenting at each a "turkey egg" appearance. The macules partially disappear under pressure early in the eruptive stage, but later become permanent, and take on a darker hue and lose the pink tinge that predominates when the eruption first appears. The spots are quite large compared to those of other disease.

The gross pathology is not distinctive. The subcutaneous hemorrhages, and enlargement of the spleen are

the only constant and striking gross lesions. The disease may be confused with a severe attack of measles, cerebrospinal meningitis or, in the early stages, even with smallpox. Diagnosis takes into consideration the time of the year, the area in which the disease was seemingly acquired, and the history of the bite of a tick. The virulent foom can usually be reproduced in guinea-pigs, with typical symptoms of the infection by injection of the patient's blood.

Complications of the disease include hypostatic pneumonia, rhuematism, gangrene and hemorrhagic diathesis (predisposition). The marked tendency to hemorrhage has been known to affect the nose, throat, lungs, and bowels and the blood loses its power of coagulation.

In treating the disease it is highly important that the patient be put to bed at once in a quiet room and not removed. Every ounce of strength should be conserved and the heart saved from unnecessary work since exhaustion is always a marked symptom. It is important to check the patient's pulse and respiration often rise, as in most continued fevers, both gradually increase until the acme of the disease is reached in nonfatal cases about the end of the second week. Failure of the heart muscle as evidenced by the thready, rapid pulse is often the first indication of a fatal outcome and for this reason a course of digitalis therapy is started early upon recommendation by most physicians in the greatest number of cases. The pulse

varies from 80 to 120 in most cases and lacks volume and regularity as the disease advances.

Cold or tepid sponges may be given every three or four hours for the intense high fever but it is best to avoid antipyretics because of their depressing effect upon the heart. Accompanying this fluids should be forced and liquids in the form of lemonade or orangeade are especially recommended. Also an enema may be given each morning if indicated. The diet should be light, nutritious and easily digestible. Special care should be given lips, tongue and mouth.

Veronal, or some mild soporific should be given for insomnia and for the low grade deliruim which are often quite troublesome symptoms. No specific drug or curative antiserum has been found for this disease and many serums and drugs have been employed experimentally in treating the disease and its complications with very little encouragement resulting.

Primary measures of prevention of course consists in avoiding, as much as possible, the known infested areas. Those who are compelled, through occupation and the like, to enter these areas are urged to examine their bodies and clothing frequently but constantly for ticks. Since the tick doesn't usually attack itself at once but crawls around for sometime it can often be felt as it is apparently searching for a suitable spot to attack itself, especially around the hairy portions of the body where it will be

protected against rubbing. Even after attachment the tick usually does not infect its host for several hours so that the sooner he is removed the better. Following the removal of the tick the spot should be cauterized with lunar caustic, nitric acid, etc.

Tight fitting leggings or puttees are suggested for all those who are going into these areas since in this way the tick will be completed to crawl up the outside and can be felt on the neck or detected on the outside clothing.

The disease itself confers a lasting immunity but a suitable vaccine that will be effective for any great length of time has not been perfected as yet. However, the vaccine in use does apparently confer effective immunity for at least one season and is highly recommended for those who must work in tick infested areas.

Investigations for prevention have been carried out along three main lines: first, a study of the disease as it occurs naturally in ticks and animals with the object of determining some practical method of tick or rodent destruction.

Second, the introduction of a tick parasite for the purpose of reducing the normal abundance of ticks to a point where the disease would cease to propagate itself.

Finally, laboratory studies of the behaviour of the virus in ticks and experimental animals with the object

of developing a preventive vaccine or curative serum.

An adequate control of the disease is not yet known and any extensive attempts to control the disease have not been made outside of Montana. The incidence has been decreased some what by the dipping of the more domesticated animals and poisoning of wild animals rodents and the like. However, these methods have been found inadequate since the multiplicity of the rodent species is so great; the insect vector is not limited in its feeding habits to one host; and man plays no part in the maintenance of the condition in nature. It has been found that ticks who become imbedded in the wool of sheep are unable to get close enough to the meat to obtain nourishment and get so immeshed in the wool that they can't free themselves so starve. Also the lanolin of the sheep pelt clogs their pours so that they are unable to breathe.

There were four deaths from Rocky Mountain Spotted Fever in Oregon last year.