GERMAN MEASLES

Thesis for the degree of M.D.

by

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INDEX.

INTRODUCTION.

In taking the disease German Measles as the subject of a Thesis for the degree of M.D. I am prompted thereto by various reasons. In the first place no monograph or the disease has appeared lately in which the general history has been gone into in any complete manner. Secondly because modern experience and later observations have made it necessary to revise and modify, or perhaps more still amplify, the question of prodromal symptoms and complications. And thirdly because there is no disease which is so frequently undiagnosed or is diagnosed as some other trouble. I would like to bring forward prominently some few points, which have been very incompletely described previously.

First, the frequency in the early prodromal symptoms of a stiff neck. Secondly, the occurrence of the symptom of neuralgia during the disease and of which I can find no record in the literature and thirdly the aid in diagnosis of the Diadzo Reaction, the absence of which is of considerable importance. The cases on which these observations were made were admitted to the City Hospital, Edinburgh during 1905 and 6., and the charts and records/

records of that Institution have been at my disposal, a bibliography with the chief references to other authorities which have been searched will be found at the end of the paper, and on the claim that as far as possible in so short a paper, every aspect of the disease has been touched upon I beg to entitle it "German Measles."

GERMAN MEASLES.

The disease which is now called German Measles in this country has been described under a multitude of names:-

German Measles, False Measles, French Measles Bastard Measles, Epidemic Roseola, Epidemic Roserash, Hybred Measles, Bastard Scarletina, Roseola, Rubeola, Rubeola Notha (Wunderlich). Rubeola sine Catarrh. Roseola Epidemica, Röthcln, Rosalia, Rosalia Idiopathica, Feuermasern Roseole, Roseole idiopathique, Exantheme fugace, Essera Vogelii (Trousseau and Borsieri) Rubeole and Rougeole fausse.

It is possible even that this very extra-ordinary variety of names, is in part accountable for the number of discrepancies and differences of opinion, which have been found on examining the descriptions of this disease by different writers. It has certainly added somewhat to the difficulty of trying to obtain anything like a complete history of its course, from its supposed first description about the beginning of the 11th Century to the present time. Many authors recognising one form of designation for the disease and/

and at the same time using another of its synonems for a perfectly different complaint, and though the names given above seem to be a very formadable list, they are probably not by any means the only ones under which the disease has been described.

In this country, though its identity had been advocated for many years, an official recognition was only obtained for it in the year 1881, and since then further changes have taken place, and attempts have been made to show, that the term Rotheln or German Measles covers more than one disease, the latest offshoot having not as yet received official recognition or even general acceptance, but it is possible that what is now termed 'the Fourth Disease' may yet receive some more descriptive title, and in any case the controversies which are appearing, and which will continue to occur until this matter is settled, may cause further additions or changes in the nomenclature.

The early history of German Measles is very uncertain. Some writers amongst whom Haesar is prominent, state, that what was described as Hhamikah or Humak [حمیکا] by Avicenna, an Arabian, who lived 980 - 1037 A.D., corresponds to German Measles. His description of the symptoms points to a disease however, which had many of the features of Measles and Small pox, but with a smaller mortality than either, and it has been contested, that it is more probable, that the disease he described was chicken pox. The next writer with claims to priority is Baillou in 1574, but this also is somewhat of a doubtful nature, and the first description of the disease was in 1752 by de Bergen and he accordingly to Griffiths maintained at that time its separate identity. Few authorities however agree with this, and most are inclined to give the credit for the first clear description to Von Orlow in 1758, who although he did not insist on its being a separate disease, gave such a clinical picture of its symptoms and appearances as showed him to be well acquainted with the disease which we now recognise as German Measles.

Following Orlow, attention was drawn to it by various writers on the continent, Heim in 1812, Willan 1816/

1816, Meissner 1841 and Schonlein in the same year, none of these however advocated the separate identity of the disease. Henke and Wunderlich considered it to be anomalous measles, Reid, Hufeland, Heim and Godin, described it as a variety of Scarlet Fever, and later Hildebrand, Schönlein, Hebra and Aitken, declared it to be a hybred of both diseases, whilst writers as late as 1835 denied its existence entirely.

In 1815 Maton established the idea based on observations that whilst one attack afforded protection from a second, that it did not confer Immunity to a subsequent attack of either Measles or Scarlet Fever, nor did attacks of either or both of these protect the subject exposed to German Measles.

In 1829, Wagner described it and stated that it was a specific disease different from Scarlet Fever and Measles, but little support was given to the theory until 1866 when Trousseau in France and Veale in this country published their papers. Trousseau declared that Rötheln bore the same relation to measles and scarlet fever, that chicken pox did to small pox.

Murchison in a lecture delivered at the Middlesex/

Middlesex Hospital after showing two cases of the disease went on to say that 'the ailment from which these patients suffer, is not generally recognised as a distinct disease' after which he put forward some of its distinctive characters, and claims for a separate identity, but confusion continued and was fostered by the puzzling writings of Sir Wm. Aitken, who differentiated between Rötheln and Roseola in his science and practice of Medicine; when he declared that Rötheln or Robeola, was often an extremely and rapidly fatal disorder, whilst Roseola had no such serious effects. In contra-distinction to this was the writing of Trousseau. "De toutes les feivres eruptives la reséole est la plus beniqne", and in support of this all the earlier literature of Paterson, Copland, Wunderlich (though the last did not insist on its separate identity) and of Thomas of Leipsig who in 1878 gave a very excellent account of the disease in Von Ziemssen's Cyclopedia of Medicine. All of whom agreed that the elevations of temperature were at the worst only moderately febrile, and that although the disease was an extremely interesting one from the controversy over its identity and its somewhat puzzling diagnosis, its claims to be regarded as a fatal disorder were practically/

practically groundless.

What the epidemic was in which Sir Wm. Aitken described such a large mortality it is now difficult to say, but no subsequent epidemic or series of cases of German Measles, with the exception of one or two reports of outbreaks in which there were concurrent disorders, has been attended with such high mortality, and this seems sufficient to cause doubts as to whether his cases were not true scarlet fever, or had some concurrent and virulent disorder, which in itself caused the mortality. In support of the former theory the statistics of mortality in Berlin (1784-1794) give the deaths from Rubeola as 457, whilst Scarlet fever only accounted for 172 and Measles for 53.

In another account of the statistics of the years 1784-1796 Formey declares that in Berlin alone, 1180 persons died of Rotheln whilst 205 died of Scarlet Fever and 103 of Measles. But the symptoms of this disease are described by Klaatsch as follows:-
"The disease begins with severe nervous symptoms of delirium and vomiting, accompanied by inflammation of the throat, and frequent formation of white patches. With this a uniform or irregular bright red eruption is present. It is followed by oedema/

oedema and desquamation in large pieces."

Heim also in his published accounts in 1812 strongly denies the existence of any specific characters in Rötheln, declaring it to be only a variety of Scarlet Fever, and on examination of his papers he gives many symptoms and signs which to-day are not associated with German Measles at all, but would be classed as cases of toxic or malignant Scarlet Fever.

1. A more than usually severe sore throat.
2. A general flush or redness of the face.
3. An eruption lasting from six to eight or even ten days.
4. A distinct desquamation.
5. Dropsical sequelae.
6. A high degree of mortality.

If these were the figures on which Sir Wm. Aitken based his statement, it is not difficult to understand, for if all the anomalous cases of scarlet fever were classed as Rötheln or Rubeola, then all the toxic and malignant cases would come under this heading, and the death rate of scarlet fever would promptly be reduced to a minimum, with a corresponding rise in the case mortality of Rotheln.

The troubles of diagnosis were further increased by some ingenious suggestions of Schönlein who believed that the true status of the disease lay half way between measles and Scarlet Fever and was in fact a combination or hybred of both diseases.

Either/

Either that when simultaneous epidemics of Scarlet and Measles were present, a special infective agent was produced, which was capable of causing some of the symptoms of both diseases, or that an individual was simultaneously attacked by both infections, in which case one of the infective agents attacked the skin, leaving the other free to attack the mucous membranes, thus accounting for the variation in the clinical symptoms between different cases. This theory seems to have held its ground for a considerable period.

Other writers used the term Roseola to mean simply a condition of the skin, in much the same sense that the term Erythema is now used.

This condition of affairs was almost general until 1850, but since that time authorities began to state their belief in the disease having a separate identity, and despite the authority of Heim Wagner's theory was supported by men of prominence, such as Hennig, Veale, Emminghaus, Thomas, Trousseau, De Man and Squire, which ended with the establishment of Roseola or German Measles as a disease separate from Scarlet Fever and Measles, and its official recognition as such at the Medical Congress held in London in 1881, and discussed at that time in the section of Diseases of Children.

The/

The next important theory put forward was that German Measles in reality consisted of two separate diseases, the one which we recognise as German Measles and another situated half way between German Measles and Scarlet Fever, and presenting many of the symptoms of both. This theory was brought forward in 1900 by Clement Dukes and he gives the name of the Fourth disease to this newly described condition.

He bases his arguments on the belief, that one attack of an eruptive fever gives immunity from a second attack in the same individual during childhood, which axiom was laid down by Cullen more than a century ago. Dukes therefore, in face of considerable opposition expresses a blind belief in this, and declares that the exceptions are so insignificant that they may be regarded as scientific curiosities only, and that the rule may be accepted as absolute and invariable. He therefore set himself to differentiate another disease distinct from German Measles to account for the fact that a child is occasionally reported to have suffered from Measles on three occasions, that is to say, Genuine Measles, German Measles and an unidentified disease, which Dukes classifies under the name of a fourth disease, he denying the possibility/

possibility that the child should have had either Measles or German Measles twice. After some time spent at this work, he published a paper in the Lancet of July 1900 and drew up a table differentiating German Measles, Scarlet Fever and his Fourth disease, but on reading carefully his differential diagnosis as set out in that paper, the evidence seems to give very little help in diagnosing German Measles from the Fourth disease, whilst abundant evidence is brought forward to distinguish either from Scarlet Fever. At the same time the differential diagnosis form Measles which German Measles may in some cases closely resemble is not touched upon. It is curious to contrast Dukes faith in Cullen's axiom, with the published statistics of Hospitals which put down the second attack of such diseases as Scarlet Fever at a definite figure, one per cent in one report, .25 per cent in another, and the writings of Borsieri who says that one attack of Roseola actually predisposes to another. "Qui semel iis laboravit, facile iterum pleuriesque prehenditur," and the fact that second attacks of Measles are known to occur.

This brings the history of the disease up to the present day in which it is accepted, that German Measles has an identity of its own, and is in no wise allied to either Measles or Scarlet Fever. The question as to whether two or more diseases are not included under the/

the term German Measles is not so satisfactorily answered, no one with experience of the disease will deny that isolated cases will crop up which it is impossible to classify, they are not Scarlet Fever, nor are they Measles, but at the same time even the most careless observer will be struck by certain points in which they vary with the classical description of German Measles. Dukes has tried to establish the identity of a disease half way between German Measles and Scarlet Fever,and calls this the Fourth disease. In this he directs all his attention to cases resembling Scarlet Fever. His papers in the Lancet caused considerable controversy and although he has some authorities on his side, the vast majority have not accepted his ideas. Now if Dukes recognises his fourth disease and places it between Scarlet Fever and Measles, he pays no attention to the cases of so-called German Measles, which resemble measles, the question might with equal justification be put, is there a Fifth disease and does the term German Measles actually cover not two diseases but three. So far isolated cases only have been observed presenting the symptoms of a disease simulating Measles and German Measles so closely, that diagnosis is only possible by watching for the results in cases with which such an one has been in contact, and as these cases/are few

cases are few and far between, it would be premature at present to try and draw conclusions from the few cases observed. But certain it is, that if the 'Fourth disease' raises general recognition, we shall promptly be confronted with another question regarding the existence and identity of a 'Fifth disease' which seems to have at all events as good a claim for attention as the former.

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DEFINITION.

The disease may be defined as a specific and infectious eruptive fever, characterised by a long incubation period, by slight sneezing and coughing, a mild degree of pyrexia and a rash of a characteristic form and colour.

By a general enlargement of the lymphatic glands associated with a stiffness of the neck, and in its later stages frequently with some slight desquamation, in what is usually an otherwise uneventful convalescence.

ETIOLOGY.

A disease which will attack all ages, but less frequent in later life, attacks the sexes equally and has a definite seasonal maximum. It has been described in most of the northern temperate climates.

It is probably caused by a micro organism but so far no one organism or combination of organisms has been advanced as the cause of disease.

It occurs in Epidemics, and spreads from case to case with an Incubation period which varies within certain limits.

An attack of the disease affords no protection to a subsequent attack of either Measles or Scarlet Fever nor does an attack of one or both of these cause immunity to it. This, together with the fact that the infection from a patient suffering from German Measles reproduces the same disease, and never has been known to cause Scarlet Fever or Measles, establishes its claim to be of a specific character. One attack usually protects against a second, but cases have been known in which a second attack has been seen.

Relapses also are known to occur.

AGE INCIDENCE.

The disease will attack persons of all ages, but is much less common in latter life. As it is a complaint which does not totally incapacitate the individual from work, and in its milder forms is one which causes a very trivial amount of inconvenience, it will be impossible to arrive at anything more than an approximate estimation of the ages most frequently attacked.

Hospital records will be swayed by the social standing, more than by the age incidence, and will naturally give a preponderance to those ages during which the patients suffering from the disease, come into close contact with a class of people who fear infection, and of those whose work makes it liable for them to spread broadcast the contagion. Hence the domestic servant, the nurse-maid and the schoolboy and girl, will be responsible for an undue percentage of the numbers reported, whilst the labourer or indeed any adult working man will be almost entirely unrepresented.

This probably caused the idea that the disease was one of childhood, and it is not a fact, as has been hinted even in recent writings that 'adult age may give immunity.' So far into old age may this disease/

disease appear, that a case has been recorded at the advanced age of 73.

Comparing a series of cases of two years admissions to Hospital. 202 cases in all.

1905 Table

Age.	Males	Females	Total
- 5	5	4	9
5 - 10	13	6	19
10 - 20	8	8	16
20 - 30	6	5	11
30 - 40	2	2	4
	34	25	59

1906 Table.

Age.	Males	Females	Total
- 5	9	8	17
5 - 10	13	16	29
10 - 20	27	16	43
20 - 30	23	23	46
30 - 40	3	5	8
	75	68	143

In 1906 table the 23 males between 20 and 30 was and to a less extent the 27 between 10 - 20 was accounted for, by an outbreak in certain of the student residences.

The 23 females between 20 - 30 consisted of domestic servants and nurses, and not one case of a male of the working classes above the age of 16 was admitted to hospital.

Sex./

Sex Incidence seems to show a slight preponderance of males, but this may be explained by the small numbers of the cases and the outbreak amongst medical students and schoolboys, and with reagrd to the latter the schoolboy would be more readily removed to Hospital than the schoolgirl.

SEASONAL PREVALENCE.

It is a disease of spring and early summer. Dr. J. Lewis Smith whose experience was gathered in America, writes however, that in his country it is most prevalent in the winter months. The table given below will show the numbers of cases treated in the City Hospital, Edinburgh, during the years between 1901 and 1906 inclusive, with the single exceptions of the months of January and February in 1901.

	1901	1902	1903	1904	1905	1906	Totals	
January	/	0	0	0	0	18	18	
February	/	0	0	0	0	16	16	
March	21	0	0	0	2	23	46	
April	20	0	0	1	0	27	48	Spring 169 = 48.4%
May	30	1	0	14	8	22	75	
June	22	2	1	8	16	14	63	
July	16	0	1	10	9	9	45	Summer 116 = 33.2%
August	2	0	0	0	1	5	8	
September	1	0	0	0	2	2	5	
October	0	0	0	1	1	1	3	Autumn 12 = 3.4%
November	0	0	0	0	2	2	4	
December	0	0	0	0	9	9	18	Winter 52 = 14.9%
	112	3	2	34	50	148	349	

Contrast this with the double rise of Measles in Spring and autumn and that of Scarlet Fever in October and November.

GEOGRAPHY.

The disease has been described in most of the countries of Europe, especially in England and Germany, but it is rare in Italy, and seems to exist in France both with the usual symptoms, and in a modified form, there being in that country a disease characterised by a general glandular enlargement, which is highly infectious and probably is a form of the same disease. Even in this country a variety has been described, in which the symptoms are confined to a slight catarrh, with a pink colouration of the conjunctiva, and an adenitis, but which is infectious and may infect others with the more common or full type.

It is partly due to these cases and to the impossibility of obtaining complete controll of all suspects, that causes the difficulty of fixing with any certainty the length of the incubation period, and of stamping out an epidemic.

Epidemics have been described in the United States of America, and as far as the literature shows the disease is unknown in Africa, Australia and in most parts of Asia and South America. It has been noted in India and in Malta.

SPECIFIC CHARACTER.

To prove the Specific nature of the disease it was necessary to show

1st That it was due to a specific poison.

2nd. That the disease had a constant clinical picture.

3rd That infection from one case produced the same disease in others.

4th That it conferred self protection i.e. that one attack protected from a subsequent. That previous attacks of other diseases did not afford immunity, and that an attack of German Measles did not afford immunity to subsequent attacks of other diseases, which were likely to be confounded with it.

Now with regard to the first contention that it must be due to a specific poison, this is entirely non proven, but in no greater degree than it is in Scarlet Fever or Measles, and no one will deny that these are specific fevers.

The second contention that it gives a constant clinical picture, is certainly true. In every case there may not be prodromal symptoms, but there is a period of slight pyrexia, a period of eruption and constant adenitis, slight conjunctivitis and/

and catarrh. In each stage the duration of the periods is to all intents constant.

The third condition that infection from German Measles produces German Measles is also true, and no observer has recorded any case in which the infection has produced any other disease nor has there ever been any suspicion of this. The disease breeds true.

The fourth condition has to be shown proved under three headings, the first that one attack produces immunity from a second - this whilst not absolutely true in every case, is at least as true as can be said of Measles, and probably more so than that of Scarlet Fever. Relapses will be shown to occur in another part of the paper. Re-infection also, though writers such as Hardaway will deny this. Both of these conditions however are more common in Scarlet fever, and are known to occur in a certain percentage of Measles cases.

That an attack of German Measles does not confer protection to a subsequent attack of Measles or Scarlet Fever, may be shown by glancing at the two following tables each of three cases belonging to two families. The first described by Thomas in 1872. Three children of the Nitsche family, with/

with their infectious history.

	ROTHELN.	SCARLET FEVER.	MEASLES.
Max -	Feb. 10th	-	July
George -	Feb. 27th	March 23rd.	July
Meletta -	March 3rd	March 26th.	July.

The second noted by Von Genser also three children of one family.

	ROTHELN	MEASLES	SCARLET FEVER.
Elsa -	April 29th	May 9th	February the following year.
Fritz. -	May 18th	May 21st	February " "
Gocta. -	May 17th	May 21st	Fenruary " "

The reverse that an attack of Scarlet Fever or Measles or separate or combined attacks of both these diseases affords no immunity to German Measles, may be seen from the records of 140 cases lately treated in the City Hospital.

Of 140 cases

67 had had Measles previously 47%

5 " " Scarlet Fever " 3%

12 " " both diseases " 8%

and of the 67 who had previously had Measles 4 were reported/

reported to have had two attacks each.

Two of the 140 cases had previously had German Measles, one of them with ordinary Measles as well. One of these being under my own observation. Irine Hutton, who was admitted on January 23rd with German Measles and was again readmitted to the same ward on March 27th with the same disease, proving that though rare a second infection can occur, unless it be put down as a relapse with an interval of two months, which seems to be a long period and to favour reinfection. She had had Measles previous to her first attack, and on her second admission was accompanied by her sister also with German Measles.

On this evidence it is sufficient to accept what has been previously stated by other writers that the disease is of a specific nature, and not in any way connected with either Scarlet Fever or Measles. Its differential diagnosis from these diseases will be dealt with later.

INFECTIVITY.

To bring forward cases to prove that the disease is infectious seems to be unnecessary, one has only to point to the outbreaks in schools, public institutions, prisons and the occasional epidemics in towns. But to show the degree the instance of an asylum containing 196 persons of whom 110 were infected, may be quoted, and in most outbreak cases may be traced which have some causal relationship to each other.

It has been said that infection may be carried by a third person, and in spite of prompt isolation of the persons affected, the disease will continue to spread.

It is maintained that the contagion is contained in the blood, and that mucous secretion, tears, sputum, and nasal discharges when present serve as the agents of dissemination. The general consensus of opinion points to it being rather less infectious, but that the virus is quite as tenacious of life if not more so than that of measles.

The no doubt limit of infectivity have always been a debatable point.

The/

The accurate limits of infectivity in this disease have always been a stumbling block to the practitioner. The disease is infectious before any obvious signs and symptoms are present, and the duration of the disease varies with the presence or absence of desquamation, though this latter is known to have a very low power of spreading the disease.

The disease may come on suddenly without prodromal symptoms as in a case which has lately come under notice, two men were together for an hour one morning, both apparently in the best of health, one (A) the following day on rising in the morning observed that he was covered with a rash, which proved to be German Measles. B. in due course developed the disease, and was not exposed to other infection, thus proving that a man apparently in good health could convey the infection to another, before he himself even suspected he was suffering from anything. Observations have constantly proved this to be the case, and have also established the fact that the highest degree of infectivity is early in the disease, rapidly declining after the disappearance of the rash. The period of infection therefore should be placed at 'from 3 days before the rash/

rash until a week after its disappearance, or in cases in which much desquamation is taking place, (and these are rare) until a little later, and though there has been no evidence to point to infection being carried by fomites, it is usual for disinfection of these be carried out as a matter of routine.

The mode of infection is probably by means of the respiratory passages, and it is probable that it is from these organs that the germs are set free in the air.

That the desquamation stage is highly virulent Dukes denies and after a course of baths declares a patient as free from infection, irrespective of the fact that desquamation may not have ceased, 14 days after the presence of the rash.

The period of isolation therefore may be fixed at 14 days from the appearance of the rash, and the period of quarantine at 21 days from exposure to infection.

Incubation period seems to be [illegible] within certain limits indefinite, different writers giving different dates, but all agree that from 5 to 21 days includes the limits. Even in the few cases that have come under personal notice, and in which the period of contact could be fixed to a day, there is a noticeable variation. In two cases the 19th day could be absolutely fixed, and in others a shorter period. In the case already mentioned of A. and B. being in contact for one hour and the following day A. developing a rash, B. 19 days later also developed a rash and though the cause of A's infection could not be definitely settled B. could not be proved to have been exposed to any other source of infection except that mentioned.

In a second instance J. G. was admitted to Hospital on February 27th and 19 days R.R. with whom he had been in contact developed a rash, and was not otherwise known to have been exposed to infection.

In a third instance I. H. was removed to Hospital with a rash on March 27th, and her sister with whom she slept followed her 14 days later. In this case the contact had been for a longer period and she may have, and very likely did, infect her sister before the actual day of the rash, so that

case/

case only shows a minimum of 14 days incubation.

In yet another case, in a house in which 5 out of 6 inhabitants were admitted to hospital.

1. L.C. was admitted on December 20th.
2. B.C. " " " " 26th.
3. M^{c}R. " " " January 9th.
4. E.M^{c}R. " " " " 9th.

leaving only one person in the house, and who was only there after the cases 1 and 2 had left, so that he was a contact case only of the patients 3 and 4 who were removed on January 9th. This person developed a rash on January 23rd, and was not known to have been in contact with any other cases, giving a minimum incubation again of 14 days, the maximum limit of this case again is not possible to fix, as he had been in contact daily with patients 3 and 4 either of whom might have infected him some days before they themselves developed rashes.

It is highly probable that patients 3 and 4 were infected by patient 1 who was removed 20 days previously, patient 2 having derived his infection from some outside source, possibly the same which infected patient 1, though this was not traced.

Moore quotes a case in which a sister developed the disease 12 days after her brother, without being other/

otherwise exposed to infection, but does not say for how long, or when she first became a contact, but again shows a minimum of 12 days.
Thomas in his article in Von Ziemssens Cyclopedia of medicine declares the incubation period to be from 17 to 21 days. Murchison 10 - 14.
T. Lewis Smith who reported an outbreak of some magnitude in New York as far back as 1874, wrote that his observations of the incubation period of the disease showed, that whilst some cases developed in from 7 to 10 days, others took from 18 to 22.
Duke in the Lancet of July 14, 1901, says the incubation period in usually 18 days, but with a range of from 9 to 21.

The earliest incubation period is that given by Griffiths as from 5 - 11 days or Glaister who says '4 to 5 days or longer.' Pollack gives from 6 to 16. Whilst the longest period recorded is that of Klaarsch who reports cases in which the period from exposure to infection, to the appearance of the first symptom was 4 weeks, he alone advocates this length of time. Griffiths considers the varying of the incubation period to be a characteristic of the disease and of some diagnostic value.

INCUBATION TABLE.

The following is a table of various observations by different authors with regard to the period of incubation, in the cases in which this could be approximately or accurately fixed.

ervation	Days after Exposure.	6 to 10	11	12	13	14	15	16	17	18	19	20
	No of cases											
1	32	32										
2	45				45							
3	9								9			
4	5					2					3	
5	2		1		1							
6	3		1		2							
7	5				3	1			1			
8	3					1	2					
9	7						5	2				
10	4						3		1			
11	7								3	3	1	
12	4									3	1	
13	11		1	1	4	1	2	1			1	
		32	3	1	10	5	12	3	5	6	6	
	136	32	63				35				6	
	days.	6 ÷ 10	11 to 14				14 to 18				19	

Bacteriology and Pathology.

The disease is in all probability caused by a micro organism, and though no organism or combination of organisms has been seriously advanced as the cause of this disease. Formad and Edwards have described micrococci in the blood, but Keating and others have demonstrated similar organisms in Measles, and it has not been shown that these can establish the bacteriological theory of the disease.

The Pathological changes in the skin consist of capillary hyperaemia of the papillae and uppermost layers of the corium, and with this a slight inflammation and corresponding exudation which passes between the uppermost layers of the corium and the Epidermis. The amount of this inflammation, as in other diseases probably decides the presence or absence and severity of the subsequent desquamation. The adenitis is due to the direct action of the virus upon the glands, and not to irritation in the peri-lymphatic tissue.

All the glands in the body become enlarged, but remain freely moveable the one from the other, and although great prominence is given to the symptoms of enlargement of the mastoid and occipital and sub-occipital/

occipital glands, this is due more to their having a bony wall to feel them against than to any idea that these are more enlarged than other glands in the body.

The spleen has never been reported to be enlarged to any demonstrable amount, and no post mortem accounts of any enlargement or microscopic changes are to be found in the literature.

SYMPTOMATOLOGY.

Prodromata. The disease in certain cases is ushered in by various well recognised prodromal symptoms, though in many cases these are entirely absent, and the advent of the eruption may be the first sign that the patient has anything the matter.

The most common of the prodromal symptoms are a slight degree of sore throat, coryza and a feeling of malaise with headache. A stiff neck is often an early sign and draws attention to the early enlargement of the cervical lymphatic glands, and is due to that cause. If the enlargement of these glands excites sufficient attention, it will be found on examination that the glands in other parts of the body are similarly enlarged, and may be felt in the axilla and groin.

Neuralgia is also occasionally complained of especially in patients who have decayed teeth, or teeth that have lately been stopped. Rheumatism has also been noted, there may be rigors and vomiting.

Some observers give the prodromal symptoms as being much more severe. Nymann in a series of 119 cases noted shiverings, giddiness and achings of the limbs with definite rigors in 19 cases.

Smith/

Smith observed convulsions, and Hardaway notes a case in which the disease was ushered in with mild delirium.

Emminghaus in his description of the prodromal symptoms, states that the initial fever is in very close relationship to the intensity of the prodromal symptoms. If these are well marked and the rash does not appear until the second day, or later, a morning remission is observed, with a subsequent evening rise accompanying the eruption. If however the prodromal symptoms are slight and the rash developes early, the initial rise of temperature is of short duration and may easily escape observation. The temperature in these well marked cases may rise to 100 or even 102 with a further rise at the time of the appearance of the eruption (Williams).

Delirium, vomiting and severe nervous symptoms are noted by Klaalsch and Emminghaus. Edwards and Cuomo have noticed a prodromal rash, slight and more or less of a uniform efflorescent appearance, preceding immediately the true eruption. Towards the later part of this stage there is sometimes suffusion of the eyes and a pink colouration of the conjunctiva better seen however when the rash has erupted/

erupted and then forming an important feature of the disease.

The analysis of 151 cases will however show well the common prodromal symptoms and the frequency of their occurrence. Edin. City Ho 1905-7

In 151 cases 46 developed the disease with no prodromal symptoms, and the first indication was the appearance of the rash.

In 32 cases there was an ill defined feeling of malaise for the period of 24 hours before the rash

In 10 this period was prolonged to 48 hours and in some of these the throat was complained of.

In 17 cases, the history was obtained of having had a cold for a few days but with no very definite symptoms beyond some slight catarrh.

14 cases complained of a stiff neck and swollen glands, the earliest being one case who noted this six days before the rash. In 6 this symptom was present 4 days, in 3 two days and in 4 one day previous to the eruption. Two of these cases were able to report that not only the glands of the neck were enlarged, but that the axillary glands also were palpable. One case had been vomiting the day previous to the rash as his only prodromal sign.

Another complained of vomiting and shivering.

Two of vomiting and a sore throat.

Three/

Three of shiverings alone.

Seven complained of neuralgia, four of whom however only complained at the commencement of the eruption, in most of these seven cases the glands were more than usually prominent.

Three cases complained of stiff neck and sore throat, shiverings and vomiting.

Five of a stiff neck and sore throat only.

One of malaise, shiverings and sore throat.

Six of sore throats only.

One of earache.

In only two was there a history of a prodromal rise of temperature, but this naturally would not be noted by the patient himself unless he had access to a thermometer, and as the large majority of these cases were children this symptom could not be accurately stated.

EXANTHEM.

In a large percentage of cases (30%) the fisrt symptom of the disease is the appearance of the rash. This first appears on the face it is well marked round the mouth, and on examination will be found on the scalp. It spreads to the neck and then gradually to the chest and back, invading the whole body from above downwards, last attacking the legs and feet, and it may be found on careful examination to be present on the palms of the hands, and the soles of the feet.

It takes from 10 - 14 hours to attain full development in any one part, and from the first appearances on the face until it has entirely faded off the lower extremity, is usually from 2 to 4 days.

This is well shown in the following series of 119 cases.

From first appearance to the complete disappearance of rash.

Days	1	Cases	10	Days	5	Cases	12
"	2	"	29	"	6	"	3
"	3	"	31	"	7	"	1
"	4	"	33				

one of its great characteristics and of considerable diagnostic value, is the variety of atages which may be observed on the same person at the/

the same time. With the rash well out on the lower parts of the body it will be well faded on the upper; and when fully erupted on the feet, no vestige of the rash will be left on the face.

In a series of 159 cases the rash was noticed to appear in 119 on the first day and in 39 cases on the second.

Two varieties of rash are seen, which for convenience it is well to describe as the large and the small, of these the large is by far the most common.

It is due to this that writers compared one to measles under the name Rubeolae morbilosae, in which the rash came out in definite macules; and the second or Rubeolae Scarletinosae, in which the rash was of the punctate scarletinal form. The large variety is slightly raised above the surface of the skin, measures about .2 c.m. in diameter, and is always discrete at first. It is definitely round in shape having none of the irregular or cresentic outlines so characteristic of a macule in measles. In colour it is a faded rose-red, changing later to a faded salmon pink and finally giving way to a faint brownish yellow discolouration of the skin. During the fading stages it has a tendency for one macule to unite with another, and in this stage more resembles measles, but owing to it never being at the same state/

state of development over the whole body at any one period, the characteristic discrete rounded appearance will on examination be found elsewhere, and should prevent errors in diagnosis.

Each macule is very slightly raised above the surface and its greatest elevation is at its centre, thus it may be said to be a maculo papular eruption, and as has been said before each macule arrives at its full development in between 10 and 14 hours. It fades on pressure leaving a slight roughness which can be felt with the fingers. The second and less common variety is a small punctate rash with each point much closer situated together and of a rather darker colour. It simulates the eruption in Scarlet Fever somewhat closely, but may readily be distinguished from this by its presence within the circum oral area, and by the absence of the general flush, which acts as a ground work for the Scarlet Fever eruption. This latter variety is somewhat more persistant than the former. At this period it is not uncommon for the patient to complain of irritative symptoms of the skin, and even in some cases to suffer from intense itching.

Enanthem. With the appearance of this exanthem the soft palate and uvula will be found to be covered with discrete/

with discrete reddish maculae, the fauces will show signs of slight inflammation. The throat will be complained of as being sore on swallowing, and the irritation cause a short dry cough, similarly the catarrh of the nasal passages causes sneezing.

The tongue is generally lightly coated with white fur, and in rare cases the papillae will be found slightly prominent.

There is a varying degree of pyrexia though in very many cases the temperature does not rise at all. In one series of 119 cases

In 58 there was no pyrexia observed.

In 39 the highest point recorded was 100.4

In 14 " " " " " 101.3

In 6 " " " " " 102.2

In 2 " " " " " 103.1

and in another series of 130 cases the maximum temperature was 103 whilst 57% had a temperature of 99° or less.

When pyrexia is present the average degree is between 99.8 and 100.8, but in those cases in which the prodromal symptoms are severe, and in which, there is a distinct initial rise of temperature with a rash that is late in developing, the temperature may rise as high as 104.

The/

The eyes are suffused, and the conjunctiva becomes a definite and very characteristic pink colour.

Photophobia is rare, in 130 cases only one presented this symptom. A muco purulent secretion gumming the eyelids together, has been described but was not seen in the above series except in three children, who previous to their attack of German Measles, had a blepharitis.

A very characteristic adenitis is present at this stage affecting the whole lymphatic system of the body, as far as can be felt by palpation. The glands at the angles of the jaw, and the chains of small glands passing downwards, along the sterno-mastoid, to a group just above the clavicle, one or more isolated glands directly over the mastoid process, and one on each side placed below the superior curved line on the occiput.

In well marked cases, a gland may be felt directly anterior to the tragus of the ear, and occasionally two glands on the thoracic wall, at the level of the 5th rib in the Anterior axillary line. The glands in the axilla and groin are enlarged and even the epitrochlear has been noted.

These glands in the places where they are palpable/

palpable in groups, are never matted together, but roll under the finger separately like peas or beans, they are tender to the touch and cause stiffness of the neck, but are seldom actually painful. So characteristic is this adenitis that physicians have said that granting they knew, that the patient had a rash, they could in the dark, by means of palpating the glands diagnose the disease. This glandular enlargement is frequently an early sign, and appears two or three days before the rash, in many cases causing a stiff neck, which is one of the common prodromal symptoms of the disease. The duration is extremely variable, in some cases the glands return to the normal in a week or 10 days, in others for three weeks or a month the glands are plainly palpable. It never leads to suppuration when uncomplicated, but I have seen one case in which there was concurrent chicken pox, with a suppurating gland which required operation.

Neuralgia frequently is complained of at this stage and this is probably to be explained by pressure upon branches of the fifth nerve, by the enlarged glands or their ducts. As the glands are freely moveable it is possible that the ducts accompanying the large branches through some layers of/

of the denser connective tissue may cause this symptom by compression.

The pulse and respiration curves show a continued relationship with the curve of temperature.

CONVALESCENCE.

Convalescence may be said to begin with the fading of the rash on the body and lower extremities, by which time, the temperature will have returned to the normal. As the rash fades a brownish yellow discclouration of the skin takes its place, and though faint in colour this will always be made out by careful examination. It has a duration of two or three days, in some cases rather longer.

Desquamation takes place but is usually confined to a furfuracous condition of the skin, and is best seen on the face, at the sides of the nose, and on those parts of the body that are least exposed to friction from the bed clothes, the hollows below the clavicles generally showing the condition well. Some writers have recorded a much more severe desquamation than this, namely cases in which the skin has peeled off in large flakes, but such a case has not been seen in a series of 59 cases under observation lately, and it is possible that it may be due to personal idiosyncrasy with a pre-existing, dry or eczematous condition of the skin, indeed the absence of marked peeling seems to be of some considerable diagnostic value, in cases which when seen in an advanced condition show a resemblance to Scarlet Fever.

With/

With the fall of the temperature and fading rash, the catarrhal symptoms rapidly clear up, the mucous membranes and conjunctiva regaining their normal appearance; the patient usually makes an uneventful recovery, and with the exception of neuralgia and a tendency to rheumatic pains, all the so-called complications and sequelae are due to secondary infections, but as the disease may predispose towards the implantation of these secondary and extraneous conditions, they must be shortly considered.

It is only to be expected that any, however small, lowering of the vitality, in the already weakly may set up even fatal complications, and an outbreak of German Measles in such conditions has been known to terminate fatally in what would on paper appear to be a very large percentage of cases, for instance Dournel in 1906 described a very fatal outbreak in a crèche in Paris, amongst children already in desperate circumstances, and during the course of 27 cases only, he saw eight deaths, and was able to demonstrate almost every described variety of complication, including meningitis, double otorrhoea, broncho-pneumonia, bronchitis, green diarrhoea and a sub-periosteal abscess. A case under my observation also was admitted to hospital in a terribly emaciated and exhausted condition but also suffering from German Measles, this case died, not so much from disease/

disease as from absolute exhaustion and neglect prior to admission.

One other condition however which might be considered as a true complication of the disease itself is that of a secondary sore throat, and which was first described by Tonge-Smith in the Lancet 1883 and since observed by other writers, the latest of whom to record a case has been Cheinisse in La Semaine Medicale (de Paris), December 1906. This secondary sore throat appears during convalescence, after all other symptoms have cleared up and is associated with a severe, apparently non-follicular or septic tonsilitis, with great swelling, even to the somewhat serious hindrance to respiration. It lasts some days and then in its turn disappears and the temperature which has been sharply elevated becomes normal again.

It is natural that if we are to describe secondary infections and their conditions as complications of the disease, first to consider those parts of the body which are primarily affected by the disease, and by which, these secondary organisms will be most likely to gain a footing. The respiratory tract in German Measles shows some varying degrees of catarrh, therefore this may be considered first. Catarrh of the bronchial tubes may or may not be present/

present primarily, but organisms gaining a footing by the lowered vitality may well develope deeper than usual, set up a bronchitis, or later a broncho-pneumonia, and these troubles have by many writers been given prominent places in the complications and sequelae of German Measles.

Similarly it may be easily understood that in a system which is just so balanced as to be able to resist tubercle, or to be in a position in which pre-existent tubercular trouble is held in a latent form, that German Measles with its attendant catarrh and irritation in the lung, may be the turning point in the struggle and weigh down the adverse scale sufficient to allow permanent trouble to start, and which might at some later date terminate fatally. In cases therefore, in which there is a predisposition to Chest diseases, special care must be taken to do all that is possible to keep up the general vitality, and as far as one is able, to prevent the spread of mischief to the weak spot.

The nasal catarrh may set up a Rhinitis and if coughing and violent sneezing be present it is not difficult to understand the route by which otitis developes, and with this subsequent development of meningitis and possibly a fatal termination.

The/

The next important normally affected tract is the Alimentary. The throat is hyperemic, the mucous membranes are so inflamed and afford a more than usually suitable place for the implantation of septic organisms, extension of this trouble therefore may cause such difficulty in swallowing, that nutrition may be interfered with, and in children, especially those in neglected circumstances, stomatic troubles may start. Following the gastritis, gastro enteritis, may occur, and what is even more common enteritis with its debilitation.. Diarrhoea and further lowering of vitality, the starting point of an uncontrollable enteritis and subsequent death.

The adenitis normally present clears up in varying periods of time, but with the natural congestion and disturbance present, septic organisms from the skin or elsewhere have been known to settle and cause suppuration, but this will never occur if the person affected be not in a deplorable state of bodily health.

The slight degree of conjunctivitis normally present, has set up a conjunctivitis of a more serious character and Blepharitis has been recorded in two out of a series of 130 cases lately treated at the City Hospital, Edinburgh.

Otorrhoea/

Otorrhoea has been described, but is a rare complication, indeed Goodhart affirms that if after an attack of apparent German Measles, a child remains thin and feeble and has a discharge from the ear, that attack was not German Measles.

Endocarditis has been recorded but must probably be put down to some cause, other than German Measles.

Rheumatism is somewhat apt to occur, especially in early convalescence, indeed it is to guard against this trouble ,and the frequency of neuralgia during convalescence ,that patients should be restricted to bed against their usual desire to be up and about.

Nephritis is present in the early stage of the fever in a considerable number of cases and this has been recorded as a complication, but out of 349 consecutive cases in the City Hospital, serious results from Albuminuria have never been noticed. The urine even in the first stages only showing the ordinary febrile changes in the increased deposit of urates and slight decrease of chlorides, in the vast majority of the cases.

In one of the last 59 cases appears that of a boy Louis Camberg who had been treated periodically for two years in the Hospital for Sick Children suffering from nephritis, and in whom the urine was tested with particular care daily. There was no increase of albumin, nor did the results of the estimation of urea/

urea show any change to what had been found during the three previous weeks.

It is the opinion of some writers that German Measles predisposes to subsequent attacks of other infective fevers, notably Diphtheria and to a less extent Mumps.

Lately papers have been written on the subject of the dangers of German Measles, but on careful reading, it will be found that these dangers only occur in conditions in which the subjects are so neglected and social standpoint so low that their vitality has been of the very smallest description. So that questionslike " La Rubeole est elle toujours benigns (Cheinisse) may confidently be answered in the affirmative quoad German Measles itself, it is probable that a simple catarrh would under the conditions described have produced a mortality no less great.

There is no evidence produced to combat the original writings of Trouseau "De toutes les feivres eruptives la reséole est la plus benique, jamais elle ne présente de gravité, et toujours elle se termina spontanément sans que le médecin ait en aucune façon besoin d'intervenir."

Relapses/

Relapses are rare but do occur, Edwards reporting two cases, one on the 4th day and another on the 20th. Griffiths three cases, one on the 11th day and two after three weeks. In these exactly the same series of symptoms was gone through as during the former attack.

Reinfection is even rarer, but in 143 cases, two reported previous attacks, one two years before and in the other, in which both attacks came under my own observation, the second attack being after an interval of two months and has already been detailed in a former part of this paper.

DIAGNOSIS.

In considering the diagnosis of this disease, when the symptoms follow the usual course and accurate observations can be obtained, there should be little difficulty, but the symptoms do not always present typical appearances and it is certain that there is no disease in which more mistakes in diagnosis occur. The rash in one part of the body may simulate measles, and it is only by careful examination of other parts that this mistake is avoided, occasionally the rash may simulate Scarlet Fever and an appreciable percentage of cases are admitted to hospital under this notification.

The following series of 143 cases show well the frequency of incorrect diagnosis in this disease. Of 143 cases of German Measles 51 were sent in as Measles 35%

" " " " " " 8 were sent in as Scarlet Fever 5%

" " " " " " 31 were sent in as for observation 21%

" " " " " " 53 were diagnosed correctly. 37%

Besides these a few urticariars, teething rashes and/

and one specific eruption were sent in as German Measles. Several cases of so-called German Measles turned out to be Scarlet Fever, and two were found to have Genuine Measles.

On considering these figures two conclusions are possible. The one that the disease must present great difficulty in diagnosis, and the other that there is a lack of observation of the clinical symptoms of the case on the part of the medical practitioner.

It will be readily admitted that a fading German Measles rash on the face will resemble closely Measles, and the temptation to diagnose the case from what is apparently a typical lesion without going more fully into the examination of the rest of the body, is great. The mistakes growing proportionately more frequent in inverse ratio with the social conditions and surroundings of the patient.

A non paying patient in a dark room, unwashed and with a large parasitic population is not an inviting object for close examination. Time also is of the greatest importance to the medical practitioner, and on seeing an apparently typical rash the alternate diagnosis of German Measles, either does not occur to him, or if it does, it is not considered of any great importance. The Local Health laws insist upon the notification of Scarlet Fever, and as soon/

soon as the Medical attendant has satisfied himself that the case is not one of typical scarlet fever; or a case in which there is apparently modification of the symptoms, his mind is at rest. In Measles and German Measles notification is purely optional, and if this does follow it is done gratuitously.

It will thus be seen that many mistakes may be avoided by more careful observation, and that although the differential diagnosis of a case from Scarlet fever and Measles ranks first and bulks far more largely than other conditions, there are also certain other troubles, which help to make the diagnosis of the disease more interesting and perhaps more difficult.

The most important of these are the exanthems produced in certain people by the administration of drugs and in most cases due to some personal idiosyncrasy. Constitutional disturbances also such as teething and stomatic troubles, are often in children sufficient to cause an evanescent eruption, whilst the absorption of septic products will produce a more lasting one.

The injection of antitoxin especially that of diphtheria and the anti-streptococcic serum causes in a large percentage of cases an irritable cutaneous eruption.

Erythemas and urticarias whatever be the cause must always be kept in mind when the diagnosis of

a/

a disease rests to a large extent on the observation of the skin conditions, and besides the above causes certain plants when handled, and even certain animals when touched, are capable of raising eruptions on the skin which, though seldom constant to one type may in a small percentage of cases simulate many of the better known and more important lesions.

The differential diagnosis from Scarlet Fever.

By the comparative absence of prodromal symptoms of any severity, by the very slight degree of sore throat and absence of vomiting, and by the probable presence of sneezing.

By the colour of the rash rose red on a white background in contrast to a darker fiery red on a flushed skin. By the larger size of the rash and its presence in the circum oral area, and by its appearance in regular stages of a more limited extent to that seen in the latter disease.

By the pink colouration of the conjunctiva as compared with the bright clear condition in scarlet Fever.

By the mild elevation of the temperature and the slight increase of the pulse and respiration rate, in marked/

marked contrast to the condition in scarlet fever, where even if the temperature is not actually high in the first stages, it will be found that the pulse rate is greatly accelerated and out of all proportion to the temperature curve.

By the fact that the tongue changes so characteristic of the various stages in Scarlet fever are absent.

By the very moderate degree of malaise felt by the patient,

By the characteristic enlargement of the lymphatic glands. If these are enlarged in Scarlet Fever there will frequently be found some obvious cause, such as vermin, and even then the uniformity of the adenitis will be lacking. From the fact that if the glands are enlarged in the latter disease it is a late rather than an early sign, and they will seldom have the same isolated feel to the palpating finger, being larger and more matted together.

The tendency to suppuration is absent in German Measles and the early complaint of stiff neck so common in German Measles, is not found in Scarlet Fever.

By the insignificance of the amount of desquamation /

desquamation and its being confined to a powdering rather than to the peeling of the cuticle so characteristic of Scarlet Fever.

Another point not perhaps of value in an isolated case but of interest in a general view, is the contrast presented by the seasonal maximum period May and June compared with October and November.

And the marked contrast in the incubation period 14 - 21 days compared with 2 to 3 or 4.

The absence of the Diazo reaction and its presence in Scarlet Fever.

DRUGS.

The differential diagnosis from the exanthems produced by certain drugs must be settled by observation of large areas of the body, and the development of the rash, by the history of the administration of such drugs, and by the obvious reactions produced by them in directions which are not affected by German Measles.

The taking of Copaiba may produce a morbilliform rash papular in type, but especially distributed round the joints. The history of administration may be difficult to obtain, but the smell of the breath and even more so the smell of the urine is characteristic. Constitutional symptoms are absent and the conjunctiva normal. There may be some slight desquamation, but the glands will not be uniformly enlarged. Antipyrine produces a more diffuse rash and the history will be readily obtained, adenitis and conjunctivitis are absent, and the chief seat of eruption is on the extensor surface. The Belladonna eruption resembles the scarletiniform type and disappears early, is seldom present on the body, constitutional symptoms absent and state of pupils characteristic.

Boric acid will produce a papular eruption but each/

each papule is scaly. History and absence of the other signs of German Measles settle the diagnosis.

Mercury will produce various types of rashes mostly when given by inunction,but occasionally with internal administration. The history and development,and absence of conjunctivitis,with the cause for which it is administered, must aid the observer in this case. It being remembered that the throat and mouth may be affected, the temperature raised and the glands enlarged. The symptoms will subside on the cessation of the drug.

Morphia may and often does produce a condition of the skin readily mistaken for Scarlet Fever, but the pupils, the conjunctiva, the absence of constitutional symptoms and adenitis will aid the diagnosis.

Quinine may cause rashes simulating almost every form of skin eruption,but the history of its administration is easy to obtain, the constitutional symptoms of German Measles are absent,and the drumming of the ears,due to an over dose of quinine is characteristic. The conjunctiva will not be pink,but the eyes may frequently be suffused.

Chloral and chrysarobin have been said to cause rashes,but the history in the former and the obvious appearances in the latter will prevent mistakes.

In/

In specific eruptions the presence of the primary focus of infection, the appearance of the throat condition,and the large size and different colour of the rash, copper coloured blotches in contrast to rose red spots prevent mistakes;though it must be remembered that pyrexia of a mild type may be present,and the condition of the lymphatic glands resembled those in German Measles.

Erythemas and urticarias must be kept in mind but their development and progress,absence of adenitis and catarrh,and the negative condition of the conjunctiva is sufficient to demonstrate the trouble with which one is dealing. It may be as well to mention however one or two of the botanical and zoological causes which are fairly constant in their effects. The poison ivy Rhus toxicodendron in America, the Primula obconica in this country and the Rhus Vernix in Japan all give a severe erythematous dermatitis. The handling of certain woods especially teak,has been known to do so. Amongst the Zoological causes there is a caterpillar which schoolboys delight to collect in order to observe the natural history changes which takes place through the larval and following periods,which is capable of causing a dermatitis.

The disease may be distinguished from Measles - by the insignificance of the prodromal symptoms, and the mild degree of nasal catarrh. A patient with German Measles will mostly sneeze once or twice in contrast to the marked symptoms of acute catarrh in true measles.

From the colour of the rash, rose red in contrast to a velvety red with a definite bluish tinge, from its size, its small definitely rounded or oval discrete macules, in contrast to the more raised irregular patches, with crescentic and indented outlines. By the early fading of the rash and the small amount of residual staining.

If the rash in one part of the body should closely resemble measles, some other area will be found in which it is not in so far advanced a stage, and still shows plainly its discrete rounded character.

By the entire absence of Koplik spots, and by the appearance of the mucous membranes of mouth and throat. In German Measles these show some slight redness and superficial inflammation, but are clear and glistening, in contrast to the turgid, dull and muddy appearance in true measles. Whilst the fauces and tonsils do not show any very marked characteristic differences/

differences, there is an eliment of pain frequently present in the throat which is absent or usually so in Measles.

The conjunctiva has a definite and characteristic pink colour, but remains glistening, whilst in Measles it becomes dull and the secretion tends to become muco-purulent and gum the eyelids together, being also frequently associated with blepharitis.

The degree of photophobia, when present which is extremely rare, is very slight as compared with that of true measles, in which the absolute intollerance of light is a frequent and well marked symptom.

By the enlargement of the lymphatic glands, which is not so characteristic in Measles, and if present is frequently associated with the presence of vermin in the scalp or elsewhere. Nor is it common for a stiff neck to be complained of, as is so frequently the case in German Measles.

By the moderate elevation of the temperature, and its early fall.

By the fact that the patient, rarely feels definitely ill, whilst an adult case of Measles able to/

to describe the symptoms will declare that the discomfort is very considerable, contrast this with the German Measles patient whose only grievance is that he is confined to bed.

By the absence in almost every case of the Diazo reaction in the urine, which may always be demonstrated in measles, if the urine be collected at the absolute height of the rash or within a few hours after its maximum development. Tables of cases are appended with regard to this, as it is felt that an important means of clinching the diagnosis in a difficult case, has been neglected and not previously fully worked out in series of cases. As will be seen later, in contact cases of measles under observation, and in which from the first prodromal symptom, taking the first sneeze as the first symptom (and not the still earlier leucocytosis which may appear as early as 4 or 5 days before the rash) until the rash had completely disappeared, the urine was tested four times daily, and at certain periods even more frequently than this, gave results showing in every case that the Diazo reaction is absent until the rash had reached a point within about two hours of its maximum development, and was present from that period onwards for varying lengths of time extending at the longest to 3½ days, the brilliance of the reaction fading gradually through an indefinite stage

to/

to an absolute negative.

In German Measles the urine was frequently and carefully tested for this reaction, in every case admitted to hospital (City Hospital, Edinburgh) during a period of 6 months it was found to be absent, with the exception of one case in which a positive reaction was obtained, and two others in which an indefinite or doubtful positive result was recorded.

The technique of the test, which has been somewhat modified from that usually described in books is as follows:-

One third of a test tube of the urine is taken and a similar amount of a saturated solution of Sulphanilic acid in 5% Hydrochloric acid is added. To this one drop only of a ½% solution of sodium nitrite is added and the whole well shaken until a fair depth of froth is obtained, this froth being mostly of a greenish yellow tinge if the test is to prove positive. A few drops of ammonia are now allowed to drop into this froth which (if the urine be that of a measles patient at a certain period of development) will become a brilliant red colour. More ammonia is then added and the whole freely shaken with the result that the body of the fluid will turn red, and in it is formed a light flocculent deposit freely floating in the fluid. If the tube be now set aside for/

for 10 minutes it will be found that the fluid is again clear, and that the deposit has collected at the bottom of the tube. On further standing for some hours this deposit will turn green.

This is a description of a positive result of the highest class,and it was found that it could not be obtained in every case. Results, however, will frequently be obtained in which the fluid is always clear, there being no deposit, but the display of a red colour in the fluid and froth demonstrating the positive reaction.

Results when the froth is not coloured red though the fluid had a reddish tinge were repeated and if the same result was obtained,were discarded as negative.

In normal urine the froth before the addition of ammonia is a glistening white,and afterwards turns yellow with no tinge of red in either the froth or fluid,and this forms the negative result of the absolute class.

It is needless to say that it is absolutely necessary for the reagents to be freshly prepared if accuracy be required.

The limitation to one drop of sodium nitrite solution makes the test much more trustworthy than when conducted with a varying,and larger quantity of the reagent.

DIAZO REPORTS.

1. Positive results with a fading measles rash, continuing positive until only slight staining was present, then negative results.
2. Positive for 5 days through all stages of rash, after the summit, negative with a rash still erupting. Case was unusual in consideration of the long duration of the reaction, positive results were obtained when even the staining following the rash had disappeared. He was being treated with diuretin and had a chronic nephritis.
3. Positive results with a fading rash.
4. Positive results, after summit of rash, negative before, remained positive for 50 hours, afterwards negative.
5. Positive with rash at summit and during fading, negative with staining present.
6. Positive with an early fading rash. This case later developed Scarlet Fever and with his second rash negative results only were obtained, slight albuminuria with his second attack.
7. Positive results obtained with rash at height, and later during fading stages.
8. Same as Case 7.

9./

9. Negative result, rash at time of the urine being obtained in late fading stage.
10. Positive results after height of rash and for 36 hours later was negative with rash still erupting and a rising temperature.
11. Positive results after summit, and for two days later, negative with a rising temperature and an erupting rash.
12. Positive result was obtained from this case, before the highest point of the temperature was reached, the rash was well erupted, but probably not at its full development.
13. Positive results with a fading rash.
14. Positive results with a late fading rash.
15. Positive results with a faded rash.
16. Same.
17. Positive with rash at height, and in early fading stages.
18. Positive with rash at height.
19. Positive with late fading rash.
20. Positive with early fading rash, negative before rash had entirely faded.
21. Positive with fading rash, and positive again with rash completely cleared up and only faintest traces of staining remaining.

22./

22. Positive with fading rash.

23. Positive with rash after summit, negative with rising temperature and negative 28 hours after first positive.

24. Positive with fading temperature.

25. Negative reaction with a fading rash and falling temperature, test was only done once.

26. Positive with a fading rash.

27. Positive with a rash probably not fully erupted, as the temperature did not reach the summit until 6 hours after the first positive urine was passed.

28. Positive with a late fading rash.

29. (Moxon) Positive specimens obtained when rash was at height and for 40 hours later negative with an advancing, and also with a late fading rash.

30. Positive result obtained when rash was in a well faded condition, there was also concurrent Scarlet Fever and Diphtheria lesions in this case.

31. Positive with a fading rash.

32. Positive in late fading and staining stage.

33. Positive with a fading rash.

34. Positive from the time rash was at its full development remaining so until the faded rash and staining had almost disappeared, in all extending over 72 hours.

35./

35. Positive with rash at height at 7 a.m. the speciman taken at midnight before this was an indefinite negative, remained positive for 36 hours.
36. Positive before the height of rash through periods of advance summit and fading, and even into the staining stages, positive for 70 hours.
37. Positive results from height of rash to its disappearance about 60 hours.
38. Positive with rash at its full development.
39. (Gauld) Positive results with a fading rash.
40. Positive result with a fading rash, was in a weak condition of health, next result was a negative, he then developed meningitis and rash became brighter again with a return of the positive reaction, diplococcus intracellularis was present in the cerebro spinal fluid and he died of that disease, the final results were negative, investigations lasting 4 days in this case.
41. Positive results from height of the rash period until the rash had been replaced by the residual staining.
42. Positive with a greatly faded rash.
43. Positive with rash at height, and later during early fading period.
44. Positive from a period just before the maximum development/

development of the rash and during fading stages.

45. Positive with a fading rash had concurrent Diphtheria.

46. Positive from period of maximum height, later during fading stages. Two negative results were obtained followed again by positives until rash had entirely faded, then again negative.

47. Positive with a poorly developed rash being a case in which the rash showed signs of suppression and a critical case which ended fatally.

48. Positive with a faded rash.

49. Positive with rash at height and for 32 hours after, then became negative.

50. Negative through all stages of a Measles rash, the case presented some peculiarities and had many of the symptoms of concurrent Scarlet Fever having a very mixed rash of a type which varied on different parts of the body.

51. Positive with a fading rash.

52. Positive with a well faded rash.

53. Positive results obtained for 52 hours after maximum development of rash and instead of gradually fading in brilliance of reaction, there was an abrupt change to a negative condition between two specimens taken at intervals of 6 hours.

54./

54. Positive from height of rash for 48 hours, then gradually faded for next two specimens (6 hour intervals) and then became negative.
55. Positive with fading rash, blood and albumin present from a concurrent nephritis.
56. Positive with well faded rash.
57. Positive from just after maximum height until rash had almost entirely faded. 48 hours.
58. Positive with fading rash.
59. Positive with fading rash.
60. Positive with early fading rash.
61. Positive with very late faded rash.
62. Positive with fading rash, concurrent Diphtheria was only positive for 3 specimens at 6 hourly intervals.
63. Positive with fading rash.
64. Positive with early fading rash.
65. Positive with fading rash.

Summary of 65 cases of Measles, 63 gave Positive Diadzo Reactions 1 case No.9 which was not tested until the rash had faded very considerably giving a negative result, and one No.50 always negative which was tested throughout the disease but which presented some unusual characters in the rash and was diagnosed as Measles from the severity of the attack and height of temperature, was most probably a case complicated with either German Measles or Scarlet Fever.

Turning now to a similar investigation carried out on patients suffering from German Measles the following results were obtained.

1. A negative result with a rash beginning to fade on the chest i.e. at a period when a positive result would have been looked for in Genuine Measles.
2. Negative results tested at intervals during the whole duration of the rash.
3. Positive with a faded rash - was undoubtedly a German Measles case being seen by two specialists, and sent in by a very experienced physician. Was only positive on one occasion, was taking no drugs and had no obvious tubercular lesions.
4. Negative through various stages of the rash.
5. Negative and with the preceding case was tested 6 hourly 4 times or until there was no sign of rash remaining.
6. Negative with well marked rash, same later when fading.
7. Negative during presence of rash.
8. Negative as above.
9. Negative results during a well erupted rash and during fading stages.

10./

10. Negative results taken through all stages of a protracted rash
11. Negative during fading stages of rash.
12. Negative as above.
13. Negative as above.
14. Negative results through all the stages from admission with a well erupted rash to a clean skin,6 hourly specimens.
15. Negative result with a fading rash.
16. Negative as above.
17. Negative as above. Jan.23rd.
18. Same case readmitted with a second attack on March 27th and again with negative results.
19. Negative results all through every stage except the earliest of a rash, when it was not tested.
20. (68) Negative with a rash well erupted.
21. Negative with fading rash.
22. (74) An indefinite positive in a case which presented considerable difficulty, but which was diagnosed as German Measles,in this case the best reaction was given by adding an excess of ammonia.
23. Negative with a fading rash.
24. Negative with rash well erupted and at several periods of the fading stages.

25./

25. Negative with well erupted rash and later.

26. Negative as above.

27. Negative as above.

28. Negative through all stages except that of the earliest appearance of the rash, when it was not tested

29.(82) Negative results tested 3 times, this was a brother of the case which gave a positive reaction.

30. Negative with fading rash.

31. Negative as above.

32. Negative as above.

33. Negative with rash well out and same result when fading.

34.(92) An indefinite result some tinge of red appeared in the froth. No sediment, but was too indefinite to reject as a negative, this result was given twice during the fading of the rash.

35. Negative at various stages of a rather confluent rash.

36. Negative through all stages of fading rash.

Thus out of 36 cases 33 gave negative results, one a positive and two indefinite results which were classed as positive.

Since/

Since this series was taken this test had been regularly carried out in all German Measles cases in the City Hospital and one further case has been found to give a positive reaction.

	Cases	Negative	Positive	Positive but Indefinite.
Measles	65	2	63	0
German Measles	36	33	1	2
In Urticarias	4	4	0	0
In Antitoxin rashes.	6	6	0	0
In Enema rashes	5	5	0	0
In septic absorbt.rashes	3	3	0	0
Copaiba rash.	1	1	0	0

PROGNOSIS:

The prognosis of a case of German Measles may be taken as always good. The disease in itself presenting no danger and although in cases in which there is pre-existant disease especially of the lungs or intestines, an attack of German Measles may lower the vitality sufficient for these concurrent troubles to regain the supremacy, the same may be said of any slight febrile trouble. In such cases the prognosis of the 'illness' would be carefully guarded, but the word illness in that sense is intended to represent the attack of the disease complained of, complicated by the concurrent German Measles and not the German Measles alone. In emaciated and neglected children intestinal troubles of a very fatal character are easily set up, and the contracting of German Measles may well be the starting point of a fatal epidemic, but which would only serve to reduce by so much the mortality of summer diarrhoea in the neighbourhood three months later. Enough has been said on this subject under the heading of complications in explaining the apparently dangerous character of certain reported outbreaks, pre-existing disease and general debility only must modify the constant prognosis of good.

Treatment of German Measles is that of an ordinary slight febrile attack, it is a specific disease and will run its course, and the less nature is interfered with by the giving of drugs the better for the patient. Confinement to bed until 4 days after the disappearance of the rash, bland diet and the regulation of the bowels during the enforced inactivity, are the only points worth mentioning. The room should be large, well ventilated and especial care taken that the patient is protected from draughts, and if a placebo be required to reassure a neurotic patient a mild febrile mixture such as

Spiritus Aetheris Nitrosi	4 drams
Spiritus Ammoni Aromatici	3 drams
Liquor Ammonia Acetatis	4 drams
Aqua Camphorae ad.	6 oz.

Sig fiat Mistura: dose ½ oz. ter in die.
might be given.

In patients in whom there is a predisposition to chest troubles the thorax should be well covered with a flannel garment, and the confinement to bed be prolonged if necessary.

Should complications be present they must be treated as they arise and if attended to at once little/

little difficulty should be experienced. For the neuralgia the giving of drugs such as phenacetin and antipyrin seems to have little effect, but in conjunction with gr. V - X of the Iodide of Potassium better results may be obtained. If the throat in the first stages be much complained of alternate gargles of Listerine and Thymol may be recommended.

After three days confinement to the house after being allowed up from bed the patients should be allowed as much open air as the circumstances will permit, and after the expiry of 14 days the patient may be allowed to return to the general community.

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