THE DEGREE OF DOCTOR OF MEDICINE OF THE UNIVERSITY

OF GLASGOW.

T h e s i s o n

S C A R L A T I N A.

By

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S C A R L A T I N A.

S Y N O N Y M S.

Scarlet Fever - Scharlach (German) - Scarlatine (French) - Scarlattine (Italian) - Escarlatina (Spanish) - Skarlazensfeber (Danish and Norwegian) - Skarlakenkoorts (Dutch) - Febris Rubra (Latin).

D E F I N I T I O N.

Scarlet fever is an acute, specific, infectious, and contagious disease,- the first symptoms of which, in general, are headache, sore-throat, and vomiting, followed, in a day or two, by a red rash, which, starting from the neck and upper part of the chest, gradually spreads over the whole body, and is, later on, followed by desquamation.

The disease is nearly always associated with pharyngitis (which may be mild or severe), and enlargement of the cervical glands.

There is a special tendency for otitis media or nephritis to develop at some period of the illness.

One attack generally confers immunity against subsequent seizures.

H I S T O R Y A N D G E O G R A P H Y.

Although there are many descriptions in the earlier writings which suggest scarlet fever, it was not until the end of the seventeenth century that the disease was first given a definite place amongst the acute exanthemata by Sydenham (1824 - 1689). He gave to it the name "Scarlatina", although, in his time, the disease seems to have been of a uniformly mild type: a severe form of scarlet fever, in which the throat affection was very prominent, was described a few years later by Morton who, however, called the disease "Morbilli Confluentes", thus confusing measles and scarlatina. One hundred years later, after an epidemic in Birmingham, Withering (Account of the

Scarlet Fever,etc.,London,1779,p.35) pointed out the difference between these two affections.

When the severity of the anginal attack had diminished,and the other symptoms of the disease,the malady had been mistaken for diphtheria;and when a papular or vesicular eruption has occurred,confusion has arisen in deciding between scarlet fever and miliary fever.

To a large extent,scarlet fever is confined to the north-west of Europe.In Asia and Africa cases are rare;and,when instances do occur,the infection nearly always remains local. In North America it is very prevalent;and,during the last seventy years,epidemics of varying malignancy have swept over South America.In Australia the disease is not common;and in various other localities it is from time to time observed.

B A C T E R I O L O G Y.

In the year 1869, Hallier(Jahr.f.Kinderh.,N.F.ii,1868, 1869) described a micrococcus in the blood of scarlatinal patients;and this organism he believed to be the cause of the disease.

In 1872, Coze and Feltz (Clinical and Experimental Researches on Infectious diseases,1872) described a bacillus in the blood of affected persons.

In 1875, Klebs found a polymorphic micrococcus in one of the inguinal glands of a patient with scarlatina;this organism he called the "Monas Scarlatinosum".

In 1885, Fraenkel and Freudenberg (Pathogeny of Scarlet Fever,Paris,1895) obtained a streptococcus from a case which ended fatally. Babes (cited by the same author) examined several fatal cases of scarlatina,and,in the majority of them, found a streptococcus which he believed to be a variety of streptococcus pyogenes.

In the same year, Klein (Etiology of Scarlet Fever, Proc. Roy. Soc.of Lond.,1887,xlii) was appointed by Government to examine into the cause of the outbreak at Marylebone;he found

that all those affected had taken milk from a certain farm at Hendon where the cows were affected with a disease, the chief features of which were catarrh of the nose and throat, red rash, and cough. Desquamation occurred in about four weeks after being attacked, and Klein pronounced the bovine disease to be none other than scarlet fever. A streptococcus was isolated from vesicles which appeared on the udders in the course of the disease; and a similar organism was found by him in the blood of the affected patients.

These conclusions were attacked by Crookshank (Lancet, 1897, Vol.i, p.1274), who affirmed that an apparently similar epidemic amongst cows occurred in Wiltshire; and of the large number of people who drank the milk from these particular animals, not one was attacked.

In 1893, Fiessingen (Semaine Méd., July, 1893) announced his belief in a streptococcal origin of the disease; and a similar opinion was expressed in the same year by Dowson (Med. Chronicle, Manchester, 1893, 1894, xix, p.217).

In 1897, Class (Med. Rec., Sept., 1899, p.330) described a diplococcus which occurred in the pharynx, and which, when injected into white swine, was said to produce an affection very similar to scarlet fever.

In 1900, Baginsky and Sommerfeld (Berl. klin. Woch., 1900, Nos. 27 & 28, p.588), as a result of their investigations, supported the theory of a streptococcal origin of the disease.

In the Annual Report of the Local Government Board for 1898 - 99, mnetion is made of a variety of streptococcus, which was called by Klein the "Streptococcus Scarlatinae", and which was found in the secretion from the tonsils in each of a series of cases. It was often found along with other streptococci, but had certain characteristics enabling it to be distinguished from them. The report further states that the streptococcus scarlatinae was rarely found in the aural and nasal discharges of these cases, but that the streptococcus pyogenes was generally observed.

In the report for 1899-1900, there is reference to the

occurrence of irregular forms of the streptococcus scarlatinae - sometimes cocci, sometimes rods, and at other times spindles. The rod-shaped forms, if very prominent by reason of their number, tend to cause confusion, when examined microscopically with the bacillus diphtheriae; and when very few, the difficulty arises of distinguishing between this streptococcus and the streptococcus pyogenes.

The report for 1900-01 states that the result of cultures from the tonsillar secretion showed colonies of two kinds: (1) The more prominent of the two were found by a streptococcus resembling the streptococcus scarlatinae, while the others (2) corresponded to the streptococcus pyogenes. The distinguishing points between the two may be represented in tabular form, thus:

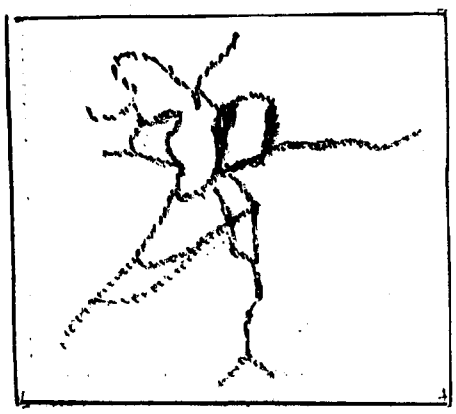
Streptococcus Scarlatinae.	Streptococcus Pyogenes.
1. In broth at 37°C.: The shape of the individual is often round, but there are some showing a tendency to a rod-shape.	1. In broth at 37°C.: The shape of the individual is round with no bacillary forms.
2. In serum condensation fluid: most of the individuals are round, but some rods and spindles occur. The chains tend to conglomerate.	2. In serum condensation fluid: The individuals are all cocci.
3. In lithmus milk at 38°C.: In the course of forty-eight hours there is a strong acid reaction.	3. In lithmus milk at 38°C.: In the course of forty-eight hours there is a feebly acid reaction.
4. Serum colonies one day at 37°C.: The growth is more extensive than that of the streptococcus pyogenes. Many bacillary forms are seen.	
5. Agar colonies one day at 37°C.: The growth is less extensive than that of the streptococcus pyogenes. Rod-shaped forms are quite evident.	

Streptococcus Scarlatinae
(Continued).

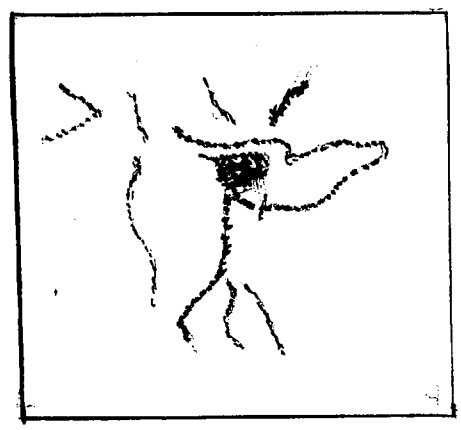
Gelatine colonies at 20 C.: Spindles and bacillary forms present.

Streptococcus Pyogenes
(Continued).

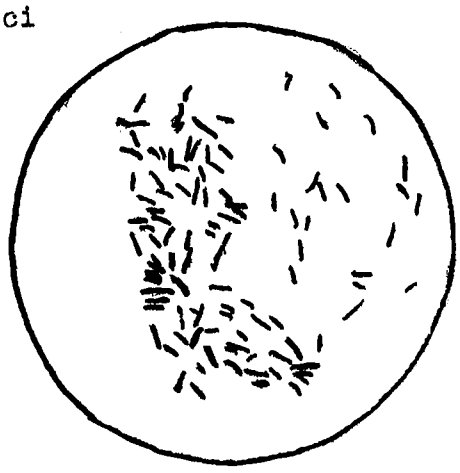
All cocci present.



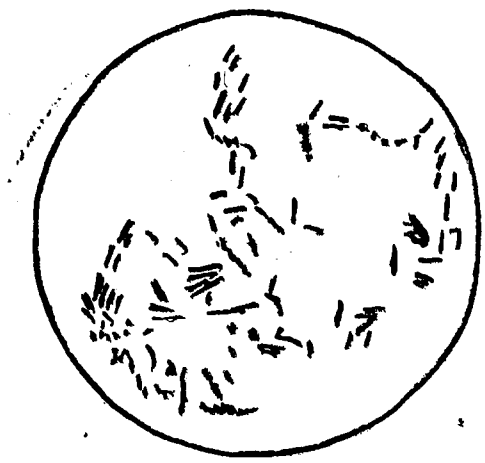
Streptococcus pyogenes grown in broth one day at 37°C.: The individuals composing the chains are cocci



Streptococcus scarlatinae grown in broth one day at 37°C.: The individuals composing the chains are mostly cocci, but some show a tendency towards a rod-shape.



Growth of the diphtheria bacillus on serum one day at 37°C.: Stained with methylene blue.



Growth under the same circumstances of the streptococcus scarlatinae, showing some bacillary forms.

The streptococcus scarlatinae stains with any of the basic aniline dyes; and it retains the stain in Gram's method.

IMMUNITY.

That the predisposition of different individuals to the disease varies considerably is shown in every epidemic of any severity, where one or two in a particular family may contract the affection in its worst form, while another in the same household may have it quite mildly. Severe forms of the disease are not by any means confined to unhealthy subjects, or to persons living in unhealthy surroundings; for at times those in apparently good health and living in sanitary surroundings may be laid low with a most malignant type of the disease.

There is no doubt that, generally speaking, all influences which depress the vitality render an individual more liable to contract scarlet fever, or anything else infectious, than otherwise; and in proof of this, as we might expect, the disease in question occurs more often, and with greater severity, in crowded towns where the sanitation is defective, than in the country. On the other hand, the histories of past epidemics show conclusively that no specific influence, as regards the production of scarlet fever, can be ascribed to the diet, bad air, or any other of the accompaniments of slum life.

Withering, writing in 1778 of an epidemic in Birmingham, mentions that the healthier parts of the town suffered much more severely than the fest; and Graves, writing in 1843 (System of Clinical Medicine, Dublin, 1843, p.501) of an epidemic four years previously, says that "the nature of the disease did not appear in the least connected with the situation or aspect of the patient's dwelling, for we observed it equally malignant in Rathmines as in Dublin, on the most elevated habitations on the mountains as in the valley of the Liffey. It raged with similar violence at Kingstown, and the neighbourhood of Killinsay and Bray".

Davies, writing of an epidemic at Bristol in 1870-01 (Brit. Med. Jour., 1870, Sept., p.297), after stating that the healthy suburb of Clifton was ravaged as severely as the slums, says that "the old and badly ventilated courts enjoy a considerable immunity".

Again, there is certainly no such general predisposition

towards the development of scarlatina as there is in the case of measles,which latter disease very few people escape,whereas quite a number of individuals have suffered at no time from scarlet fever.In an epidemic occurring in the Canary Islands in 1873-75,where no case of scarlatina had occurred for fifty-seven years,a striking difference is shown in the number affected in two villages which were,apparently,under the same conditions as regards the temperature,air,etc.In Haldersrig, with 161 inhabitants,the percentage of cases was 30;but in Eide,with 305 inhabiltants,it was only 2.In 1846 an epidemic of measles affected one-fourth of the patients,while during the scarlet fever epidemic but one-seventh suffered.

Further proof of individual susceptibility or the reverse is afforded by the number of nurses and servants at fever hospitals,who may be near infected patients for weeks and months without contracting the disease,and then perhaps develop it for no obvious reason.From the fact that these people are always in an infected area,and yet go in safety for a long period,it is probable that there is a change in the resisting powers of the individual rather than an extra dose of the poison.As will be shown later,the immunity which many people possess is markedly decreased by the presence of a wound,or the the existence of the puerperal state.

There is no doubt that after puberty the tendency to contract the disease diminishes;so that adults who have not had the malady may be repeatedly exposed to infection,and yet not develop it.

The immunity acquired by one attack generally lasts the lifetime;but occasionally undoubted second attacks of scarlatina are observed.

ETIOLOGY.

Not many years ago, it was stated by some writers that scarlet fever could arise de novo; but today the general belief is that each disease had a particular cause, and that, in the case of the acute fevers, that cause is a micro-organism. As we have seen in the report of Dr. Gordon to the Local Government Board for 1900-01, an organism has been isolated from cases of scarlatina; and this organism, although resembling the streptococcus pyogenes on the one hand, and the bacillus of diphtheria on the other, seems to have cultural and morphological characteristics to distinguish it therefrom.

Whether this particular organism is the cause of the disease or not, it is obvious that extension of the disease is due to direct or indirect exposure to the poison whatever it may be.

CLIMATE.

The fact that Asia and Sfrica, particularly in their tropical and subtropical parts, rarely show an instance of the disease suggests that a high annual mean temperature may have an inhibitory effect on the spread of the disease; but against this is to be placed the fact that at times the disease is epidemic in South America - a large part of which is in the subtropics.

On the other hand, neither can the influence of cold be predicted; for while the disease occurs largely in the north-west of Europe, which lies in the temperate zone, epidemics have been described as far north as Iceland.

Since catarrh of the nose and throat predisposes an individual to contract the disease, it might be expected that cold and damp weather (when there is greater liability to catarrh) would be most favourable to the development of scarlatina; but against this is the fact that several severe epidemics have been reported in hot weather. Indeed, if the weather has any influence, its nature is evidently not understood.

SEASON.

A curve representing the prevalence of the disease in this country is at its lowest in April and the beginning of May, gradually rising until September, then rising very rapidly until the end of October, after which it drops as suddenly as it rose until the end of December, and sinks more gradually to its lowest point in April.

Hirsch (Handbook of Geographical and Historical Pathology, Vol.i, p.184) of the time of prevalence of the disease and the point of highest intensity:

	Winter.	Wtr. & Spg.	Wtr. & Sum.	Spring.	" & Summer.	Spg. to Aut.	Summer.	Summer and Autumn.	Summer to Winter.	Autumn.	Autumn and Winter.	Autumn to Spring.	Total.
Scandanavia and Russia.	8	6	7	9	7	5	9	..	12	6	3	72	
Germany, Holland, and England.	46	24	24	17	19	25	36	14	48	25	6	287	
France, Italy, and Spain.	7	7	5	4	4	6	7	..	6	4	3	51	
North America.	5	3	5	1	..	4	1	1	..	3	2	25	
	60	40	53	33	27	40	53	15	66	38	14	435	

This table shows that:

29.5 % occurred during the autumn months.
24.7 % " " " winter "
21.8 % " " " spring "
24.0 % " " " summer "

The mortality-rate for London between 1838 and 1853, according to Hirsch (loc.cit.) was as follows:

31.1 % occurred during the autumn months.
22.8 % " " " winter "
19.9 % " " " spring "
25.2 % " " " summer "

SOIL.

The evidence collected regarding the relation of the soil to the spread of the disease shows that the nature of the former has no ascertainable influence upon the propagation of the latter. Scarlet fever is found on clay, chalk, and sand; on hills and in valleys; and, if some places are affected more than

others, the cause does not seem to be the nature of the soil.

AGE.

Age is a very important factor in the spread of scarlatina; for statistics show that the vast majority of cases occur between the ages of two and five.

Murchison illustrates the frequency of the disease at different ages by the following tabulation of returns:

	Number.	Males.	Females.	
Under 1 year	9,999	5,575	4,424	6.7 %
From 1-2 years	20,975			
" 2-3 "	23,842			
" 3-4 "	22,528			
" 4-5 "	17,726			
Under 5	95,070	49,157	45,899	63.8 %
From 5-10 "	38,591			
" 10-15 "	8,676			
Total 5-15 "	47,267	23,242	24,025	31.7 %
From 15-25 "	3,871			
" 25-45 "	1,971			
" 45-65 "	516			
" 65-85 "	118			
" 85-95 "	4			
Over 95 "	6			
From 15-95 "	6, 492	2,964	3,528	4.3 %
	Total	75,373	73,456	

The following table shows the admissions into the hospitals of the Metropolitan Asylums Board from 1871 - 1893 inclusive (Clifford Allbutt's System of Medicine, p.131):

Ages.	Males. Cases admitted.	Males. Died	Males. Mortality per cent.	Females. Cases admitted.	Females. Died	Females. Mortality per cent.	Total. Cases admitted.	Total. Died.	Total. Mortality per cent.
Under 5	9,767	1834	18.8	9,825	1741	17.7	19,595	3,575	18.2
5 - 10	13,633	797	5.8	15,126	801	5.3	28,763	1,598	5.6
10 - 15	5,759	144	2.5	6,585	173	2.6	12,344	317	2.6
15 - 20	2,214	70	3.2	2,477	60	2.4	4,691	130	2.8
20 - 25	932	22	2.4	1,312	40	3.0	2,244	62	2.8
25 - 30	390	17	4.4	667	20	3.0	1,057	37	3.5
30 - 35	240	12	5.0	348	15	4.3	588	27	4.6
35 - 40	92	8	8.7	167	7	4.2	259	15	5.8
40 - 45	53	5	7.7	65	3	4.2	118	8	5.4
45 - 50	17			31	1		48	1	
50 - 55	16	1		15			31	1	
55 - 60	4	1		3			7	1	
Upwards	1			6	1		7	1	
Totals	33,122	2911	8.8	36,630	2862	7.8	69,752	5,773	8.3

These tables show that the greatest liability to scarlet fever occurs about the fifth year. In infants under six months the disease is rare, and in those under three months it hardly ever is observed.

As to the existence of a congenital form of scarlet fever, although we have undoubted transmission of smallpox during intra-uterine life,- and, therefore, arguing by analogy, we might expect scarlet fever to be similarly transmitted,- still, owing to the absence of any authenticated case of infection during gestation, there can be no proof of the existence of congenital scarlatina. Children, it is true, are often born with a reddish skin and desquamation later on; but this latter is a perfectly normal process.

SEX.

The above table taken from Murchison's work shows a total percentage of 50.7 males, as against 49.3 females affected with scarlatina.

On the other hand, the second table shows a preponderance of

females in the proportion of 11 to 10. From these opposing facts we gather that sex has little or no influence on the causation of the disease.

SURGICAL SCARLATINA.

By this is meant the occurrence, usually within the course of a day or two after operation or injury, of symptoms which in some cases are those of true scarlatina, while others have caused considerable discussion as to their real nature.

The earliest reference to an eruption after an injury is given by Civiali (Practical Treatise on the Diseases of the Genito-Urinary Organs, T.iii, p.596, 1858), who noted the occurrence of a rash, in several cases of vesical calculus, either during the passage of a stone or following closely on an operation for the relief thereof.

In the same year, M. Guinaud See (Trélat, Progr.Méd., Sept.14, 1878) noticed the occurrence of a rash after an operation. In 1863, Maunden (Brit.Med.Jour., 1863, Vol.ii, p. 679) reported the development of scarlatinal symptoms after median lithotomy. Each of these observers noted the onset of the symptoms within two days after the operation.

In that year Harrison (Ibid., 1863, Vol.ii, p.633; 1864, Vol. ii, p.390) also reported the development of a red rash on the third day after a compound dislocation of the thumb.

Another case (Ibid., p.428) of a red rash, occurring the sixth day after infliction of a scalp wound and followed by desquamation, was presumably not infectious; for no one else in that household took scarlatina, and no source of infection could be traced.

In 1875, Sir James Paget (Clinical Lectures) mentioned several cases in which symptoms, believed to be those of true scarlet fever, developed within a week after operation. Other cases of a similar nature were reported by March (Records of the Great Ormond Street Hospital), and by Thomas Smith.

These and the following suggest that there may be two classes of post-operative symptoms: (a) Those of true scarlatina; and (b) those with a non-infectious rash, which may closely resemble a scarlatinous one, or may be urticarial, vesicular, or

papular.Proof that a rash of the latter class is due to scarlatina can only be absolute when infection from or to another individual can be traced;but even in true scarlatina it is often very difficult to find a source of infection for an isolated case;and also,if the patient with scarlatina be isolated at once,the disease may go no farther,- so that it is often most difficult to decide whether a case of scarlatinal or not.

A fact,brought out on examining the above-mentioned cases, is that sore-throat is not nearly so prominent a symptom as in ordinary scarlet fever;and that this rather supports the view that,in cases of surgical scarlatina,the virus enters by the wound,whereas,in ordinary scarlatina,infection is said to enter the system generally by the throat.

The following two cases are reported by Dr. Braxton Hicks (Stirling,- St.George's Hosp.Rep.,Vol.x,1879):

(1) A patient developed a rash of a roseolous character a few days after an operation for lithotomy;and it was found that his bed had been previously occupied by a scarlatinal patient.

(2) In another case,on the third day after the removal of a cyst from the neck,the wound looked unhealthy;on the fourth day,a scarlet rash appeared along with a slight sore-throat; on the ninth day,the symptoms had all disappeared;and on the seventeenth day,the patient's wife developed typical scarlatina.

Another case is cited by Bryant (Clinical Surgery,Part iii) of the development of a scarlatiniform rash on the fourth day after an ovariotomy.Desquamation followed,but the wound healed perfectly.

Lea (Brit.Med.Jour.,Feb.15,1879) tells of the following occurrence: An abscess was opened for acute necrosis of the tibia in an adult.The temperature rose from 101° to 104°F.,and the condition of the wound became worse.No sore-throat existed; but desquamation and albuminuria were present;and,while one of the patient's children had had scarlatina,another took it later on.

The following thirty-nine cases have been collected by Stirling,and published in the "St.George's Hospital Reports

of se.	Name.	Sex.	Age. Y.	Age. M.	Date of Admission.	Disease.	Nature of Operation.	Date of Operation.	Date of Scarlatina.	Number of Days.	Remarks.
1	W.F	M.	2	9	Jan. 19	Necrosis	Removal of bone	Jan.19	Jan.20	1	
2	H.W.	M.	3		- 16	Strang.Hernia.	Herniotomy	-- 16	-- 19	3	
3	T.M.	M.	3	6	- 24	Tarsal Disease	Removal of Bone	-- 29	-- 30	1	Scarlatinal Angina.
4	A.B.	M.	9		July 6	Fatty Tumour	Removal	July 8	July 9	1	Albuminuria.
5	A.G.	M.	4		- 16	Perineal Abscess	Opened	June 16	June 17	1	Died. Scar.Maligna. General duskiness of Skin rather than rash.
6	W.H.	M.	7		April 11	Enlarged Bone	Removal	Apr.17	Apr.19	2	Infection traceable.
7	E.F.	F.	2	6	Dec.12	Croup	Tracheotomy	Dec.12	Dec.17	5	Albuminuria "
8	K. M.	F.	3		Oct.16	Diphtheria	"	Oct.16	Oct.19	3	Died.
9	L.A.	F.	3		Jan.19	Cleft Palate	Staphylorrhaphy	July 4	July 6	2	
10	M.A.B.	F.	3		- 19	" "	"	Aug.26	Aug.27	1	
11	J.L.	M.	5		Oct.31	Calculus Vesicae	Lithotomy	Nov.4	Nov.6	2	
12	B.W.T.	M.	5		Jan.27	Croup	Tracheotomy	Jan.31	Feb.3	3	Died.
13	K.C.	F.	6		Apr.30	Abscess(Morb.Cox)	Opened	May 15	May 17	2	Infection traceable.
14	M.N.	F.	1	10	- 19	Ankle Disease	Syme's Op.	Apr.28	Apr.29	1	Died.
15	A.C.	F.	1	9	July 22	Cleft Palate	Operation	July 23	July 24	1	
16	C.W.	F.	3		Sept.6	" "	"	Sept.8	Sept.10	2	Infection traceable.
17	H.H	M.	4		- 16	Calculus Vesicae	Lithotomy	-- 16	--- 19	3	Albuminuria and desquamation
18	E. P.	M.	2		Jan.31	Webbed Fingers	Plastic	Feb.14	Feb.16	2	Desq.Inf.traceable.
19	J. B.	F.	9		Mar.2	Abscess(M.Coxae)	Opened	Mar.19	Mar.20	1	
20	J.C	M.	7		Apr.7	Calculus Vesicae	Lithotomy	Apr.20	Apr.22	2	Inf.traceable.Albuminuria and desq.
21	J.R.	M.	3		Sept.3	Cleft Palate	Staphylorrhaphy	Sept.10	Sept.11	1	
22	W.S.	M.	2	10	May 23	Croup	Tracheotomy	May 26	May 27	1	
23	W.D.	M.	3		Apr.16	Malformation of Fingers	Plastic	Apr.21	Apr.24	3	
24	E.S	M.	2	9	Sept.13	Fatty Tumour	Removal	Sept.16	Sept.18	2	
25	E.H.	M.	5	9	Mar. 7	Psoas Abscess	Opened antisept.	Mar.12	Mar.15	3	Slight sore-throat.
26	F. H.	M.	5	4	Oct.22	Harelip	Operation	---	Oct.27	Less than 5	Infection traceable
27	A.D.	F.	3	3	Sept.26	"	"	---	Oct.2	" " 7	
28	--	M.	4	6	Oct.31	Tarsal Disease	Removal of Bone	Nov.2	Nov.4	2	
29	N.H.	M.	5	6	-- 10	Ankle Disease	Sinuses opened	---	Oct.20	Merely stated that S.F.after Operatn.	Anasarca and Albuminuria
30	S.P.	F.	5		--- --	Supernum.Toes	Plastic Op.	---	Oct.18		
31	M.I.	F.	7		-- 11	Abscess of Hip	Opened	---	Oct.19		
32	F.L.	M.	8		Aug.25	Burn	-------	---	Aug.29	4	Desquamation.
33	H.P.	F.	9		Nov.3	Ster:Mast.Contr.	Tenotomy	Nov.8	Nov.9	1	
34	E.T.	F.	20		Dec.2	Varicose Veins	Ligatured	Dec.5	Dec.7	2	
35	G.R.	M.	12		Aug.25	Talipes	Tenotomy	Sept.9	Sept.10	1	
36	W.F.	M.	8		-- --	Knee Disease	Thigh Amputation	Aug.26	Aug.29	3	Desq.and Albumin.
37	J. C.	M.	25		Jan.18	Accident	Amput.of Arm	Jan.18	Jan.21	3	
38	J.S.	M.	8		Feb.12	"	" " Thigh	Feb.12	Operation followed by scarlatina		Died.Desq.Others infected.
39	T.G.	M.	6		Jan.22	Tibial Exostosis	Remov.antisept.	Jan.30	Feb.1	2	

The above table shows that in 78% the eruption occurred within three days of the operation or injury. In a few of the cases no period of incubation is given; but for the rest the average period is two days.

The incubation period of ordinary scarlet fever is about seven days, so that the constancy of such a short period as two days suggests that there is some connection between the infliction of the wound and the occurrence of the disease. As to the nature of that connection, it is, of course, evident that a severe operation will lower a patient's vitality, and render him, for the time being, more liable to take the infection of scarlatina or anything else that may be there; but the majority of cases in the above table developed after minor operations, many of which could not be considered to have lowered the patient's vitality at all.

Sir James Paget suggests that the cases which develop post-operative scarlatina may have had the infection about them before the operation, and that the latter only served to hasten matters; but this does not explain why the affection is more liable to follow small operations than large ones, or why the scarlatinal symptoms should develop with such regularity in point of time after operation as they have been shown to do.

At present, there is clear evidence to show that the virus gains access to the system in these cases: arguing from the analogy of vaccination and of erysipelas, - in which affections small wounds give rise to severe symptoms, - one would be inclined to say that the poison must enter by the wound; but this theory hardly reconciles with the fact that in many of these cases the wound does well, which same one would not expect if the infection occurred by that channel.

In addition to a short incibation period and a diminution or absence of throat symptoms, another point of difference between ordinary scarlet fever and surgical scarlatina is that in the latter there are usually no premonitory symptoms, and that the rash is the first sign of anything wrong; further, in surgical scarlatina it first appears on the face, neck, and upper extremities, and then, later on, spreads downwards.

The figures for age show the marked susceptibility of young children in surgical as well as in ordinary scarlatina. The mortality is about the same in the two affections, although one might have expected it to be higher in surgical scarlatina, on account of the presence of a wound in addition to the fever.

Scarlet fever is practically the only one of the eruptive pyrexial affections which is likely to attack the subjects of wounds. Sir. James Paget (Address on Surgery before the British Medical Association, 1862) reports a case which developed measles at the site of a wound; and a case is also reported of a similar development of smallpox; but, with these exceptions, it may be said that scarlatina is the only one of its class to which patients with wounds are liable.

When a post-operative case shows merely a fleeting rash with, perhaps, no other symptom typical of scarlatina, there is often great doubt as to the real nature of the disease. That such rashes exist, and that they may have no connection with scarlet fever, has been mentioned by several observers.

Spencer Wells reported a case in which a scarlatinal eruption covered the whole body within a quarter of an hour after the application of tincture of steel to a uterine growth. Broadbent observed three cases with a bright-red rash after operation. Slight desquamation followed; but at no time was there fever, and subsequent events proved that the cases were not scarlatinal.

Cheadle (Brit. Med. Jour., 1879, Vol. ii) reports the following: A child with an abscess in its thigh due to injury, and without any external wound, developed, at the commencement of suppuration, a general scarlet rash. No source of infection could be found; the eruption disappeared in twenty-four hours, and no extension of the disease occurred.

Stirling (St. George's Hosp. Reps., 1879, Vol. x) writes to the effect that a child was taken to St. George's Hospital, on January 2, 1877, suffering from a slight burn of the right hip and right side. The skin generally was red, with a few vesicles upon it. On January 4, the temperature rose to 102° F., and the tongue was white and moist. That day a diffuse roseolous eruption app-

next day, the eruption had gone; and by the eighth the child was well on the road to recovery.

Another case of burn followed by a scarlatiniform eruption was under the present writer's care:

E. H., aged 2, was admitted to the Grimsby and District Hospital on December 4, 1906, suffering from a fairly extensive burn of the abdomen.

Her temperature for the first day was subnormal; then it rose on the fifth to 103.4° F. in the morning; fell to 101.4° F. in the evening; rose to 102° F. next morning; fell to normal on the eveining of the sixth; but next morning (7th) rose again to 100° F.

Now was noticed a red rash all over the body; but especially well-marked on the face, neck, and chest. The tongue was slightly furred, but the papillae were not prominent. The pharynx was red and swollen, but there was no enlargement of the cervical glands. On the upper part of the body the rash looked absolutely typical of scarlatina, although on one thigh the eruption was slightly vesicular. On the evening of the 7th, the child's temperature reached 101.8° F., after which it gradually descended, and has remained normal ever since. By the 9th, the rash had faded slightly, and by the 11th had gone. There was a branny desquamation a few days later; but, as the child was kept in the general ward and no case developed before or after, it may be assumed that the case was not one of scarlatina.

With regard to the wound, sometimes it progresses favourably, at other times it suppurates; and this latter is especially likely after cleft-palate operations, which might be expected in view of the fact that all evidence points to the throat as being one of the chief, of not the chief, centres of infection.

The production of thr rash is still a matter of discussion, as to how and why it appears. Arguing from the analogy of rashes produced by certain drugs, for example, belladonna or copaiba, - which produce their effects by acting upon the vasomotor centre, - similar causes might be expected to operate in the case of wounds. It is well known that stimulation of the skin sets up a reflex act very readily; and it may be that the stimulation

of that structure which occurs in operative interference may so influence the vasomotor centre,in some cases at any rate, as to cause some form of erythema of the external integument of the body.This theory is supported by the number of burns and scalds,which act as poerful stimulants to the skin and which are followed by rashes thereof;but it in no way explains why these rashes should be at times urticarial,and at times papular,or,again,vesicular.

It is generally admitted that within the first twenty-four hours after an operation,in a great many cases,there is a rise of pulse and temperature;which rise subsides in a few hours without apparently interfering with the progress of the wound. It is obvious that the wounding of the tissues which occurs in an operation sets up a certain amount of local inflammation which causes a temporary rise in temperature and pulse.Applying this theory to the production of rashes,it may be quite well understood that some at least of the rashes originate in this way.In view of the facts before us,it seems likely that post-operative rashes have no common cause,but that each of the various factors mentioned may at times play a part in producing them.

Finally,there is good reason for believing that septicaemia and pyaemia differ only in degree,and not in kind,from surgical scarlatina;but this is beyond the scope of the present article to determine.

PUERPERAL SCARLATINA.

As with surgical scarlatina,there has been considerable discussion as to whether the symptoms (red rash,temperature, etc.),which sometimes follow a confinement,are due to scarlet fever or not.

Epidemics have been reported by Welsch of Leipzig (1665), by Hamilton (1740),by Ludwig (1758),and by Brioude (1782):the latter states that,in Jordandale (Auvergne),the epidemic was so severe that young women refused to marry on that account.At this time the disease was called "Miliary Fever" in our own country.

In 1799,Malfatti (Hufeland's Jour.,Vol.xii,1800) reported a serious outbreak in the Vienna Maternity,in which the symptoms were,offensive lochia,pain on pressure over the uterus,followed - from the second to the sixth day - by shivering,headache,noises in the head,a feeling of malaise,and a hot skin.The red rash, which began on the neck and face,gradually spread over the whole body,and about the fifth day became bluish,the pulse became weaker,and death occurred.An interesting point reported in this epidemic is that the anginal symptoms were very mild.

In 1825,Senn (Thèse de Paris,1825) described an epidemic at the paris Maternity,which committed great ravages among a number of children who were being kept there for vaccination. He pointed out,what is now generally admitted,that,although a recent confinement,at times,seems to predispose to the development of scarlatinal symptoms,yet pregnant women are immune.

Trousseau (Clinical Medicine,1885,T.i,p.184),writing of an epidemic in Blois in 1828,says that,generally speaking, pregnant women are immune,but that from twenty-four to thirty-six hours after delivery,and in a few days,the patients died.

In 1862,Denham (Quart.Jour.Med.Sci.,Vol.xxxiv),writing of a recent epidemic of puerperal fever in Dublin,gives it as his opinion that puerperal fever,erysipelas,and scarlatina are all closely related,and may even be different manifestations of the same disease.

MacClintock (Dublin Med.Jour.,1866) says that the nearer the attack is to the confinement the greater is the danger;and that,in a Dublin epidemic in 1854,out of ten deaths,eight showed the first symptoms of puerperal scarlatina within thirty-six hours of delivery.Twenty-eight of his patients were attacked on the first and second day,and among them the mortality was 45%; whereas,among those attacked on or after the third day after delivery,the mortality was about 12%. The author quotes Halahan, who states that three of his cases who developed scarlatina immediately after delivery all died;of five who took it within the first twenty-four hours,four died;and of three who were

not attacked until the fifth day all recovered.

In 1871, Braxton Hicks (Trans.Obstet.Soc.Lond.,1871) makes mention of the absence, or slight development, of sore-throat in cases of puerperal scarlatina. He also states that the majority of the cases that afterwards develop scarlatina go on to full term; and he suggests either that the pregnant state possesses a peculiar resisting power against the disease, or that infection occurs at the confinement; also that the short period of incibation is due to the lowering of the vital powers consequent upon a labour - especially if severe, - as, many of the cases in question are, - and to the condition of the genital tract.

Oldhausen (Arch.f.Gyn.u.Obstet.de Crédé,1876), writing in 1876, says that puerperal fever was not considered to have any connection with scarlatina in Germany at that time, although he himself thinks that some of the puerperal cases are truly scarlatinal; and he mentions the fact that a recently-delivered woman who has developed the symptoms may communicate true scarlet fever to those about her.

Lucas Championnière (Jour.de Méd.Pract.,1877) stated that, in his opinion, puerperal cases were in a class by themselves, and, although resembling the other eruptive fevers were distinct from all of them. He also makes the following remarkable statement with regard to the reappearance of the rash: "With my last patient I have noticed it seven consecutive times, the last rashes have not been well marked, and the fever only moderately severe. But the earlier eruptions were accompanied by a high fever.

These two theories of the causation of the cases under discussion may be called:

1. The Septicaemic Theory. 2. The Scarlatinal Theory.

In support of the former may be mentioned:

(a) The rash can be other than scarlatinal.

(b) There is an absence of flaky desquamation, the latter being sometimes furfuracious.

(c) The genitals are by no means always at fault.

(d)Often comes on without apparent cause,and may not be transmitted.

(e) A scarlatiniform eruption has been seen in several different conditions - for example,variola,typhoid fever,miliary fever,septic onfections,and after the administration of belladonna, chloral,or mercury.

In support of the latter theory may be mentioned:

(a) Morbid depression certainly proves infection;and, no doubt,in some cases at least,labour has a very exhausting effect upon women.

(b) Development of true scarlatina in those round about.

(c) In many cases the typical symptoms of scarlet fever are present;and then the diagnosis is clear.

As a result of the numerous observations on the subject,it would seem that,similarly to surgical scarlatina,there may be infectious and non-infectious rashes.

As to the nature of the attacks,which have been called scarlatinoid (Guéniot),and which includes all those of a doubtful etiology,no definite pronouncement can be made.

One may make mention again of eruptions produced by belladonna,chloral,and calomel;for these drugs are sometimes largely used in puerperal women.These drug-rashes may be followed by desquamation in large flakes,like the typical scarlatinal peeling.

Evidence of a previous attack of scarlatina is always against the scarlatinal nature of the present one.Absence or presence of an epidemic of scarlet fever at the time will have an important bearing on the question of diagnosis.

As with surgical scarlatina,one of the marked features of the attacks is the mildness of the throat symptoms,which is in marked contrast to the state of affairs in ordinary scarlet fever;and another point is the absence of renal complications in puerperal cases,whereas albuminuria is an important symptom. As with surgical scarlatina,it would seem probable that puerperal rashes,etc.,have more than one cause,and that,at present,the

true cause of many of them is little understood.

RACE.

Statistics show that the white races are far more susceptible to the poison of scarlatina than the black, and the black more so than the yellow.

Minor, writing in 1875 of the Southern States of North America, says that of black 1 died out of 34,704, while of the whites the proportion was 1 in 10,790. During the American Civil War, 378 whites took scarlatina, of whom 70 died; 118 negroes contracted the disease, of whom but 2 died (Welch and Schamberg).

In the case of the yellow races, its occurrence is extremely rare. It has been reported in Pekin (Morach, - Ann. d'Hyg.), but otherwise China and Japan have been, and are still, free from the disease.

SOCIAL CONDITION AND SANITATION.

Position in the social sense seems to have very little, if any, effect on the susceptibility of the individual. The mortality is certainly greater among the poor than among the rich; but that, as we have already seen, is not due to any specific influence exerted by unhealthy surroundings on the development of the disease.

Welch and Schamberg (Acute Contagious Diseases, p.352) give the following figures to show that elevation has a favourable, rather than the reverse, effect upon the spread of the disease:

Altitude.	Deaths.
150 - 600 feet.	1 to every 4380 of the population
600 - 1000 "	1 " " 1401 " " "
1000 - 5400 "	1 " " 1447 " " "

The prevalence of scarlatina is greater in towns than in rural districts; but this might be expected of a contagious disease. As we have seen in discussing the question of immunity, the rich and poor alike, when exposed to infection, are liable to contract the disease.

CONTAGION.

The virus of scarlatina is much less volatile than that of smallpox, as is shown by the fact that the percentage of cases near a scarlet-fever hospital is not above the normal; while the number of cases near a smallpox hospital is decidedly increased above the normal.

Its striking-power is less than that of measles - a fact well brought out by the epidemics of the two diseases in the Canary Islands mentioned under Immunity: whether this is due to the fact that the virus is a relatively heavy body, or whether to the fact that dilution with air has a markedly inhibitory effect, cannot be determined.

The infectious element is in the nose and throat, in the skin, and in the secretion of a mucous cavity. It is probable that each contains the virus; for the disease is infectious before, at the beginning of, and after desquamation. Even when the throat symptoms are slight or absent, the disease is still infectious - examples of which are found under the regular malady and the puerperal variety of the same. Infection has occurred from children who have been discharged from hospital apparently cured; and this rather supports the view that the chief seat of the virus is in the throat, since it is obvious that the throat cannot be scrubbed as the skin can.

A case of infection in the earliest stage of the disease is given by Trousseau (Cited by Corlett, - Acute Infectious Exanthemata, p.236): A London merchant, who had been spending the winter in Paris with one of his daughters, planned, on his return to England, to stop over in Paris for several days. His eldest daughter, who had been keeping house in England during his absence and who was anxious to meet her father and sister, went on to Paris. While crossing the Channel, she was seized with fever and sore-throat. Seven or eight hours later, she arrived in Paris, reaching the hotel but a short time after her sister and father had arrived from Pau, and came down with a severe attack of scarlatina. Within twenty-four hours, it developed in her sister as well. There had been no scarlet fever in Pau, but it

was epidemic at that time in London.

Lemoine (loc.cit.) has suggested that the contagious element resides in the throat,and nowhere else.He regards the contagiousness of the skin as due to secretion from the throat which has dried on;but this theory can only obtain where the anginal symptoms are,at least,of medium severity,- for where the throat affection is mild or absent the disease is still infectious.

Healthy persons may transmit the disease,as in the instance given by Corlett (loc.cit.,p.233).Dr.W.Essingen went from Worms to Mannheim,visiting there three children ill with scarlatina.He returned to Worms,and on the afternoon of the same day,whilst paying a friendly visit at the house of his friend Dr.Loeb,took the latter's little daughter upon his lap,holding her there for some time.On the following day she developed a typical attack of scarlet fever.Dr.v.Essingen had,it seems, not changed his clothes between the visit paid in Mannheim and the call in Worms.There was previous to this,so far as could be ascertained,no scarlet fever in Worms.

An instance is also recorded of the transmission of the disease through two healthy persons,who remained well while the unfortunate patient died of the malignant forms of the disease.

The malady has been transmitted by means of clothes,books, toys,letters,hair,and articles of furniture.

Several epidemics have been ascribed to infected milk, although it has never been definitely proved that the cows supplying that particular milk were suffering from scarlatina.

The outbreak at Marylebone in 1885,and the conclusions arrived at regarding its cause have been mentioned under Bacteriology.

The same year an outbreak occurred at Rostock (Ger.),in which,with two or three exceptions,the affected persons drank milk from a certain farm in the village of Gehlsdorf where scarlet fever already existed.A great increase in the number of cases occurred in June of that year;and it was found that several of the infected had,whilst the disease was upon them, handled the cows or the milk.An interesting point brought out

by this epidemic is that those who drank boiled milk escaped the disease;and this has been proved to apply to other epidemics - showing that this article of diet does at times contain the infectious element.

It has also been stated that the disease occurs rarely,or not at all,in countries where cow's milk is not consumed.This certainly applied to Japan,where cow's milk is not used as a food,and to India,where children are kept at the breast until they are from four to five years of age,and where,as we have seen,scarlet fever rarely occurs at all and never spreads.In France,although the disease is common enough,no epidemics have been traced to infected milk-supplies;and this may possibly be due to the fact that the great majority of French children are breast-fed,either by the mother or by a wet-nurse,until they are nearly past the most likely period of infection.

It has been shown by Thomas that horses,dogs,cats,swine, and other domesticated animals are sometimes affected with the disease,and may convey the infection to human beings (Murchison,- Lancet,1864,Vol.ii,p.431).We have seen that Klein's view of the disease amongst cows at Hendon (1885) has been the subject of dispute;and although it cannot at present be said that there is absolute proof of the occurrence of the disease in animals, the probability is that it does occur.

The tenacity of the scarlatinal virus is remarkable;and infection has occurred from articles that have lain by for several years.Murchison (loc.cit.) gives the following instance: During an epidemic of scarlet fever,a ward in St.Thomas' Hospital was set aside for scarlatinal cases.Although this ward was repeatedly cleaned,and,it was thought,disinfected,for two years after all the children put therein developed the disease.

With regard to contagion,scarlatina is probably infectious at all stages of its existence;but it seems likely that,at the beginning,infection is,comparatively,not great,- for if the suspect be isolated at once,it is quite possible that the other children in the house will not take the disease.

Desquamating epithelium is probably infectious,because

patients with no other sign of the disease than this one have transmitted the disease;at the same time,infectivity is probably not great during the later stages of the process,- for Lemoine (Bull.et Mém.Soc.Méd.des Hôp.de Paris)mentions that soldiers discharged from barracks while still "peeling" did not spread the disease on their return home.

The evidence before us points to the febrile stage as the most highly infectious;the period of incubation is so to a certain extent;the beginning of desquamation is very infectious; but the danger from the skin becomes less as convalescence advances.

There is a possibility of infection through the urine in cases of chronic albuminuria,although no such case has been proved.A body called "scarlatinine" has been obtained from the urine of a patient suffering from the disease;but injections of this body into lower animals has not proved anything,except that the body is a poison.

Epidemics of scarlet fever,contrasted with those of measles or smallpox,show,in the first place,that the former are much more confined to certain parts of the world than the latter - e. g., measles and smallpox occur with considerable frequency in both Asia and Africa,while scarlatina is rarely found in either. Again,scarlatina occurs,as an epidemic,much more rarely than measles.There may be many years between epidemics of scarlatina in any particular district,although, after the virulence of an epidemic has passed off,sporadic cases of scarlatina tend to occur;whereas in measles isolated cases occur only at the beginning,or at the end of,an epidemic. Furthermore,scarlatinal epidemics vary largely in intensity, and consequently in the death-rate.

Graves (Clinical Medicine) mentions how,for nearly thirty years epidemics of scarlatina in Dublin were very mild;and then, in 1834,the disease began to assume a severe type with a consequent high mortality.

PATHOLOGY.

Two factors come into play in producing the lesions which are found post-mortem in cases of scarlatina - viz.:

1.Scarlatinal toxin.

2. Secondary infection by staphylococci,streptococci, pneumococci,etc.

At present it cannot be determined,in any given case, whether a particular lesion is due entirely to one one of them or not,although it may be assumed that/in the early stages of the disease any changes that may be present are due entirely to the scarlatinal toxin;whilst those that die later with associated symptoms of throat trouble probably owe their death, in part at least,to infection with organisms other than the streptococcus scarlatinae.

SKIN ERUPTION.

There is a considerable difference of opinion as to the nature of the cutaneous lesion in this disease - whether it is inflammatory at all,and,if it is,the degree of inflammation.

Klein (Local Government Board Report.viii.24.Lond..1876) described a thickening of the mucous layer,with eveidences of division in many of the cells of the rete.In the latter also, he described lymph-corpuscles with deeply-stained nuclei.

Unna (Orth's Lehrb.der Spec.Path.Anat.,1894,Vol.ii,pp. 629 et seq.) contends that there is no leucocytosis such as occurs in undoubted inflammation of any part of the body.The swelling of the skin which often occurs is not,in his opinion, an actual oedema,but rather the result of distended vessels in the cutis vera shwoing through the shrunken epidermis;and he affirms that the condition in question is due to a vasomotor paralysis of the vessels,rather than to anything of an inflammatory nature.

Von Jürgensen (loc.cit.,p.114 et seq.) entertains a similar belief with regard to the nature of the engorgement of the vessels.

On the other hand, Thomas (loc.cit.,p.20 et seq.) and

Ziegler (Lehrb.der Spec.Path.Anat.) consider that inflammation doed play a part in the process.

Kaposi (Path.und Therapie der Hautkrankh.,1899,p.243) states that there is normally a hyperaemia with a moderate exudation,and that the papillary and vesicular eruptions are due to marked exudation and cell-proliferation in the papillary layer and in the rete Malpighii.

Pearce (Boston City Hosp.Reps.,1899,p.50) asserts that from the fifth to the tenth day there occurs marked infiltration of the epithelium,together with polymorphonuclear leucocytes; also that the deeper cells occasionally show mitosis.

Clifford Allbutt (System of Med.,Vol.ii,p.165) supports the view that the oedema which so often occurs is inflammatory in nature,and that there is a rapid increase of cells in the Malpighian layer of the skin.

It will be seen that there is a great variation in these descriptions,and that the latter seem to show that the phenomena of inflammation are not always present,and are at times apparently absent.

According to Malcolm Morris (Diseases of the Skin,1899,p.88), local changes of varying degrees of intensity with,in the worst cases,leucocytosis into the tissues are manifested in the erythemata of the skin.

The balance of evidence points to the occurrence of inflammatory phenomena in the skin - in at least a large number of cases.

Desquamation is brought about by an effusion of serum into the deeper layer of the epidermis,thus separating the individual cells.On the trunk,the first appearance of desquamation in a typical case is a number of small powdery scales,which are most numerous where the eruption has been best developed. In a day or two,these scales are thrown off,and jagged rings of dry skin appear in their place,which,meeting with other rings,produce figures resembling maps.

Desquamation of the trunk nearly always starts from the miliary vesicles,which are found in nearly all well-marked cases.

On the hands and feet the epidermis is usually shed in

large flakes.If the extremity be kept wrapped up,a whole cast of the epidermis of the part may come away.Desquamation tends to be branny on the face.

Although many of the papillae occur in hair follicles,the two are not necessarily connected;for the former are much more numerous than the latter,and sometimes occur on scar-tissue where the hair follicles are absent.

In the mucous membrane of the pharynx and nose , the changes are the same as those described for the skin - viz., local engorgement of the vessels with,later,a leucocytic infiltration. About the third day,the gums often show white patches which represent desquamating epithelium.On the tongue,the changes corresponding to those in the skin begin sooner,and are more marked - especially in the papillae.

LYMPHATIC SYSTEM.

In 1872,Harley made post-mortem examinations of a number of cases of scarlet fever,and he came to the conclusion that the lymphatics were the seat of the disease,owing to the hyperplasia of the lymphoid elements which he so constantly found in cases that had died of this disease.

At the present time,this enlargement of the lymphatic glands is admitted,and is considered as one of the characteristic signs of the disease.The maxillary and submaxillary are perhaps the most frequently enlarged,and these sometimes suppurate later on.Klein (Trans.Path.Soc.,Lond.,1877) found cells like giant-cells in the middle of the enlarged glands,and large endothelial cells in the lymph sinuses.

Pearce (Scarlet Fever,- Boston City Hosp.Reps.,1899) found large endothelial cells in the lumina of the lymph simuses; and many of these cells contained a number of disintegrated lymphoid cells.

The tonsils may only be slightly swollen,or may be extremely ulcerated with small abscesses here and there - these latter conditions occurring in the septic type of scarlatina.The whole organ may slough,and the destructive process may gradually involve the other structures in the neighbourhood.Bacteria of

putrefaction are found on the tonsils;and the ears,and the maxillary and submaxillary glands become enlarged and often suppurate.

The spleen may be of normal size or greatly enlarged. Pearce (loc.cit.) states that,in one class of cases where the organ is affected,the Malpighian bodies are enlarged,while the pulp remains normal;and in the other the pulp is increased in amount,while the Malpighian bodies are scarcely evident.He found the blood-vessels congested in the affected organ,and a mass of cells,- chiefly lymphoid,- with occasionally a few leucocytes under the endothelium lining the vessels.

Klein,in examining a few cases,noted enlargement of the Malpighian bodies with endothelium-like cells in the middle,as he found was the case with other lymphatic glands.

Although in many cases of lymphadenitis(the maxillary glands, forexample) are due to infection by a pyogenic organism,- especially the streptococcus pyogenes,- yet,~~from the~~ fact that patients who have died of scarlatinal toxaemia,early in the disease before the ordinary septic organisms have entered the system,have often shown the same general enlargement of the lymphatic structures of the body as occurs in those with obvious secondary infection.

HEART.

The condition of the heart in this disease is due in some cases to the effect of the scarlatinal toxin,and in others to pyogenic organisms which are carried to it by the blood-stream. An instance of the former condition is afforded by the acute dilatation which at times occurs in the early stage of the disease.Later,changes in the heart may be secondary to the nephritis which sometimes develops in the course of the illness.

Silbermann (Jahrb.f.Kinderh.,Vol.xiii,p.178) has shown that acute dilatation of the heart may be followed by hypertrophy of the valves;and Romberg (Uber die Erkrankhungen des Herzmuskels bei Typhus Abdominalis,Scharlachs,und Diphtherie,- Deut.Arch. f.klin.Med.,Vol.xlviii,1891,p.369 et seq.) mentions the early

occurrence of an acute myocarditis involving the interstitial connective tissue,as well as the muscular substance.

Pearce (loc.cit.) found fatty degeneration of the heart in five out of nine cases examined.

Pericarditis may arise as an extension from the myocardium, or it may be due to a primary affection of the pericardium, which,like other serous membranes,is especially liable to be attacked in this disease.A serous effusion often arises as a result of the pericarditis,but a purulent effusion is very rare.

Endocarditis,although - as in the case mentioned by Romberg - due to the effects of the scarlatinal toxin alone, is probably,in the majority of instances,to be attributed to a mixed infection with one or more of the ordinary pyogenic organisms.

KIDNEY.

There has been considerable disputation as to the seat of the changes which often occur in scarlatinal nephritis. Kleb (Handb.der Path.Anat.,Berlin,1876,Vol.i,p.632) mentions the frequent occurrence of an interstitial nephritis in the early stages of the disease;and he was the first to point out the existence of a glomerular nephritis developing during convalescence.

Klein (loc.cit.) found evidences of a glomerular nephritis in several cases that had died;but the date of fatality was not confined to the later period of the disease.

Friedländer (Cited by Pearce,loc.cit.) speaks of:

(1) A catarrhal nephritis,immediately following the eruption,in which the kidneys are moderately hyperaemic,the glomerular tufts normal,and the capsular epithelium slightly thickened.

(2) Interstitial or septic nephritis,in which the kidney is large and pale,with a number of small punctate haemorrhages in it.It is found in the severe septic nephritis which sometimes occurs in scarlatina,and resembles the condition semetimes found as a complication of diphtheria.

(3) Glomerular nephritis,which occurs during convalescence and is,in his opinion,the most important of the three

forms.In this variety of nephritis, the interstitial tissue appears to be normal.

Councilman (Boston City Hosp.Reps.,S.8, 1897,p.38 et seq.) states that in many cases the glomeruli are particularly involved,while in the other cases the interstitial tissue is the principal seat of the mischief. He mentions an acute,non-suppurative nephritis which occurs in scarlatina,and in which the lesion is in the interstitial tissue,while the glomeruli are unaffected.

Pearce (loc.cit.) examined a number of cases that had died early in the disease.He found acute degenerative changes in all,and in every one the changes were in the interstitial tissue,while the glomeruli were unaffected.

From the facts given above,it would seem that,although an interstitial nephritis is the form taken by the lesion in the early stages of the disease,later,during convalescence,the nephritis is of the glomerular type,and the form that characterises the disease in its symptomatology.Microscopically, in this form the kidney is increased in size,the capsule strips off readily,the glomeruli are well-marked,while the cortex is pale.In the glomerulus there is a great increase of the endothelial cells of the vessels,and along with this degeneration and necrosis of the tubular epithelium,- so that the tubules become full of dead cells.

Certain investigators (Marie,Babes,etc.) have found streptococci in nearly all forms of scarlatinal nephritis,and, except when the disease arises very early in the course of the fever,it is always a question as to how much of the renal trouble is due to the effects of the septic organisms and how much to the scarlatinal toxin.

The early nephritis described by Friedländer may correspond to the initial catarrh of other mucous membranes which occurs in scarlatina;but,in the present state of our knowledge,it cannot be stated why,as a general rule,the nephritis should be interstitial at one stage and glomerular at another,and,again,a combination of the two at a third.

LIVER.

The changes in the liver are such as are often found in all acute infectious diseases,with the exception that the organ frequently shows an extreme degree of fatty degeneration.

Pearce (loc.cit.) found,in a few cases which he examined, small areas of dead hepatic cells scattered throughout the organ,and also evidences of phagocytosis by the vascular endothelial cells.

Jaundice is a fairly common accompaniment of scarlatina, and,though usually slight,occasionally it leads to a fatal termination of the illness.

STOMACH AND INTESTINES.

According to Fenwick (Med.-Chir.Trans.,1862,xlvii,p.209), a process,similar to cutaneous desquamation,takes place in the stomach - even to the entire destruction of the epithelium in severe cases.There is a further analogy to the changes in the skin and other mucous membranes in the dilatation of the blood-vessels and the filling of the gastric tubules with broken-down tissue and small cells.

Pearce (loc.cit.) examined a case which was fatal on the second day,and found the surface of the stomach covered with mucus and dead epithelium;he also noted a marked leucocytosis of the finely-granular variety.

In the intestine there is a general enlargement of the lymphatic glands and Peyer's patches.The condition of the mucous membrane is similar to that of the stomach in this condition.

PERITONEUM AND SEROUS MEMBRANES.

The serous membranes are particularly liable to infection in this disease;but the peritoneum is one of the rarest to be attacked.When diseased,the changes are similar to those found in the skin and elsewhere.

BONE-MARROW.

Pearce (loc.cit.) examined the bone-marrow in eleven cases, mostly children.In all cases the tissue was very cellular,and it contained giant-cells,nucleated red and coarsely-granular leucocytes in great abundance.Lymphoid and neutrophilic cells were also found,but not in great numbers.

BLOOD.

The specific gravity of the blood is greatly reduced. The haemoglobin, according to Widowitz (Jahr.f.Kinderh., N.F., xxviii, p.384), is almost invariably high in the beginning, falls until convalescence has begun, and then increases again. A greater fall takes place if nephritis has developed.

Hayem and Kotschetkoff (Cited by Ewing,- Clin.Pathol.of the Blood, 1901) both maintain that the number of the red blood-corpuscles gradually diminishes to about three millions in the great majority of cases.

On the other hand, Zoppert and several other observers have noted but a slight decrease in the number of these cells.

Leucocytosis.

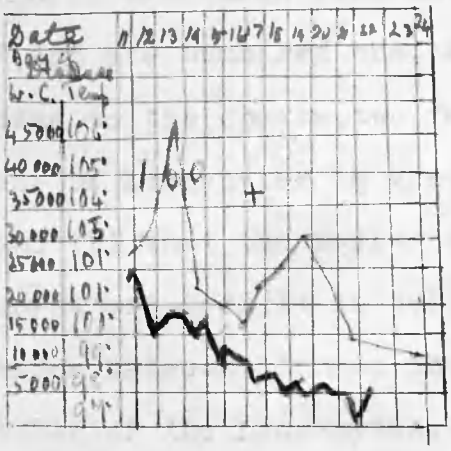
Kotschetkoff (centralbl.f.Path., 1897, Vol.iii, p.468), as the result of his examination of twenty cases, states that a leucocytosis begins two or three days before the eruption, and lasts for five or six weeks.

Rieder and Felsenthal (Quoted by Sevestre) mention the occurrence of leucocytosis, but are not agreed as to the extent of it.

Von Limbeck, Pichandfalla (loc.cit.), and others state that they have found no leucocytosis in uncomplicated cases.

In a series of thirteen cases collected and published by Sevestre (The Leucocytosis of Scarlet Fever,- St.Barth.Hosp. Reps., Vol.xxxii), there was in all a well-marked leucocytosis varying, however, in degree, and preceded in the early stages of the disease by a leucopenia, which was found to last only a few hours. This writer also believes that in mild cases the number of leucocytes is less than in severe cases; and Lotschetkoff (loc.cit.) affirms that, in severe cases, the number of leucocytes may be five times greater than the normal.

Case 1.

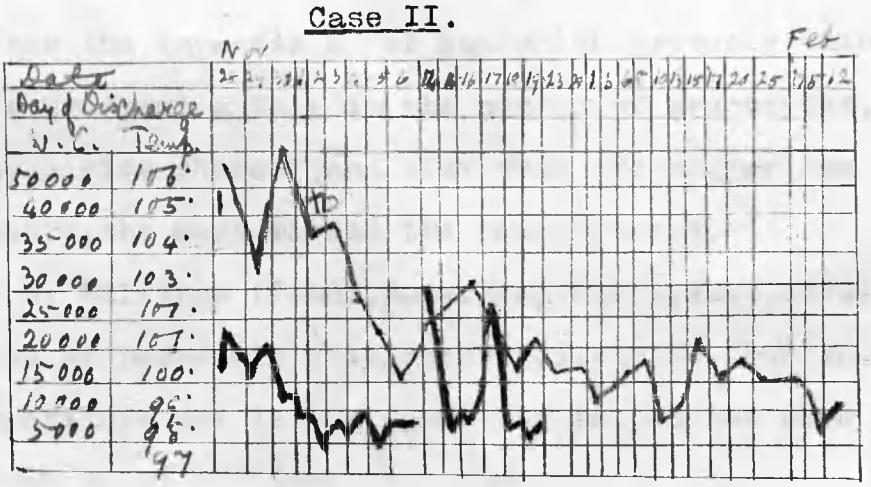


The light tracing represents the leucocytosis, and the heavy tracing the temperature.

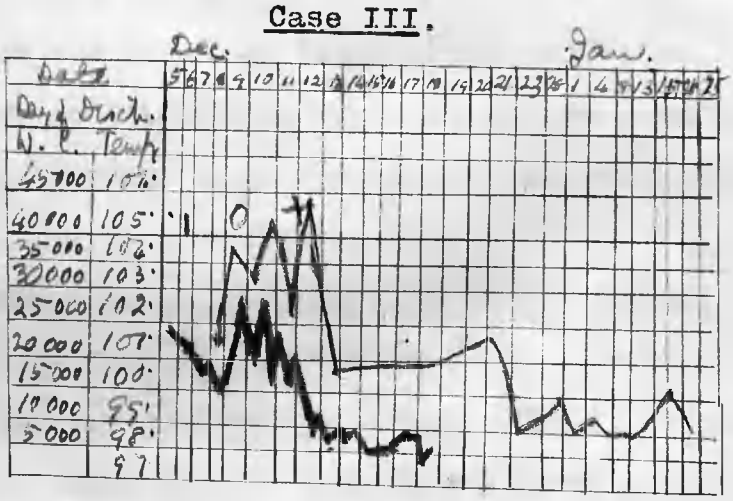
1 - Day on which rash was most marked.
+ - " " " " " last seen.
O - " " " desquamation commenced.

} In all charts.

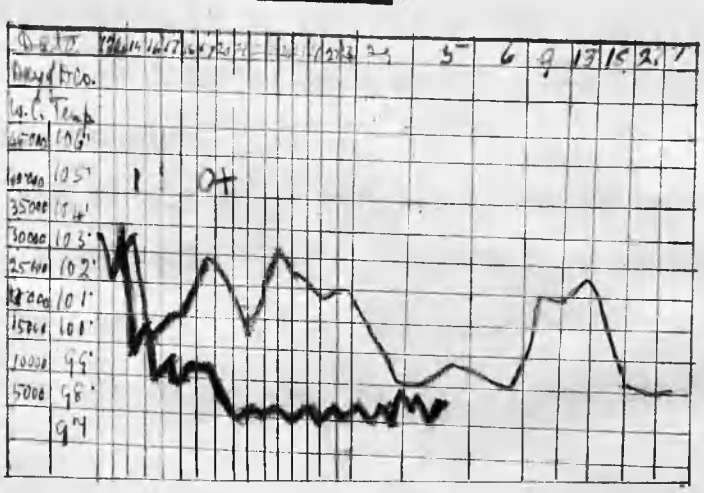
Case II.



Case III.



Case IV.



These four charts are taken from Sevestre's "Leucocytosis of Scarlet Fever", and are numbered one, two, three, and four of his series. According to the charts, two facts may be deduced: (a) That the number of leucocytes is greatest while the temperature is raised; and (b) that the number of leucocytes tends to fall when the temperature does. It is evident that there is no actual correspondence between changes in the temperature and changes in the number of the leucocytes, but only a general similarity. The same remark applies to his other cases, of which the above may be taken as typical examples. Comparing the leucocytosis in scarlatina with that in some other conditions we find the following:

Kanthack (Brit.Med.Jour., 1892, Vol.i, p.1300) has shown that, after the injection of bacterial products into animals, there is at first a fall in the number of leucocytes, followed later by a rise thereof; and also that the higher the temperature, the more marked the leucocytosis.

J. S. Billings (Johns Hopk.Hosp.Bull., Aug., 1894), writing of a case of pneumonia that recovered, states that the fall in the temperature and in the number of leucocytes were closely related in point of time.

Bouchut and Dubrisay (Compt.Rend., 1877, Vol.lxxxiv, p.158) believe that in diphtheria there is always a marked leucocytosis - greatest at the height of the temperature, and gradually diminishing during convalescence.

In typhoid fever, various authorities quoted by Sevestre (loc.cit.) mention that, during the febrile period when no complications are present, the number of leucocytes are slightly, or sometimes considerably diminished; while, after the temperature has come down, there is a slight increase.

The above conditions make typhoid fever exceptional amongst the infective fevers.

Bowie and Kotschtkoff (Quoted by Welch and Schamberg, - Op. cit., p.438) both state that differences in temperature have no effect on the leucocytosis in scarlatina.

Sevestre concludes that no connection exists between the

severity of the throat symptoms and the number of leucocytes, except when much sloughing and ulceration have taken place - in which case the number of the leucocytes will be increased.

Kotschtkoff (loc.cit.) says that the degree of leucocytosis acts especially upon the throat symptoms, and not at all upon the temperature. Erythemata of the skin are always accompanied by a leucocytosis, and one would expect scarlatina to be no exception to this rule.

Sevestre states that the more intense the rash, the greater the leucocytosis. In estimating the number of leucocytes at any period of the disease, the fact of the existence or absence of complications such as otorrhoea, rhinorrhoea, etc., must be taken into account: for these alone would probably cause a leucocytosis. According to Sevestre, there is in the first few days an increase in the finely-granular leucocytes, followed by a fall towards the end of the first week. The coarsely-granular are less in number than normal. The large mononuclear cells and the lymphocytes are diminished in the early stages, but shortly return to normal and remain there.

According to Kotschtkoff, the coarsely-granular increase for the first three weeks - after which they fall, to return to normal in about six weeks. In some cases, he says, they are absent.

Bowie asserts that the finely-granular at first increase, and then fall to normal, while the lymphocytes act in an inverse manner. The coarsely-granular are diminished at the outset, and then increase until the height of the disease is reached - until the number falls to normal.

PANCREAS.

This organ shows a condition of fatty degeneration, if it is affected at all.

RESPIRATORY SYSTEM.

Pleurisy with effusion sometimes occurs, and there is a great liability for it to become purulent as the result of a secondary infection.

Broncho-pneumonia may occur, and is often due to infection with the streptococci or staphylococci.

EYE.

Early catarrhal inflammation of the eye is rare;but,in severe cases with diminished secretion of the lachrymal glands and sluggish action of the lids,there is a danger of foreign bodies remaining in the cornea and leading to ulceration of the part.

Catarrhal conjunctivitis may occur,and occasionally the anginal affection spreads to the lachrymal ducts and sets up mischief there.

The cornea may also be seriously affected as a result of suppuration of the lymphatic glands of the neck.

EAR.

Catarrhal otitis media is common - especially in cases with serious throat symptoms.Both ears are not affected at the same time;but,when one side is affected,the other is liable to be also involved.

The mucous membrane of the Eustachian tube becomes swollen to such an extent that the tube is often blocked,thus preventing the escape of any exudate that may be found.

NERVOUS SYSTEM.

In the majority of severe cases,the cerebral symptoms of headache followed by great langour may occur;or,again,convulsions, which vary from a single one up to a large number,and are of varying intensity,may be seen.

Delirium may occur early in the course of the disease,and last until the temperature falls:it may be accompanied by great restlessness,and it is in such cases a dangerous complication, according to its power of exhausting the patient.When occurring very early in the disease,this symptom is presumably due to the severity of the scarlatinal toxin;but,later,it follows mastoid disease,from which septic infection may reach the brain and meninges.

Addy (Glasg.Med.Jour.,1880-85,S.13,pp.463-465) reported a case of partial hemiplegia with amnesia following scarlatina.

Meningitis may occur as a result of septic infection from the nose or ear.Roger reports a case (Charité Annal.,Bd.3,p.28) of meningitis following upon a purulent rhinitis,and occurring

in the course of scarlet fever.The same author also reports cases of paresis of the lower limbs following scarlatina,when a throat culture negatived the suggestion of diphtheria.

Mitchell (Edin.Med.Jour.,1881-82,xxvii,pp.721-724) and others have reported a few cases of acute mania coming on during scarlatina,and sometimes persisting with convulsions.

Ejis (Arch.f.Kinderh.,1900,xxvii) describes a case of multiple neuritis following scarlatina;and two other cases of this disease have been reported in connection therewith.

JOINTS.

A form of synovitis called "scarlatinal rheumatism" sometimes develops in this disease.The effusion is serous,and only very rarely becomes purulent.It tends to affect older children,and is very rare under the age of three years.The smaller joints are more liable to be affected than the larger ones - especially the wrist and finger joints. The affection is most common during desquamation,although it may occur at any period of the disease.

BONES.

Purulent otitis media may lead,by direct infection,to necrosis of the temporal bone and the the ossicles of the ear. Another occasional result is empyema of the mastoid.

Brown (Lancet,1884,p.200) reports a case of necrosis of the lower jaw;and Neumark (Arch.f.Kinderh.) tells of several instance s of acute osteomyelitis in this disease.

MUSCLES.

Abscesses occasionally occur in the substance of a muscle, as a result of secondary infection.

GENERATIVE ORGANS.

Labial abscess may occur in the case of the female;and Cowper's glands may be the seat of suppuration in the male.

SYMPTOMATOLOGY.

This may be conveniently discussed in four stages - viz.: (1) Incubation; (2) Invasion; (3) Eruption;and (4) Desquamation.

STAGE OF INCUBATION.

The incubation period of scarlet fever is more variable, although within narrow limits,than that of either measles or smallpox.

Murchison (Contributions to the Etiology,Pathology,and Treatment of Scarlet Fever) mentions thirteen cases,in none of which did the incubation period exceed six days.

Trousseau's historic case,in which the period was only twenty-four hours,has been mentioned under Etiology.

Hoff,writing of an epidemic in the Canary Islands in 1873-75,noted an average incubation period of eight to nine days. During the same epidemic,Petersen found the period to vary from nine to eleven days.

Clifford Allbutt (Op.cit.,Vol.ii,p.130) states that he has never met with a case having an incubation period of more than six days,and finds the average duration to be from two to four days.

On the other hand,Hagenbach-Burkhardt (Jahr.f.Kinderh.,N.F., Vol.xxiv,p.105 et seq.),in a series of fifty-eight cases,found that in the majority of them the incubation period exceeded six days.

E. Lynn Jenkins (M.O.H.to the Hinckley Isolation Hospital) suggests that some of the cases of scarlatina may have an incubation period of from three to four weeks.He mentions some cases (Brit.Med.Jour.,Jan.26,1907,p.299) which,after having been sent into the hospital scarlatina ward,turned out to be nothing but that,having been in the ward,could not be discharged at once.These children developed true scarlatina only three or four weeks after admission.

But in view of the balance of evidence pointing to a short period for this disease,and also of the fact that the incubation periods of measles and smallpox are - in the vast majority of cases - fixed,it would seem more reasonable to suppose that,

in the cases of supposed long incubation quoted above,either there was a fresh infection,or that the virus had been in the child's throat for some time,but at first dod not find conditions suitable to its development.In support of this latter view may be adduced the fact that nurses and attendants at fever hospitals may be for months exposed to the infection of scarlatina and remain healthy,and then,for no obvious reason,may be attacked by the disease.

There are certain conditions which modify the length of the incubation period:the presence of a wound (as has been mentioned in treating of Surgical Scarlatina) generally shortens it,although an exception to this is mentioned by Corlett (loc. cit.,p.172),who states that in one authenticated case the incubation period has been shown to be shorter.Further,the more violent forms of the disease probably have a shorter incubation period than the milder forms (Johannsen,- Die Epidemische Virbreitung des Scharlachfieber in Nowegen,Christiania,1884,p.166).This certainly seems likely to be the case for scarlatina as it is for smallpox.

STAGE OF INVASION.

Prodromata.

The stage of invasion is usually very short - twenty-four hours being the average.During this stage,vomiting is one of the most constant symptoms;headache,sore-throat,and rise of temperature occur a little later;and in young children convulsions may be prodromata of the attack.There may be diarrhoea,but constipation is usually present instead.In the case of an adult,headache and sore-throat are,as a rule,the most prominent symptoms.

The temperature rises rapdily,and may reach as high as 104°F.in a few hours.The pulse-rate is often much quicker than we should expect in comparison with the temperature - from 140 to 160 being the usual count with children,when they affected with the disease.

Within a few hours,the glands at the angle of the jaw become swollen,and often somewhat tender.The tongue is coated with a grayish-white fur: the edges and tip are reddened,but

the papillae are prominent;and these together form one of the early characteristic signs of scarlatina - the"strawberry tongue".

The mucous membrane of the mouth and pharynx are reddened. The rash appears on the buccal mucous membrane at the end of twenty-four hours:later on the first,or early in the second, day it appears on the uvula,spreads to the head and soft palate,to the pillars of the fauces,and to the mucous membrane of the cheeks.The tonsils are markedly enlarged,and the follicles are swollen and prominent.

The face is flushed;the eyes are dull and heavy; the conjunctivae may be slightly injected,but do not become acutely inflamed as they do in measles.

The lungs are normal;and there may be some albuminuria - more especially if the temperature is high.

STAGE OF ERUPTION.

The rash is more prominent in fair-skinned children than in dark ones,and in full-blooded than in anaemic ones.

Warmth and crying increase the intensity of the eruption, and,as with other rashes,it is more pronounced over those areas which are exposed to pressure.The redness disappears under pressure;this,however,is not peculiar to the eruption of scarlatina.Within twenty-four hours the characteristic rash is seen on the neck and upper part of the chest,in the subclavicular regions,and rapidly spreads to the chest,face,abdomen,arms,and legs.

The rash consists of a number of minute bright-red spots, pin-point in size,corresponding to the hair follicles,and separated from one another by small areas of pale skin.As the eruption progresses,the pale areas become reddened,and there may develop at the same time some oedema of the skin.In contrast to measles and smallpox,on the face the eruption is not marked,and is seen,as a rule,upon the forehead and cheeks, which areas may become deeply injected - thus causing the areas round the nose and mouth which remain free from eruption to look very pale.As might be expected,the rash is more prominent on the extensor surfaces,where there is more pressure,than upon

the flexor surfaces of the limbs.

Sometimes on the arms,legs,and buttocks a measly rash is suggested by the blotchy appearance which is produced by large irregular patches of healthy skin.At times a general "goose-flesh" is observed,and,when present,this is best marked on the chest and abdomen.

When the rash is fully developed - which occurs in two or three days - the colour is that of a boiled lobster.

It is very common to find numerous miliary vesicles accompnaying a well-developed rash: these vesicles vary in size from a pin-point to a pin-head,and contain a whitish fluid.The coarse papules on the outside of the leg,thigh,and arm retain their injection for some days after the true eruption has disappeared. Itching is a troublesome symptom.

As the rash develops the general symptoms become more severe:the buccal and pharyngeal mucous membranes become more injected,the thirst is great,dysphagia is more marked,and sometimes there is pain shooting towards the ear.

The tongue gradually loses its grayish-white fur,the tip and edges become reddened,and papillae on the dorsum become more prominent;about the fourth day the tongue desquamates, leaving a raw-looking surface with enlarged papillae,which same has been compared to a red strawberry.

The sunmaxillary glands are enlarged,and often tender on pressure;the inguinal glands may be enlarged to the size of a bean;and there is a tendency for all the other lymphatic glands to be affected.When the glandular swelling develops early,it may subside without interference;but when it develops late in the disease,suppuration is likely to occur.

The temperature often remains about the same for three or four days,but occasionally it contnues to rise,in which case the prognosis is very grave.It usually comes down by lysis, but sometimes a critical fall occurs.

The pulse-rate is quick compared to the temperature.

STAGE OF DESQUAMATION.

The rash begins to fade on the third or fourth day, and all symptoms to abate: desquamation then occurs. This latter usually appears first where the rash was first seen, and from which it first disappears - the neck and upper part of the chest - and proceeds slowly until the whole body has been included.

Two types of desquamation may be distinguished: (1) That upon the neck, face, and trunk occurs in the form of pin-point powdery scales, which are thrown off in a day or two, leaving minute jagged rings of desquamation: these rings spread centrifugally, and often produce a map-like appearance - the upper layer of the horny layer of the skin being removed in this way. (2) On the hands and feet - especially of the extremities be covered up, and so free from injury - the type is membranous, and a part or the whole of a cast of the hand or foot may be taken off.

The duration of desquamation varies very much: some mild cases finish in two or three weeks, while others - not necessarily serious ones - may continue to desquamate for two months or more.

Where the rash has been intense, a second desquamation may occur - particularly on the palms and soles. The more intense the rash has been, the more marked is the desquamation; and the process always lasts longer on the palms and soles when the epidermic is very thick.

Sometimes, with well-marked rashes, petechial haemorrhages may occur - much smaller than those occurring in malignant cases, and unaccompanied by the bleeding from the mucous membranes which characterises the latter.

Desquamation may occur a second time, and, in this case, the process is generally limited to the palms and soles.

VARIETIES OF SCARLATINA.

SCARLATINA ANGINOSA.

The above description applies to ordinary cases of scarlatina; but sometimes the disease occurs - more commonly in children than in adults - in a form which is characterised by a particular severity of the throat symptoms.

The incubation period in this form is generally shortened, the temperature rises higher, and remains up much longer than with cases of ordinary scarlatina.

Delirium is often present, and the child refuses to partake of nourishment.

The rash is usually very well-marked all over the body, including the face.

The pulse varies from 120 to 150 per minute, and is of small volume.

The glands at the angle of the jaw become swollen very early; the throat is intensely red; and, about the third day, a membrane generally appears on the tonsils, uvula, and soft palate.

There is purulent discharge from the nose, and the membrane lining it is often ulcerated.

Ophthalmia and purulent otitis media are liable to develop - the symptoms generally being those of septicaemia.

Broncho-pneumonia is very apt to occur, and to lead to the death of the patient. Occasionaly, however, death is due to haemorrhage occasioned by extensive sloughing of the lymphatic glands.

After extensive sloughing - such as may occur in mixed cases of scarlatina and diphtheria - the destructive process may go on to perforating ulcers of the soft palate, and, in these cases also, death is liable to ensue from septic poisoning.

SCARLATINA MALIGNA.

This form occurs rarely, and is so called because death takes place in a very short time - occasionally in the first twenty-four hours.

The onset is very sudden: a severe attack of vomiting may

come on in a child who has,up to then,seemed perfectly well; the temperature rises to 105°F.,or a little higher perhaps; the pulse is very quick;and the little patient is often delirious.

The rash is generally livid,and often appears in the hands and feet before it is seen on the body.

The throat is very swollen,so that swallowing is often impossible.

Sometimes collapse occurs before the eruption has had time to appear;and the urine may be scanty and albuminous.

In the haemorrhagic form,which is characterised by bleeding from the mucous surfaces,the rash becomes purple in the early stages of the disease,and is not easily obliterated by pressure.

Epistaxis and melaena are the most frequent forms of haemorrhage,and soon exhaust the patient,if he is not already collapsed from the effects of the intense toxaemia.

The subjects of this form of the disease are generally children between one and two years of age,who are in a poor state of health,though older children and even adults are not exempt.

IRREGULAR FORMS OF SCARLATINA.

SCARLATINA WITHOUT ERUPTION.

One can only be certain that such may exist where,in a given family or group,attacks,otherwise typical of the disease, occur.

It has already been mentioned that death may occur in the malignant forms before the rash has had time to appear,but, apart from these cases,the eruption may disappear so quickly that the only proof of there having been one is the subsequent occurrence of desquamation.Further,nurses and doctors,in constant attendance on cases of scarlatina,often develop sore-throat with some elevation of temperature,and a feeling of maliase without the characteristic rash;but the fact that true scarlatina may be communicated by them to susceptible individuals proves that,at least in some cases,the illness has been a form of the disease.

Graves (Quoted by Welch and Schamberg,- loc.cit.)mentions the case of aboy who came home from school where scarlatina was

prevalent, complaining of sore-throat, headache, and nausea. The symptoms continued for three days without a trace of eruption, and then disappeared. Before the boy had completely recovered, his father and two sisters developed scarlatina, thus showing what the former's illness had really been.

SCARLATINA MILIARIS.

In this form of the disease, small vesicles are developed - chiefly on the trunk, but also sometimes on the limbs.

SCARLATINA PAPULOSA.

In this type, small dark papules develop at the mouth of the hair follicles.

SCARLATINA VARIEGATA.

This form is characterised by a very irregular distribution of the eruption, often associated with a measles-like rash: between areas of bright-red spots the skin is generally covered with a pale rash.

The duration of the eruption may be considerably prolonged, and it may break out again after the occurrence of desquamation, although, according to Kaposi (Path. u. Therapie der Hautkrankheiten, 1899, p.236), this latter affection is an erythema rather than a true scarlatinal eruption.

SCARLATINA SINE FEBRE.

In very mild cases, after a moderate rise for a day or two, the temperature sinks to normal, and remains so. McCollom says that, out of a series of cases, in thirty-seven the temperature was not above 99°F.

In some of the present writer's cases, no temperature elevation was recorded from the time of arrival in hospital; but, as these cases had been ill for three or four days before admission, there may have been slight fever at the beginning. Occasionaly there is a daily intermission, the temperature falling to normal in the morning, and rising considerably in the evening.

Henoch (Charité Annal., p.513) has described a case in which the temperature was higher in the morning than in the evening.

SCARLATINA SINE ANGINA.

We have already seen that in cases of surgical and puerperal

scarlatina the involvement of the throat is generally much less than it is in ordinary scarlet fever;and this suggests that,in the latter,the seat of inoculation is the throat,whereas,in the former,the poison may enter by the wound.

It is said that in some cases of ordinary scarlatina the throat is not at all affected;certainly it is sometimes only congested for a few hours,and after that causes no inconvenience to the patient.

SCARLATINA WITHOUT DESQUAMATION.

The amount of desquamation varies with the intensity of the eruption: sometimes after a very mild eruption no desquamation can be seen,or at least not without considerable visual effort.

RECURRENT ERUPTIONS AND RELAPSES.

A scarlatinal eruption has been known to appear a second time within a few days of the appearance of the first;but also, after convalescence the general symptoms of scarlatina (including the eruption) may reappear.This latter,if occurring well into the period of convalescence,may be looked upon as a second attack, but,if earlier than this,must be regarded as a relapse,and is probably die to a fresh infection from without - such as might be expected to occur in a fever hospital when the means of infection are always present.

These secondary rashes are at times due to sepsis,and often then closely resemble the eruption of true scarlatina.

OCCURRENCE OF SCARLATINAL RASH WITH OTHER ERUPTIONS.

It is said that the rashes of measles,chickenpox,or smallpox may coexist with that of scarlatina,but such cases are very rare.

When they do occur,the secondary eruption usually appears after the first has faded,as actually happened in a case brought under the present writer's notice where a measles rash occurred in a child that was desquamating from scarlatina.

Murchison (Lancet,1864,Vol.ii) emphasises the fact that, where two eruptions coexist,one is usually mild and not well developed.

Furthermore,where a scarlatinal rash is present with an

eruption of another kind, there is always the possibility of the former being the prodromal rash, and the latter the true one: this applies especially to commencing smallpox.

COMPLICATIONS.

Injection of the fauces is an almost invariable accompaniment of scarlet fever;but,in the severe forms of the disease,this injection increases,and,on the second day,patches of a yellowish-white membrane,thinner and softer than that of true diphtheria, appear on the soft palate.Both sides are generally affected,but the disease may be more marked on the one side than on the other.

The inflammatory process may extend along the Eustachian tube,and not give rise to otitis media,which is a frequent complication of scarlatina.

Further changes are as follows:The glands at the angle of the jaw enlarge and often suppurate,the pulse is very frequent, and prostration is often extreme;the mischief may extend to the nose,setting up a purulent rhinitis,the discharge from which,being very irritant,causes abrasions of the skin,which are most difficult to heal.Very occasionally,the throat becomes gangrenous,leading to perforation of the soft palate,which,when it does occur,is more often due to a mixed infection of scarlatina and diphtheria than to the former alone.

A secondary angina may occur late in the disease,with the usual symptoms of suppurative tonsillitis.

With regard to the bacteriology of these cases,the Klebs-Loeffler bacillus is rarely present;and the condition is due to chiefly the streptococcus pyogenes,but partly also to the staphylococcus pyogenes and some other organisms.

True diphtheria may develop,but usually from the third to the sixth week of the disease (Clifford Allbutt's System of Med.,Vol.ii,p.161). Post-scarlatinal diphtheria closely resembles ordinary diphtheria.The paralyses which are liable to occur after diphtheria are rare after scarlet fever,and,when they do occur,rhere has probably been a mixed infection.

EARS.

In cases of scarlatina with severe throat symptoms,middle-ear disease is very common,and infants are more liable to be affected

than older children:which same may be due to the larger size of the Eustachian tube in the former.One or both ears may be affected,and,in the latter case,there is usually an interval of a few days between the onset of the two attacks.

If the attack occurs after the temperature had fallen,the latter will rise again,and this will be accompanied by a quickened pulse and other symptoms of acute inflammation.The discharge may be serous,in which case recovery of hearing will probably be perfect,but when the exudate is purulent,total deafness is likely to follow.

On examining the tympanic membrane in a purulent case,it is seen to be cloudy,swollen,and of a yellowish colour;the handle of the malleus is hidden,and the lining of the external auditory canal also shares in the inflammation.

The Eustachian tube becomes filled with exudate.The inflammatory process may spread to the mastoid cells,as well as to the meninges of the brain;and this may lead to sinus thrombosis, followed by cerebral abscess and suppurative meningitis.

The facial nerve may be affected,and bring about paralysis of the muscles supplied by it.

EYES.

In cases of scarlatina where a purulent rhinitis has been set up,the inflammatory process may extend to the eyes and cause severe conjunctivitis.Primary keratitis may occur in feeble children,and lead to perforation of the cornea.

HEART.

As with other acute inflammatory disorders,the heart is sunject to a certain degree of fatty degeneration;but,in addition to this,the scarlatinal toxin has a particularly harmful effect on the heart,as is evidenced by the extremely rapid pulse,which is one of the symptoms of the disease.

When nephritis develops,there is a certain amount of dilatation and hypertrophy - this applies particularly to children,but is sometimes also found in adults.The myocardium is generally the seat of the affection rather than the valves;but when the latter are diseased,the mitral is more liable to be injured than the tricuspid (Romberg,- Deut.Arch.f.klin.Med.,

Vol.xlviii,1891,p.369 et seq.).

LYMPHATIC GLANDS.

A general lymphatic enlargement is one of the prominent symptoms of the disease,but sometimes the glands become extensively enlarged and may suppurate - this being especially liable to occur in those forms of scarlatina characterised by severe throat symptoms.

As a proof of the special effect which the scarlatinal toxin has upon all lymphatic tissues,it may be mentioned that there is a general lymphatic enlargement in cases of early death from the severity of the toxaemia.

The glands of the neck may become so swollen that movement of the head is difficult,owing to the collar formed by the chain of enlarged cervical glands.

Rarely a diffuse cellulitis of the neck - Ludwvic's angina - may supervene;and this is almost invariably fatal, either from profuse suppuration or from haemorrhage due to perforation of the large vessels of the neck.

Bokai (Jahr.f.Kinderh.,N.F.,Bd.10,p.108) has seen a few cases of retropharyngeal abscess following suppuration of enlarged cervical glands.

Sometimes,after the acute symptoms have subsided,the glands of the neck undergo moderate enlargement,which may be followed by suppuration;but,as a rule,recovery takes place without the glands breaking down.

KIDNEYS.

Involvement of these organs is more to be feared with scarlatina than with either of the other acute exanthemata;and no case of the former can be considered free from the danger of a subsequent serious nephritis.As distinguished from nephritis due to causes other than scarlatina,are the onset at about the same period of the disease in all cases,the marked tendency to anasarca,and,finally,the favourable ending of cases that seem desperate.

As to the cause of the nephritis,Forchheimer remarks that a similar condition is produced by a poisonous dose of cantharides,

and that the appearances are such as are produced by a streptococcal infection such as complicates many cases of smallpox.

Albuminuria is common while the fever is high;but this is usually transient,and seldom leads to serious symptoms.When true scarlatinal nephritis does occur,it is found after the acute symptoms have subsided - generally about the third week.

In a typical attack of nephritis,the temperature is generally of moderate height;it is also frequently irregular, and may drop to the normal and rise again.Frequency of micturition is sometimes a symptom before albuminuria has appeared.

Marked pallor of the face and puffiness of the eyelids are noticeable features of the affection.Oedema is more common than in ordinary Bright's disease,and the bloated appearance of the face,feet,legs,and genitalia is often extreme.

The frequency of anasarca varies in different epidemics. Trousseau (Quoted by Welch and Schamberg,- Op.cit.,p.415) believes that it is met with in cases of medium severity rather than in bad ones.Barthez and Rilliet (loc.cit.) observed it in one-fifth of their cases.

The effusion may effect the peritoneal and pleural cavities,and,very occasionally,may lead to oedema of the glottis; oedema of the lungs and of the brain is likely to be present in cases that are going to die.Anasarca has rarely been noted in cases that have albuminuria absent.Henoch (loc.cit.,p.415) in particular emphasises this point.

URINE.

The tests required for the examination of the urine are:

1. For Albumin;

(a) Boil the top of a column of the urine: a precipitate,insoluble in acetic acid,forms.

(b) Addition of a few drops of urine slowly to strong nitric acid gives a brown ring at the junction of the two liquids.

2. For Blood:

(a) Add some tincture of guaiacum to some of the urine,and shake well;then add a little ozonic ether to

the mixture,and shake again; a blue colouration is now observed at the top of the mixture.

(b) The microscopic test for the presence of blood-corpuscles.

3. For Sugar:

(a) Heat the urine with a strong solution of caustic potash - a brown colouration results if sugar is present.

(b) Put one drop of a solution of sulphate of copper into some urine,and then add caustic potash: a blue solution is now observed,which - owing to the reduction of cupric oxide to couprous - gives a reddish precipitate on boiling.

(c) On boiling some of the urine with an alkaline solution of picric acid,a dark-red opaque solution is produced, due to reduction to picramic acid.

(d) Under the influence of yeast,sugary urine is changed into alcohol and carbonic acid.

4. For Pus:

(a) Mix some urine with excess of liquor potassae, and pour from one test-tube to another - if present,a ropy character is given to the fluid.

(b) The microscope reveals the presence of pus cells.

In the febrile albuminuria of the early stages,besides albuminuria there may be a few red and white corpuscles,and, perhaps,a few hyaline casts.With the occurrence of true scarlatinal nephritis,the albumin increases in amount until,on boiling,it may constitute a half of the urine excreted.A smoky appearance of the urine,and the presence of red corpuscles and of epithelial cells microscopically,show that the destructive changes are going on in the kidney.The amount of urine secreted progressively diminishes until,in severe cases,it is quite suppressed for some hours.In certain epidemics the albumin is intermittent in its manifestations,and may be absent for two or three days and then reappear.

In some cases of scarlatinal nephritis, when the quantity of urine is very much reduced, uraemia may develop; it is characterised by the usual symptoms of headache, vomiting, and twitching of the facial muscles. Amaurosis may develop, but usually disappears when the convulsions cease.

Although cases of scarlatinal nephritis apparently recover perfectly, still there is a certain proportion of damaged kidneys dating from the scarlatinal attack; and these cases are likely to become troublesome later on.

Caiger had six cases of chronic albuminuria, out of a total of seventy-seven, in the South-Western Hospital, London.

SCARLATINAL RHEUMATISM.

The frequency of the arthritic involvement seems to vary in different epidemics. Trousseau found articular pains in one-third of his cases; Ashby noted synovitis twenty times in nine hundred cases.

The articular affection may take the form of a serous synovitis, or of purulent synovitis - the former being much more common than the latter.

The smaller joints are more often affected than the larger ones, the acid sweats of ordinary acute rheumatism are absent, and the tendency to the development of cardiac complications in scarlatinal rheumatism is much less.

PURPURA HAEMORRHAGICA.

Purpura haemorrhagica may come on after the subsidence of the acute symptoms; purple spots appear, and bleeding occurs from the nose, gums, stomach, bowels, and kidneys. This secondary purpura is not peculiar to scarlatina, but is also seen after other acute infectious disorders - e. g., influenza.

Biss (Lancet, Aug. 2, 1902, p. 286) reported a fatal case of purpura haemorrhagica complicating scarlatina.

Murray (Ibid., Feb. 11, 1893, Vol. i) reported another instance; and Philips (Ibid., 1893, Vol. ii) describes one which recovered.

GANGRENE.

Noma is occasionally seen, but not so often as after measles.

Buchan (Lancet, Oct. 5, 1901, p. 915) reported a case of a boy who developed haemorrhage into the skin of his legs, particularly

the right;there was also bleeding from his nose,lungs,and stomach; a line of demarcation formed above his right knee,and an amputation was performed there,followed by rapid recovery.

Several other cases of gangfene complicating scarlatina have been reported.

SKIN.

Herpes develops every now and then,usually about the mouth; and urticaria may occur at any period of the disease.

Eczema rimosum may develop after desquamation has left the skin dry and hard;impetigo may result from the irritation of a purulent otitis.

Boils may make their appearance during the illness,but are more liable to occur afterwards.

STOMACH AND INTESTINES.

Severe diarrhoea is fairly common in the early stages of the disease.

Litten (Charité Annalen,Bd.7,p.128) speaks of (a) mild diarrhoea,(b) dysentery with tenesmus and bloody stools,and (c) typhoidal stools,the latter with the general symptoms of enteric fever.

LIVER.

Jaundice is occasionally encountered in the course of a scarlatinal attack.

According to Baginsky (Die Kinderkrankheiten,Berlin,1889, p.117),the occurrence of this symptom in the course of nephritis shows a tendency to uraemia.

LUNGS.

Pulmonary complications are less common in scarlatina than in measles,but broncho-pneumonia occurs in many of the severe forms,especially in the case of infants.

Lobar pneumonia is sometimes found,and,as had already been mentioned,oedema of the lungs may be present when the kidneys are seriously affected.

PLEURAE.

The scarlatinal virus has an especial tendency to attack serous membranes;if an exudate forms,it nearly always becomes

purulent,owing to secondary infection.

VEINS.

Phlebitis is a rare complication.The veins of the neck, arms,and face are the most likely to be affected by inflammation; and,when present,it is generally to be observed in the neighbourhood of suppurating glands.

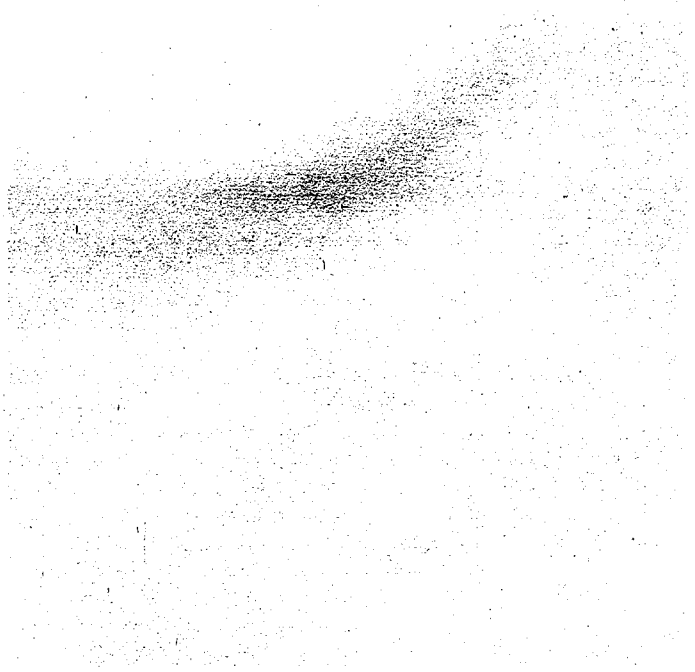
NERVOUS SYSTEM.

In severe cases,early cerebral symptoms are generally marked - e.g., headache,some degree of delirium,and at times convulsions - the latter especially in the case of young children.

Meningitis may result from extension of the septic processes from the ear or nose.Egis (Arch.f.Kinderh.,1900,xxviii) reported a case of multiple neuritis following scarlatina.

Hemiplegia may occur early from cerebral haemorrhage;it is due to convulsions;or later,it is due to embolism (Welch and Schamberg,- op.cit.).

Insanity has been reported by several observers.



S E Q U E L A E.

Anaemia is a common sequela;but there is no accompanying susceptibility to tuberculosis,such as occurs after measles.

As has been stated elsewhere,damage to hearing often follows a purulent otitis media;and a kidney that has been affected with scarlatinal nephritis,and recovered,is still liable to give trouble later on.

Chorea may develop a few months after convalescence.

D I A G N O S I S.

GENERAL DIAGNOSIS.

The points to be remembered in approaching the question of a general diagnosis in scarlatina are:

1. Temperature of 102° to 103° F.

2. Pulse of varying rapidity - often 120 beats per minute, or even more.

3. Rash of an intensely red colour, and punctate in appearance, which is noticed within the first twenty-four hours, beginning in the neck and upper part of the chest, and gradually spreading over the whole body.

4. Throat is red and swollen, and the patient complains of difficulty in swallowing.

5. Desquamation begins where the rash was first seen, and is branny on the face and trunk, while it is flaky on the limbs.

6. Contagiousness is proved by the development of the disease after touching infected articles.

7. Epidemics of the disease occur with varying severity.

8. Sequelae are liable to follow, the most important of which are deafness and nephritis.

DIFFERNETIAL DIAGNOSIS.

OTHER EXANTHEMATA.

The various differential points dealing with the affections included in the above category may, for the sake of convenience, be displayed in tabular form as on next page:

	SMALLPOX.	CHICKENPOX.	MEASLES.	GERMAN MEASLES.	SCARLATINA.
Period of Incubation.	Twelve days.	Fourteen days.	About twelve days.	Fourteen to eighteen days.	Two to five days.
Prodromal Symptoms.	Usually severe. Headache, vomiting, and great pain in the back.	Often absent, and never severe.	Coryza, cough, and sometimes vomiting.	Often absent; never severe.	Headache, sore-throat, and fever; submaxillary glands usually tender.
Date of appearance of eruption on skin.	On fourth day.	Often first symptom noticed.	On fourth day.	On first and second day.	On first or second day.
Appearance and development of eruption.	First appears on forehead and face as a spot-ty and papular rash, becomes vesicular, and the pustules finally dry up. Umbilication a feature.	Vesicles which come out in successive crops on the chest, abdomen, and back. Vesicles are not indurated, and are easily emptied.	Blotchy dark-red eruption on face and neck. Rash sometimes takes a crescentic form.	Small rose-coloured spots. May resemble either measles or scarlatina.	Punctate intensely red rash giving appearance of a boiled lobster. Begins at neck, and travels downwards, avoiding region of mouth and nose.
Eruption on mucous membrane.	Pustules often seen on pharynx and inner side of cheek	Vesicles often appear on palate and inner side of cheek.	Often seen some time before skin eruption; consists of red spots with central white dots.	Slight eruption seen at same time as rash.	Diffuse mottling of fauces; strawberry tongue; tonsils swollen.
Constitutional symptoms.	Mild in vaccinated cases, but otherwise often severe.	Slight and often absent.	Increase with eruption.	Slight and often absent.	Increase with eruption. Very rapid pulse is a feature of the disease.
Fever.	Temp. falls with appearance of rash, but usually rises again when pustules mature.	Slight.	Increase with eruption.	Slight.	Usually high for three or four days.
Desquamation.	Pocks desiccate leaving scars.	Vesicles desiccate sometimes leaving superficial scarring.	Branny.	Slight.	Branny on face and trunk, flaky on limbs.
Complications and sequelae.	Abscesses and tuberculosis.	Practically none.	Broncho-pneumonia, whooping-cough, tuberculosis.	None.	Deafness and nephritis.

ERYTHEMA.

The eruptions of scarlatina and simple erythema may closely resemble one another;but the absence of constitutional symptoms,of sore-throat,and of lymphatic enlargement will distinguish the two affections.

DRUG ERUPTIONS.

Quinine,mercury,and opium may cause rashes closely resembling that of scarlatina:in such cases,discontinuance of the drug will be followed by disappearance of the eruption and subsequent desquamation.

DIPHTHERIA.

When a membrane appears on the tonsils during the course of scarlatina,there may be difficulty in deciding whether diphtheria be present or not.Also,in some cases of the latter disease an erythema of toxic origin may appear,and suggest that the affection may be an anginal type of scarlet fever.

The onset of diphtheria is generally,however,less abrupt than that of scarlatina,and the constitutional symptoms in the former are more pronounced at the beginning.

In the severe forms of scarlatina,where membrane does develop,it usually does so late in the disease;whereas in diphtheria it appears on the first or second day of the illness.

Furthermore,paralyses are much more likely to follow diphtheria;while renal trouble is much commoner as a complication after scarlatina.

TONSILLITIS.

There is often great difficulty in distinguishing between this disease and scarlatina:the temperature and the constitutional depression are usually greater in the former,and the tongue remains coated and does not show the characteristic "strawberry" appearance.Nevertheless,with a well-marked scarlatinal rash it may be hard to decide between the two affections.

INFLUENZA.

Occasionally this disease is preceded by a red rash, which may,for a time at least,suggest scarlatina.

CEREBRO-SPINAL MENINGITIS.

When this disease commences, as it sometimes does, with convulsions, sore-throat, and eruption, there may be some confusion; but the character of the rash and the development of symptoms referable to the neck will distinguish between the two affections.

THE RASH OF NEW-BORN INFANTS.

We have already seen that there is sometimes a doubt as to the nature of the reddish rash and subsequent desquamation seen at birth in some infants, and which, in the great majority of cases seem to be part of a normal process.

RASH IN NEGROES.

In the case of the negro races, the rash is often not at all prominent, and diagnosis must then depend on the other symptoms of the disease.

P R O G N O S I S.

A very important point in the prognosis is the **CHARACTER OF THE EPIDEMIC** prevailing at the time; but even in a mild epidemic, we here and there meet with cases of unusual severity.

AGE has an important bearing on the prognosis - the mortality being greatest under six years of age.

SEX has little or no influence upon the ultimate result of the disease.

SOCIAL CONDITION is a factor not to be disregarded; for the children of the well-to-do classes have a greater vital reserve than those of the poor. Moreover, the former have better nursing and attention than the latter. On the other hand, as has been already mentioned in treating of the Etiology of the disease, scarlatina is no respecter of persons; and in some epidemics it certainly has been more prevalent amongst the rich than amongst the poor and needy.

The STATE OF THE ATMOSPHERE and the NATURE OF THE SOIL have been shown to have no appreciable effect upon the severity of an epidemic.

The occurrence of PUERPERAL and SURGICAL SCARLATINA, as well as the presence of the disease in those of an ENFEEBLED CONSTITUTION, will call for a guarded prognosis.

UNFAVOURABLE SIGNS are:

A very high temperature - 106° F., or even higher.

Extreme rapidity and feebleness of the pulse.

Persistent vomiting and diarrhoea.

Presence of delirium, stupor, and convulsions.

Great breathlessness and signs of collapse.

If the rash is intense but poorly developed, and if it be haemorrhagic, the prognosis is grave.

Later in the disease, the development of severe throat symptoms, of diphtheria, of nephritis, or of marked involvement of the heart - are all most serious symptoms.

No case of scarlatina, however mild, can be considered free from the danger of the subsequent development of nephritis.

The outlook is favourable when:

The symptoms are only moderately severe.

The throat is only mildly involved.

The eruption appears at the right time, and is well developed all over the body.

The temperature falls with the disappearance of the rash.

M O R T A L I T Y.

The severity of scarlatinal epidemics has been shown to vary considerably. Thus, Sydenham never saw a severe case; and Graves witnessed a severe epidemic during the years 1800-1804,- after which, for nearly thirty years, the type of disease was so mild that hardly any deaths occurred.

Hirsch and Thomas state that the average mortality of scarlatina is about 10 per cent.

Johanssen gives a death-rate of 14.17 per cent. for a large number of cases occurring during recent years in Norway.

The mortality in London, calculated from the notifications and deaths in the hospitals of the Metropolitan Asylums Board for the last five years, has averaged about 5 per cent.; while the hospital mortality has been about 6.7 per cent. (Clifford Allbutt,- loc.cit., Vol.i, p.128). The following are some of the figures given:

Year.	Notifications.	Deaths.	General Mortality.	Hospital Mortality.
1890	15,330	876	5.71	7.86
1891	11,398	589	5.17	6.67
1892	27,095	1174	4.33	7.28
1893	36,901	1596	4.32	6.11
1894	18,440	962	5.21	5.92

The following figures are taken from the report of the Medical Officer of Health, Hatch, and concern the Grimsby Fever Hospital:

	Admitted.	Died.
January	4	-
February	-	-
March	8	-
April	5	-
May	1	-
June	8	-
July	12	-
August	16	1

	Admitted.	Died.
September	15	1
October	13	-
November	18	-
December	12	-

This gives a mortality of 1.78 per cent.

T R E A T M E N T.

PROPHYLAXIS.

NOTIFICATION AND SCHOOL ADMINISTRATION.

For a general practitioner, the first step after diagnosing a case of scarlatina is to notify the health authorities, and to isolate the patient. If this is done at once, the disease can often be prevented from spreading; for the infectivity in the early stages is not very considerable.

If there are other children in the house, these must not be allowed to go to school, or to any place where they will mix with their kind, until at least a week has passed since the patient first showed signs of illness and the others have failed to contract the disease.

In all large schools, it is the custom at the beginning of each term for the the schoolmaster to receive a certificate stating that each indivisual child who returns to school has not, during the holidays, had any infectious illness or, so far as is known, been in contact with any so afflicted. In case a child has had such illness, he must bring a certificate from the family physician stating that the child is now free from infection.

A child who has been suffering from scarlatina must not attend school for at least two months after the outbreak of the disease, and, in the case of the the persistence of any aural or nasal discharge, the period must be still longer. It is the custom in some large towns to appoint medical men to make periodical visits of inspection to the schools; and this is much to be recommended.

School teachers should be instructed to recognise the obvious signs of an acute infectious illness; for, where there is no medical inspector, an intelligent teacher is of considerable value in preventing the spread of infectious diseases.

Schools are now built with ample means of ventilation and for cleanliness - both powerful allies in fighting a disease such as that now under consideration. When a case of scarlatina

has occurred in a school and the patient has been discharged, special attention should be given to any other children complaining of sore-throat, although any other symptoms may be very mild. All such suspicious cases should be isolated at once, and, if the symptoms have not abated within twenty-four hours, the case should be treated as one of scarlet fever.

These means may be successful in preventing the need for closing the school; but, where fatal cases continue to occur in spite of every care, the school should be closed, and remain so for at least a month - the time depending on the character and duration of the epidemic.

ISOLATION.

When there is no danger to the other members of the household, the patient can be treated at home; but, unless isolation can be properly carried out, he should be sent to a fever hospital. Where it is decided to keep the patient at home, the parents must be told that he will be isolated from the rest of the family for at least six weeks, and possibly more; and also that anything which has been in contact with the child will have to be destroyed if of little or no value, and if of value will require to go through a process of disinfection.

A room should be chosen at the top of the house, and one as far apart from the rest of the domicile as possible. It should be well lighted, and have an open fireplace. All furniture - except such as is absolutely necessary - should be taken out of the room, the carpet taken up, and old pieces that can be destroyed afterwards put down. Over the doorway should be hung a sheet which is kept moistened with a 1 in 20 solution of carbolic, or with a 1 in 1000 of perchloride of mercury; this sheet will collect any infectious particules floating in the air. The floor, the walls, and the furniture are to be wiped every day with a cloth wrung out of one of the above-mentioned solutions.

Whoever nurses the patient must not come into contact with the other members of the household. She must wear a sterilisable cap to cover her hair, and she must have a bath and a change of clothing before leaving the sick-room.

The visiting physician before entering the room must put on an overall with a cap for the head, the whole of which can be sterilised each time after use, and is kept outside the room.

When leaving, he should thoroughly wash his face, hands, and head; the beard should have special attention, because it has been uncovered in the sick-room. Before visiting any other patients, he should have a good airing; and when confinements and scarlatinal patients have to be visited on the same round, it is better to give up one or the other.

All eating and drinking utensils should be kept entirely in the sick-room; but when any article is taken down to the kitchen, it should first stand for ten minutes in boiling water. Any food that is not eaten should be destroyed - preferably by burning.

Aural and nasal discharges should be received on pieces of rag and burnt, and the sputum should be treated in the same way. The urinal and bedpan should contain enough 1 in 20 carbolic, or the corresponding strength of another disinfectant, to completely cover the contents thereof.

With regard to the period of quarantine, it may be stated, in the first place, that while there is any aural or nasal discharge the patient must not leave hospital or his room; for these discharges are decidedly infectious.

As to the contagiousness of desquamating epithelium, Millard (Lancet, Apr. 5, 1902) questions its infectivity, and points out that while the proportion of return cases does not seem to be increased when the patient goes out, still infection has occurred from cases which had quite stopped desquamating.

There is no doubt that infection has occurred from cases that are apparently quite well, with neither desquamation nor discharge from any of the cavities; but, in the meantime, until more is known of the habitat of the scarlatinal germ, the presence or absence of desquamation of often very useful as a guide in determining when a patient is fit to be sent out.

A second desquamation is generally considered not to be

infectious,although Murchison reported the case of a boy who, after an attack of scarlatina in which desquamation has been well-marked and had occurred twice on the feet,was pronounced well and sent home,whrere his hands and feet desquamated again, and his mother in four days time developed scarlet fever.

As for the "return cases",the reports drawn up for the Metropolitan Asylums Board do not throw much light on their causation.The first,by Dr.Cameron,suggests that when infection had been conveyed by the patient,the latter had generally rhinorrhoea;while the second,by Dr.Turner,states that while, among 397 cases without complications of any kind,3.27 per cent.caused infection on returning home,and among 343 with rhinorrhoea only 2.62 per cent.proved infectious.These apparent contradictions may be partly explained by the fact that, in the second series of cases,180 patients were kept in hospital for more than ten weeks,by which time the infectivity of the nasal discharge was probably attenuated.

DISINFECTION.

When the patient has stopped desquamating and has been for some time free from nasal and aural discharge,he is given a bath containing some antiseptic - e.g., 1 in 1000 perchloride of mercury.The hairy parts are well scrubbed,and special attention is given to the palms and soles where the epidermis is thick and desquamation is inclined to linger.

All articles of little or no value should be burnt. Blankets,mattresses,clothing,etc.,should be disinfected by means of super-heated steam.Where no disinfecting plant is available,blankets and clothing should be boiled and the mattresses burnt.

The room,- and in the case of a school every room in it,- should be thoroughly sprayed with formaldehyde, ~~which~~ IN is a ~~compound~~ MIXTURE of equal parts of water and OF a saturated solution of ~~formalin~~ FORMALDEHYDE GAS.Three parts of this mixture are used for every 1000 cubic feet of air space in the room.All drawers must be turned out,and all bedding,etc.,suitably disinfected.

~~Other~~ OTHER methods of obtaining formaldehyde gas are:

1. Generating from a watery solution by distillation in a retort. Formalin is used for this purpose, and 10 ounces of it should be used for every 1000 cubic feet of air space.

2. Production from wood, or methyl alcohol mixed with water over incandescent platinum in a state of fine division.

3. Production from heating paraform, which is one of the polymeric forms of formaldehyde. For each 1000 cubic feet of air space 2 ounces of paraform must be used.

In each method, all cracks in the room must be sealed up beforehand, windows pasted up, doors secured, keyholes plugged, and fireplaces closed. All drawers must be turned out, so that their contents may be exposed to the disinfectant. Sheets are hung across the room; and the operator, after tying a wet towel over his mouth and nose, begins at the lowel or sheet furthest from the door, and sprinkles each one with a few ounces of formalin. The sprinkling is done with a spray-producer; and the best sheet is one made of coarse cotton. The room, or rooms, should be left for twenty-four hours, after which they must be exposed to influence of fresh air and sunshine.

Sulphur dioxide is a good disinfectant; but it must not be used in furnished apartments, because of its injurious effects upon the colouring matter in cotton and linen goods.

For the disinfection of a room there must be plenty of moisture to change SO_2 ~~with~~ INTO H_2SO_3. The room is prepared as described for disinfection with formaldehyde. Flowers of sulphur in the necessary amount is placed in a pot, and this latter in a tub of water. This prevents the danger of fire, and supplies the necessary moisture. The room should be exposed to the gas for twenty-four hours.

Disinfection by super-heated steam injures the fabric of some articles; but it is the safest of all ways, and then any duscharge has penetrated any part of the bedding, steam disinfection is absolutely necessary.

Chlorine vapour, - prepared by mixing chlorate of potassium with strong hydrochloric acid, - is recommended by Dr. Burney Yeo; but he thinks that, while this is an excellent aerial disinfectant, it should be supplemented by wiping any possible dust collections

with rags wrung out of an antiseptic.

The advantages of formaldehyde gas are that, while actively germicidal, it has no bad effect upon the higher forms of animal life, and is the only efficient disinfectant that does not spoil the furniture of a room. Its germicidal value is due to its property of combining with the nitrogenous part of the bacterial protoplasm; and its deodorising action is due to its combination with the nitrogenous products of animal matter.

Sulphur dioxide, as we have seen, injures cotton and linen goods, and is destructive to the higher forms of animal life.

The disinfection of a room with formaldehyde gas is therefore to be advocated. It may be conveniently, and with the greatest efficiency, used in the form of a spray; all bedding which is not burnt should be disinfected with steam.

Cadavers.- Bodies should be covered after death with a sheet immersed in strong antiseptic; and, if possible, cremated. When this is not allowed, the body should be surrounded with plenty of fresh lime, and buried some way below the soil.

Books should be opened, and the leaves thereof thoroughly sprinkled with formalin.

Letters should be properly disinfected by being submitted to dry heat.

Vehicles can be disinfected by running them into closed compartments, which are then filled with formaldehyde gas.

DRUGS.

For prophylactic use, certain drugs have been recommended for use internally.

Decoction of cinnamon has been advicated by Dr. Carne Ross, and it has also been praised by Dr. Caiger (Allbutt's System of Med., p.173), who affirms that it has a marked influence in preventing the occurrence of the more common complications.

Urotropin is recommended by Widowitz; and it is said by Patschkowski to prevent the occurrence of nephritis after scarlatina (Therap. Monats., Dec., 1904).

DIET.

During the early stage of a severe attack, milk is the best diet; and it helps to allay the intense thirst from which

the patient suffers.If the patient likes milk and digests it well,it may constitute his nourishment during the febrile stage;but where he does not like it,there is no onjection to milk puddings,jellies,beef-tea,etc.In mild cases these articles of diet may be allowed from the first,with the subsequent addition of bread and butter and tea.

Caijer gives during the febrile stage eggs beaten up in milk,broths,and calves' foot jelly;when the temperature falls, he gives eggs,custard,and bread and butter.Ripe fruit,in good condition,is allowed at any time during the illness.He asserts that he has not found any increased risk of albuminuria from using these articles of diet. A fruit diet helps to prevent constipation,which is sometimes a symptom in this as in other febrile diseases.

The patient should be confined to bed for at least three weeks from the onset of the illness,even in mild cases,because of the increased risk of nephritis developing,in a patient who is up,from chilling of the surface.

In order to still further prevent the occurrence of nephritis, the skin must be kept freely acting;and this is best effected by tepid sponging once or twice a day.

When much itching is complained of,an ointment containing 1 per cent.of menthol,or 2 per cent.of carbolic acid,may be rubbed into the skin.

MEDICINAL TREATMENT.

It has not yet been proved that any drug has a specific or direct influence upon the disease:consequently the exhibition of medicaments in this disease must be symptomatic.

The patient must have plenty of ffesh air to breathe,but must be kept put of all draughts;as much light as he can comfortably tolerate should be admitted to the sick-room.

In mild cases such as have been common in this country of late years,medicine is often unnecessary,although a saline mixture is usually given during the febrile stage.

When vomiting is present,all food by the mouth should be stopped,the patient kept absolutely at rest,and given half-grain

doses of calomel;small pieces of ice may also be given to the patient to suck.When constipation is obstinate,one of the mildest vegetable laxatives may be used.

When the temperature is very high (103°F.or more)and continues so for several days,- and especially when delirium or convulsions are present,- hydrotherapy is the treatment indicated.It may be given in the form of sponging,pack,or the entire bath - the method employed depending on the condition of the patient.Ice bags and Leiter's coils are also suitable in many instances.This treatment not only lowers the temperature, but,by keeping the skin active,lessens the tendency to nephritis,and also makes the patient feel more comfortable. A healthy young adult with continuous high temperature may be sponged twice daily with cold water (65°F.);but a patient with any cardiac weakness,and all young children should receive the warm bath,which same is safer and very soothing to the nervous system.

Phenacetine may be given,in doses of 2 to 3 grains every four hours,to a child of twelve,as an antiseptic;but it should not be used until hydrotherapy has been tried and failed to effect a sufficient reduction of the temperature.

Throat.

When the symptoms are at all severe and if the patient be old enough to understand, he should gargle with a solution of boric acid,or of chlorate of potash,several times daily.

When the streptococcal inflammation is severe and membrane has formed,the throat should be sprayed with hydrogen peroxide (1 part to 4 of water).

For septic throats with ulceration of some of the soft tissues,Caijer recommends a spray prepared by pouring 5 minims of strong hydrochloric acid upon 9 grains of chlorate of potassium,made up to the ounce with water.The advantage of this mixture is that it contains a large amount of free chlorine,which has a very beneficial effect upon this affection.The throat and nose should be syringed out with this solution every three or four hours.The patient's head is held over a basin,and

kept there.

For extensive streptococcal exudation, Forchheimer recommends antistreptococcic serum, supplemented by the application to the throat of a swab saturated with Loeffler's iron-toluol solution.

If the cellular tissue in the neck be the seat of a brawny induration, free incisions should be made at once to relieve pain and provide drainage for the inflammatory matter. In ~~any~~ such severe case the present writer has seen great benefit resulting from saline enemata given every six hours during the very acute stage.

Purulent Rhinitis.

Irrigation with warm saline (normal) solution will clear the cavities without causing irritation.

In obstinate cases, 10 per cent. solution of argyrol (a combination of metallic silver with a proteid obtained from wheat) may be used in a similar way.

A solution of borax and boracic acid is often very useful, in that it dissolves the mucus.

A solution of formalin (1 per cent.) has a disinfectant and deodorising effect upon the nasal discharge, although occasionally the skin at the nasal orifices shows signs of irritation after its use.

Cardiac Weakness.

With regard to the use of alcohol, an uncomplicated case will not need it; but when the heart begins to flag,- either from the severity of the toxin or from sepsis,- brandy or whisky are to be recommended. They may be administered in drachm doses every hour if collapse threatens, and as often as may be necessary until the heart recovers.

Aromatic spirits of ammonia constitutes a good heart tonic, and may be given in doses of from 5 to 15 minims with equal parts of ether: these two drugs together form an excellent diffusible stimulant.

For this condition of heart weakness Henoch recommends camphor in ½ - 3 grain doses, hypodermically, every two or three hours.

Musk (½ - 3 grs.) caffeine (¾ - 1½ grs.), and morphine

(1/50 - 1/20 gr.) have each their advocates.

Cardiac dilatation is best met with tincture of digitalis or strophanthus,preferably the former,in doses of from 5 to 15 minims.

TREATMENT OF COMPLICATIONS.

OTITIS.

In the early stage,pain in the ear may be relieved by heating a large wineglass,putting into the bottom of it some cotton wool with about thirty minims of chloroform upon it, and applying it over the affected ear:the chloroform vapour acts as an anaesthetic and antiseptic.

Hot fomentations sprinkled with opium may be applied externally;and if these fail,leeching the tragus may be tried.

When an examination of the ear can be made and the membrane is seen to be bulging,an incision should be forthwith made;but in very young children,owing to the extreme narrowness of the canal and to their struggling,it is often most difficult to obtain a view of the drum;often the appearance of pus in the external auditory meatus is the first sign of middle-ear mischief.

An ear discharging pus may be syringed with boracic acid every four hours,and after each syringing a few drops of rectified spirit allowed to remain in the ear for a minute to help in keeping the passage as dry as possible;finally,some iodoform powder should be blown in with an insufflator.If the discharge is very offensive and continues so,hydrogen peroxide (1 in 3 of water) may be used for syringing,instead of boracic acid,and is very beneficial.

If rednessmswelling,and pain develop over the mastoid,an incision should be made,and any carious bone removed.An antiseptic fluid should be syringed through from the mastoid antrum to the middle ear,and by inclining the head to one side, the fluid will run out of the external auditory canal.The cavity in the bone may be filled with iodoform emulsion,and iodoform powder may be blown into the external ear.Irrigation of the mastoid should be done twice a day at first.At times removal of the ossicles and the remainder of the membrane may

be necessary.

ADENITIS.

The application of a mixture of glycerine and a solution of iodine in iodide of potassium to the fauces, and the painting of tincture of iodine over the gland externally, will often bring about resolution in a case of cervical adenitis.

If suppuration takes place, prompt incision and free drainage is the treatment.

RHEUMATISM.

Sodium salicylate should be given in full doses (gr.15-30 three times a day for an adult), and the affected joints may be painted with glycerine and belladonna, and wrapped in plenty of cotton wool.

Occasionally the articular effusion becomes purulent, in which case it must be opened antiseptically, irrigated with a weak antiseptic, and drainage tubes put in the most suitable positions - after which the opening must be syringed with sanitas, hydrogen peroxide (carbolic acid (1 in 60), or perchloride of mercury (1 in 10,000) as often as may be necessary. As soon as the acute inflammation has subsided, gentle passive movement may be started, and gradually increased in amount according to indications.

NEPHRITIS.

The skin and bowels must be encouraged to act freely throughout the disease.

When the renal trouble becomes acute, hot baths should be given daily. A large amount of water should be drunk to flush out the kidneys and carry away some of the toxin; and the bowels should be opened with jalap or other hydragogue cathartic.

Wet cupping to the loins may be useful when suppression of urine is almost complete.

The diet should consist entirely of liquids. Vomiting should be treated with one or two minims of tincture of iodine every hour.

During convalescence, tincture of steel is often given to correct the anaemia which is the usual accompaniment of this

condition.

Whenever during the course of a scarlatinal attack uraemia threatens, two or three drops of croton oil may be given in a drachm of milk, the patient placed in a hot bath, and half a grain of pilocarpine injected; venesection is beneficial at times.

If spasm of the glottis causes increased difficulty in breathing, chloroform will relieve the suffering.

Oedema of the lungs is a most serious complication, and should be treated with venesection and the exhibition of digitalis to contract the vessels.

During comvalescence the patient should be kept in bed a month after the onset of the affection, and should be very careful about draughts and wettings when he is at exercise out of doors.

Persistent albuminuria, of three or four months' duration, suggests some permanent injury to the renal tissue.

STOMATITIS.

In mild cases the mouth may be syringed every four hours with chlorine-water.

Any carious teeth should be removed, and the rest kept clean.

Noma, which is a severe form of the disease, should be treated by thorough scraping under an anaesthetic, followed by the application of strong nitric acid to the raw surface.

DIPHTHERIA.

This may occur during scarlatina, and is best treated with antitoxin.

TONSILLITIS and BRONCHITIS.

These affections are to be treated as if existing independent of scarlatina.

ECZEMA.

The scabs may be loosened by the application of pieces of lint soaked in warm oil, and then picked off: the ointment of ammoniated mercury is then applied.

The diet must be regulated; and, if the affection persists for some time, a course of arsenic - beginning with 2 minim

doses for a child of five, and gradually increasing the dose until the limit of safety is reached - is indicated.

SERUMTHERAPY.

Savenko (Vratch, June 26, 1905) described a scarlet fever serum obtained from three sources. The steps of the process of manufacture are:

(1) Streptococci are obtained from the blood in a fatal case of the disease.

(2) From the mucus of the tonsil in a severe case.

(3) From the cardiac blood post-mortem.

Cultures from the three sources are made with Martin's broth mixed with peritoneal fluid.

Menshikoff has used this serum in twenty cases, generally with improvement in the symptoms.

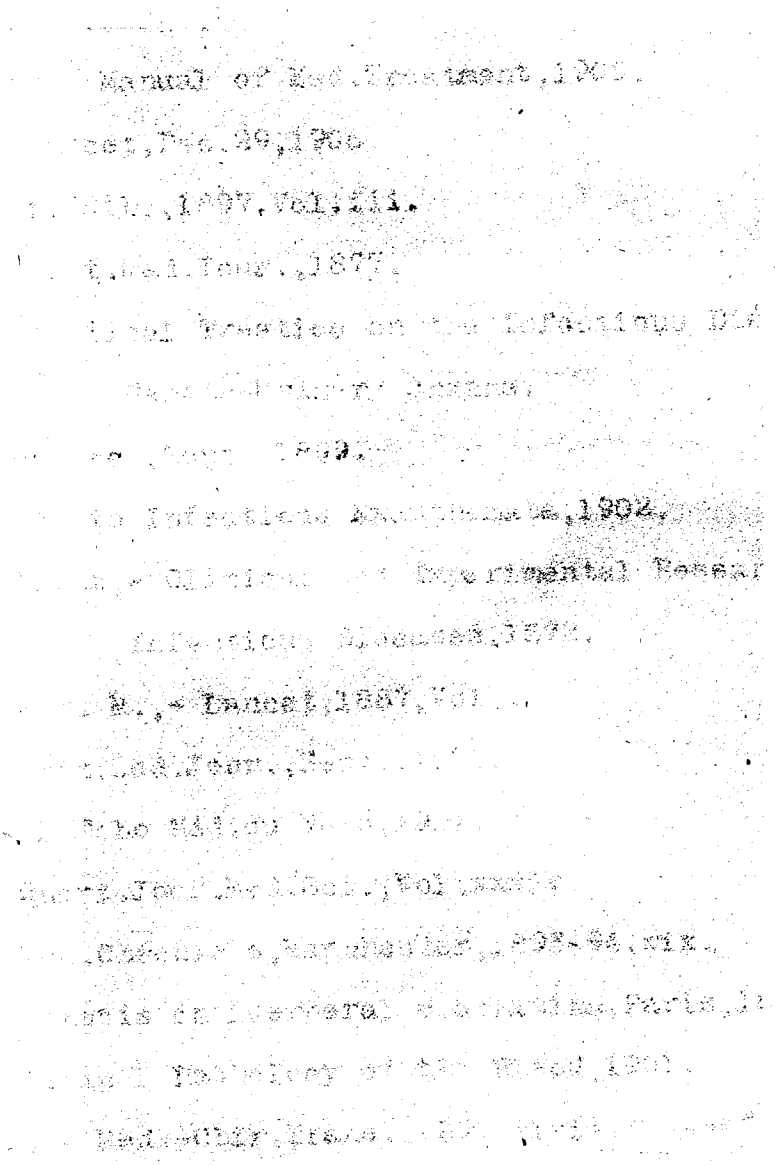
The ordinary complications are not prevented, but are said to be milder and to disappear more quickly. The dose varies from 90 to 250 c.c., and the inventor notes that urticaria sometimes occurs during treatment.

Palmirski and Zebrowski (Bull. de l'Inst. Pasteur, Nov. 18, 1905) state that they have isolated the scarlatinal microbe, and they call it the "streptococcus conglomeratus". From this organism anti-scarlatinal serum has been prepared, which the authors have used in 1000 cases of which 133 were very severe. In all these latter the beneficial effect is said to have been marked, resulting in a general improvement. The serum appears to do most good when the disease consists simply of rash, fever, and sore-throat. The authors believe that scarlatinal nephritis has been much less common when the serum has been used; but they cannot say that the complications are influenced by it. The mortality for the 133 cases is given as 15 per cent,, which certainly compares very favourably with the usual mortality of such cases - 60 to 70 per cent. They hold that the serum does good by stimulating phagocytosis, not by any bactericidal action.

Blood-serum of Convalescents.- Roger (Infectious Diseases, p. 1672) reports a case of a boy, aged 15, who was suffering from a very severe type of scarlatina. He was unconscious on admission,

and his urine was almost suppressed;his pulse was 120,and his temperature 104°F.Saline was given hypodermically,and 80 c.c. of defibrinated blood were later obtained from a convalescent,and injected beneath the skin of the abdomen - venesection having been perviously performed.The boy made a good recovery.

Huber and Blumenthal (Berl.klin.Woch.,1897,No.31) have also used blood-serum in this way.The blood was mixed with saline, and also with 1 per cent.of chloroform,- after which the mixture was shaken and allowed to stand,then used. In three out of thirteen cases,a good result was obtained;but the other eight were hardly affected at all.



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PERSONAL CLINICAL OBSERVATIONS OF SCARLATINA CASES,

ILLUSTRATED BY NUMEROUS CHARTS.

Case 1.

F. C., aged 13, was admitted to hospital on March 25th, having been ill for four days.

There was no previous history of rheumatism, but the child was said to have been "nervous".

On admission, a rose-red rash was well-developed on the trunk and limbs; the tongue was red and dry; there was enlargement of the cervical glands; the tonsils were swollen and ulcerated; and the nose was discharging freely.

On April 9, the apex beat was found to be in the nipple line, and a loud systolic murmur was heard. Cardiac dulness was increased half an inch on the left side, and reached to the right border of the sternum on the right side. There was a systolic bruit at the base of the heart. Albuminuria was present.

Salines were given freely by the rectum, and an iron mixture by the mouth.

On April 17, the patient vomitied, and then had convulsions which lasted two hours, - for which jalap and a mixture of potassium bromide (gr.v) and chloral hydrate (gr.v) were administered.

The next day, the face was seen to be swollen and the eyelids oedematous.

On April 20, the patient had another attack of convulsions, and a temperature of 102° F. accompanied the same.

Next day, there was another convulsion (slight), followed by an attack of vomiting.

After this the patient improved; and, by April 29, the urine was free from albumin, and the heart sounds were quite normal.

On May 22, the patient was discharged cured, having been in hospital for fifty-nine days.

CASE 1.

. DISEASE.

Notes of Case.

Name: Frederick Clarke

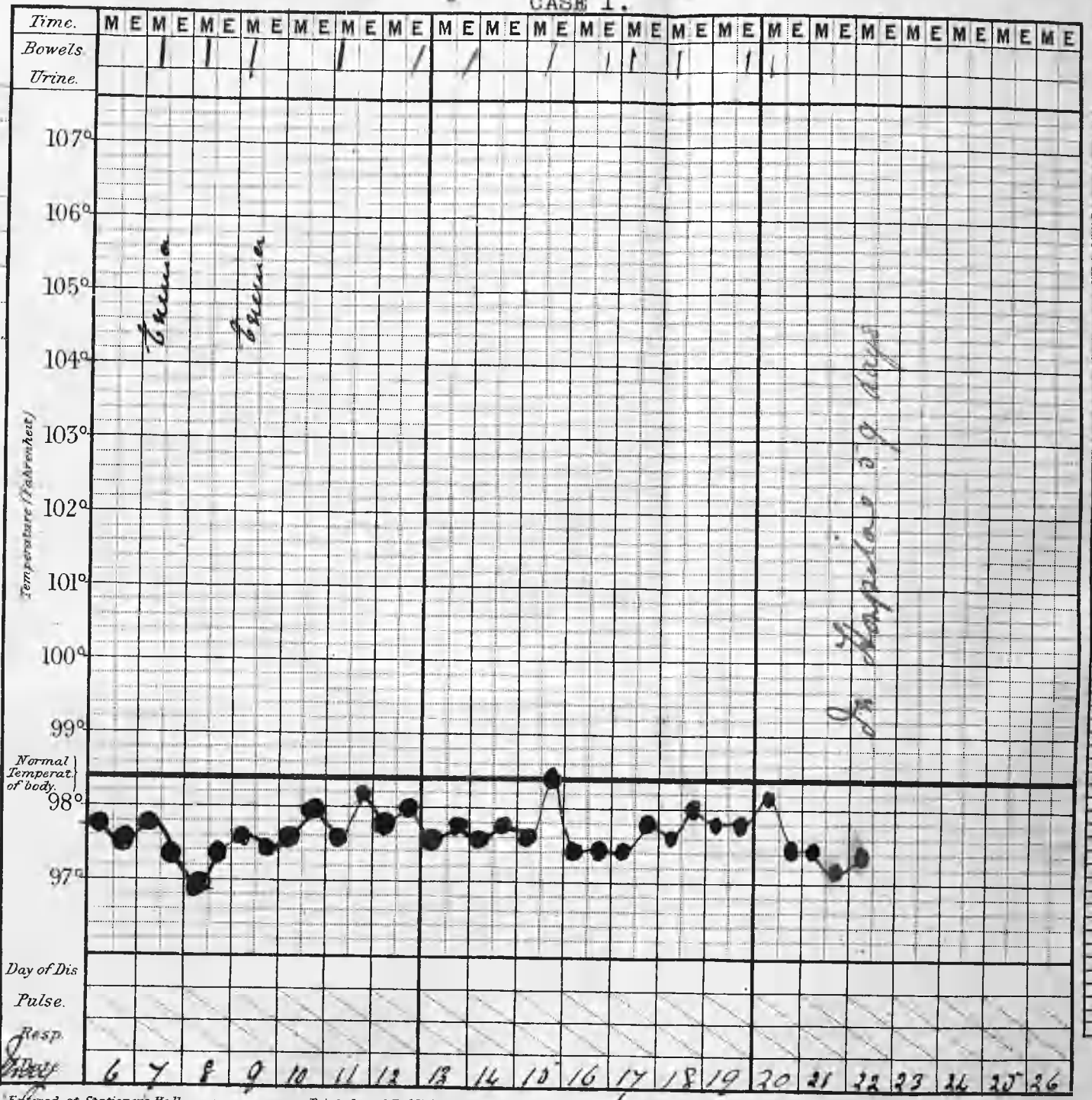
Age: 18 yrs

Diet:

Case Book N°:

Date of admission: March 26th /07.

Result:



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CASE 1.

DISEASE.

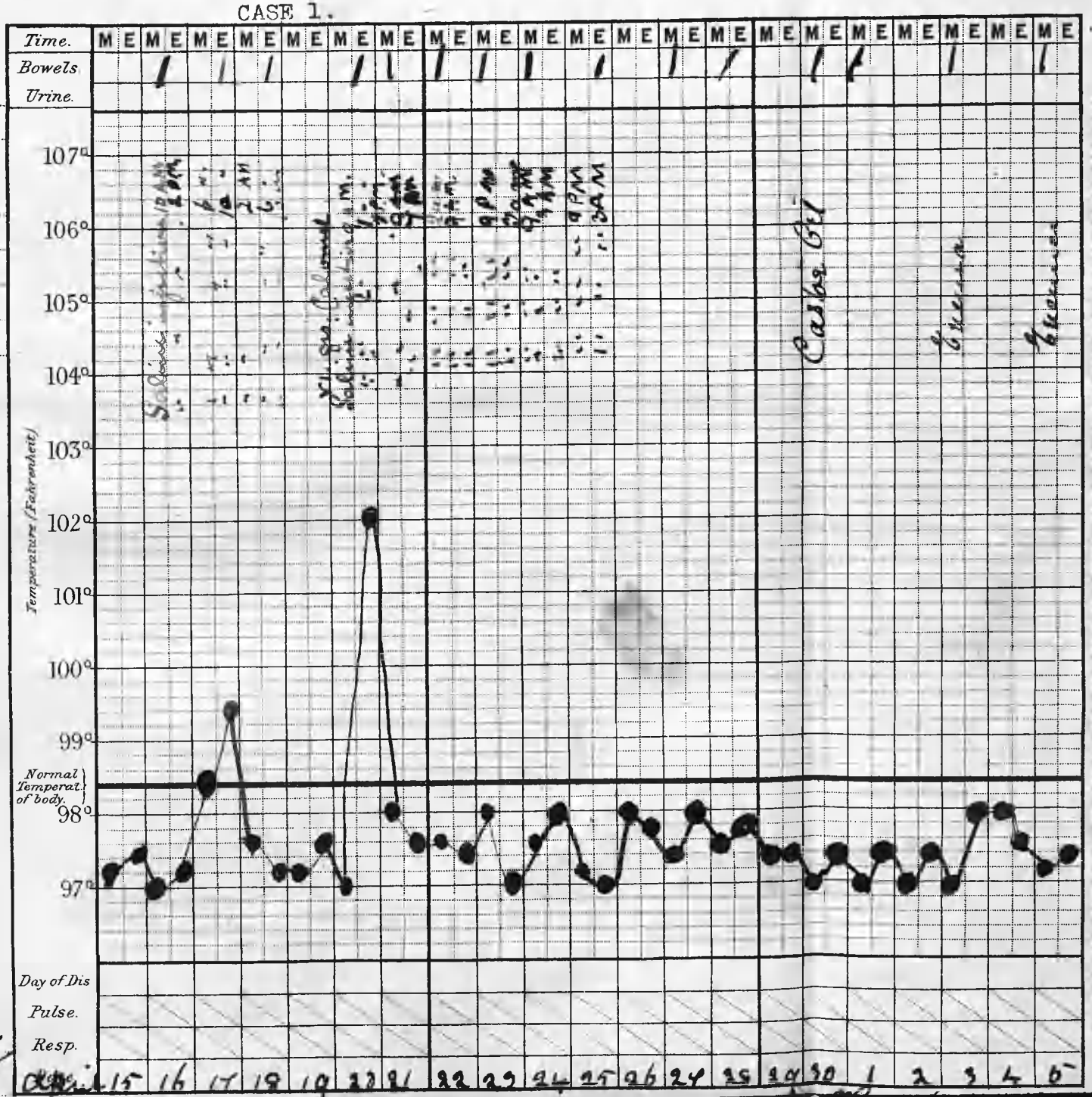
Notes of Case.

Name Fredrick Clarke.

Age 13 yrs.

Bed

Case Book No.



Date of admission.

March 25 1907

Result

CASE 1.

DISEASE.

Notes of Case.

Name { Frederick Clarke

Age 13 yrs

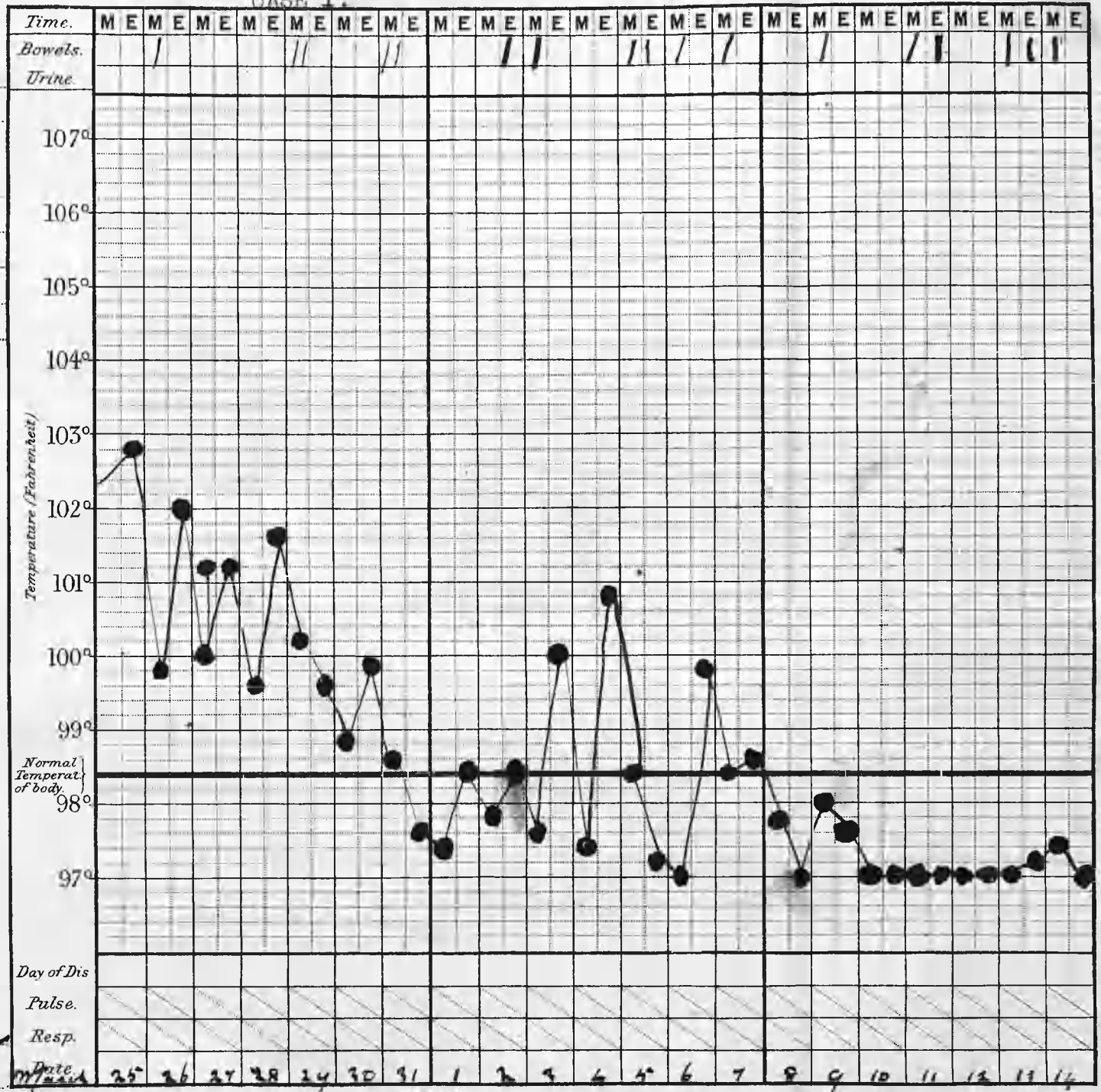
Ward

Case Book No.

Date of admission.

March 25th 1904.

Result



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CASE 1.

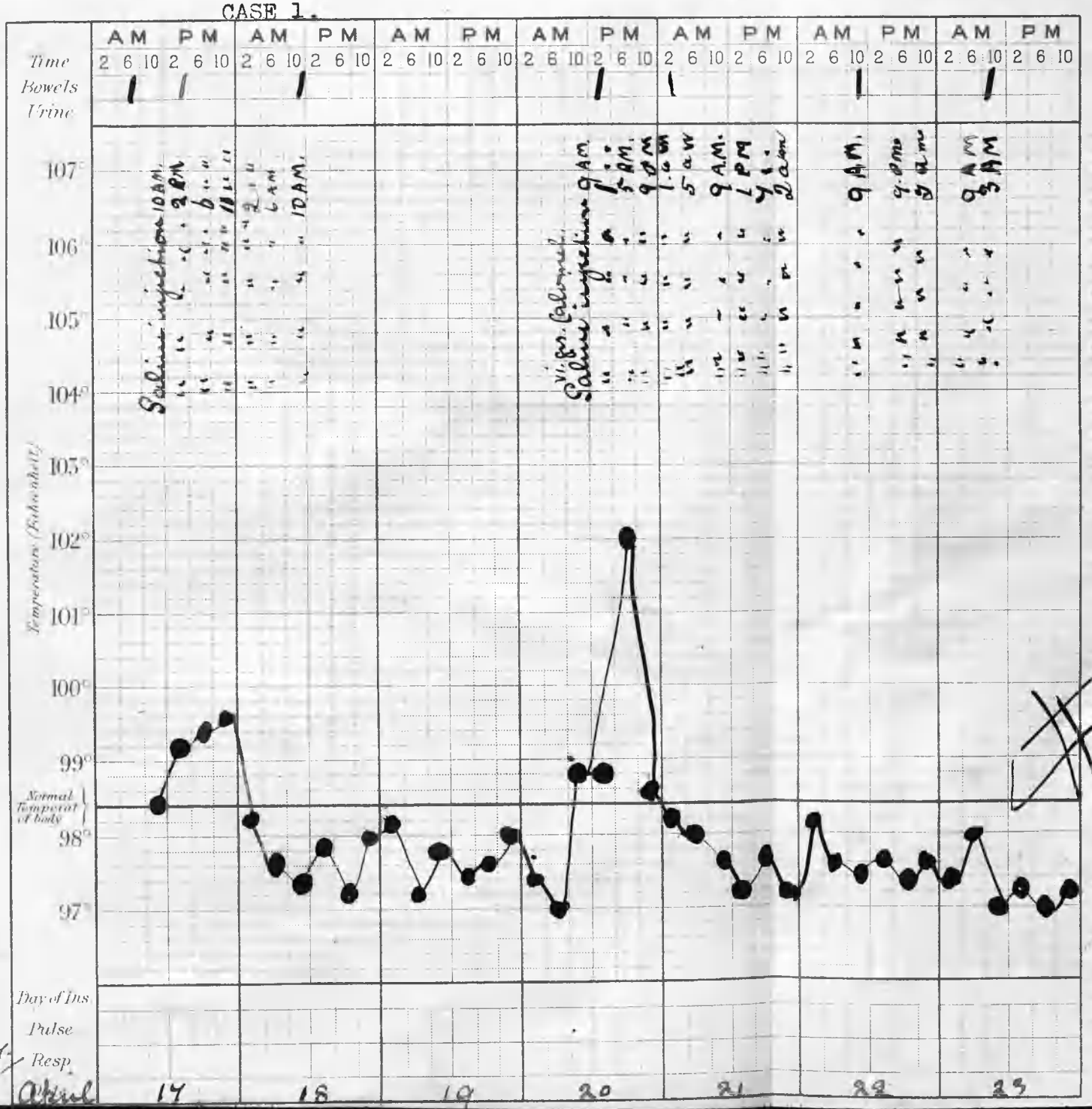
OUR CHART.

DISEASE.

Fredrick Clarke. 13 yrs.

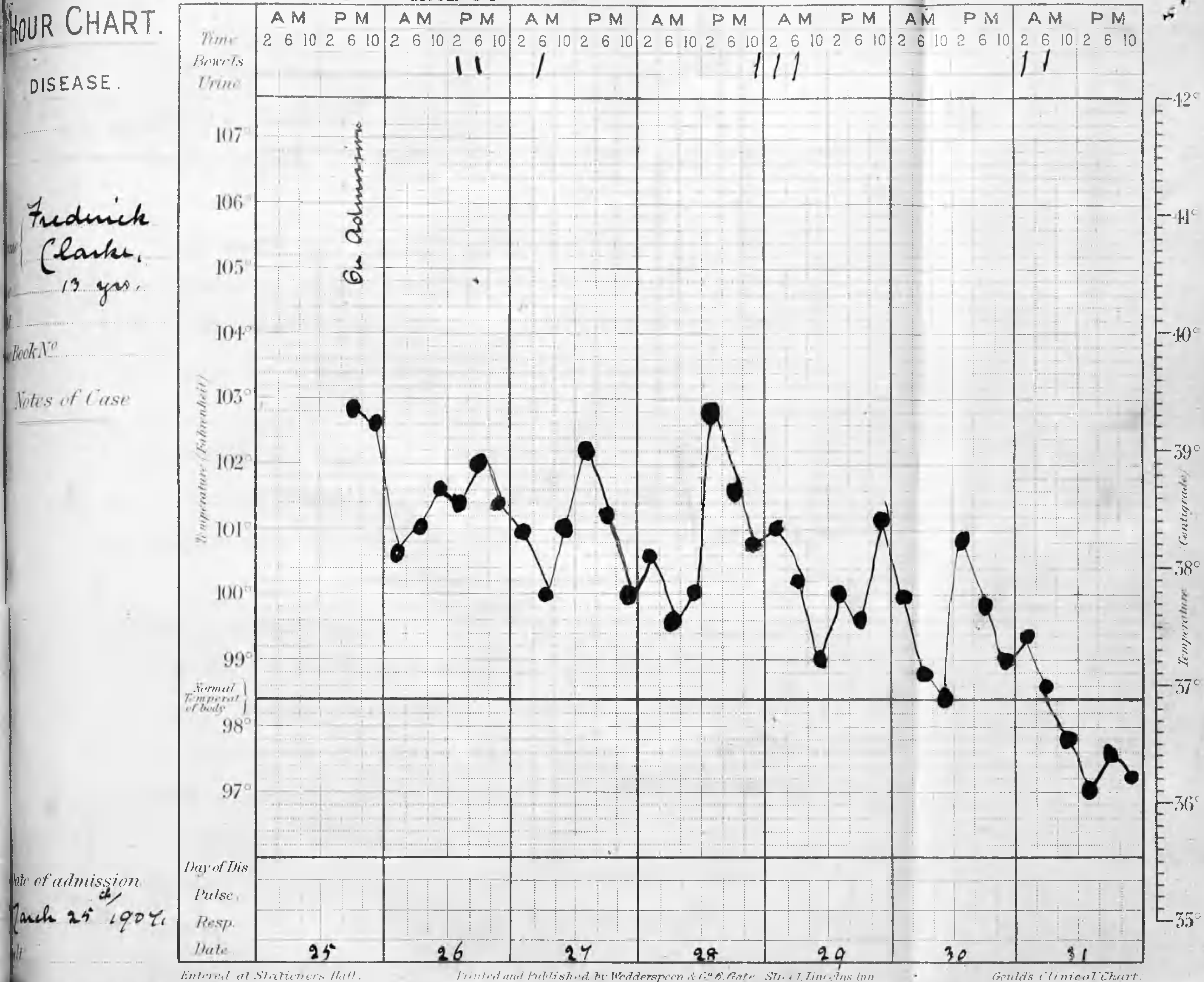
Book N°

Notes of Case



Date of admission March 25 1907

CASE 1.


HOUR CHART.
DISEASE.
Fredrick Clarke. 13 yrs.
Book No
Notes of Case
Date of admission
March 25th 1904.
Time
Bowels
Urine
AM PM
2 6 10 2 6 10
On Admission
107° 106° 105° 104° 103° 102° 101° 100° 99° 98° 97°
Temperature (Fahrenheit)
Normal Temperat. of body
42° 41° 40° 39° 38° 37° 36° 35°
Temperature (Centigrade)
Day of Dis
Pulse
Resp.
Date
25 26 27 28 29 30 31
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Goulds Clinical Chart.

Case 2.

H. H., aged 8, was admitted to hospital on April 1, having been ill for three days.

On admission, the temperature was 102° F., and the pulse 140 and feeble.

There was a rose-red rash, well-developed and slightly miliary in parts, with general glandular enlargement. The tonsils were swollen, and covered with a thick membrane. Albuminuria was present: the patient was in a semicomatose condition.

Diphtheritic antitoxin was given on the second day, and saline enemata - at first hourly, and then, as the patient's condition slowly improved, at longer intervals. Strychnine was given in five-minim doses hypodermically. By the 5th the salines could be discontinued.

The throat was much clearer, and the glandular enlargement less marked. The nose and throat were daily syringed with formalin.

Agar-agar was inoculated with a throat swab, and an abundant growth of streptococci was obtained; but there were no diphtheria bacilli present.

On the 6th, the glandular infiltration was marked on the right side of the neck; and, on the 18th, an abscess which has formed was opened and drained.

On May 11, the sinus in the neck had closed; and the patient was discharged cured, having been in hospital for forty-eight days.

CASE 2.

DISEASE.

Notes of Case.

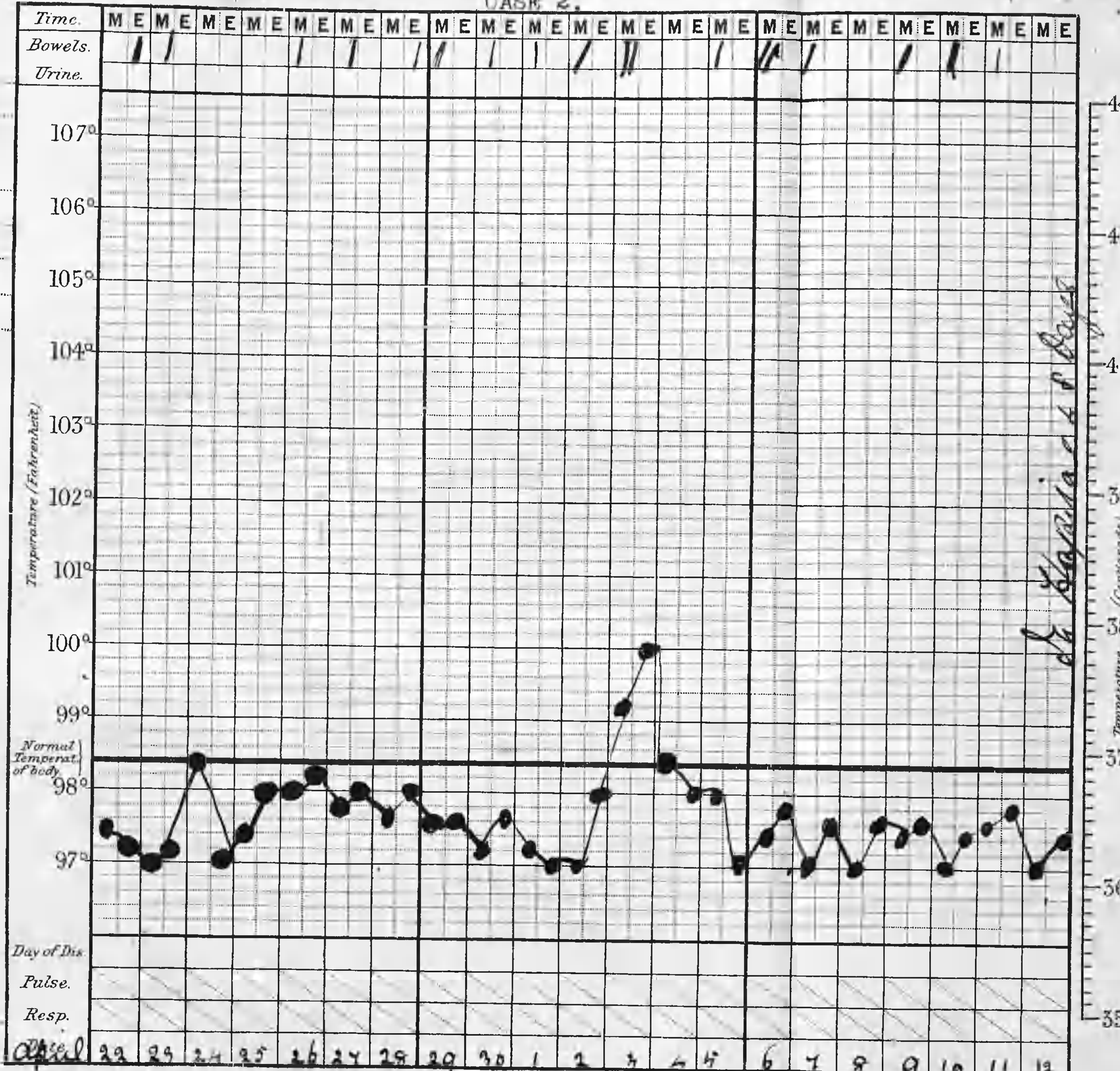
Helma Hobday.

6 yrs.

Book No.

Date of admission

April 1 1907.



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CASE 2.

DISEASE.

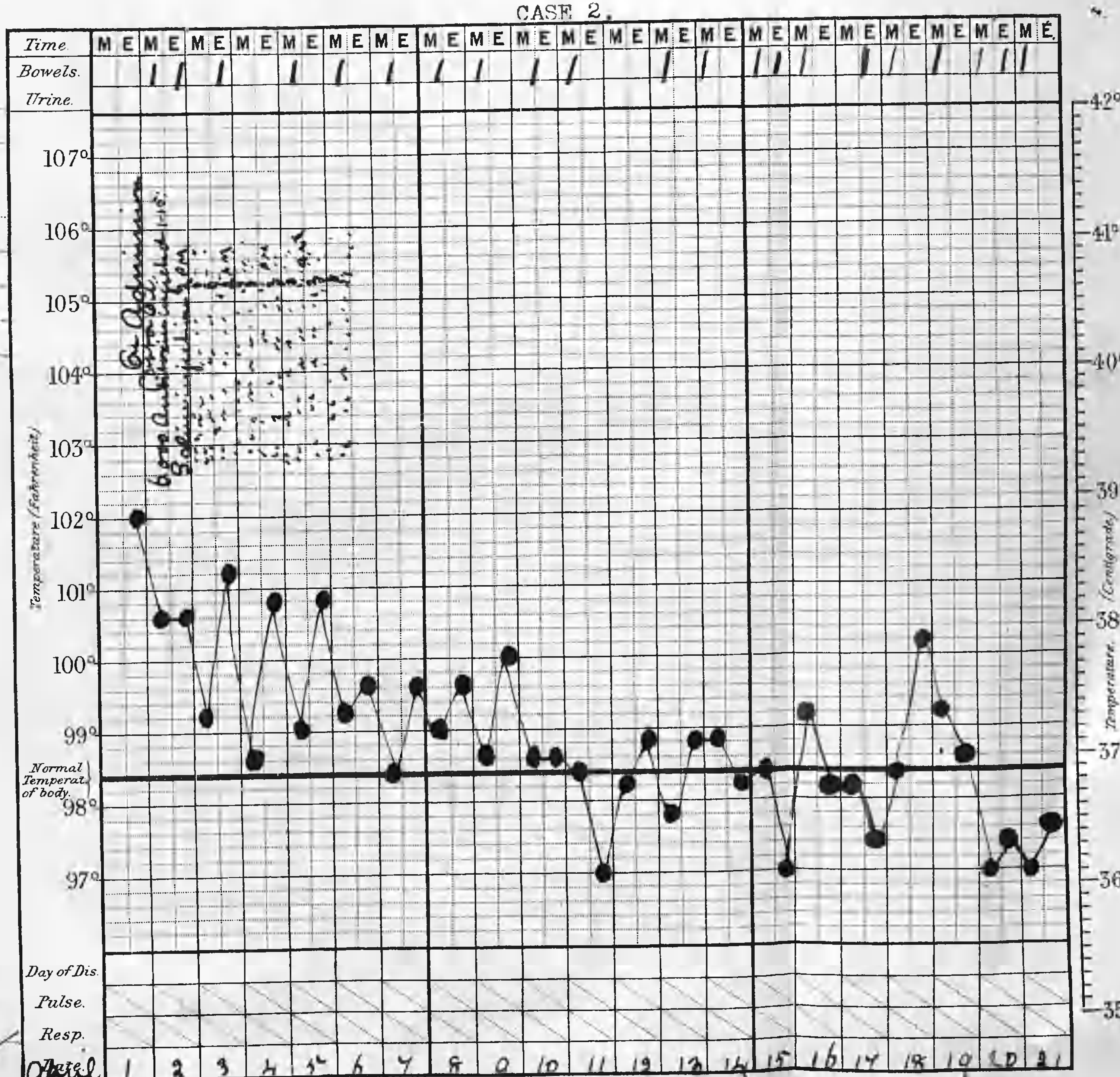
Notes of Case.

Helena Hobdale. 8 yrs.

Book No.

Date of admission April 1 1907

Result



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Gould's Clinical Chart.

CASE 2.

HOUR CHART.

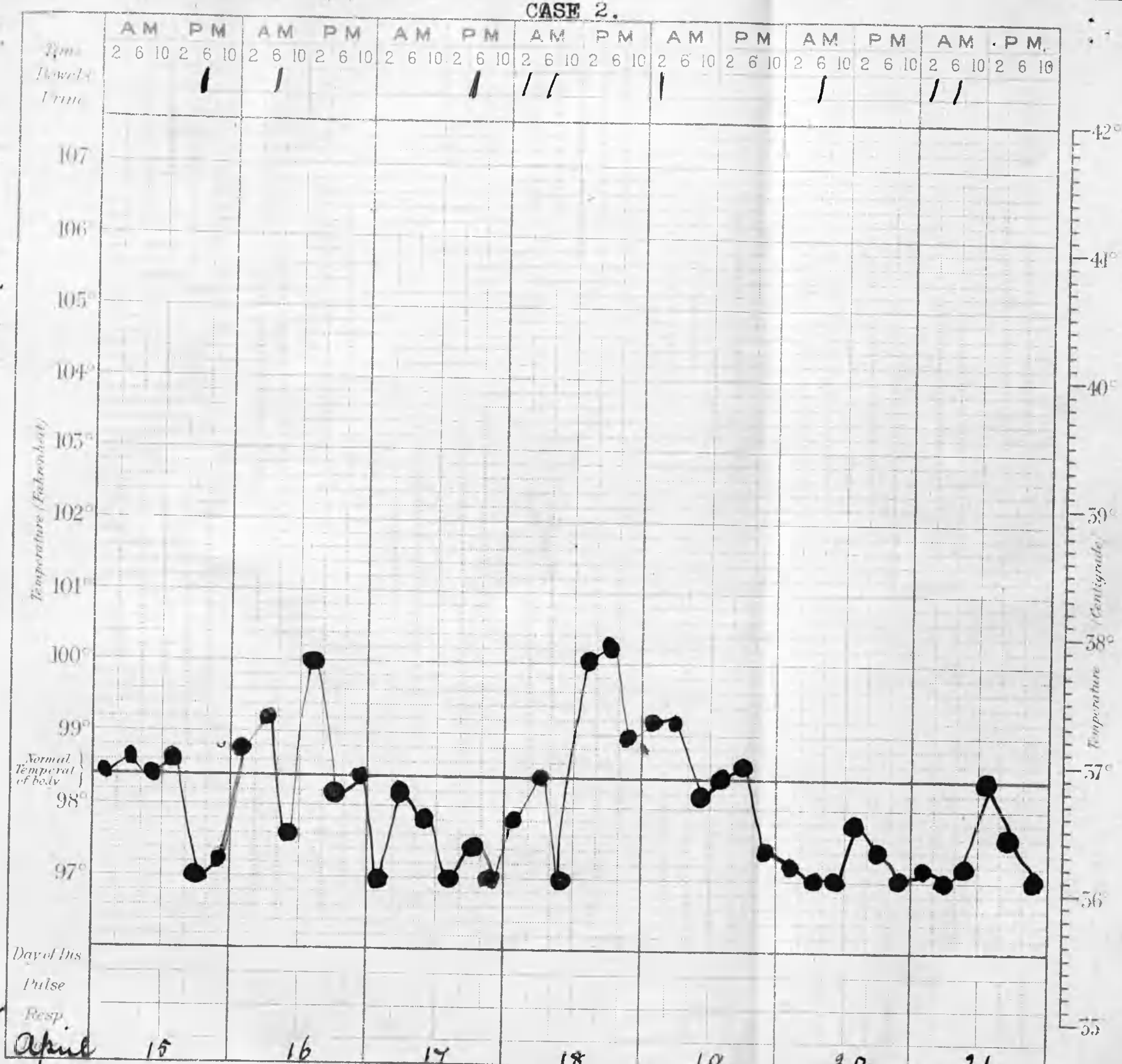
DISEASE.

Helma Hobday. 8 yrs.

Book No.

Notes of Case

...e of admission ...il 1st 1904.



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Printed and Published by Wodderspoon & Co 6, Gate Street Lincolns Inn

...'s Clinical Chart

CASE 2.

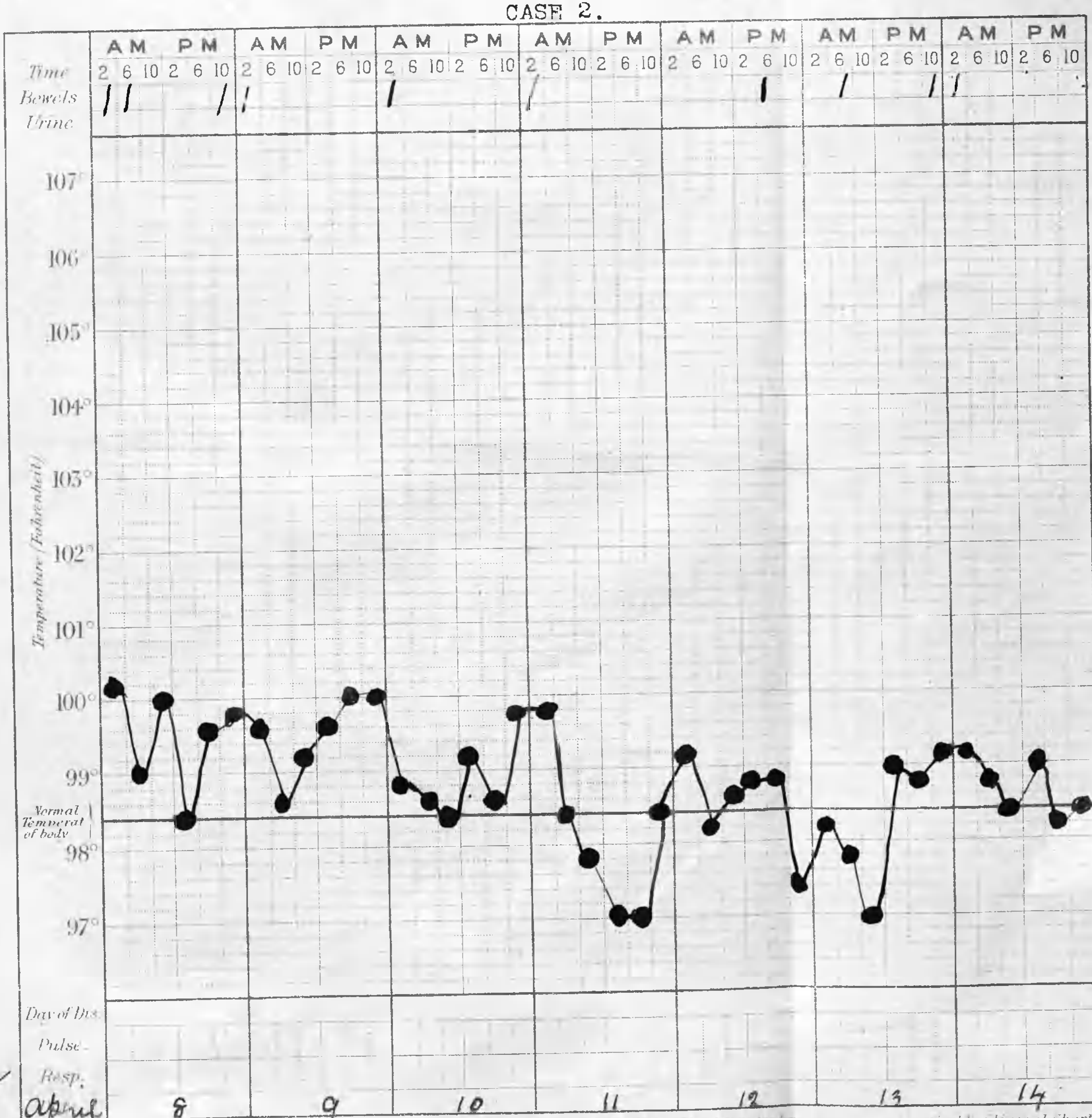
OUR CHART.

DISEASE.

Helena Holday. 8 yrs.

Book No.

Notes of Case



Date of admission April 1st 1904.

Result

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CASE 2

HOUR CHART.

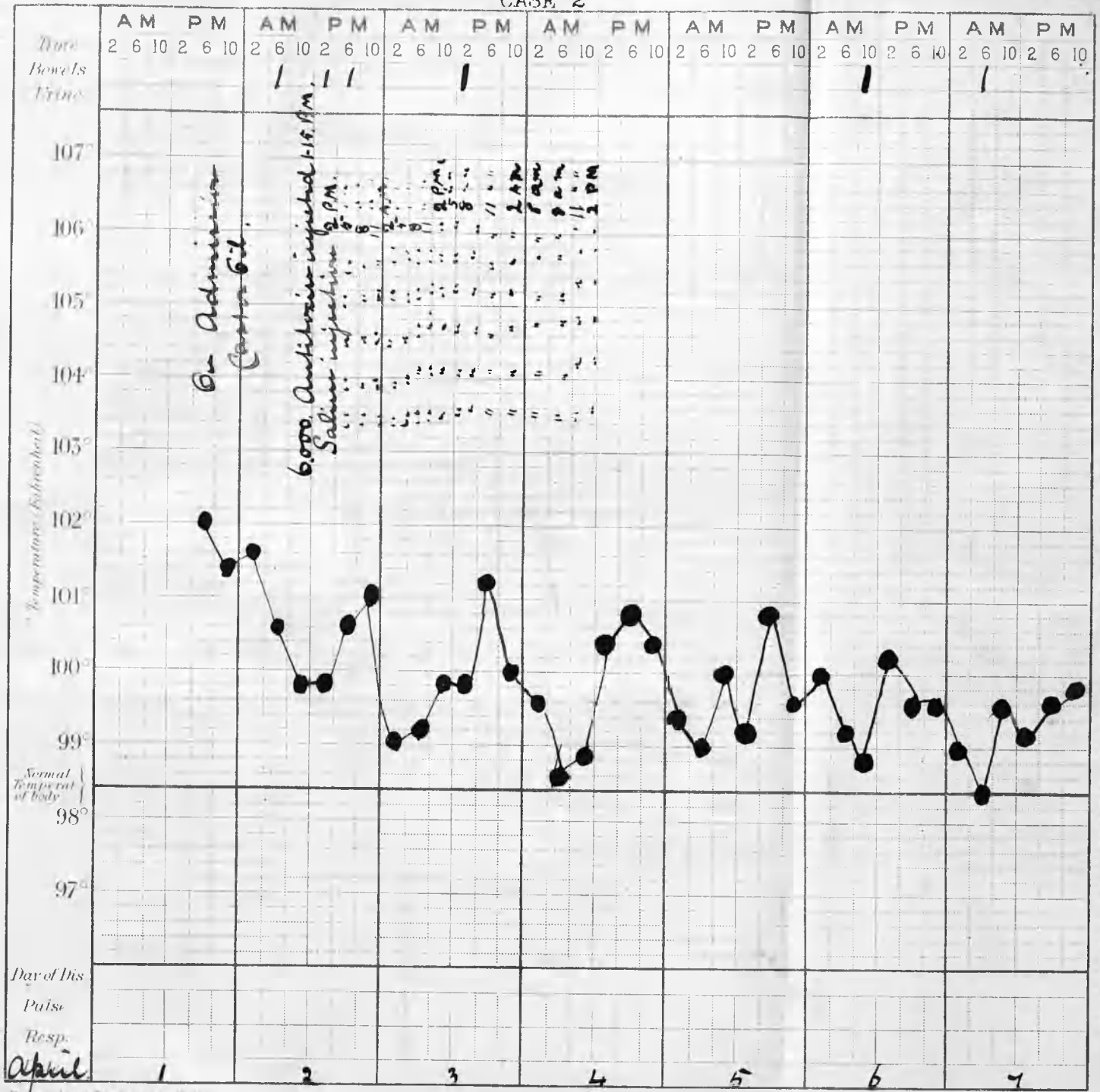
DISEASE.

Helma Hobdahl. 8 yrs.

Book No.

Notes of Case

Date of admission April 1st 1904.



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Case 3.

K. M., aged 15, was admitted to hospital on April 9, having been ill for four days.

On admission, the rash was not well-developed anywhere, but the face was desquamating.

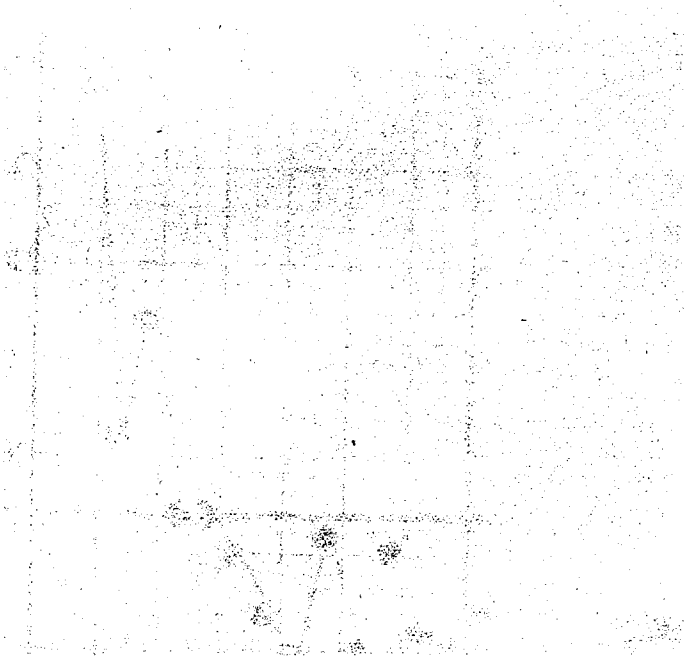
The tongue was dry and scaly; the throat was red and swollen; and there was considerable glandular enlargement.

The temperature was 102.8° F., and the pulse 120; albuminuria was present, but disappeared after the febrile stage, and did not return.

There was neither aural nor nasal discharge; but a cervical gland on the right side remained enlarged on May 4.

On the 18th, the patient was discharged cured, having been in hospital forty days.

The treatment of the throat was painting with glycerine and a solution of iodine in potassium iodide internally, with tincture of iodine externally.



Case 3.

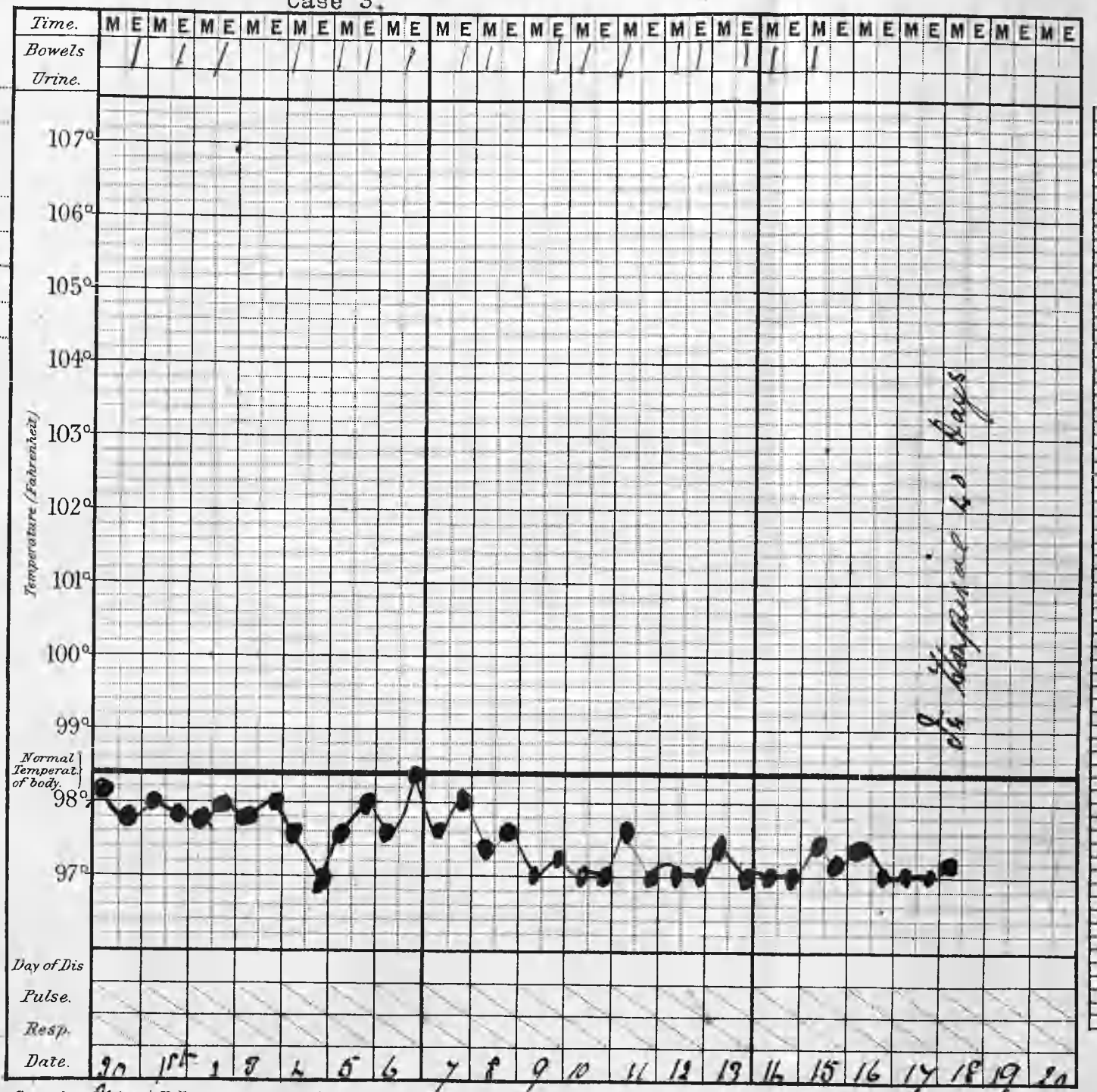
DISEASE.

Notes of Case.

Katherine Miller
16 Yrs

Book No.

e of admission.
ril 9th /07



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Gould's Clinical Chart.

Case 3.

DISEASE.

Notes of Case.

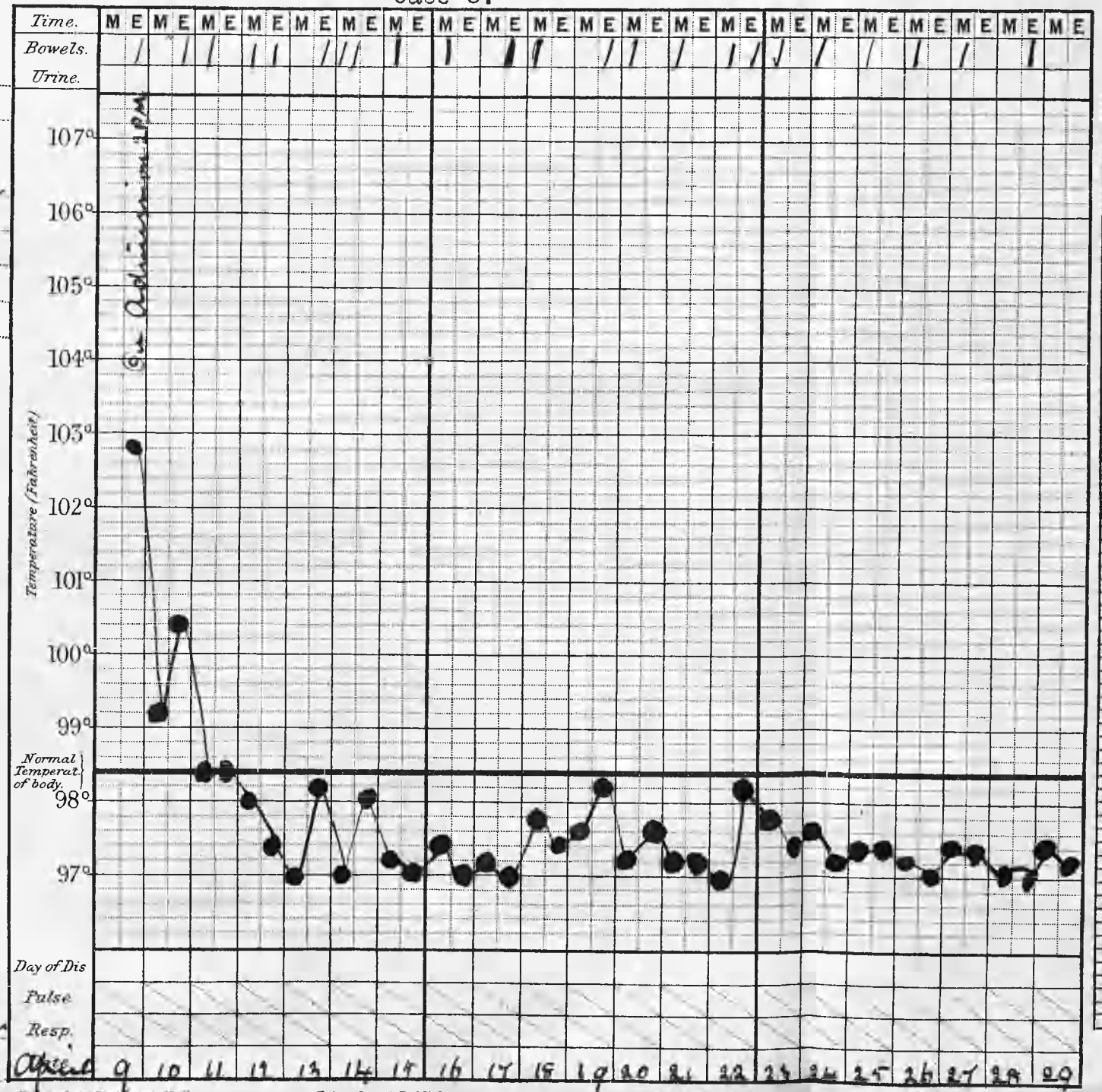
Catherine Miller.

15 yrs.

Book No.

Date of admission.

June 9 1907.



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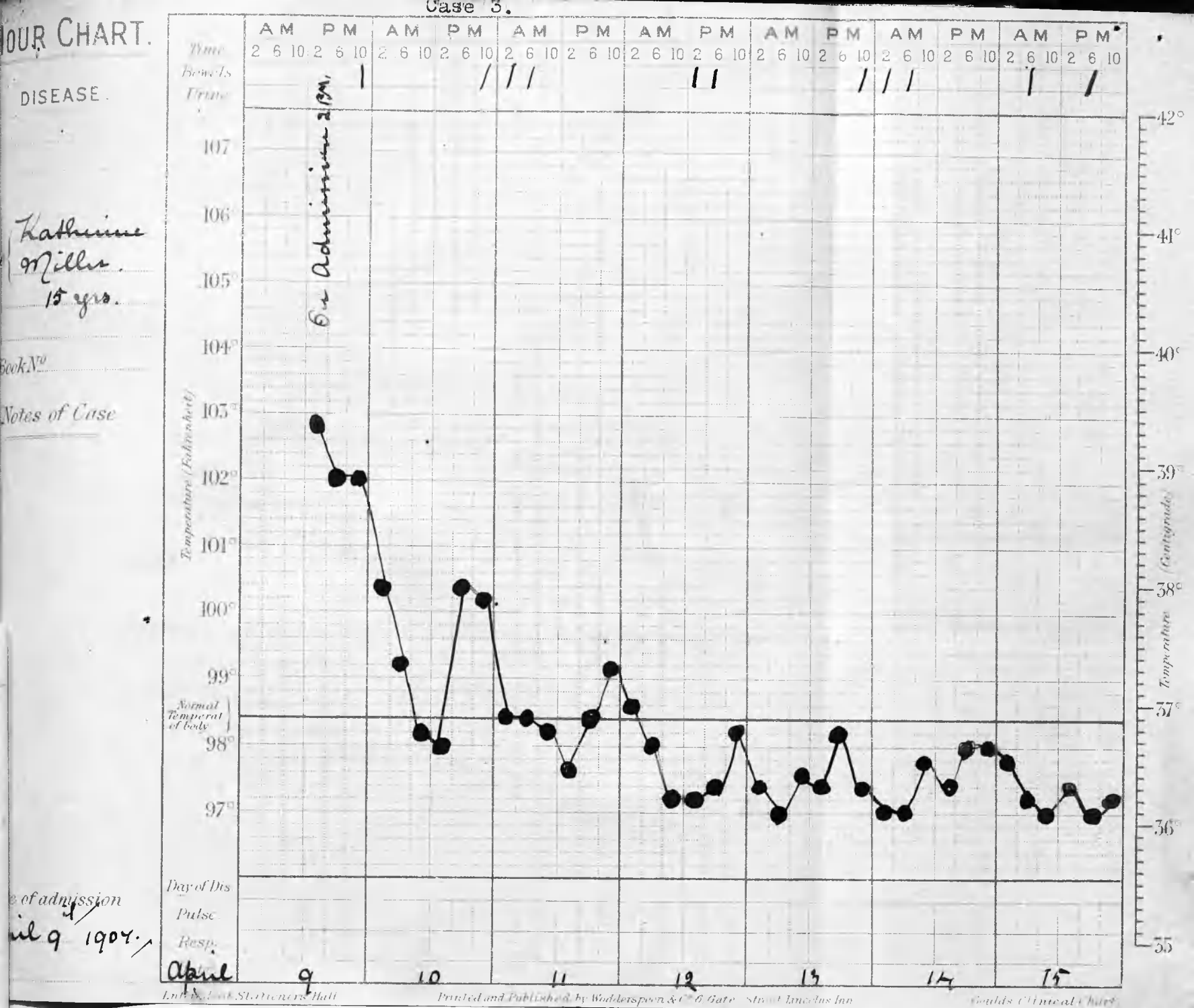
Case 3.


OUR CHART.
DISEASE.
Katherine Miller.
15 yrs.
Book No.
Notes of Case
e of admission
il 9 1904.
Time
Bowels
Urine
AM PM
2 6 10 2 6 10
6 a Admission 2 PM.
Temperature (Fahrenheit)
107
106
105
104
103
102
101
100
99
Normal Temperature of body
98
97
Day of Dis
Pulse
Resp.
April
9
10
11
12
13
14
15
42°
41°
40°
39°
38°
37°
36°
35
Temperature (Centigrade)
Lund & Lock Stationers Hall
Printed and Published by Wodderspoon & Co 6 Gate Street Lincolns Inn
Gouldis Clinical Chart

F. N., aged 6, was admitted to hospital on April 11, with a history of sore-throat six weeks before, and of an attack of haematuria a week ago.

On admission, no rash and no desquamation could be seen anywhere.

There was a slight general glandular enlargement.

The heart and lungs were normal.

Albuminuria was found on each occasion that the urine was examined, but in diminishing amount.

Tincture of steel was prescribed.

By May 22, the patient was well enough to go home, having been in hospital thirty-six days.

Case 4.

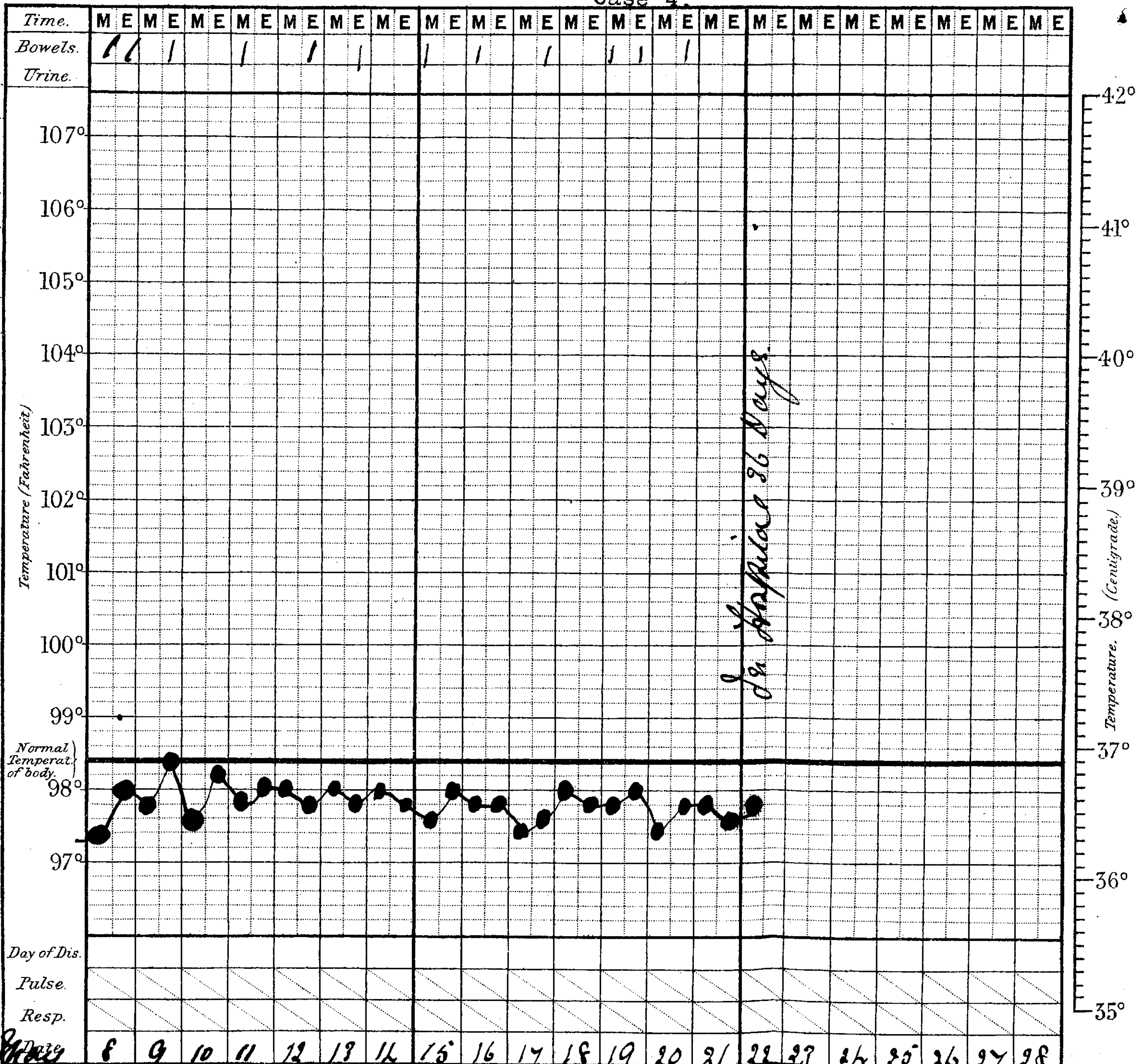
DISEASE.

Notes of Case.

Friederick
Needham
6 yrs

Book No.

Date of admission.
April 17th 1907



Case 4.

DISEASE.

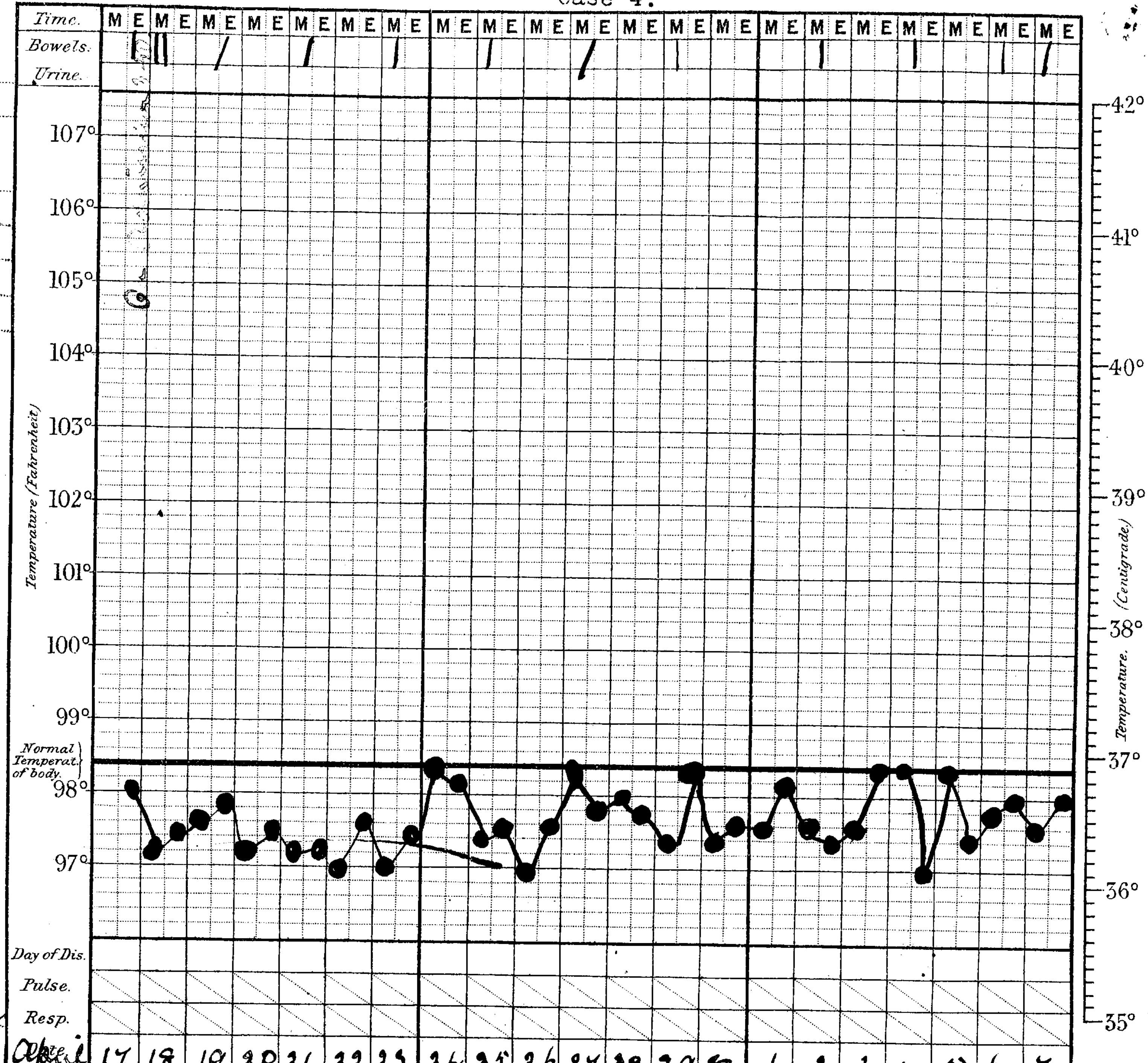
Notes of Case.

Name { Frederick Newman 7 18.

Book No.

Date of admission.
April 17 1904

Result



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Case 5.

H. K., aged 23, was admitted to hospital on April 5, having been ill for six days. His illness started with "shaking" and a sore-throat.

On admission, there was a dull-red rash on his chest and arms, brighter red on his legs and thighs.

His tongue was red and dry. The fauces were red, the tonsils were swollen and discharging, but no membrane was present.

There was general glandular enlargement, especially marked on the left side of the neck.

A pleuritic friction sound was heard at the left base in the axillary line.

By April 10, the general condition had improved: herpes had developed round the mouth.

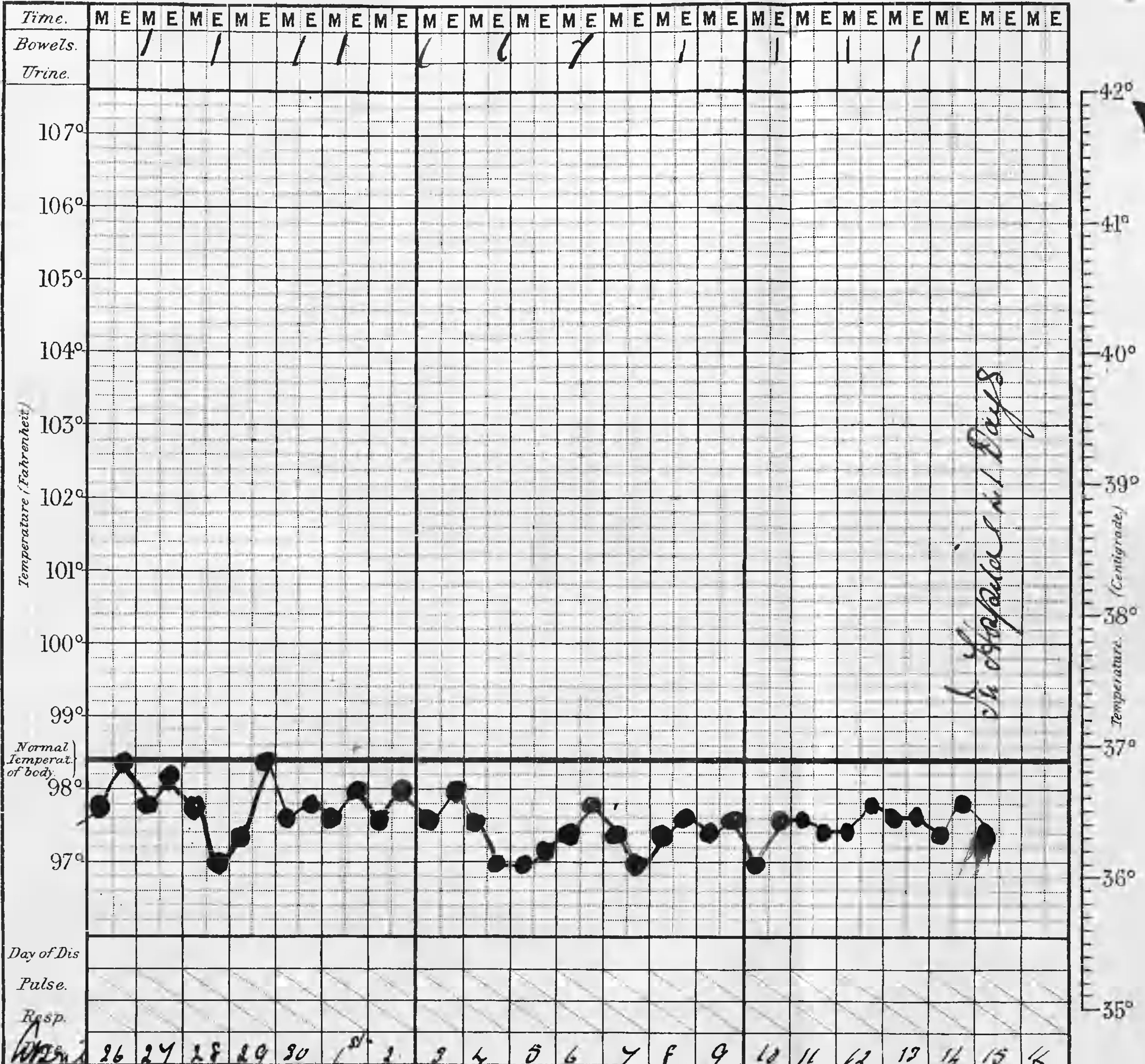
There was a slight trace of albumin, which, however, had quite disappeared by May 14,- when the patient was discharged after a residence of forty-one days in hospital.

DISEASE.

Notes of Case.
Harry
Thingswood
23 yrs

Book No.

Date of admission.
April 15th /07



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Case 5.

DISEASE.

Notes of Case.

Harry Kingswood
23 yrs.

Book N°

Date of admission.
April 5 1902

Time.
Bowels.
Urine

Temperature (Fahrenheit)

107° 106° 105° 104° 103° 102° 101° 100° 99° 98° 97°

Normal Temperat of body

Temperature (Centigrade)

42° 41° 40° 39° 38° 37° 36° 35°

Day of Dis
Pulse.
Resp.
Date

April 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

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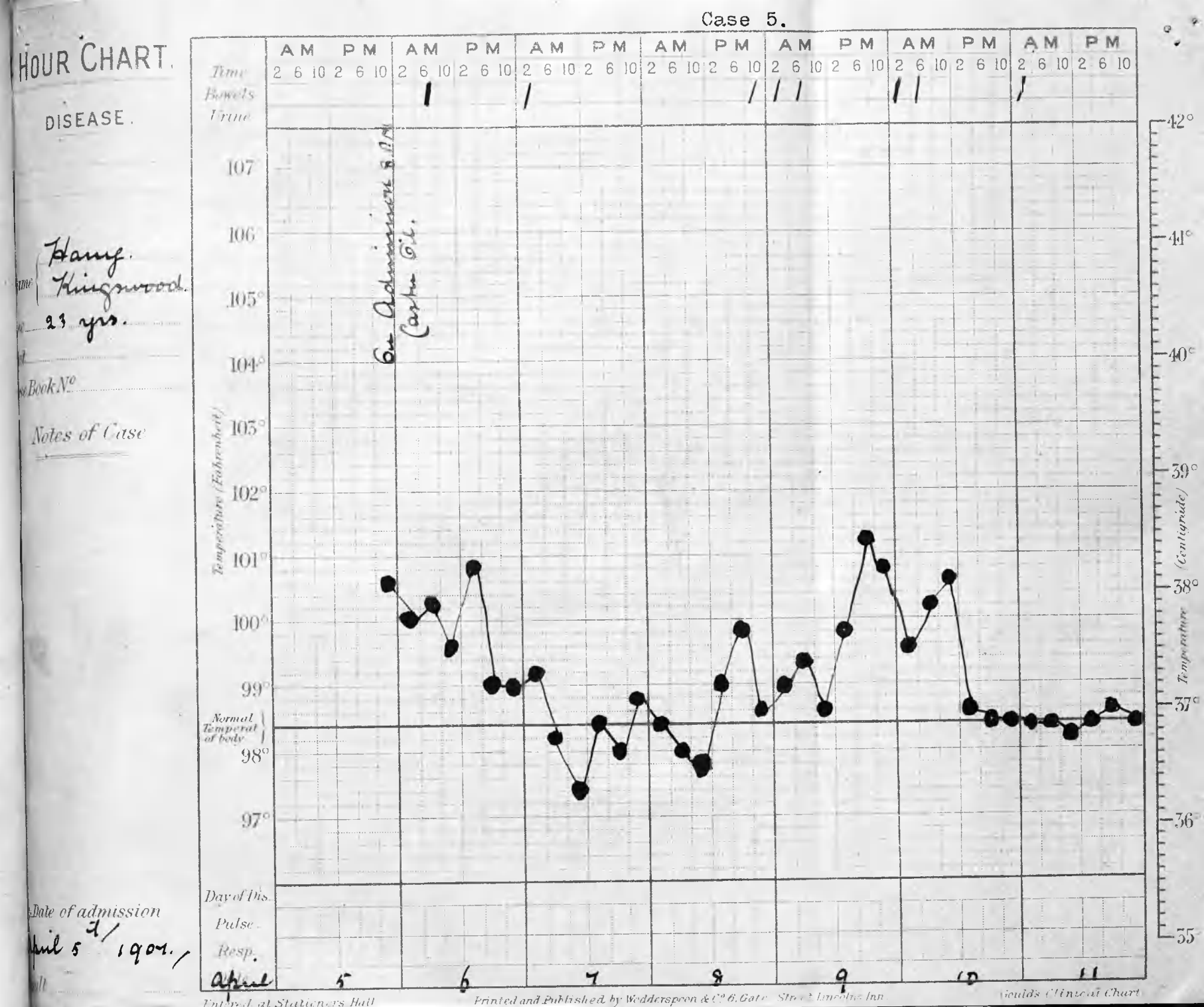
Gould's Clinical Chart.

Case 5.



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Gould's Clinical Chart
Entered at Stationers Hall

Case 6.

H. R., aged 24, was admitted to hospital on April 4, with a history of two days' illness.

On admission he had a bright-scarlet rash on his arms and his trunk.

His temperature was 100°F., and his pulse 115.

His tongue and fauces were red, but the tonsils were not swollen. There was slight general glandular enlargement.

By April 10, desquamation was well-marked on his neck, shoulders, back, and sides.

On April 25, his temperature was 103°F., accompanied by redness of the fauces; but there was no membrane there present.

On the 27th, 28th, and 29th, his temperature continued high, and a slight systolic murmur developed at the apex of the heart.

There was a trace of albumin observed in the urine, but no tube-casts could be discovered.

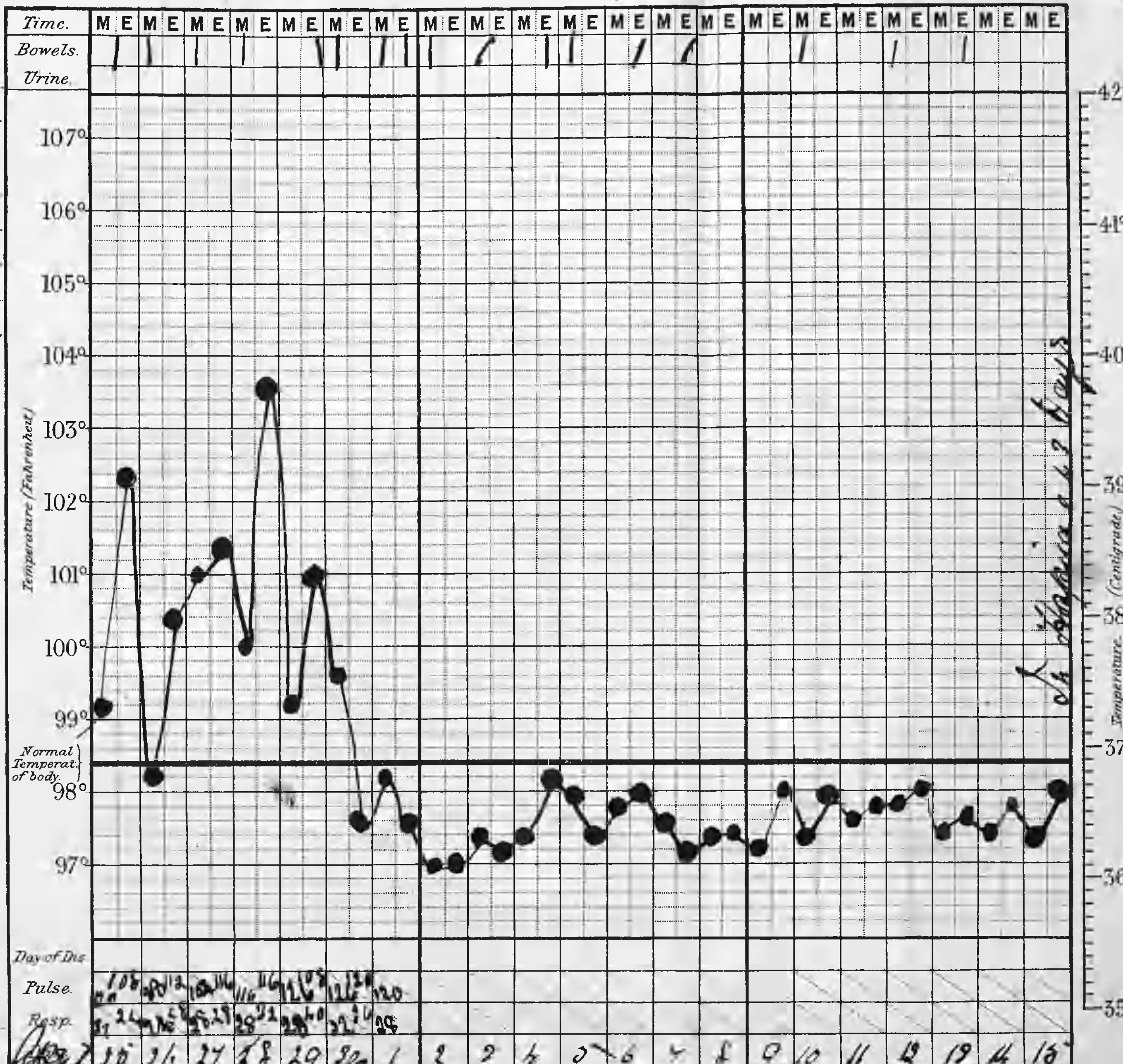
On May 16, the patient was discharged cured, his heart having recovered, and his urine having become normal again.

DISEASE.

Notes of Case.
Herbert Keeling
24 yrs

Case Book No.

Date of admission
April 24/07



Case 6.

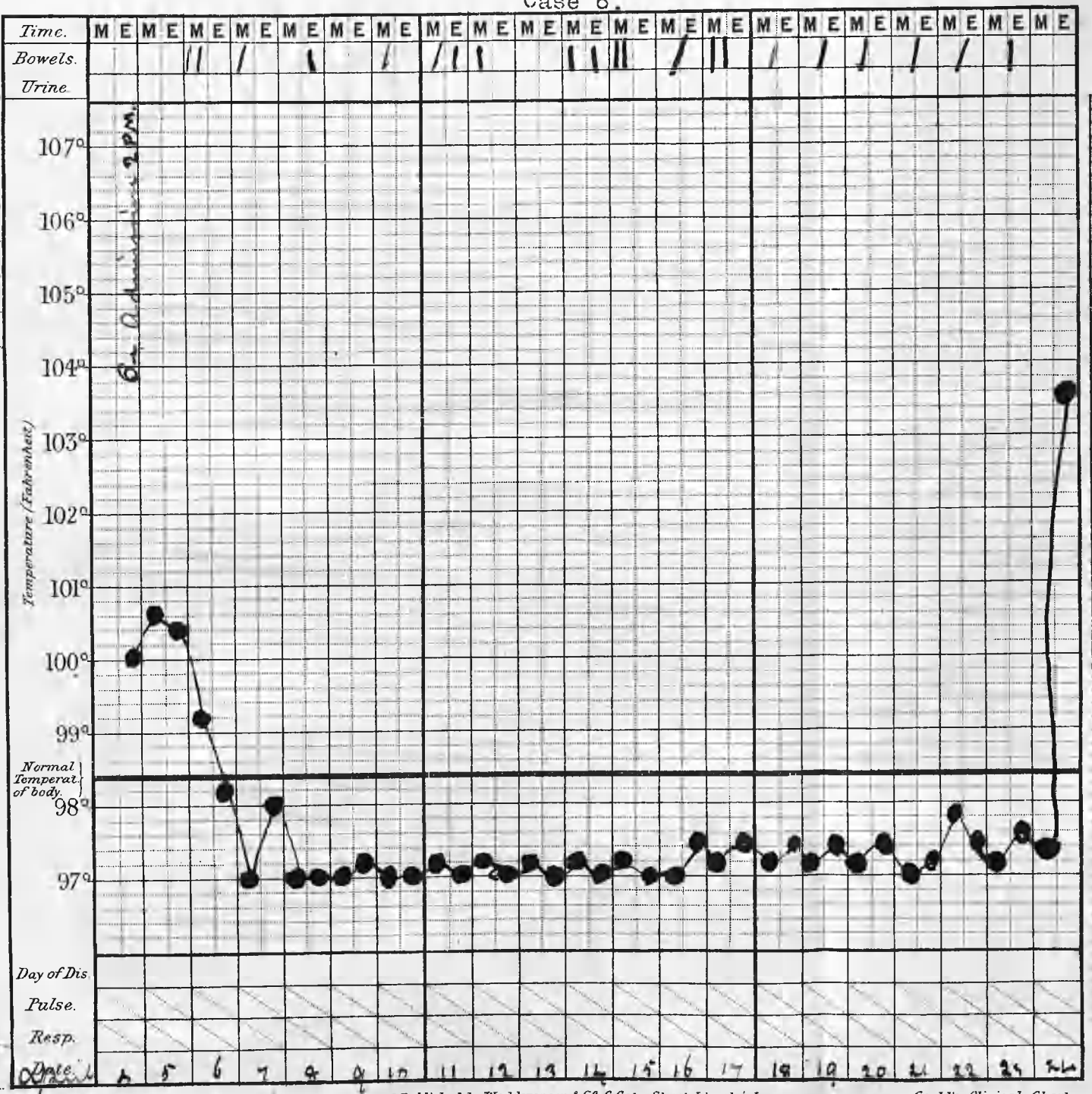
DISEASE.

Notes of Case.

Herbert.
Rusling.
24 yrs.

Book No.

Date of admission.
April 4 1901.



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HOUR-CHART.

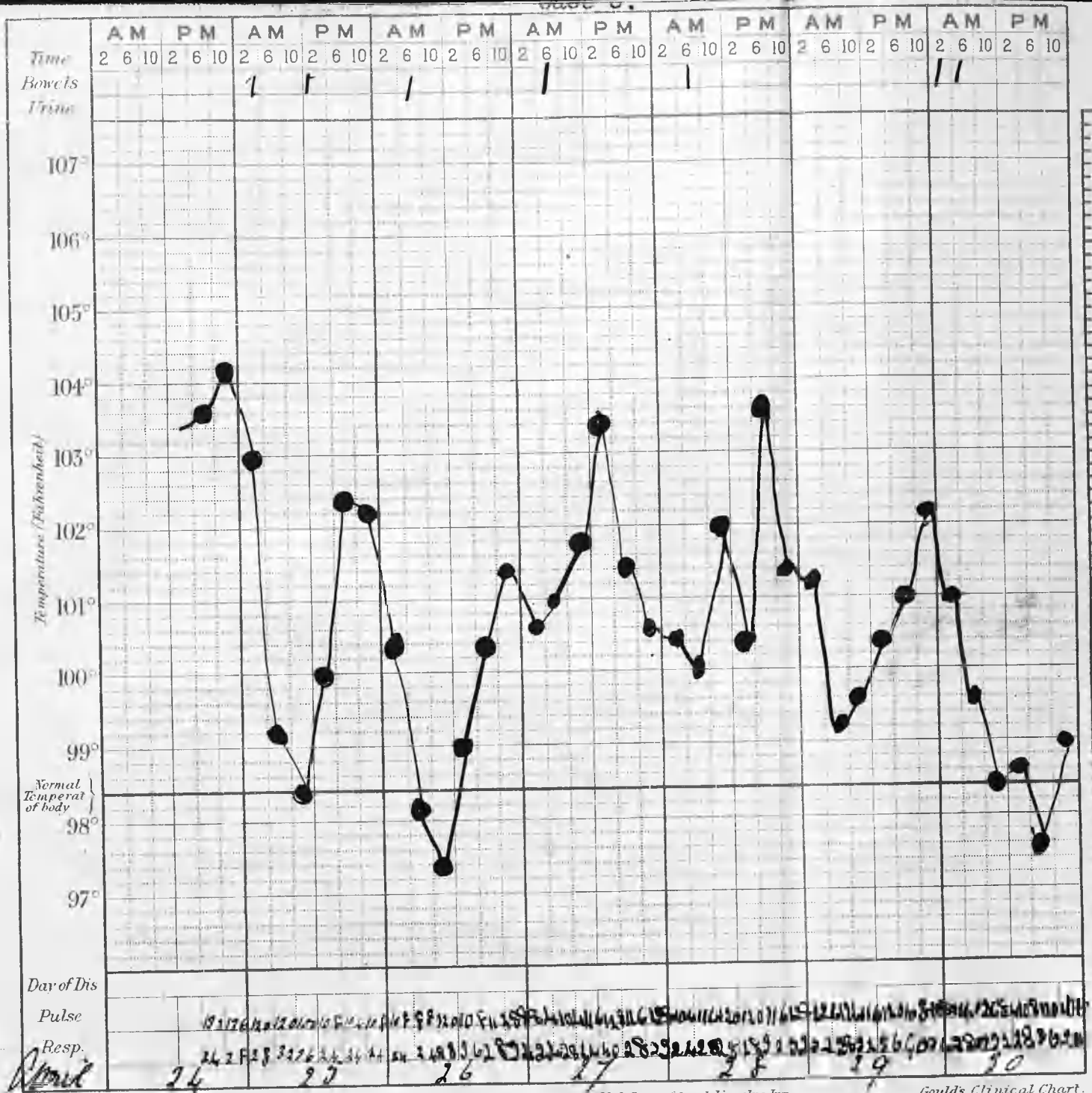
DISEASE.

Herbert-
Rustig
24 yrs

Book No.

Notes of Case

Date of admission
Oct 4th 07



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Goulds Clinical Chart.

Case 7.

L. S., aged 17, was admitted to hospital on April 4, having been ill for a fortnight.

On admission his temperature was 99° F. and pulse 80.

His tonsils were somewhat swollen.

There was no glandular infiltration.

There was a branny desquamation on the face, neck, and upper part of the chest.

The ears and nose did not discharge.

The heart and lungs were normal, and there was no albuminuria.

Desquamation was well-marked on the regions mentioned, but did not appear on the arms or hands.

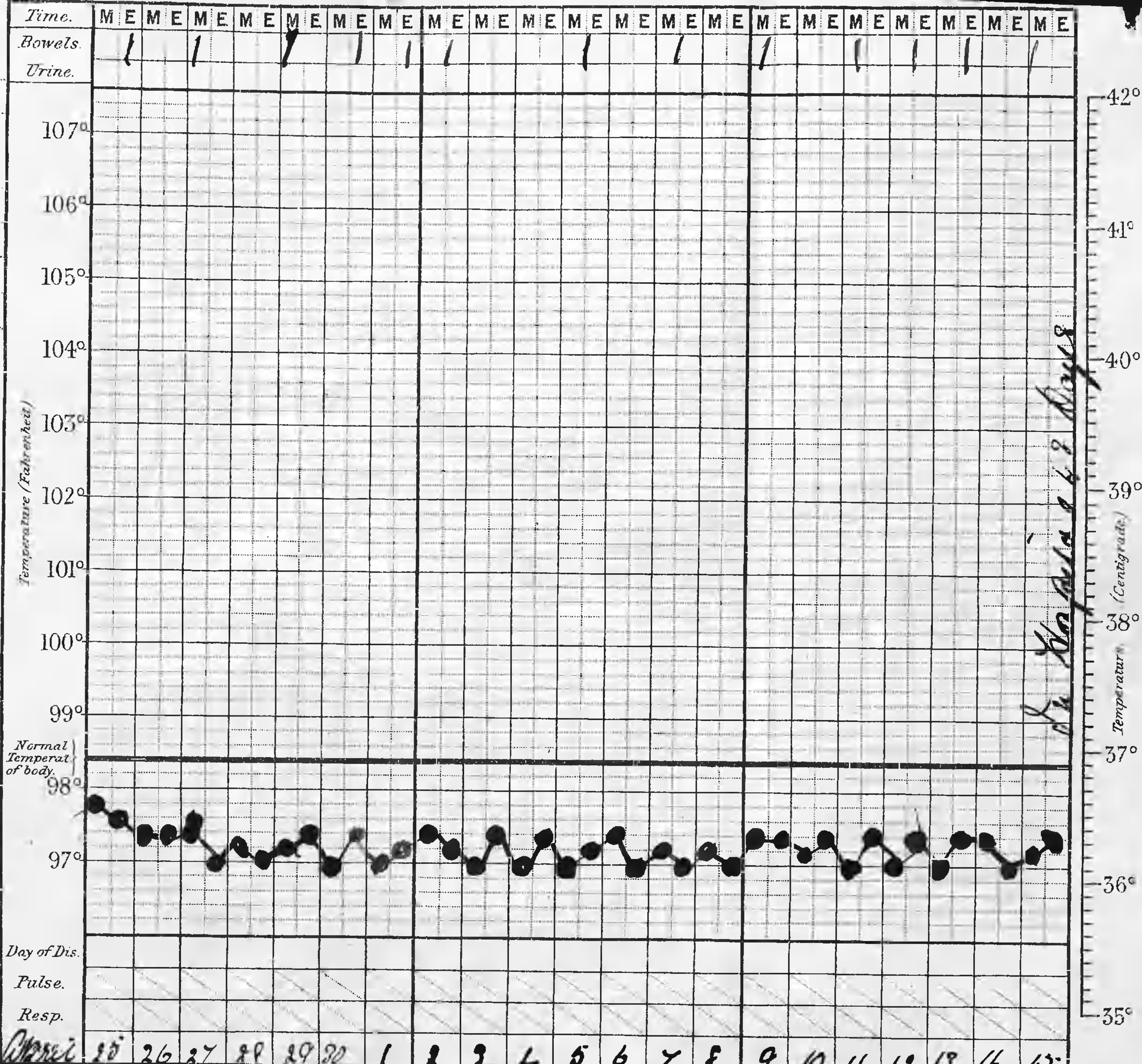
On the 16th, the patient was discharged cured.

DISEASE.

Notes of Case.

Louisa
Paxton
17 yrs

Book No.



Date of admission.
April 4th/07

Case 7.

DISEASE.

Notes of Case.

Louisa.

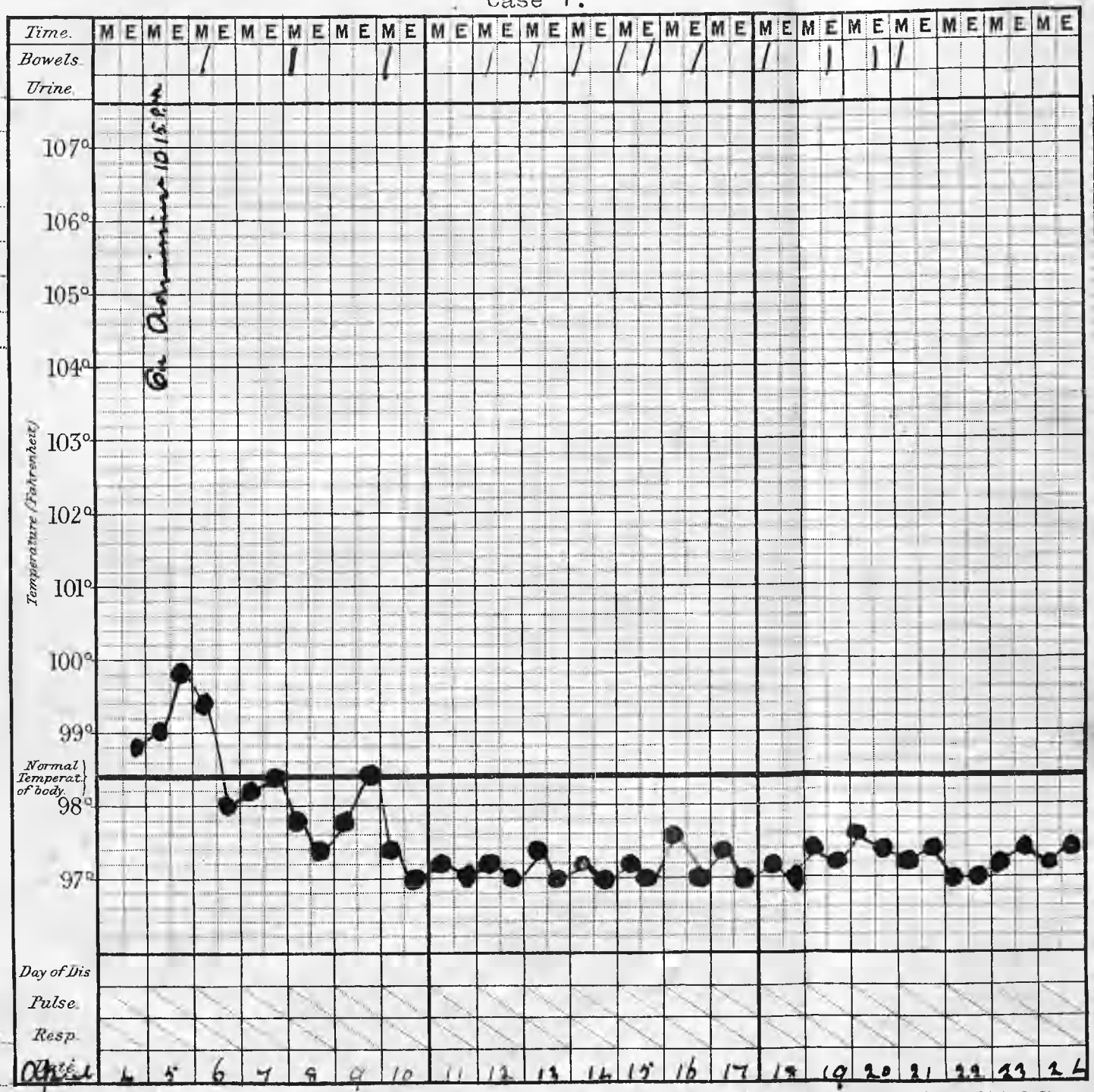
Saxton.

17 yrs.

Book N°

Date of admission.

April 4 1907.



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Case 8.

E. C., aged 5, was admitted to hospital on March 23, with a history of eight days' illness.

On admission, he had no rash and no glandular enlargement. His temperature was normal.

On April 7, his temperature rose to 103.4°F., his face became puffy, the urine was smoky and contained some blood-corpuscles.

A faint systolic murmur was heard at the apex, which by the 13th was well-marked.

On the 27th the urine had become normal; and, on May 15, the patient was sent home after a stay of fifty-four days in hospital.

Case 8.

DISEASE.

Notes of Case.

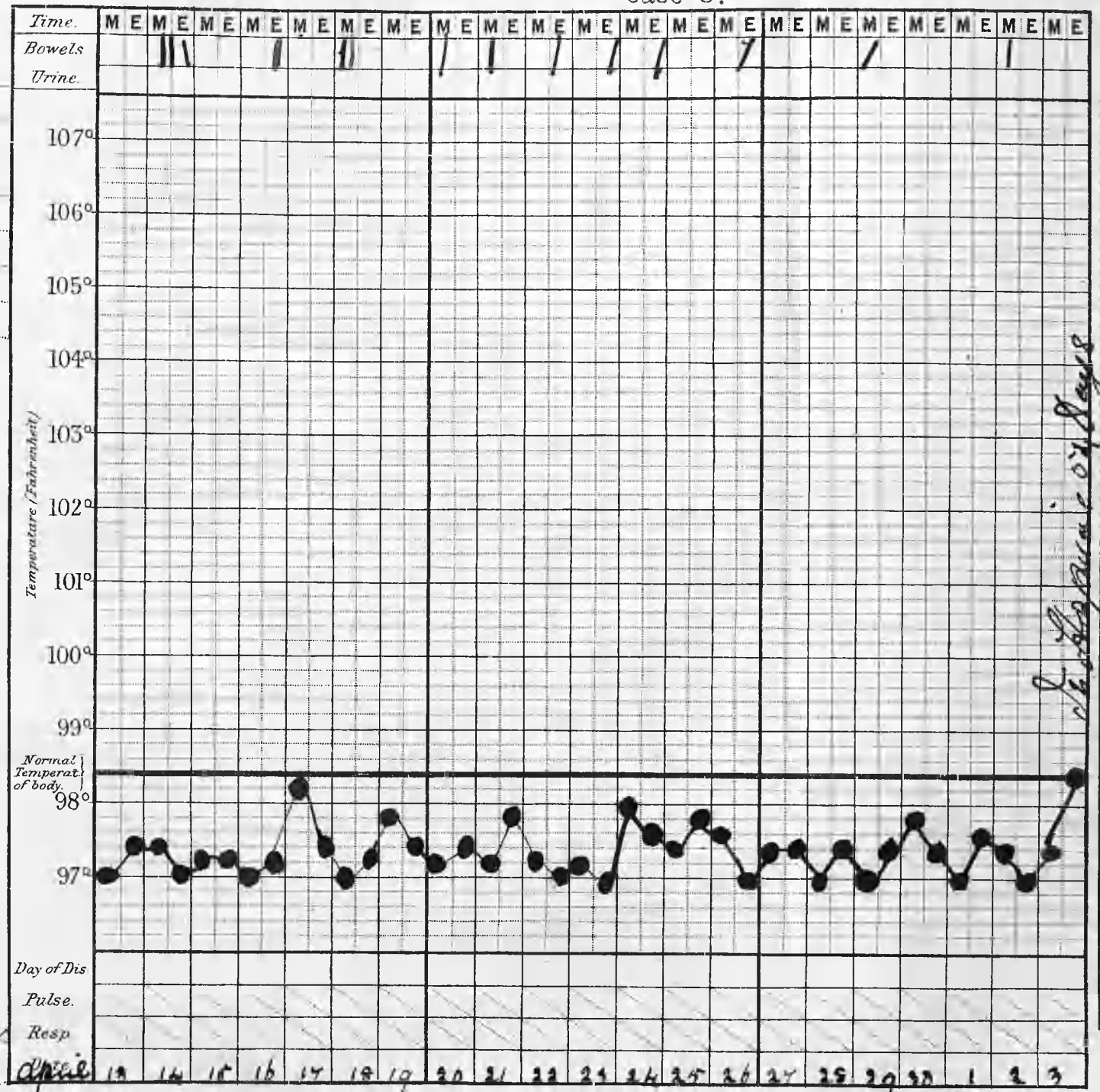
Edward Clark.

5 yrs.

Book No.

Date of admission.

March 23 1907.



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Graphic Temperature Chart.

Case 8.

DISEASE.

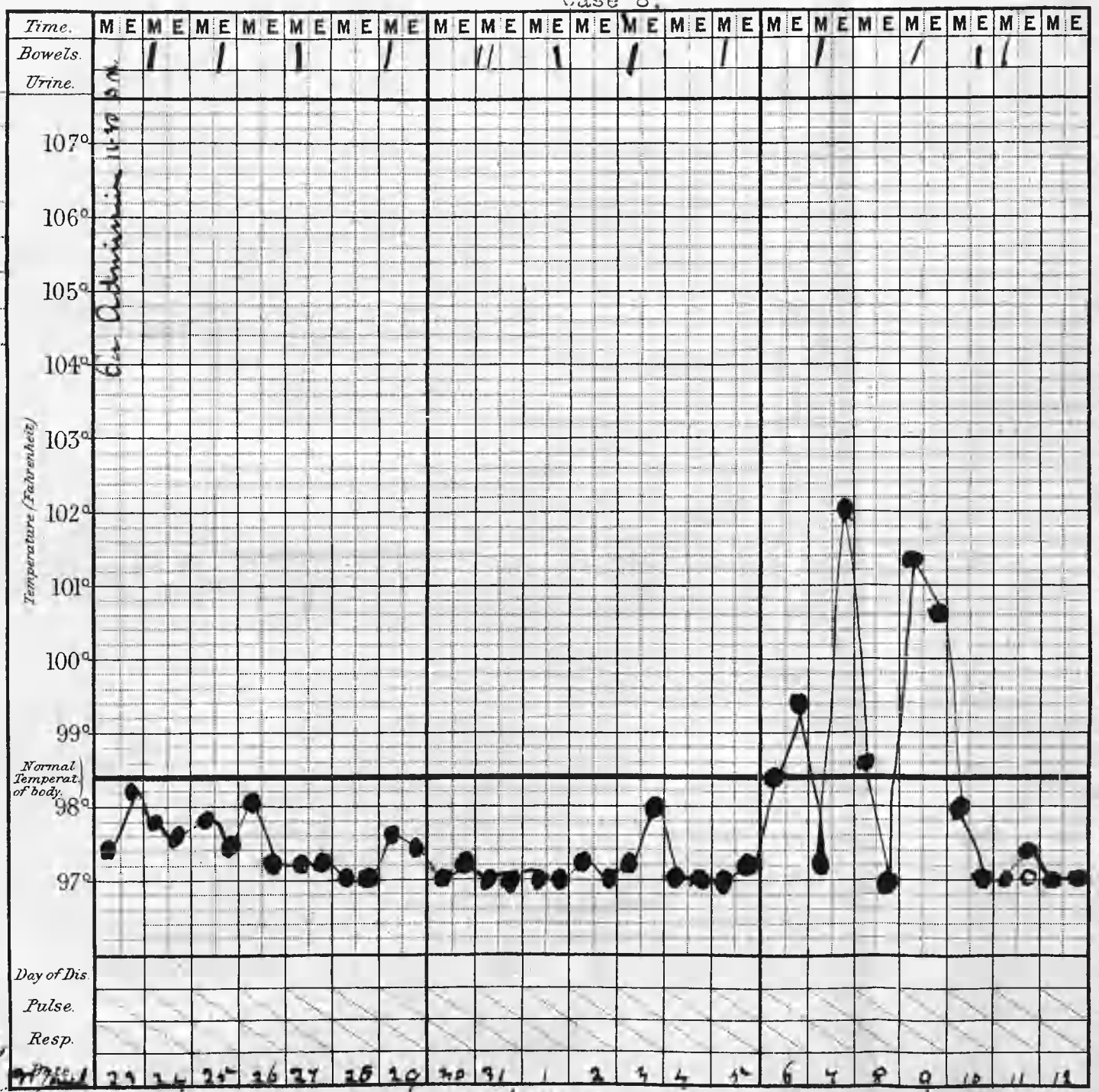
Notes of Case.

Edward Clark 5 yrs

Book No.

Date of admission. March 23rd 1907

Result



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Case 8.

HOUR CHART.

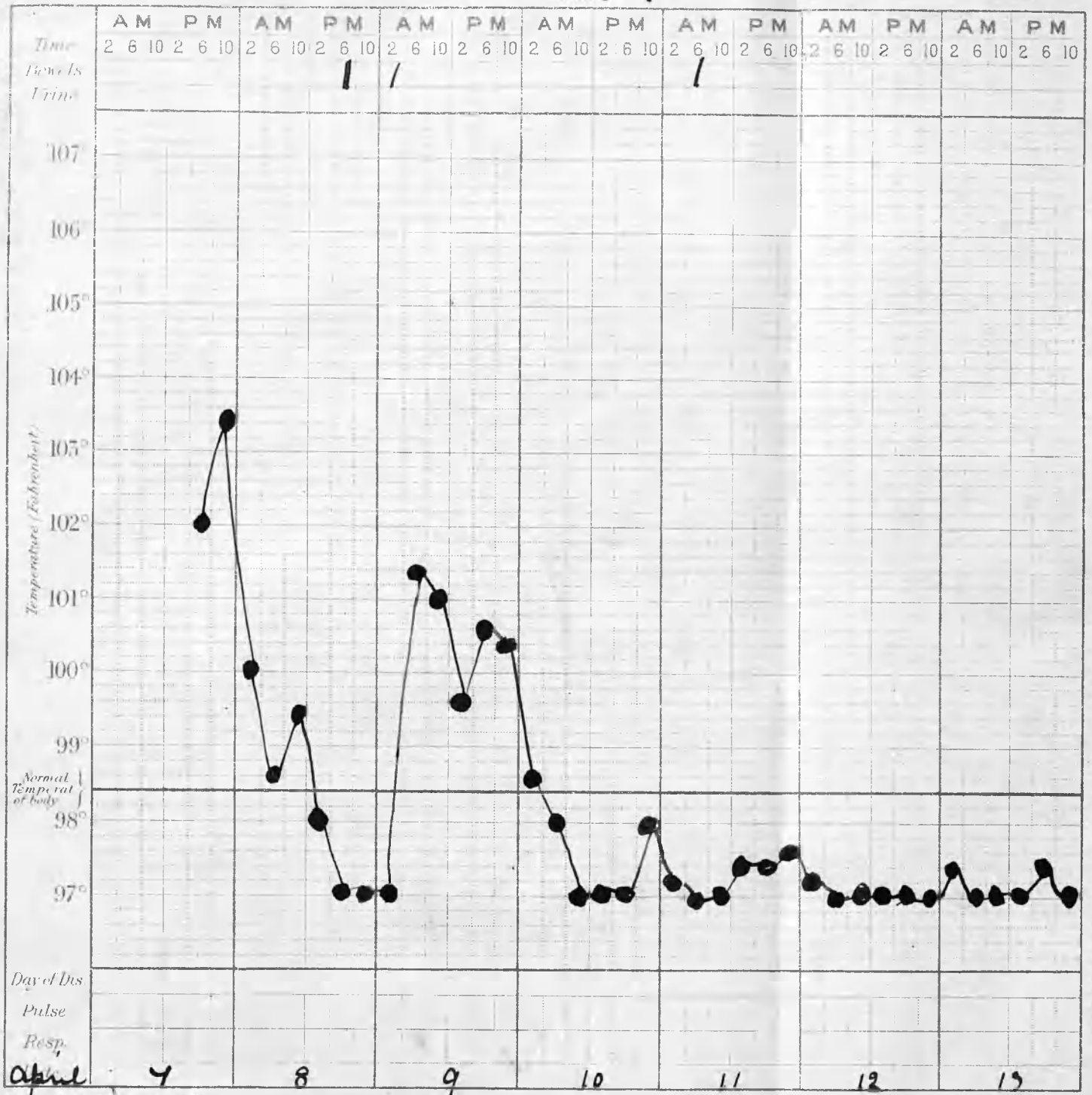
DISEASE

Edward Clarke.
5 yrs.

Book No.

Notes of Case

of admission
ch 23 1904.



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Goulds Clinical Chart.

Case 9.

C. B., aged 20, was admitted to hospital on March 4, having been ill for four days.

On admission, his temperature was 100·F., and pulse 120.

He had a scarlet rash which was fading; his tongue was red, the papillae prominent, and he had a nasal discharge.

His throat was red and inflamed.

On March 13, he developed pain and swelling in both wrists and ankles.

His heart and lungs were normal, and he had no albuminuria.

Ten grains of salicylate of sodium were administered; and, by April 13, his rheumatism had quite disappeared.

On the 18th he was quite sound, his nasal discharge having quite ceased after being treated with formalin; and he was now discharged, having been in hospital for forty-seven days.

Case 9.

DISEASE.

Notes of Case.

Name Charles Brown.

Age 20 yrs.

Book No.

Time. M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E

Bowels.

Urine.

Temperature (Fahrenheit)

107° 106° 105° 104° 103° 102° 101° 100° 99°

Normal Temperat. of body. 98° 97°

9a Typhoid 14 days.

42° 41° 40° 39° 38° 37° 36° 35°

Temperature (Centigrade)

Day of Dis.

Pulse.

Resp.

Date. 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Date of admission. March 24th 1904.

Result Dis April 10th 1904.

Entered at Stationers Hall. Printed in April by Wodderspoon & Co. 6, Gate Street, Lincolns Inn. Gould's Clinical Chart.

Case 9.

DISEASE.

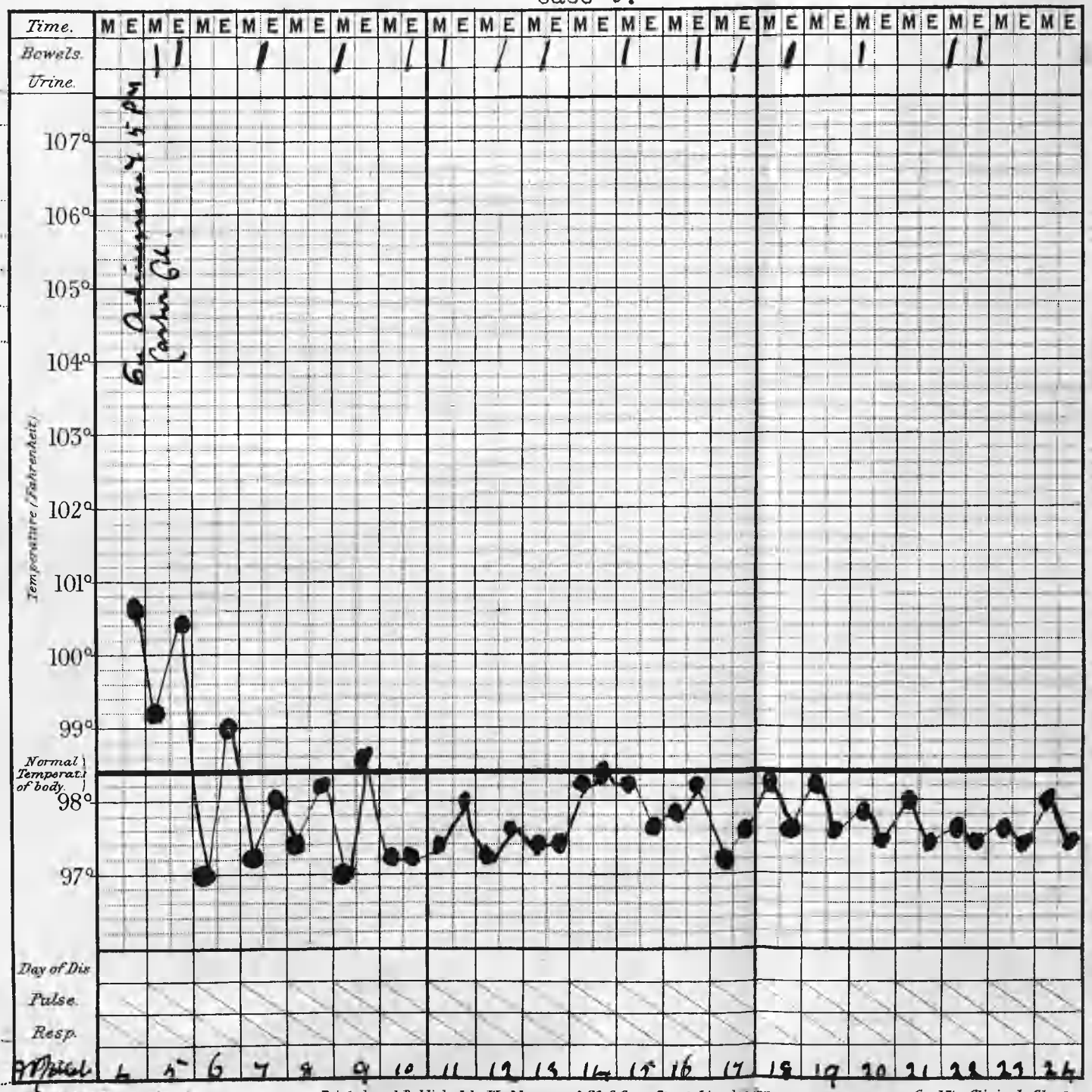
Notes of Case.

Charles Brown.
20 yrs.

Book No.

Date of admission.
March 4 1904

Result



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Gould's Clinical Chart.

Case 9.

[...]OUR CHART.

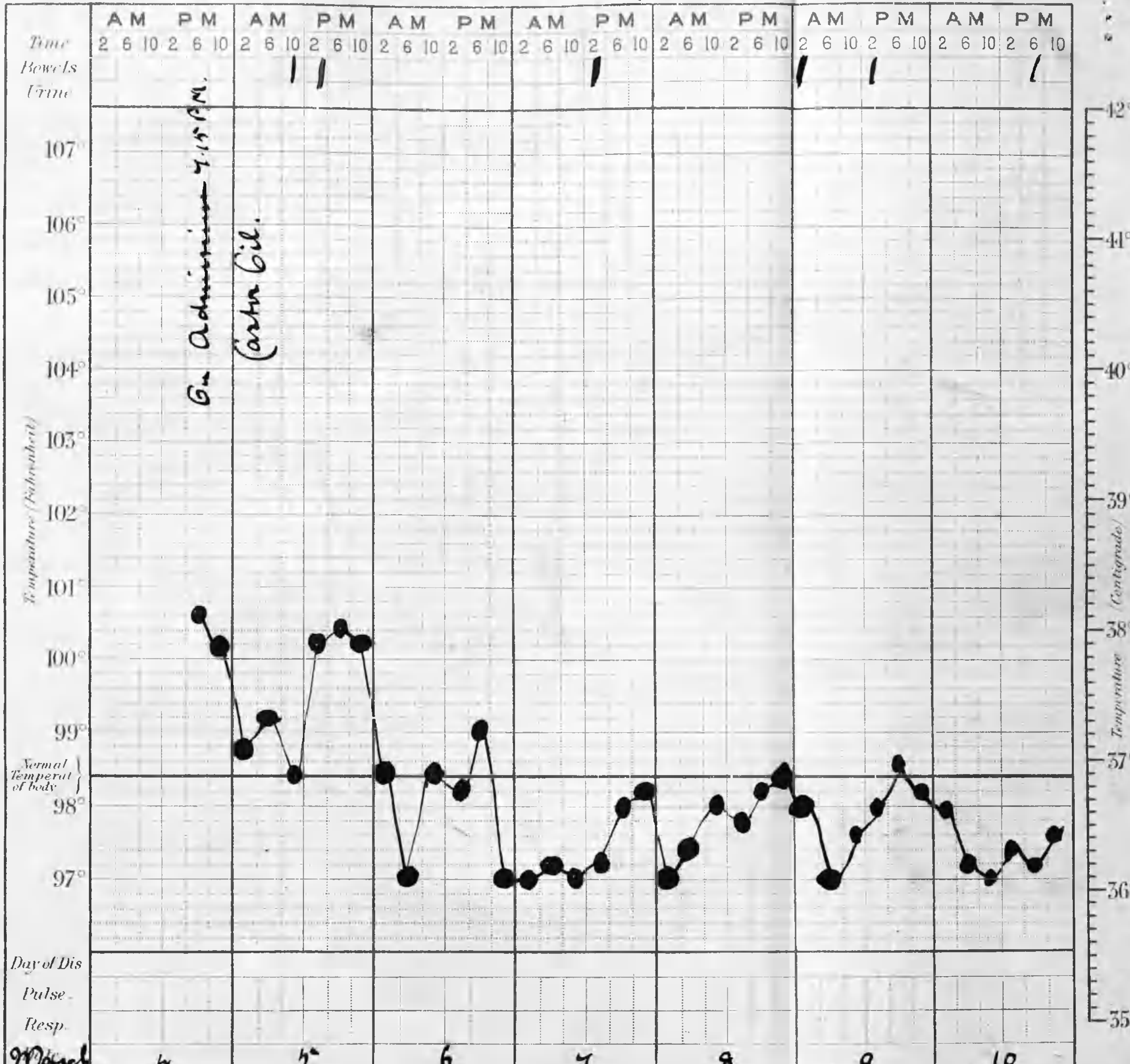
DISEASE.

Charles Brown.
20 yrs.

[...]ok No.

[...]otes of Case

[...]e of admission
[...]arch 4th 1907



Case 10.

C. H., aged 4, was admitted to hospital on March 3, after an illness of three days.

On admission, the temperature was 97° F., on the evening of the second day it reached 99.6° F., and on the fourth evening 99.8° F., and his pulse varied from 100 to 110.

The rash was fading; the tongue was coated with a whitish fur, and there was general glandular enlargement.

The nose was discharging; and there was a superficial ulcer on the chin.

The nose was syringed with 1 in 1000 formalin solution, and the chin dressed with oxide of zinc.

The urine was normal during the whole course of the illness.

By April 13, the child was well, and was discharged as cured.

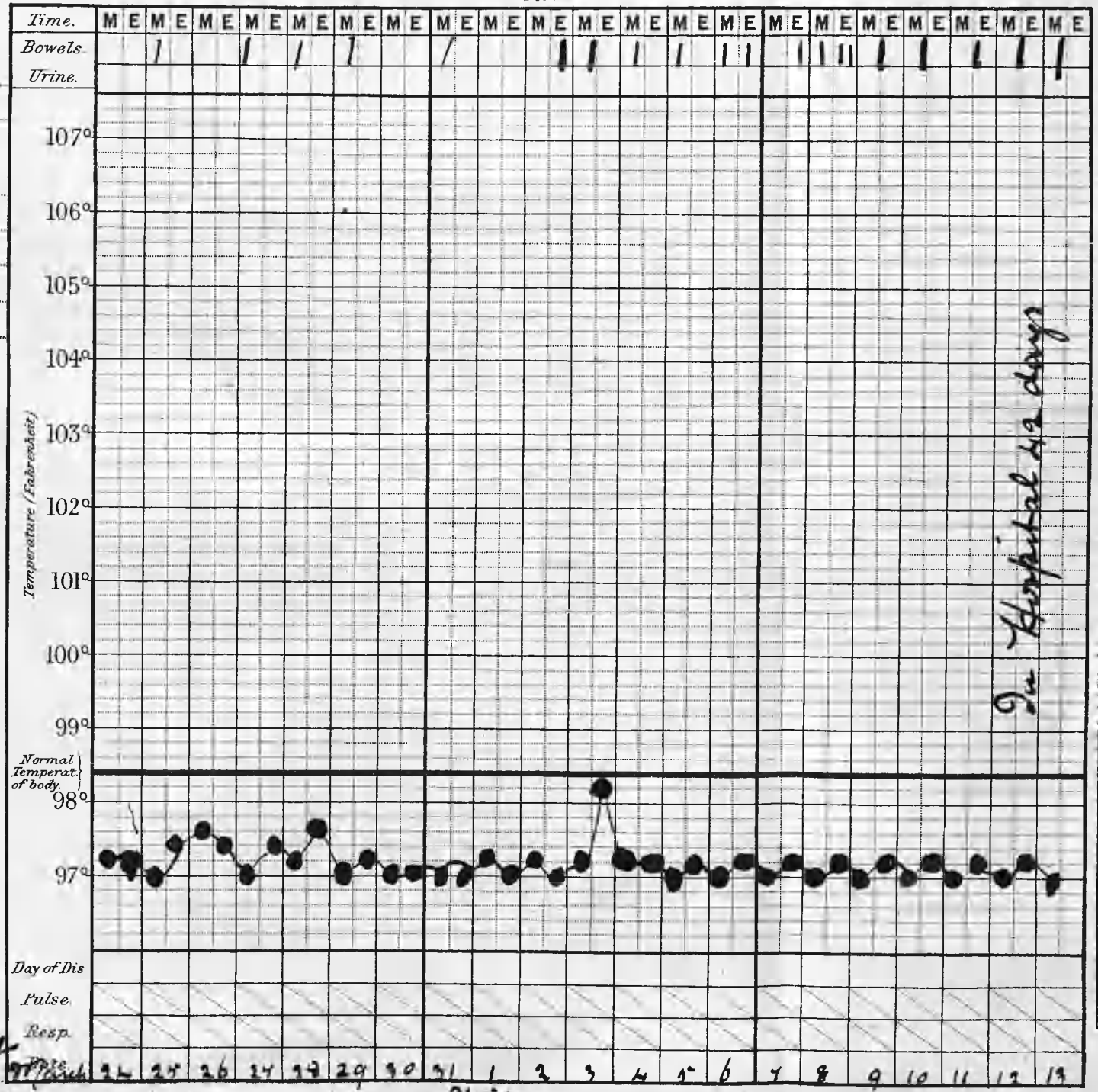
Case 10.

DISEASE.

Notes of Case.

Caroline Downes
4 yrs.

Book No.



Date of admission
March 3rd 1907.

Dis April 13th 1907.

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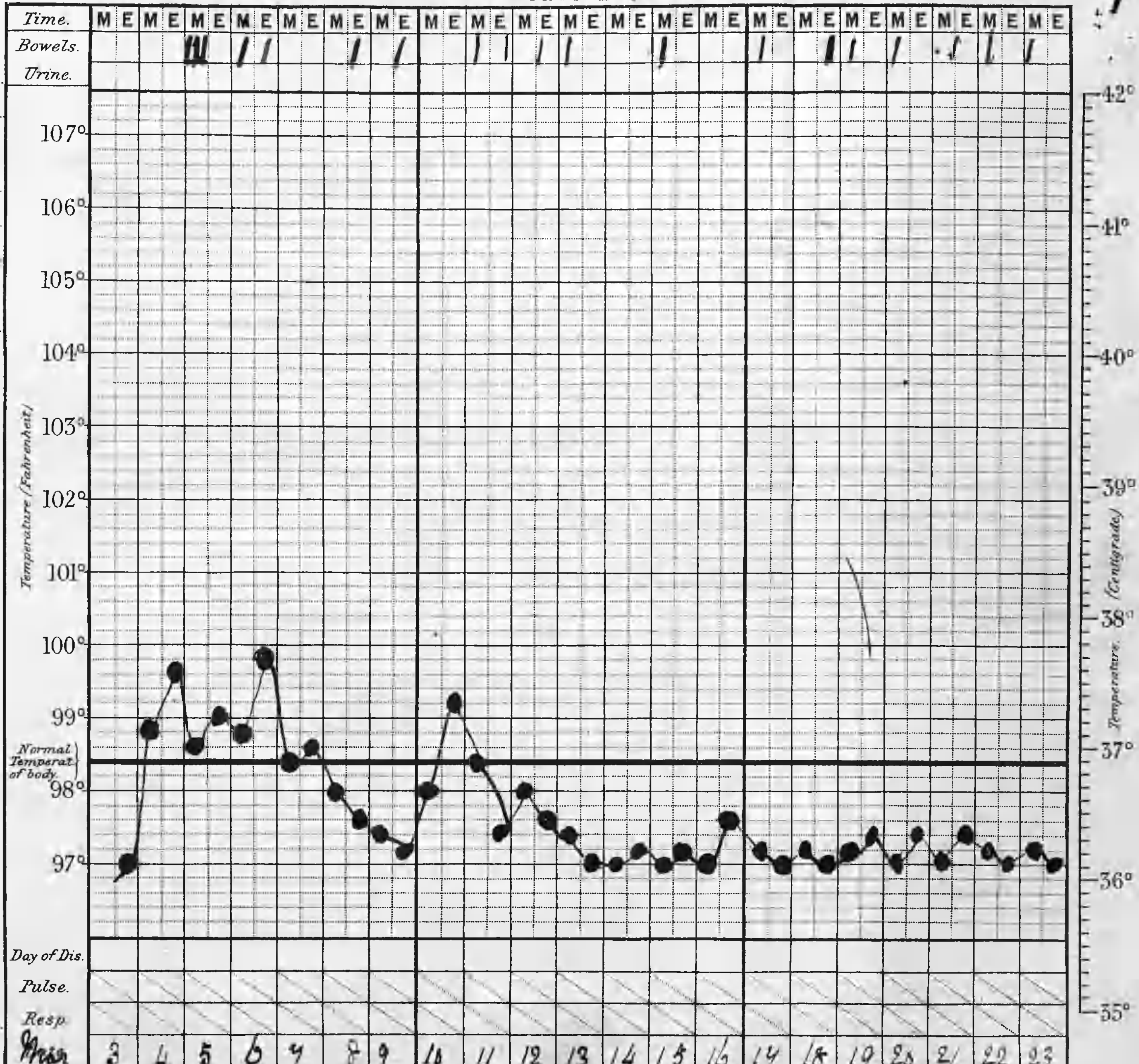
Case 10.

DISEASE.

Notes of Cas.
Caroline
Hrussen
4 Years

Book No.

Date of admission
March 3rd /07



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Case 11.

D. H., aged 2, was admitted to hospital on March 2, after an illness of four days.

On admission her temperature was 100.4°F., and her pulse 120.

There was no rash, but desquamation was evident on the trunk and limbs.

There was a profuse discharge from the nose, nasopharynx, and eyes; the tongue was ulcerated.

The nose and throat were syringed with formalin, and the child put on a mixture of chlorate of potash, tincture of steel, and glycerine.

By April 17, the child was ready to be sent home.

There was slight albuminuria while the temperature was raised; but the urine had been normal for some time before the patient was discharged.

Case 11.

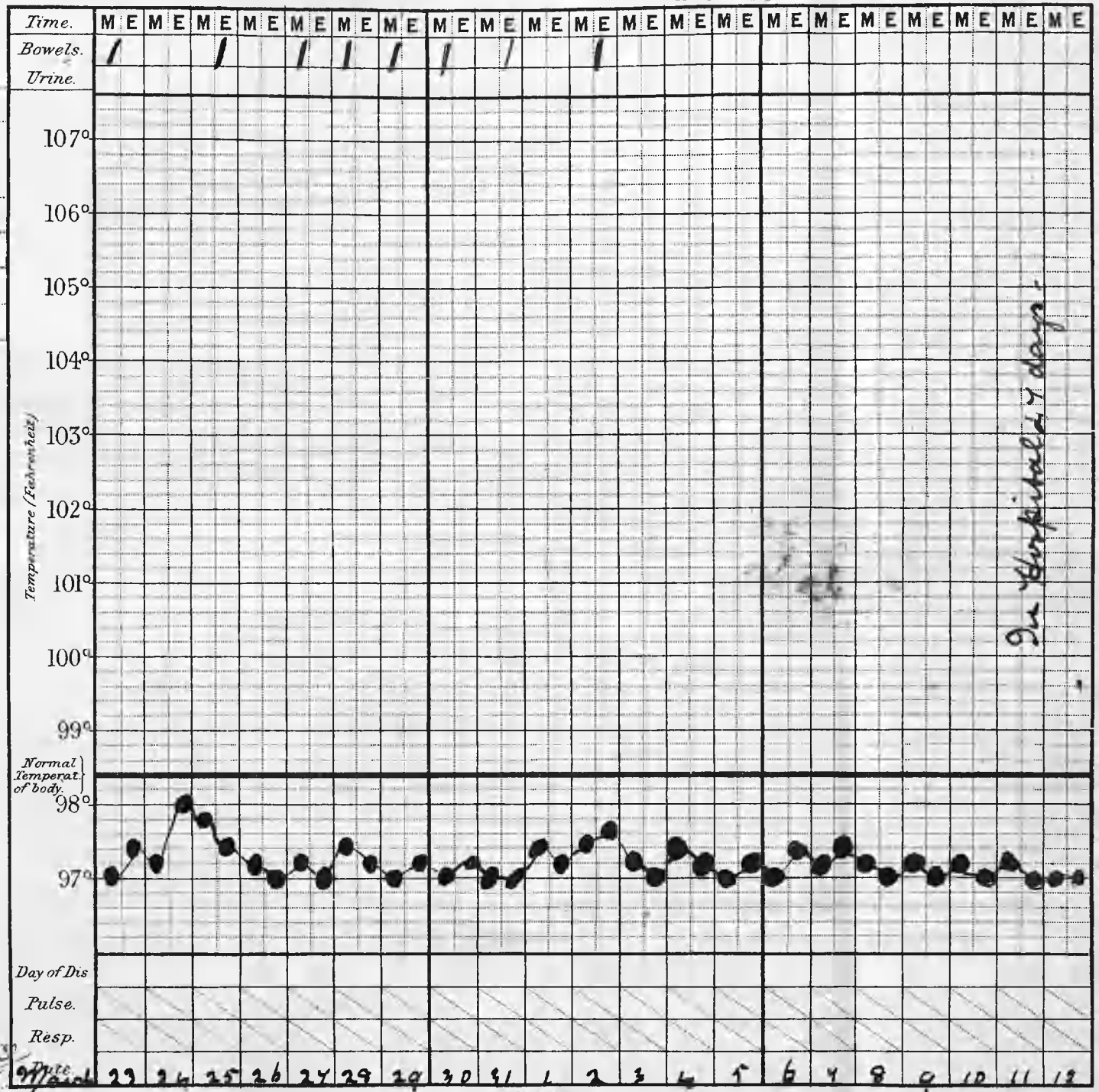
DISEASE.

Notes of Case.

Dorothy
Thomas.
2 yrs.

Book No.

Date of admission.
March 2 1904.
Date of Dis April 19
1904.



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Case 11.

DISEASE.

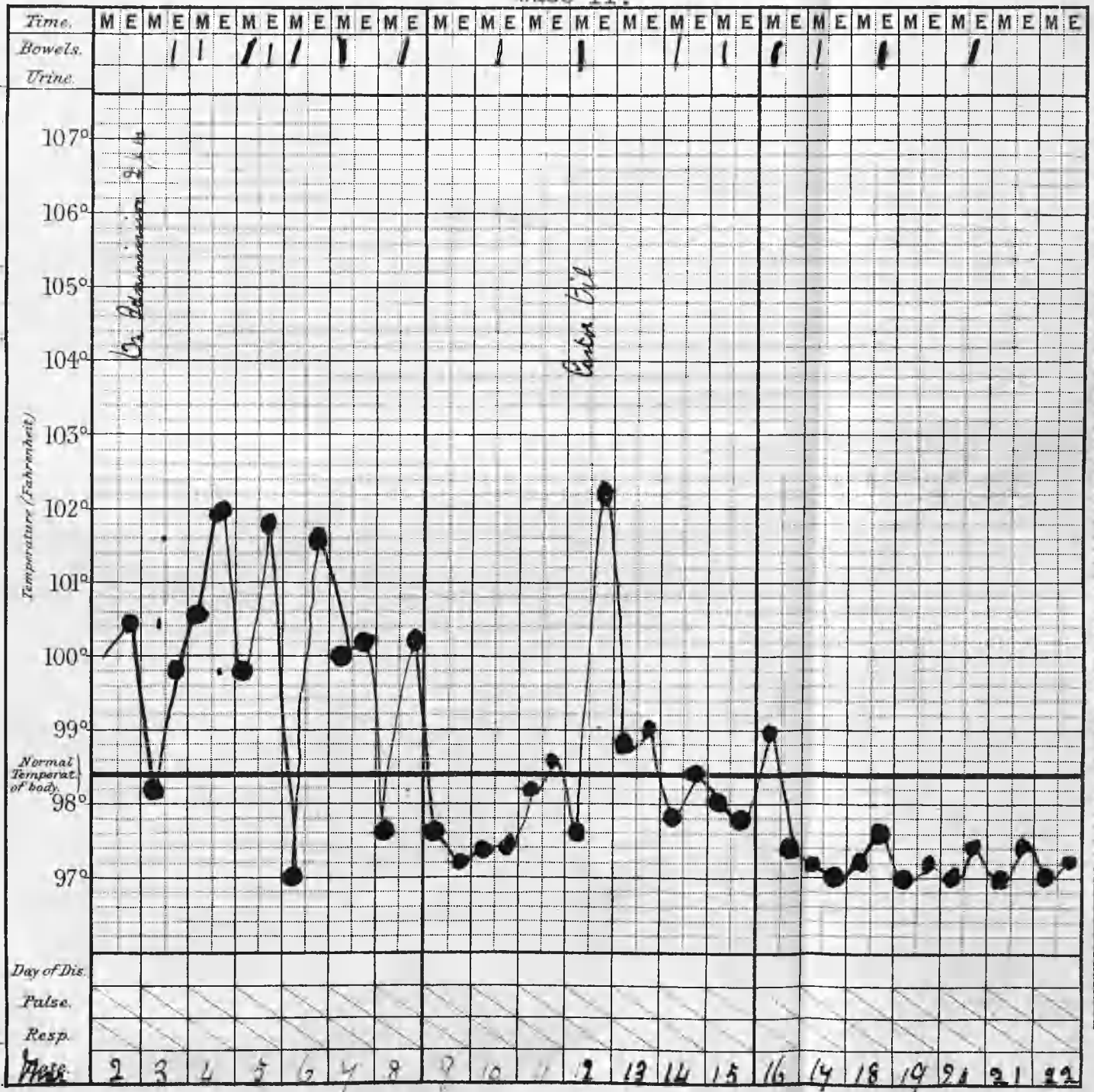
Notes of Case.

Dorothy
1 Houston
2 Lps

Book N°

Date of admission.
March 2nd 04

Result



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HOUR CHART.

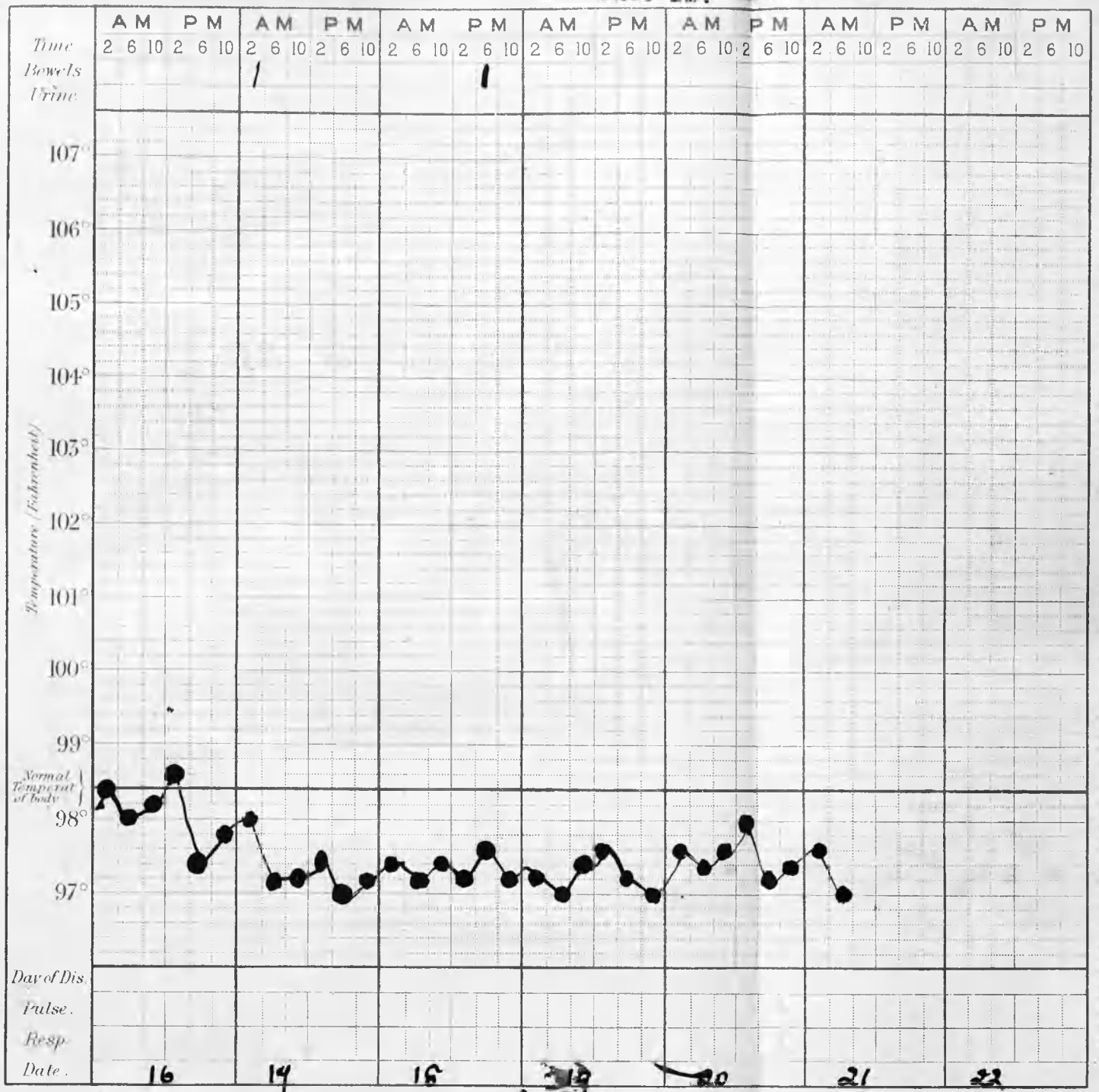
DISEASE.

Dorothy Howsen. 2 yrs.

Book No.

Notes of Case

Date of admission March 2nd/04.



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Case 11.

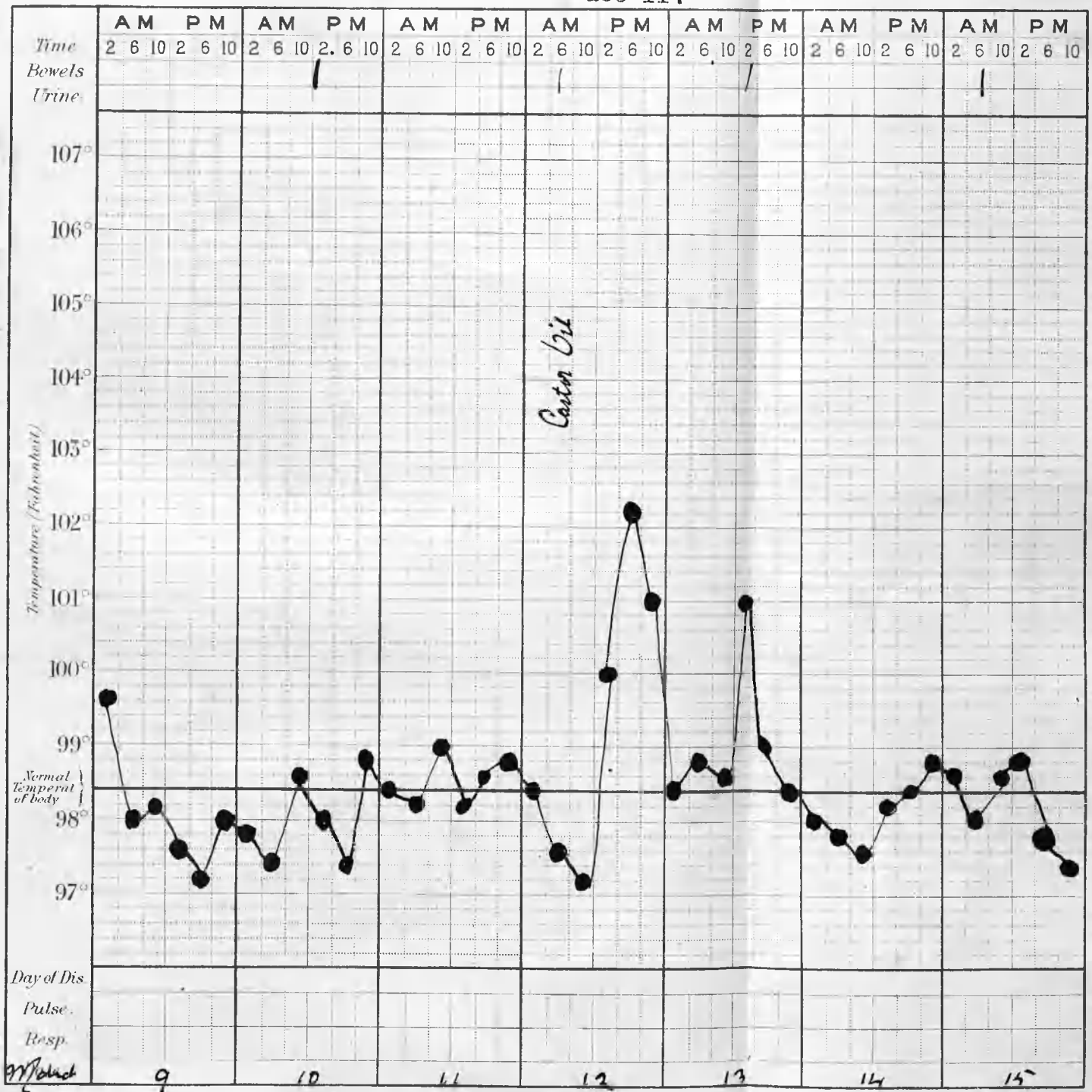
OUR CHART.

DISEASE.

Dorothy Hourn
2 yrs.

Book No.

Notes of Case



Date of admission
March 2. 1907

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Case 11.

OUR CHART.

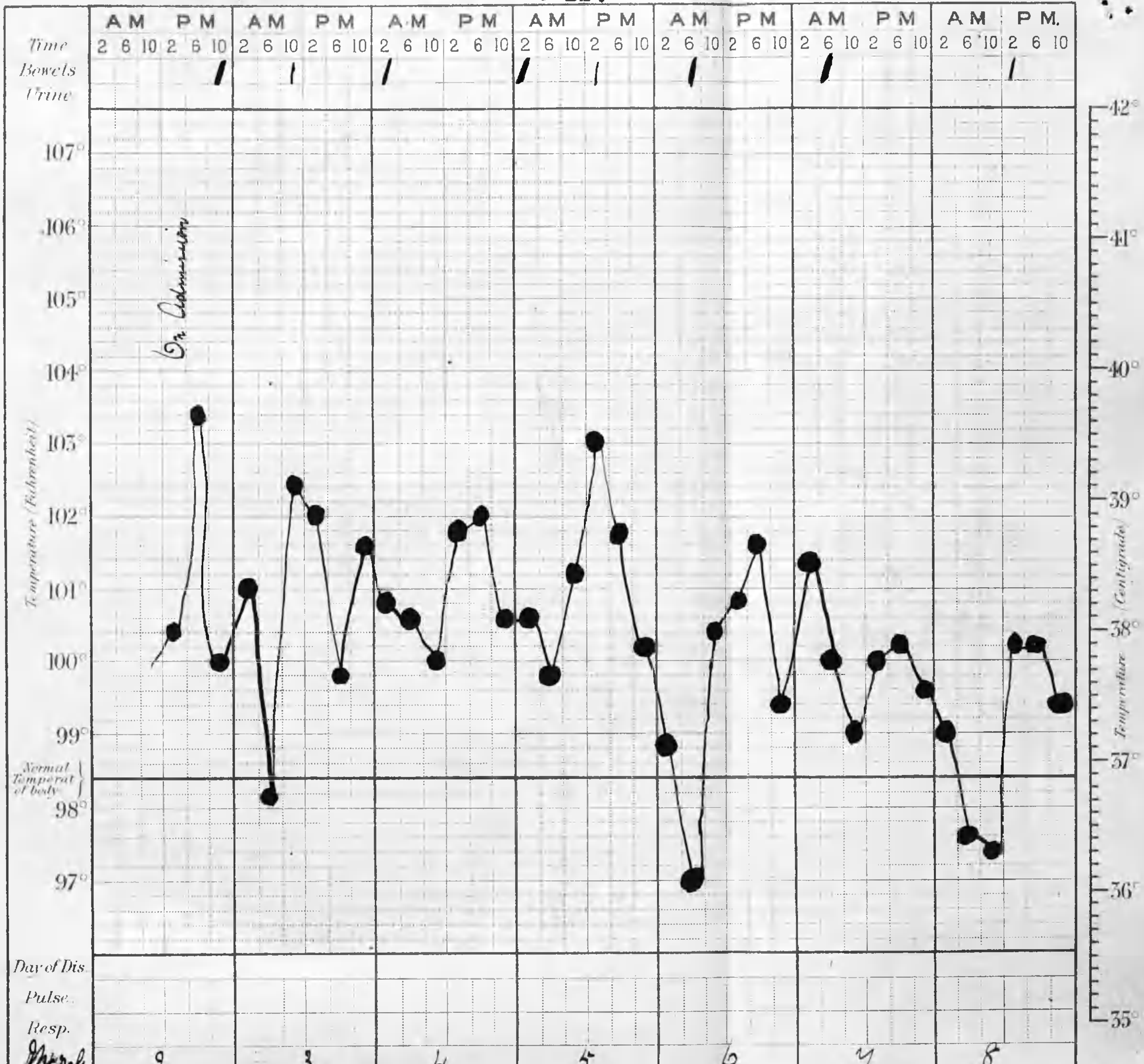
DISEASE.

Dorothy Houlden
2 Years

Book No.

Notes of Case

Date of admission
March 2nd/04



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Case 12.

J. C., aged 11, was admitted to hospital on February 27, with a history of four days' illness.

On admission, the temperature was 100°F., and pulse 110.

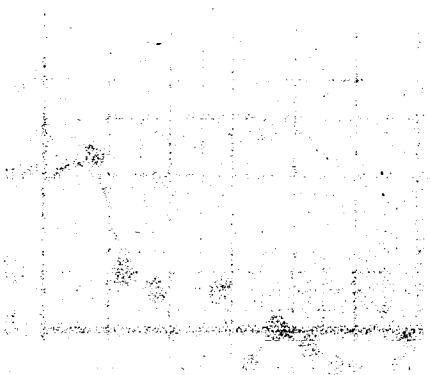
There was a slight red rash over the trunk and limbs, some enlargement of the tonsils, but very little reddening, and a normal tongue.

There was a slight general glandular enlargement.

Herpes developed over the left side of the lower jaw between the angle and the symphysis.

There was some nasal discharge, which was treated with a formalin douche; and, by April 12, the patient was discharged, having been in hospital for forty-six days.

The urine was normal throughout.



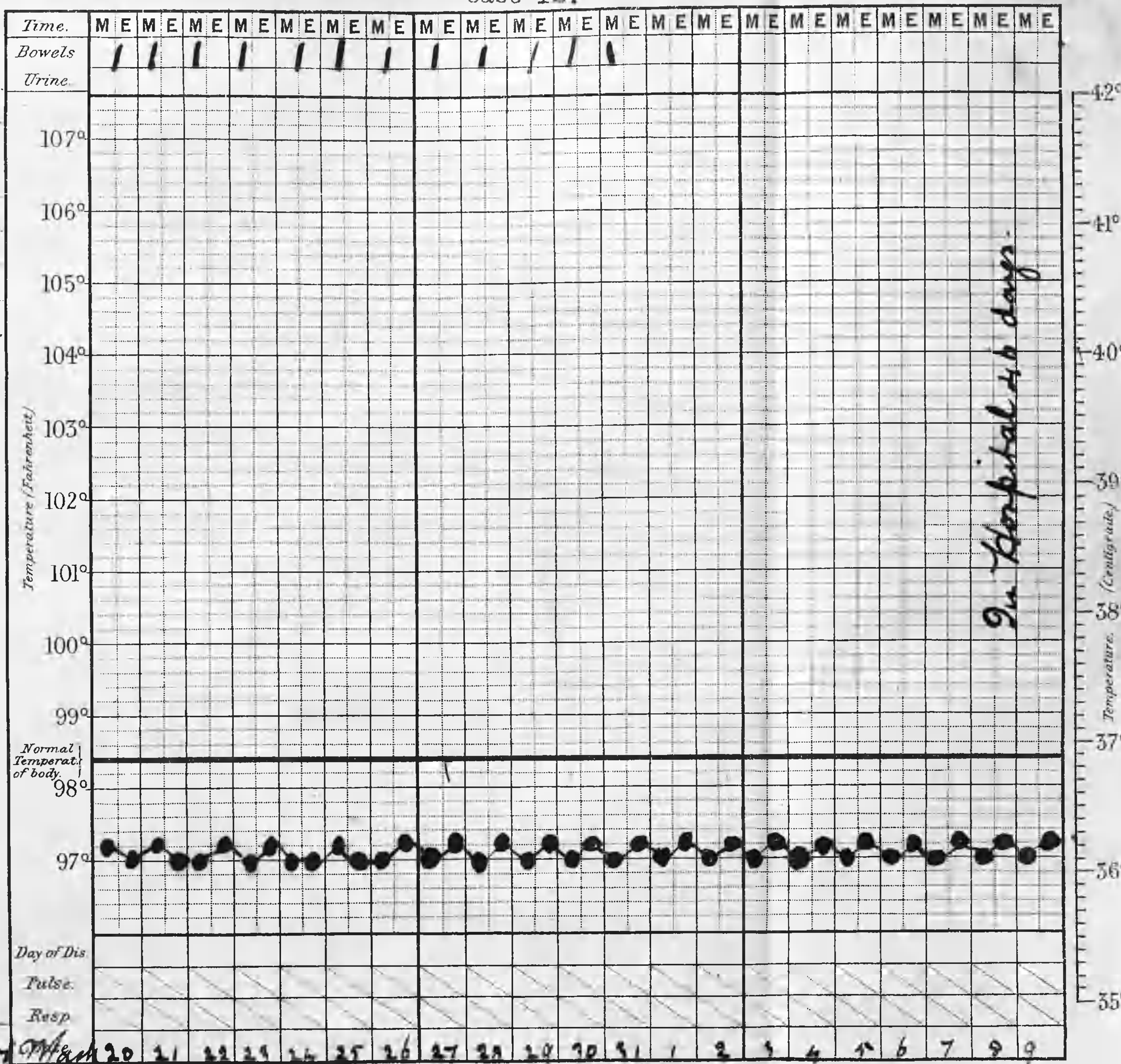
Case 12.

DISEASE.

Notes of Case.
John
Coyne.
11 yrs.

Book No.

Date of admission.
March 24 1907
April 13 1907



Case 12.

DISEASE.

Notes of Case.

John
boys
11 years

Book N°

Date of admission
Feb 27 1907

Time
Bowels.
Urine.

Temperature (Fahrenheit)

107° 106° 105° 104° 103° 102° 101° 100° 99° 98° 97°

Normal Temperat. of body.

Temperature. (Centigrade)

42° 41° 40° 39° 38° 37° 36° 35°

Day of Dis.
Pulse.
Resp.
Date.

27 28 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Mar

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Case 13.

E. H.,aged 2,was admitted to hospital on December 4, with a large recent burn of the abdomen.

This burn was dressed with ointment,and later,during the sloughing stage,with boracic fomentations.

On December 7, a scarlatinal rash developed on the trunk and limbs,with some vesicles of a miliary character on the left side and left side of the abdomen.

There was in addition a general redness of the fauces.

On the 12th,branny desquamation began,and involved especially the abdomen and thighs.

On January 9, the child was discharged cured.

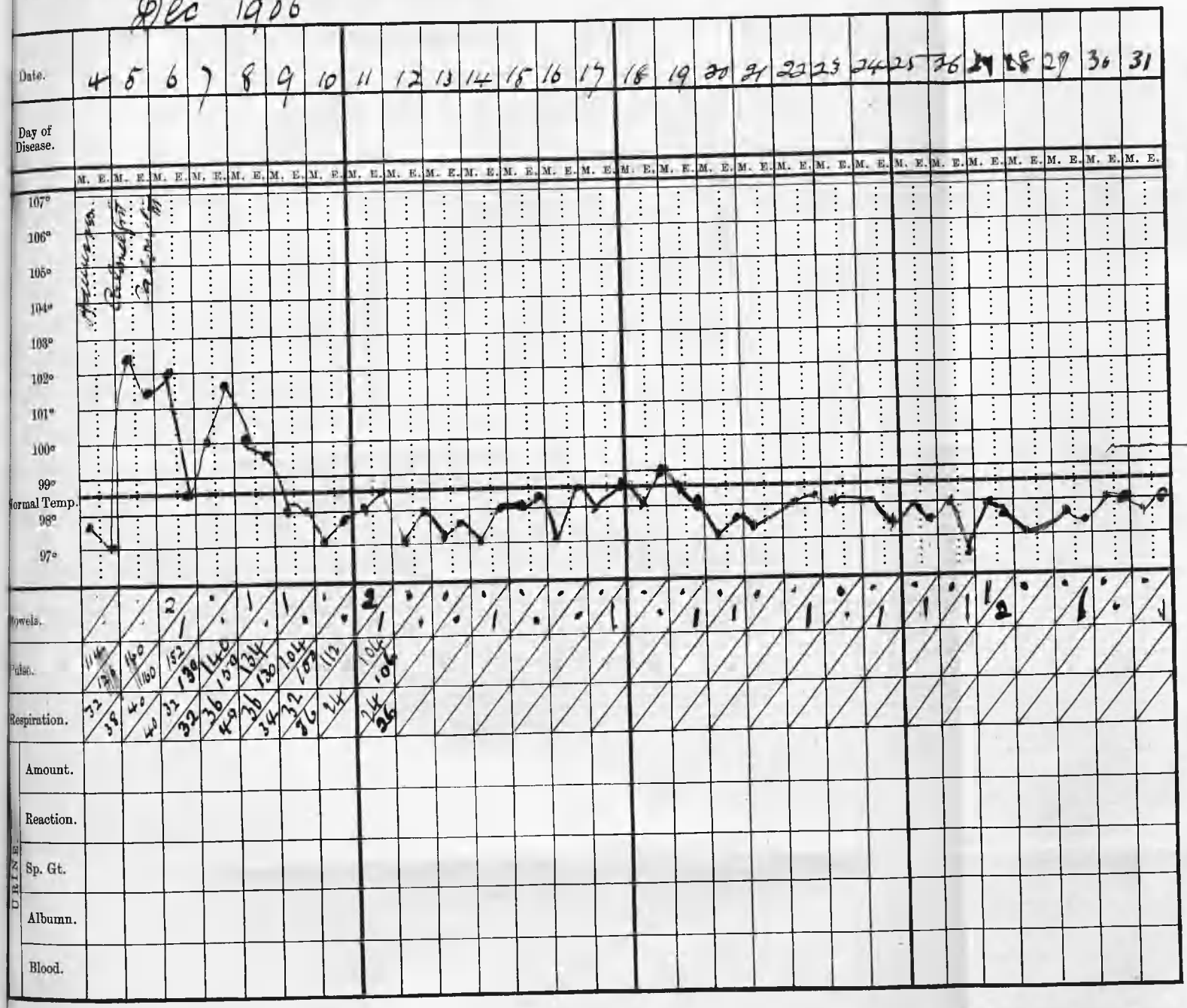
This case has been referred to on a former page of this thesis.

Case 13.

GRIMSBY AND DISTRICT HOSPITAL.

NAME Elizabeth Hall WARD May

Dec 1906



Case 13.

GRIMSBY AND DISTRICT HOSPITAL.

NAME Elizabeth Hall. WARD May.

Jan: 07

Date.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Day of Disease.																												
	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.	M. E.
FAHRENHEIT. 107°																												
106°																												
105°																												
104°																												
103°																												
102°																												
101°																												
100°																												
99°																												
Normal Temp.																												
98°																												
97°																												
Bowels.	1	1	2	1	1		1																					
Pulse.																												
Respiration.																												
URINE. Amount.																												
Reaction.																												
Sp. Gt.																												
Albumn.																												
Blood.																												

Case 14.

G. A., aged 8, was admitted to hospital on February 26, with a history of a fortnight's illness.

On admission, her temperature was 97.8°F., and her pulse 70.

Both tonsils were enlarged, and the right one was superficially ulcerated; her tongue had finished desquamating, and was beginning to be covered with its normal coating; there was slight glandular enlargement.

No rash was present anywhere, but desquamation was taking place on the right side of the chest and the abdomen.

There was no albuminuria, and the heart and lungs were normal.

The disease took a normal course; there was never any aural or nasal discharge; and the urine remained free from albumin, - so that the patient was discharged on April 4, having been in hospital for thirty-six days.

DISEASE.

Notes of Case.

Gladys Applyard

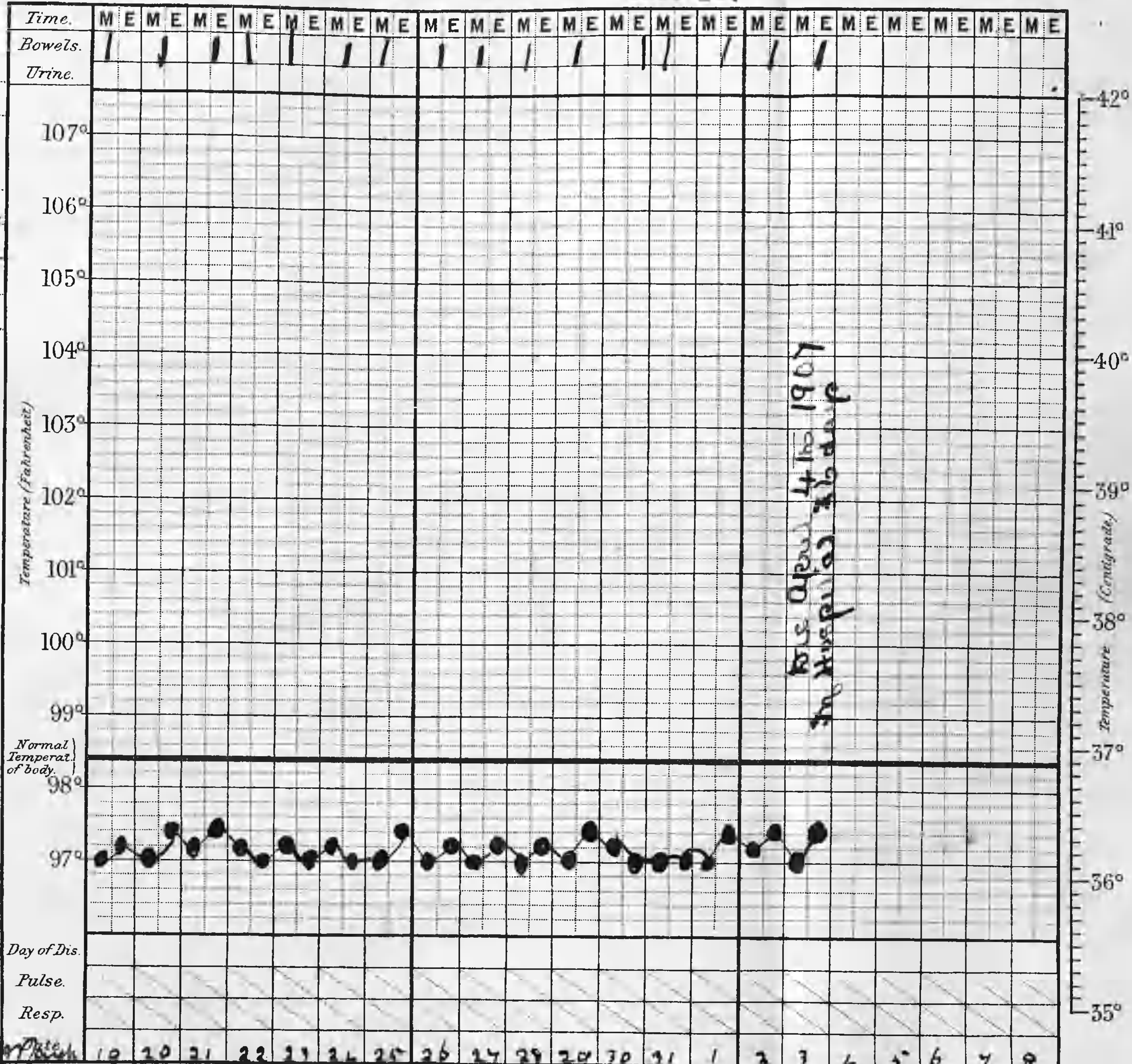
8 yrs.

Book No.

Date of admission.

..26 1907.

Date of ... the 4 April 1907



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Gould's Clinical Chart.

Case 14.

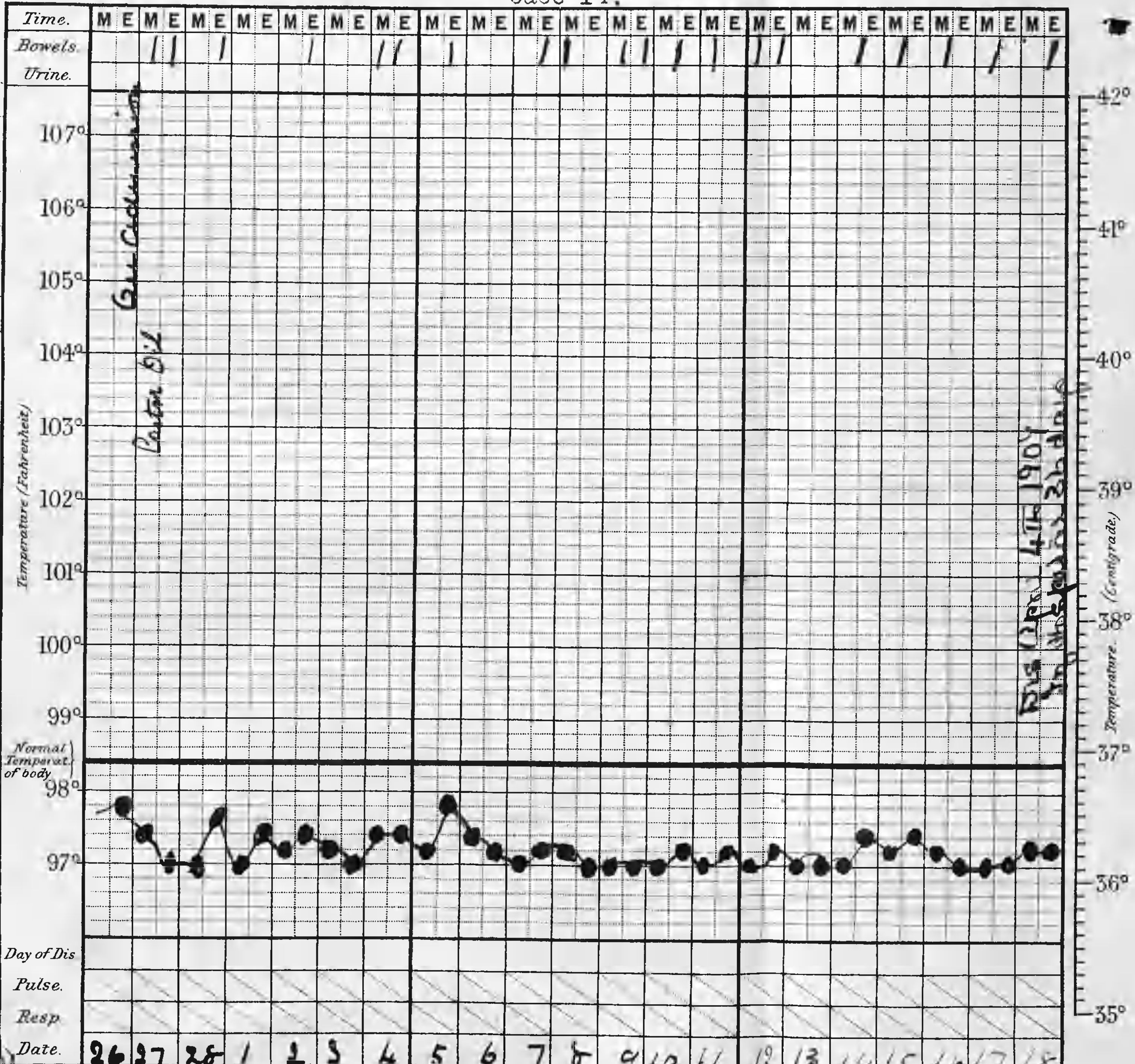
DISEASE.

Notes of Case

Gladys Applegarth

8 years

Book No.



Date of admission

Feb. 26 1907

Result Dis. April 4. 1907

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Case 15.

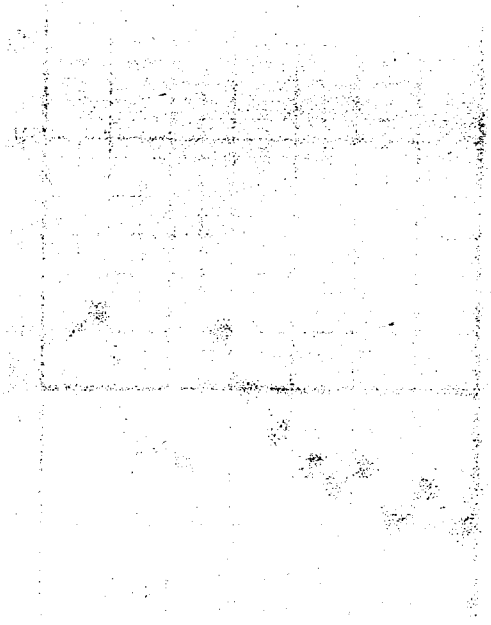
D. A., aged 5, was admitted to hospital on February 26, with a history of a fortnight's illness.

On admission, her temperature was 99.2°F.

There was no rash, but desquamation was well-marked on the trunk and limbs.

On April 8, a slight nasal discharge appeared, but syringing with formalin cured this symptom in a short time, and by April 13 the child was ready to go home, having been in hospital for forty-six days.

The urine was normal during the whole time she was in hospital.



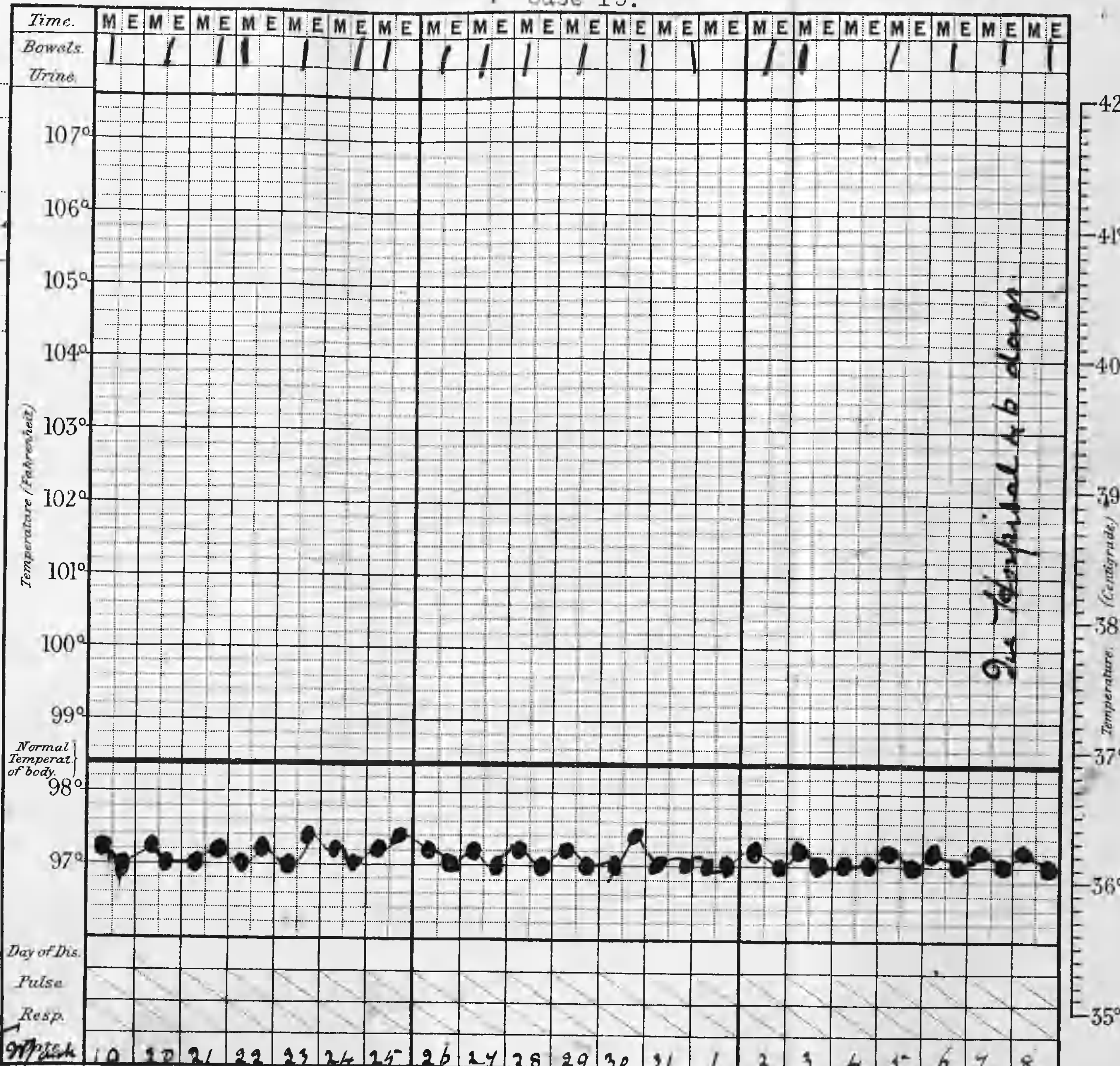
DISEASE.

Notes of Case.

Dois Applegard
5 yrs.

Book No.

Date of admission.
26 1907
Dis April 12 1907



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Case 15.

DISEASE.

Notes of Case.

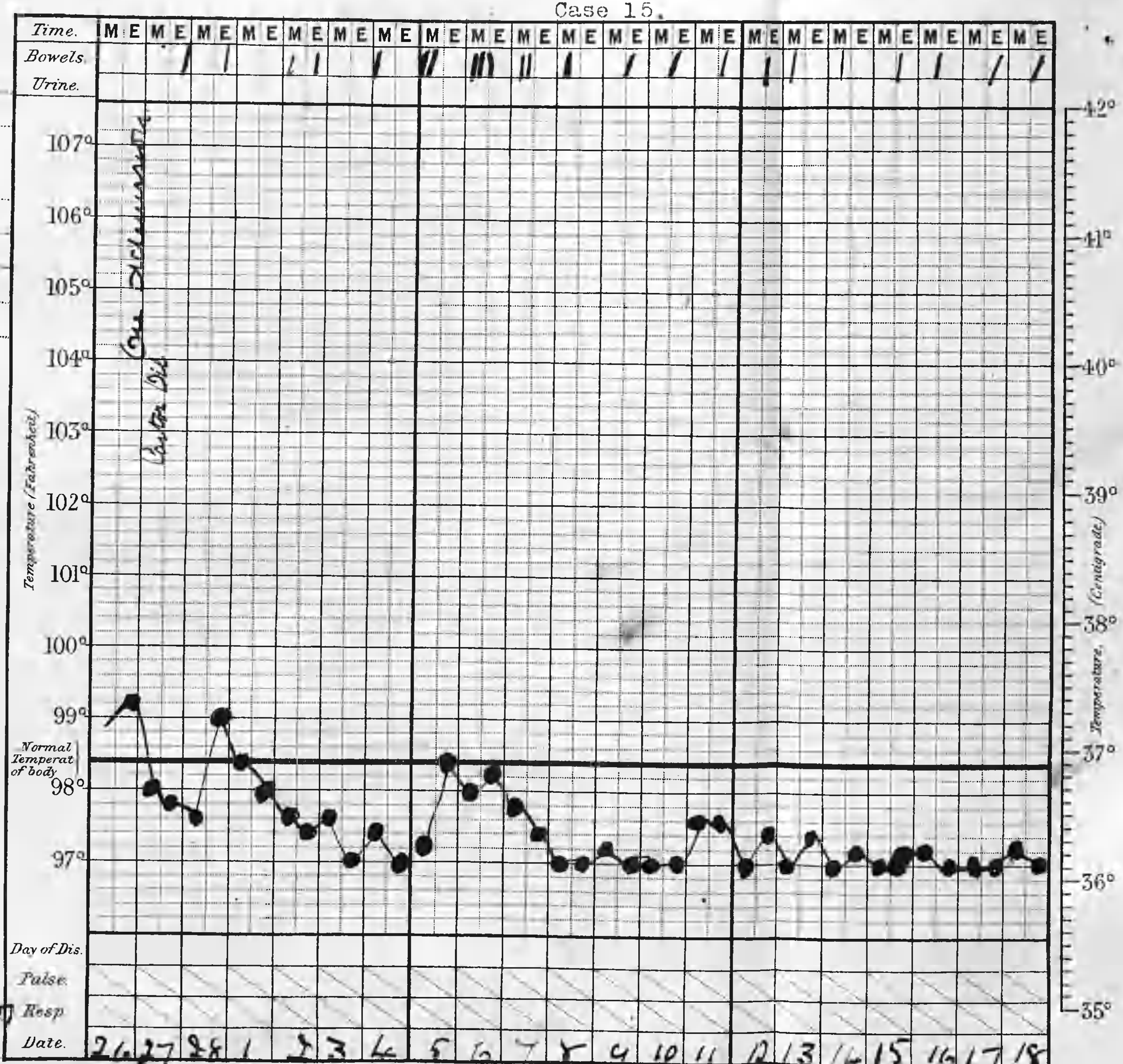
Doris Appleyard

5 years

Book No.

Date of admission

26 190



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Case 16.

F. J., aged 5, was admitted to hospital on February 23, having been ill for a fortnight.

On admission, his temperature was 100°F., and his pulse 120.

The patient was desquamating on his palms, his throat was inflamed and ulcerated, he had a large cervical gland on the left side, and a smaller one on the right.

On March 3, the left gland was incised and drained.

By April 13, the sinus in the neck had closed; there was no discharge from the nose; and the urine was normal, - so that he was sent home, having been an inmate of the hospital for fifty days.

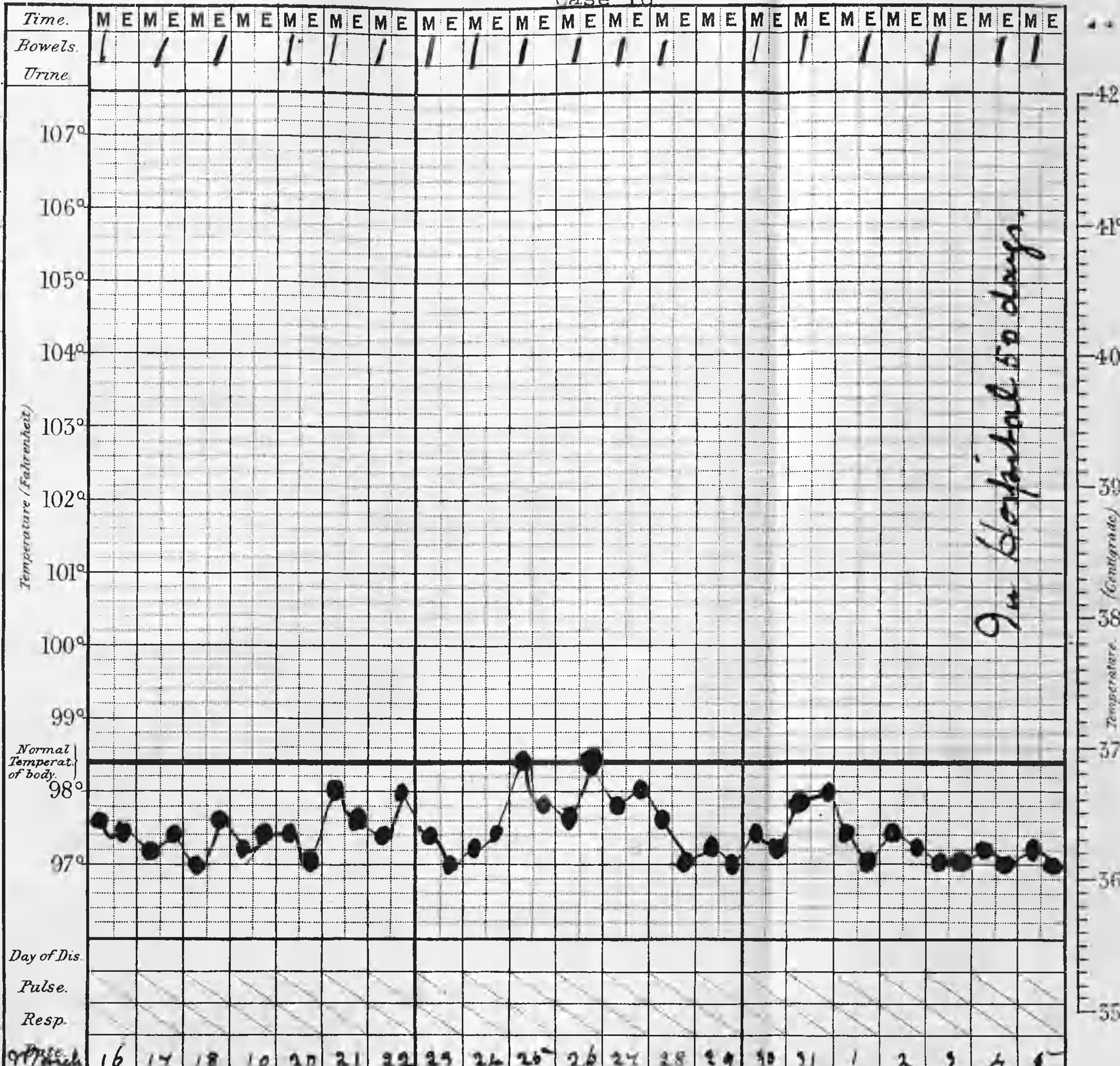
Case 16

DISEASE.

Notes of Case.

Frank Johnson 5 yrs.

Book No.



Date of admission. Mar 23 1907.

Dis April 12 1907

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Case 16.

DISEASE.

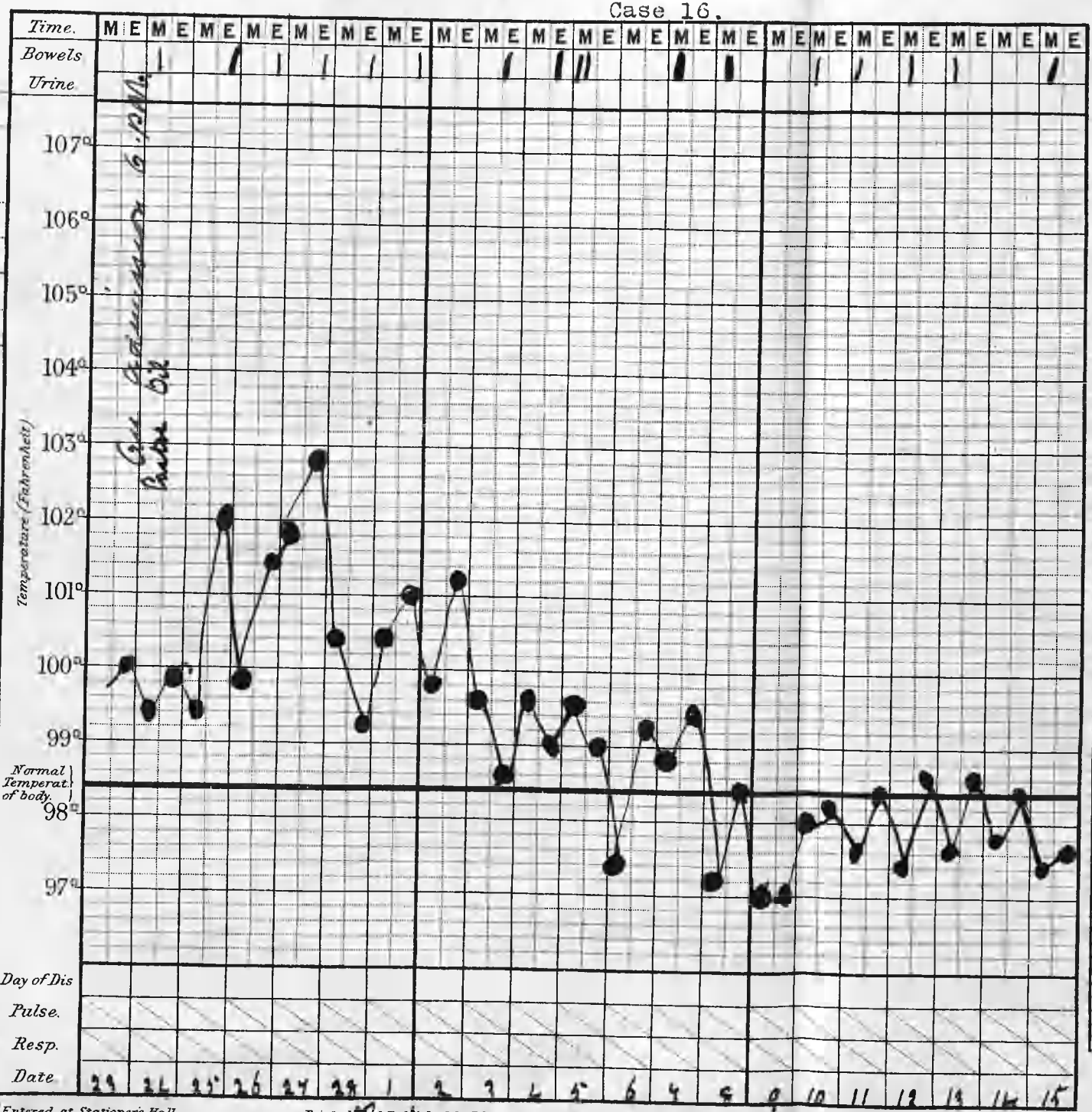
Notes of Case.

Frank Johnson, 5 years.

Book N°

Date of admission.

Sept 23 1907.



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Case 16.

HOUR CHART.

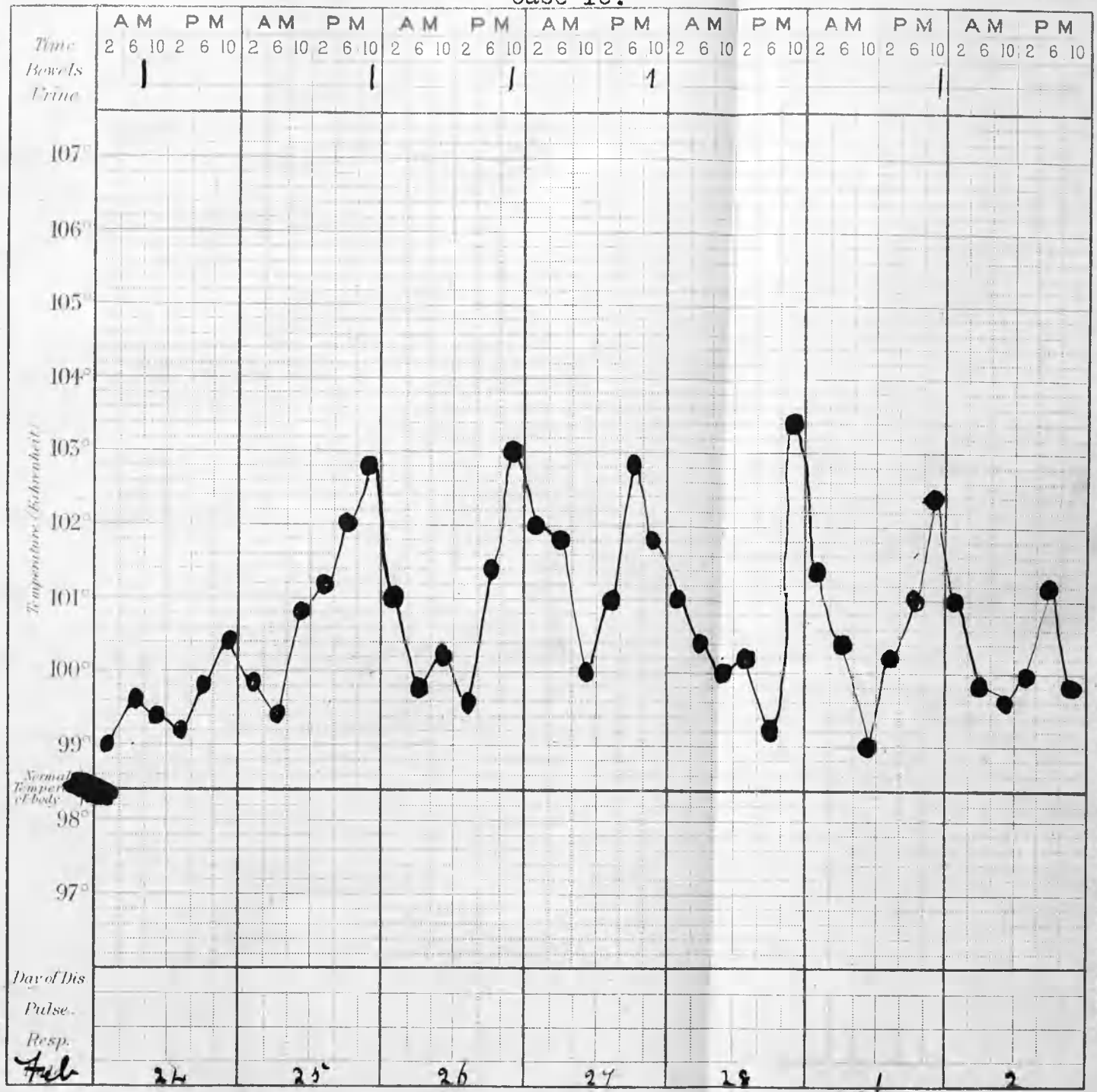
DISEASE.

Name: Frank Johnson. 5 yrs.

Book No.

Notes of Case

Date of admission Feb 23rd 1904.



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Case 16.

OUR CHART.

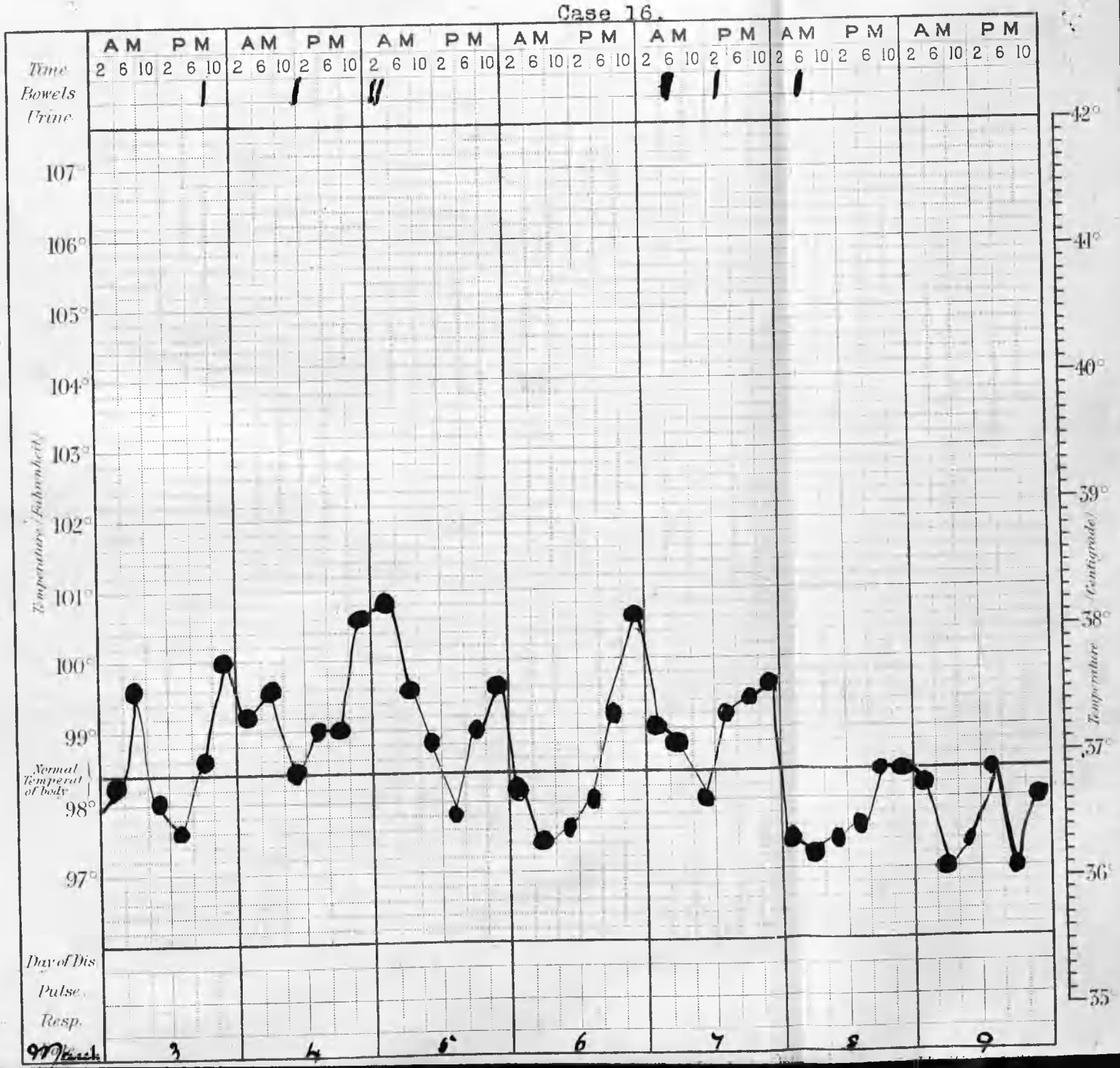
DISEASE.

Frank Johnson. 5 yrs.

Book No.

Notes of Case

Date of admission Feb 25th 1907.



Case 17.

J. McL.,aged 41,was admitted to hospital on February 21, after an illness of four days' duration,commencing with shivering,vomiting,sore-throat,and pain in the back.

On admission,his temperature was 97.2°F.,and his pulse 70.

He had a rose-red rash on his chest,arms,legs,and feet; his tongue was dry,coated,and red at the tip;his fauces and palate were reddened;and there was slight glandular enlargement.

On the third day,his temperature rose to 100°F.,but after that was,and continued to be,practically normal.

The heart was normal,and there was slight albuminuria present.

The throat was painted inside with a mixture of a solution of iodone in potassium iodide and glycerine,while the tincture of iodine was applied externally.

This was done twice daily;and by April 3,the throat was nearly well;by the 9th the parient was ready to go home,having been in hospital for forty-eight days.

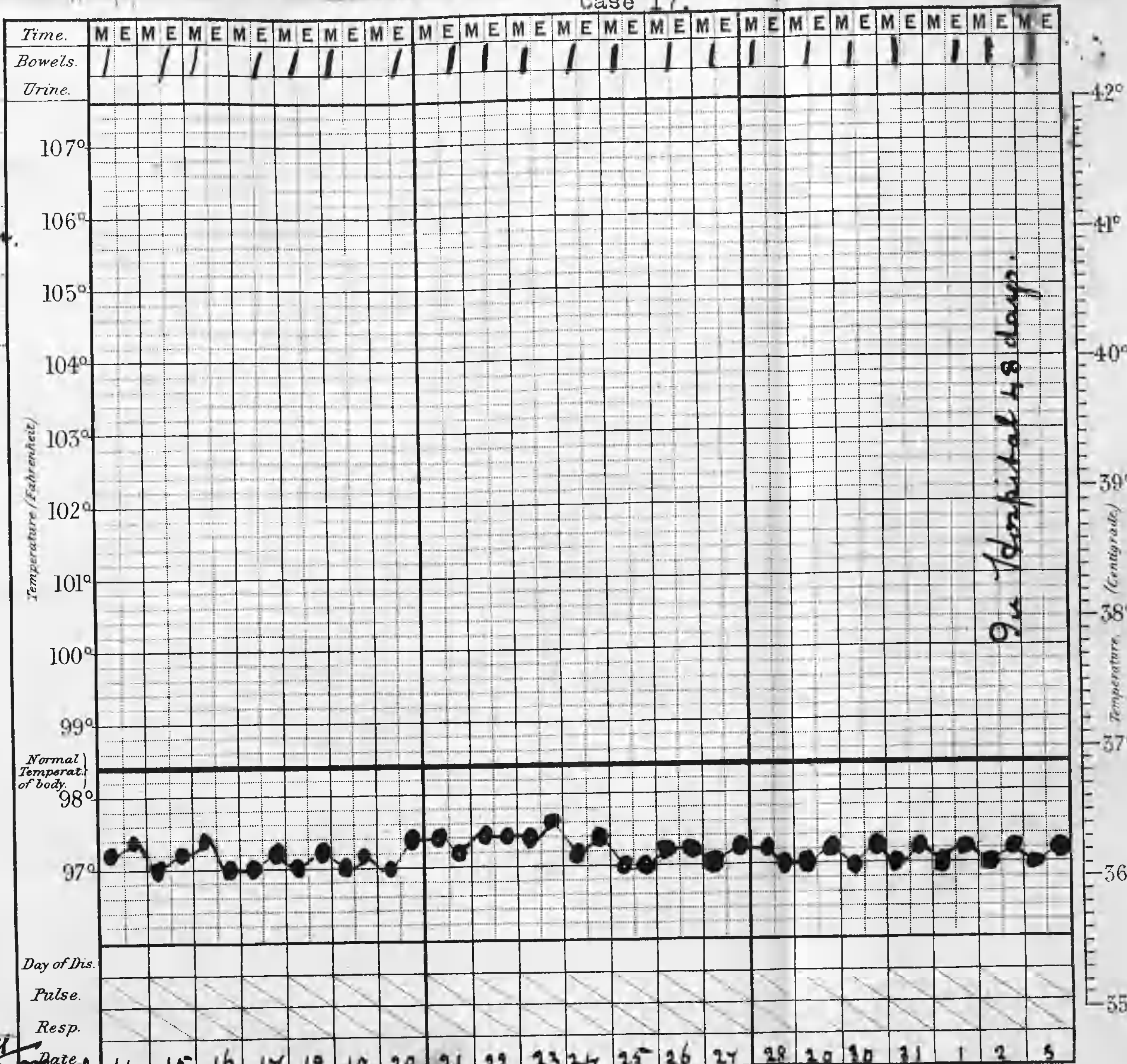
Case 17.

DISEASE.

Notes of Case.
John
McLoughlin.
41 yrs.

Book No.

Date of admission.
21 1907.
Dis April 9
1907.



Entered at Stationer's Hall.

Printed and Published by Wodderspoon & Co. 6, Gate Street, Lincolns Inn.

Gould's Chart.

Case 17

DISEASE.

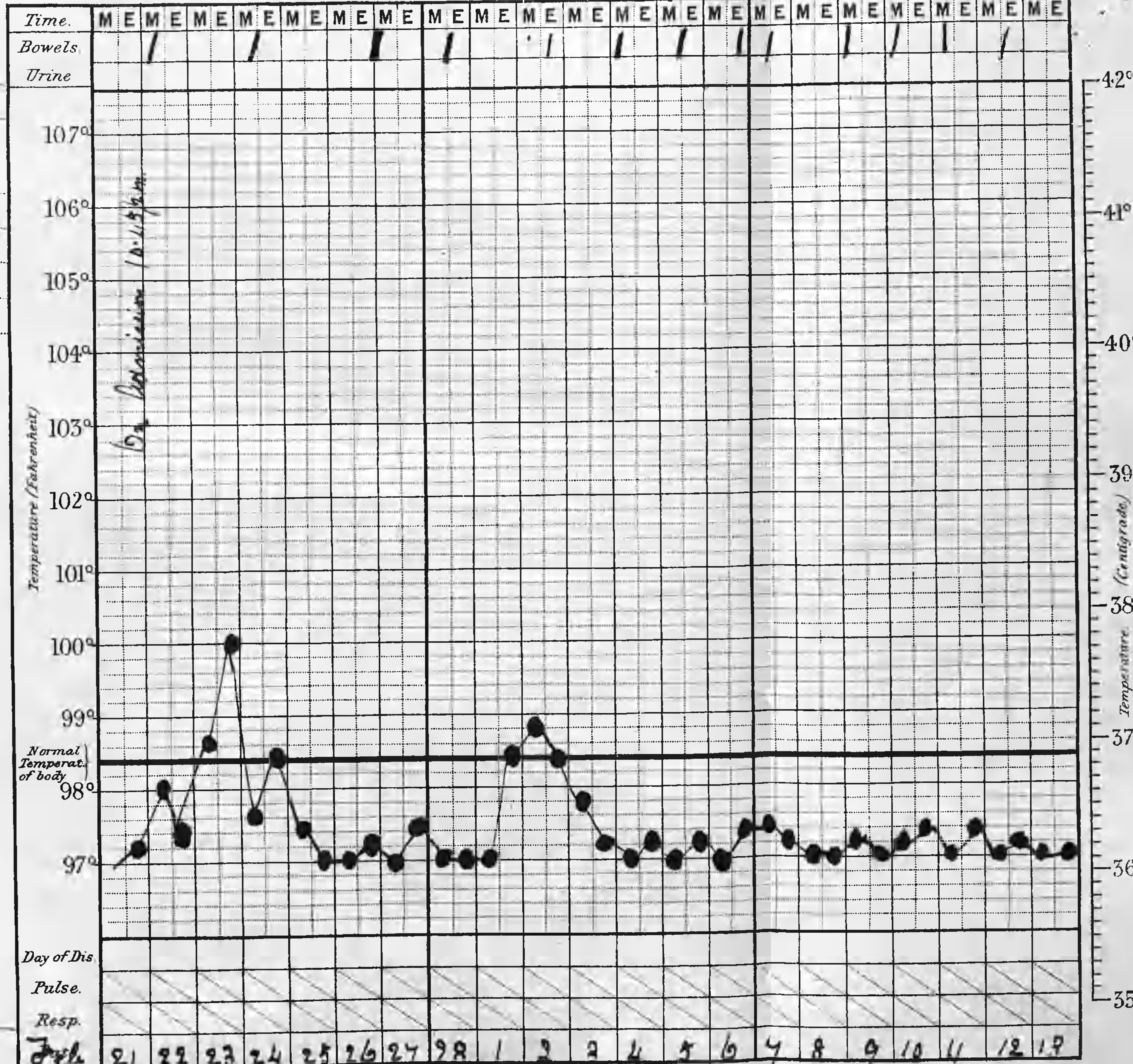
Notes of Case.

John McLoughlin
41 Yrs

Book No.

Date of admission. Feb 21st 1904

Result.



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Case 18.

L. M., aged 24, was admitted to hospital on February 19, having been ill for four days.

On admission, her temperature was 99° F., and her pulse 80.

She had a red rash, which was fading, on the trunk and limbs.

The fauces were red, and the tonsils somewhat swollen; there was no glandular enlargement.

A trace of albumin was detected in the urine, but no other signs of renal mischief.

By March 5, desquamation was well-marked, the urine was normal, and the general condition good.

The heart and lungs presented nothing unusual on examination.

On April 5, the patient was quite well, and left hospital, having been an inamte for forty-five days.

Case 18.

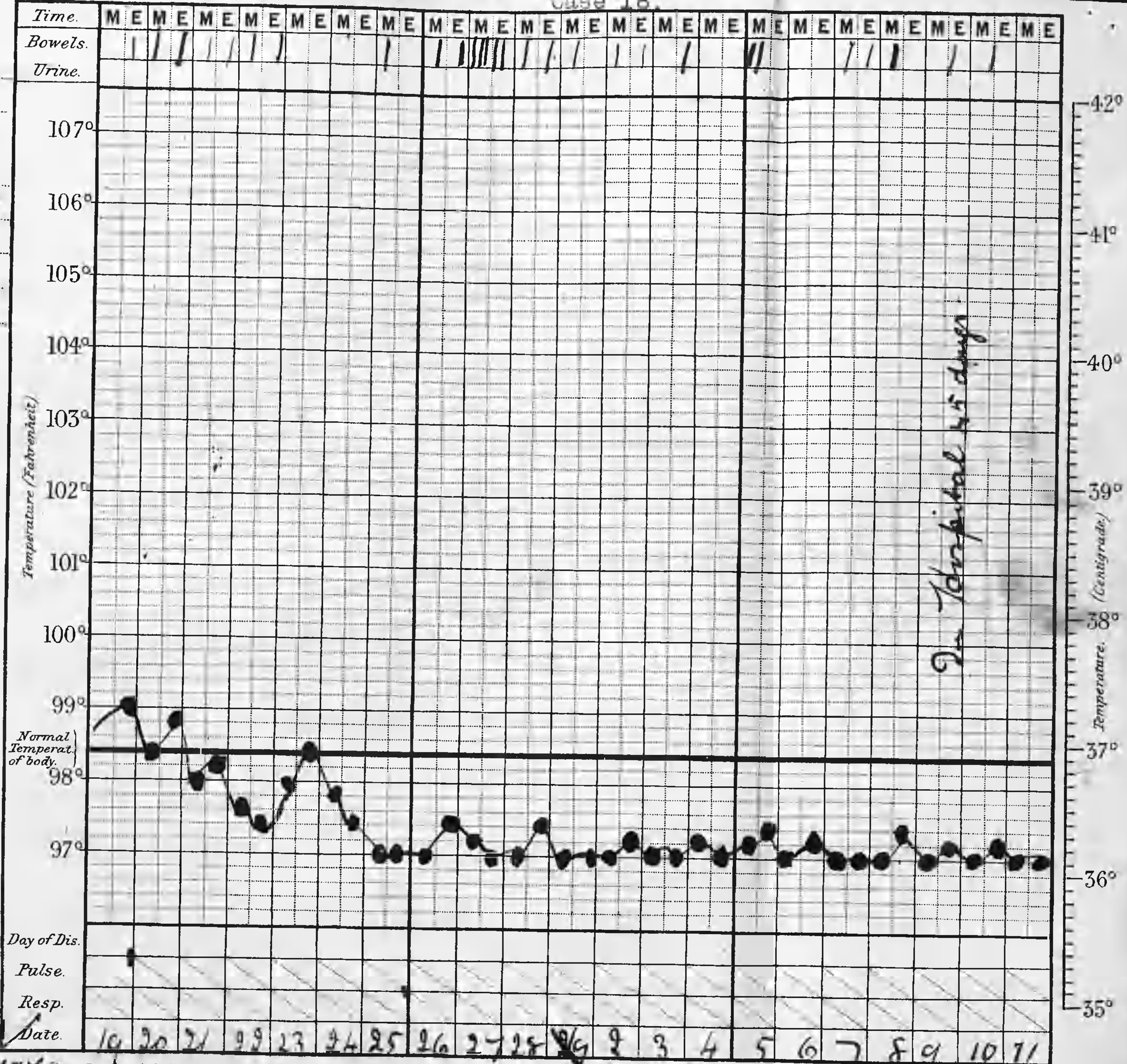
DISEASE.

Notes of Case.
Lucy
Mucklow
24 yrs

Book No.

Date of admission.
Feb. 19 1907

Dis. April 11th 1907



Case 18.

DISEASE.

Notes of Case.

Lucy Marckham 24 yrs.

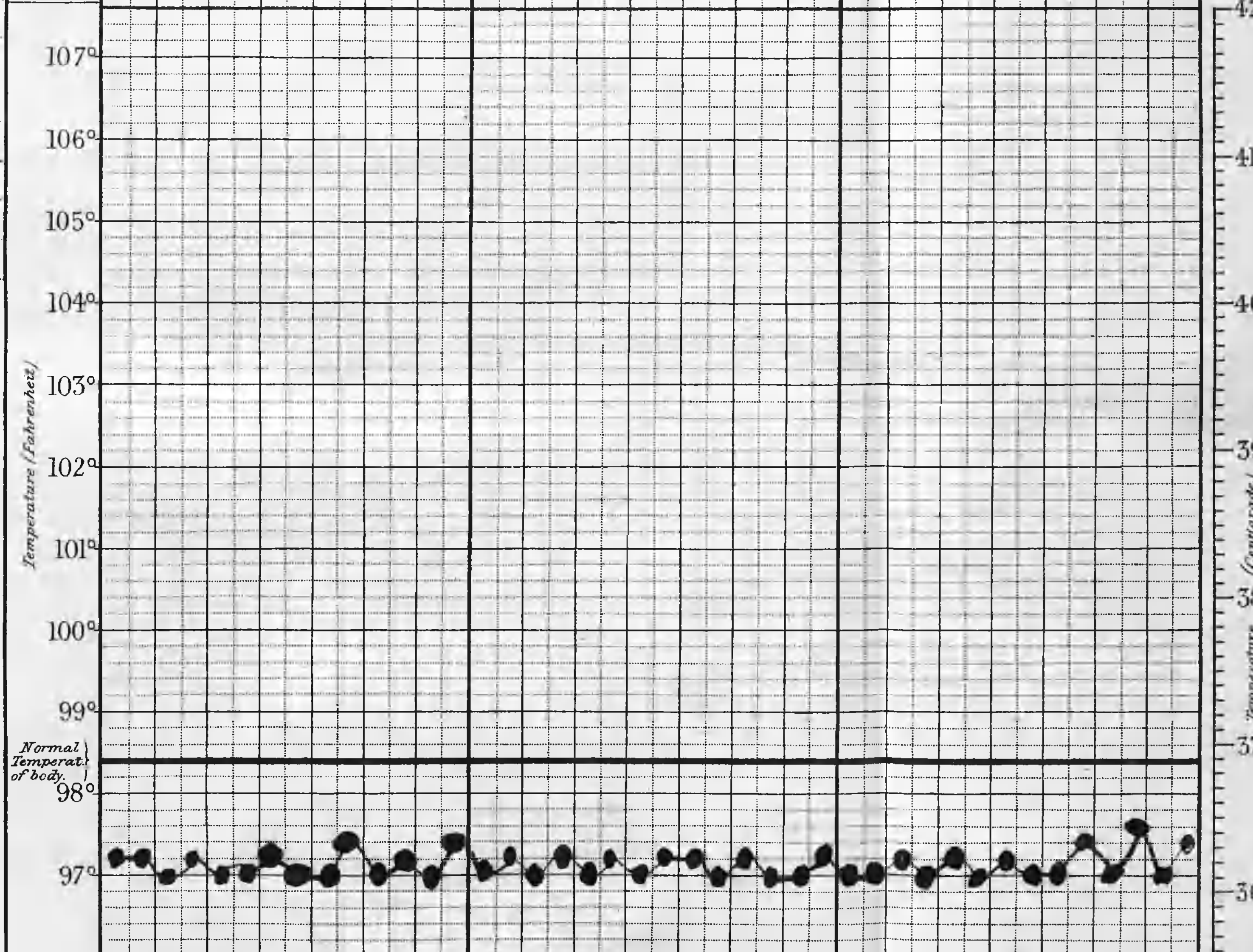
Book No

Date of admission.

[illegible] 19th 1907.

[illegible]

Time.	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E
Bowels.		/	/	/	/		/		/		/			/	/		/		/		/		/			/	/		/	/		/		/		/	/		/		/	/
Urine.																																												



Day of Dis.

Pulse.

Resp.

Date	March 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	April 1

Case 19.

S. F., aged 11, was admitted to hospital on February 2, having been ill for three or four days.

On admission, her temperature was 99°F., and her pulse 80.

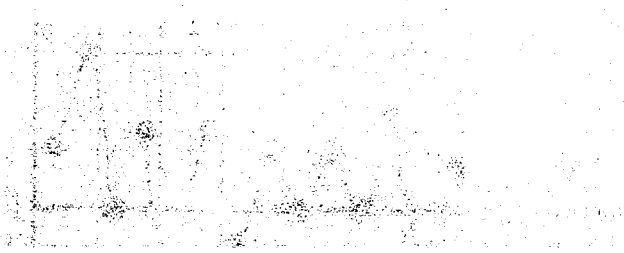
A scarlatinal rash was present on the trunk and limbs; and the tonsils were swollen and ulcerated.

On February 9, there was slight albuminuria, which disappeared in three or four days and did not return.

Desquamation was not well-marked but did occur where the rash had been.

On March 2, a double follicular tonsillitis developed, which gradually cleared up; and on April 18, the child was sent home, having stayed in hospital for seventy-seven days.

The heart and lungs were normal throughout.

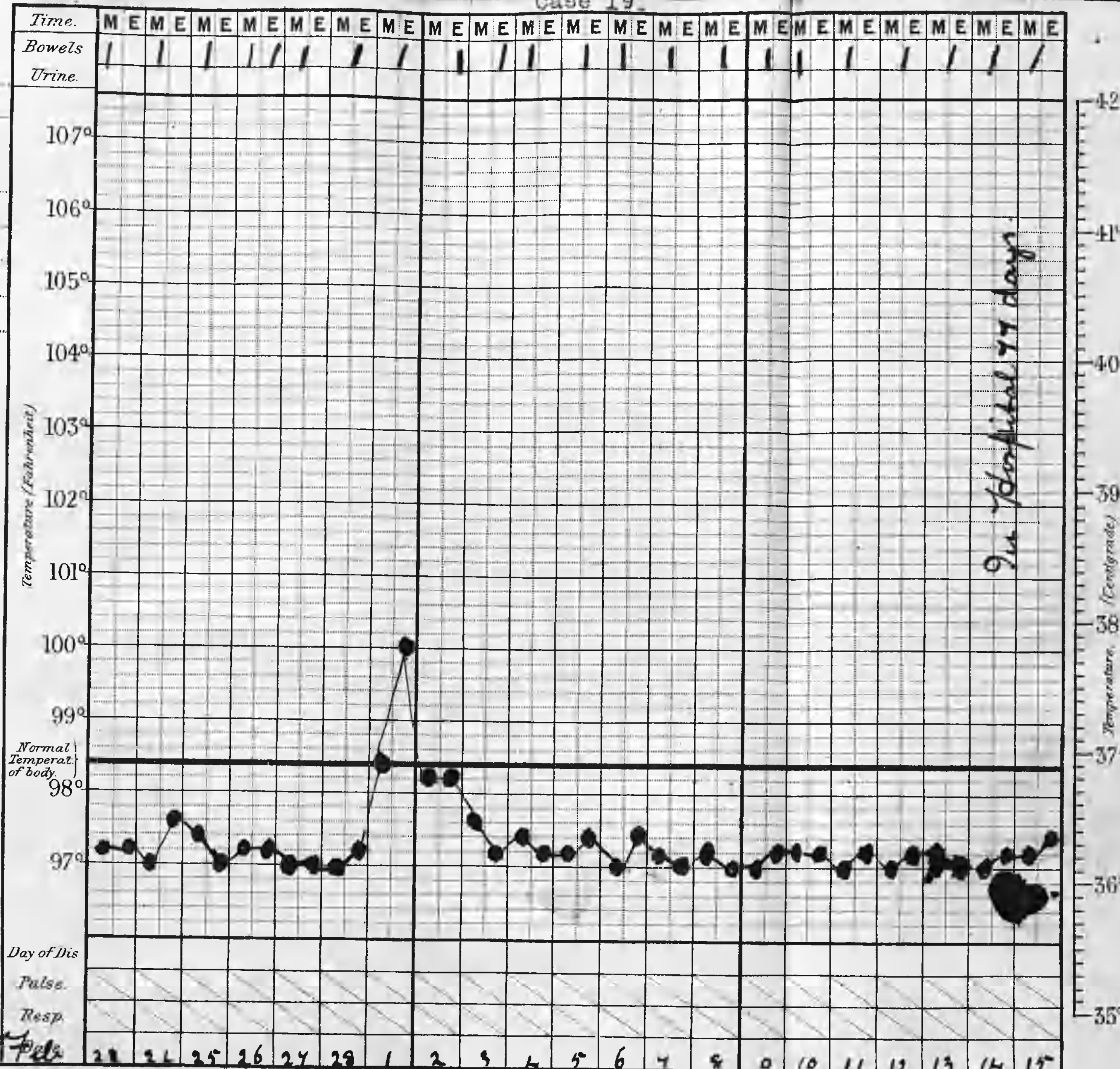


Case 19.

DISEASE.

Notes of Case.
Sidney Francis.
11 yrs.

Book No.



Date of admission.
2nd 1904.
Dis April 19 1904

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Case 19.

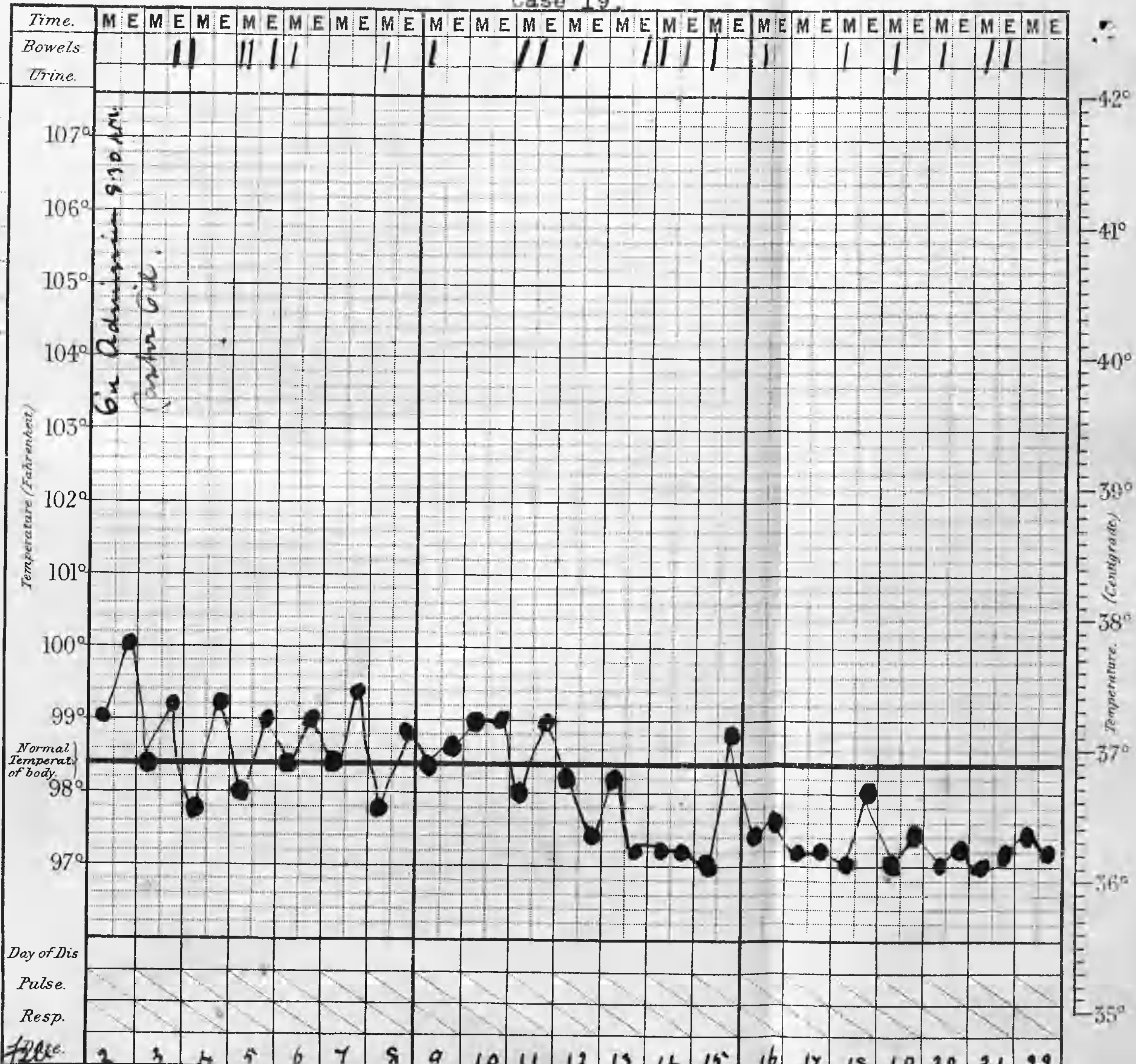
DISEASE.

Notes of Case.

Sidney Francis.
11 yrs.

Book No.

Date of admission.
Feb 2nd 1907.



HOUR CHART.

DISEASE.

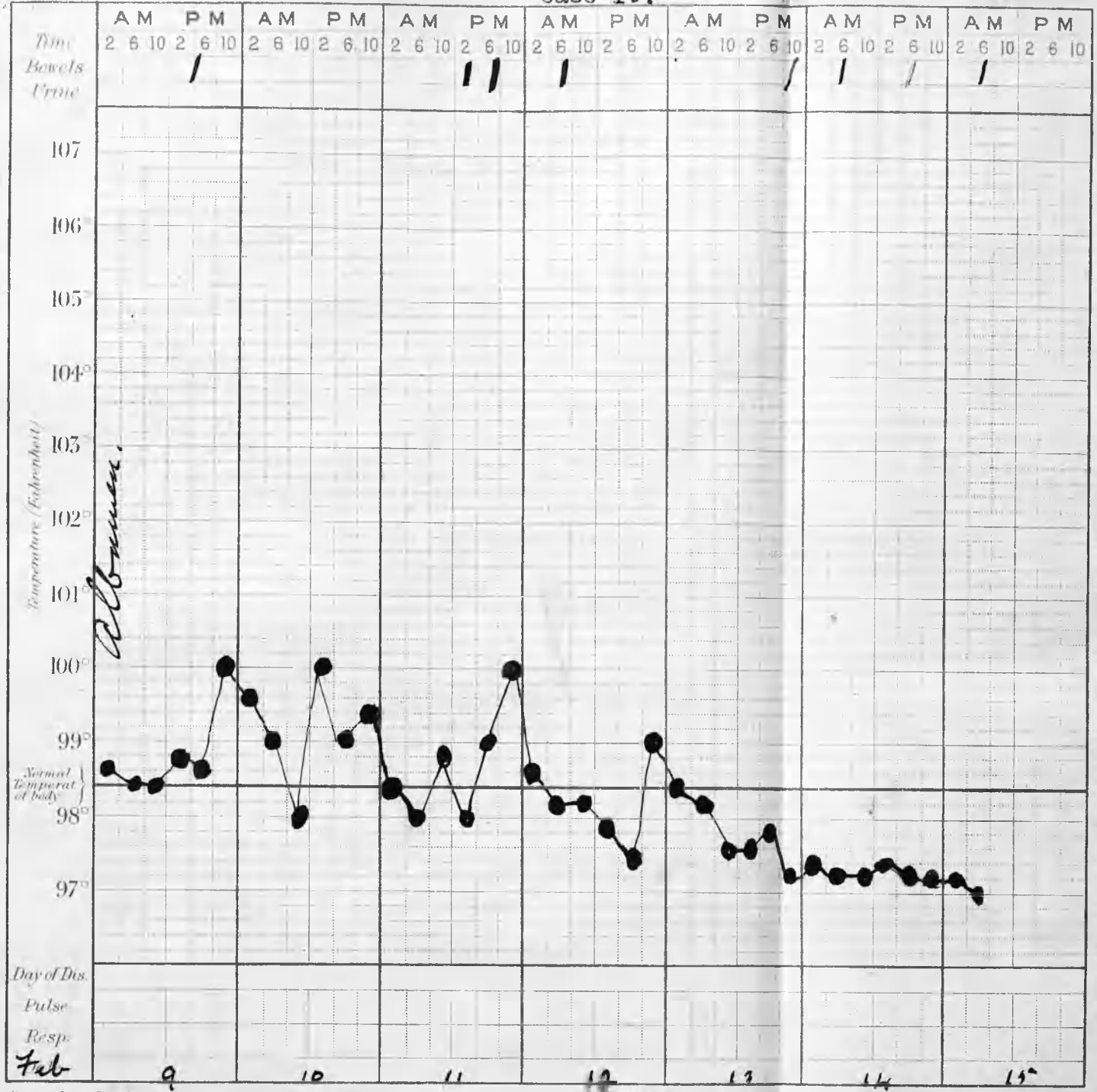
Sidney.
Francis.
11 yrs.

Book No.

Notes of Case

Date of admission
Feb 2 1907

Case 19.



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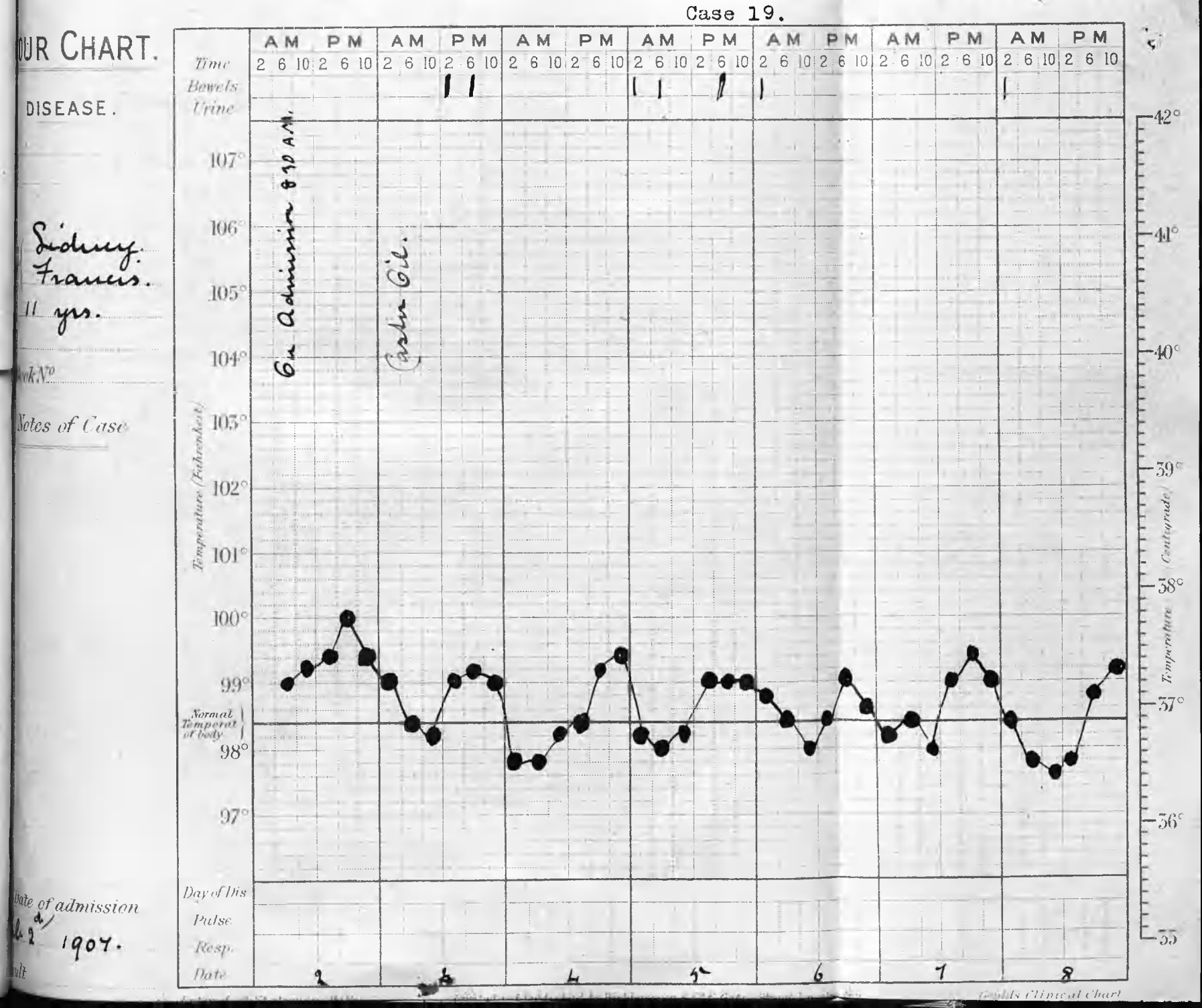
Case 19.


OUR CHART.
DISEASE.
Sidney.
Francis.
11 yrs.
Week No.
Notes of Case
Date of admission
2 1907.
Result
Time
Bowels
Urine
AM PM
2 6 10 2 6 10
6 in Admin @ 10 A.M.
Castor Oil.
Temperature (Fahrenheit)
107°
106°
105°
104°
103°
102°
101°
100°
99°
Normal Temperat of body
98°
97°
Temperature (Centigrade)
42°
41°
40°
39°
38°
37°
36°
35°
Day of Dis
Pulse
Resp.
Date
2
3
4
5
6
7
8
Gould's Clinical Chart

Case 20.

A. McB., aged 6, was admitted to hospital on January 24, having been ill for two days.

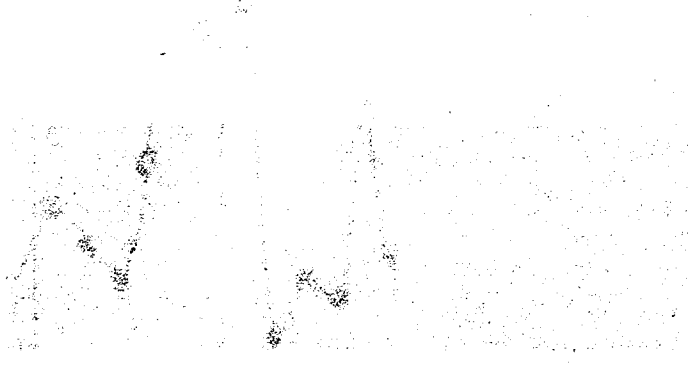
On admission, there was a dark-red rash on the chest and back.

The tonsils were gray, and there was a profuse nasal discharge.

The breath smelt foul, and the general condition was bad.

Diphtheria antitoxin was given on the first and second days (4000 and 6000 units respectively), and also 10 c.c. of antistreptococcic serum.

Saline was administered by the rectum every twelve hours from the fifth to the eighth day; but, in spite of all that could be done, the child died from toxaemia on February 2.



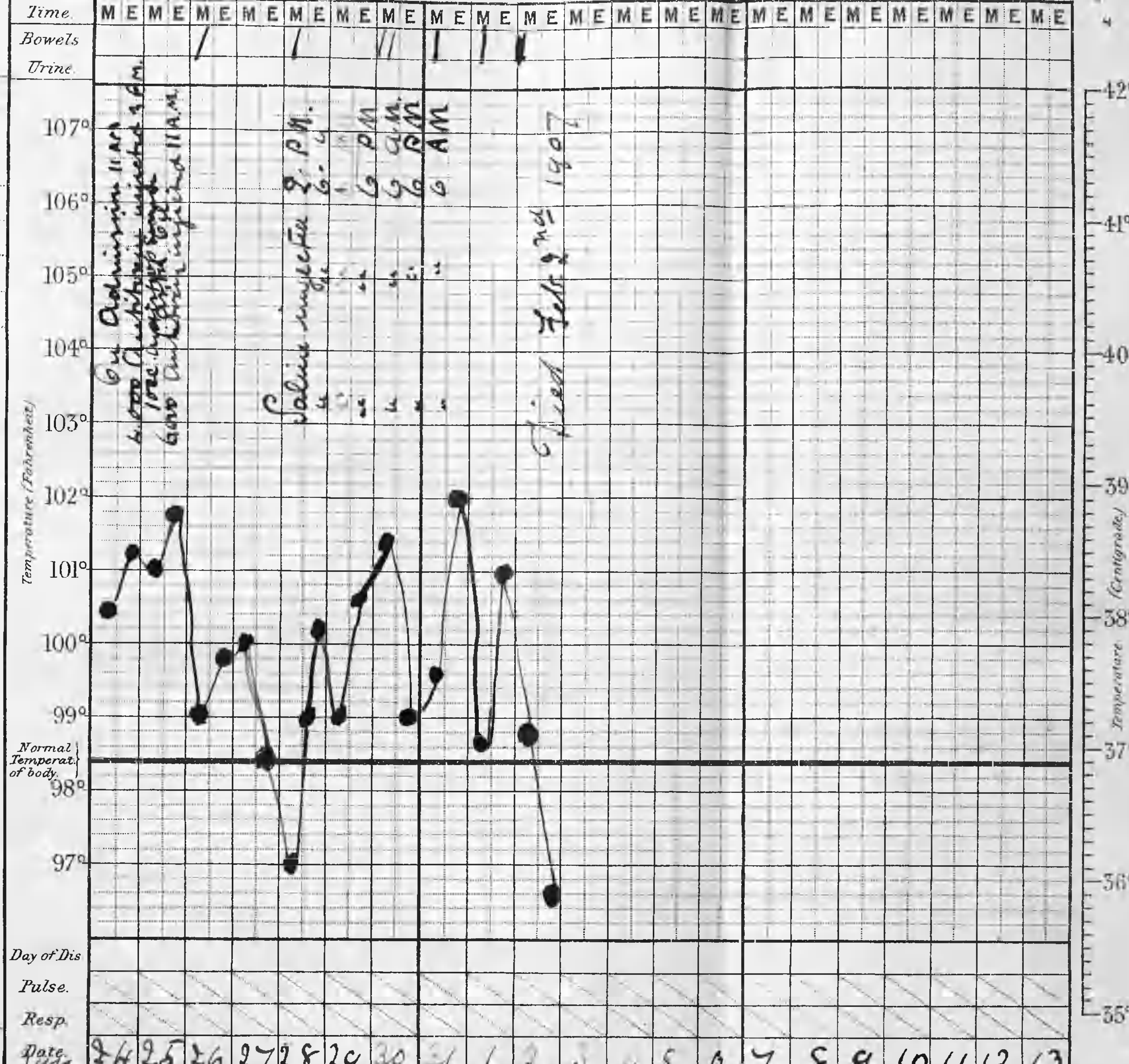
DISEASE.

Notes of Case.

Annie McBride
6 yrs

Book No.

Date of admission.
Jan 24 1900



Case 20.

[illegible]OUR CHART.

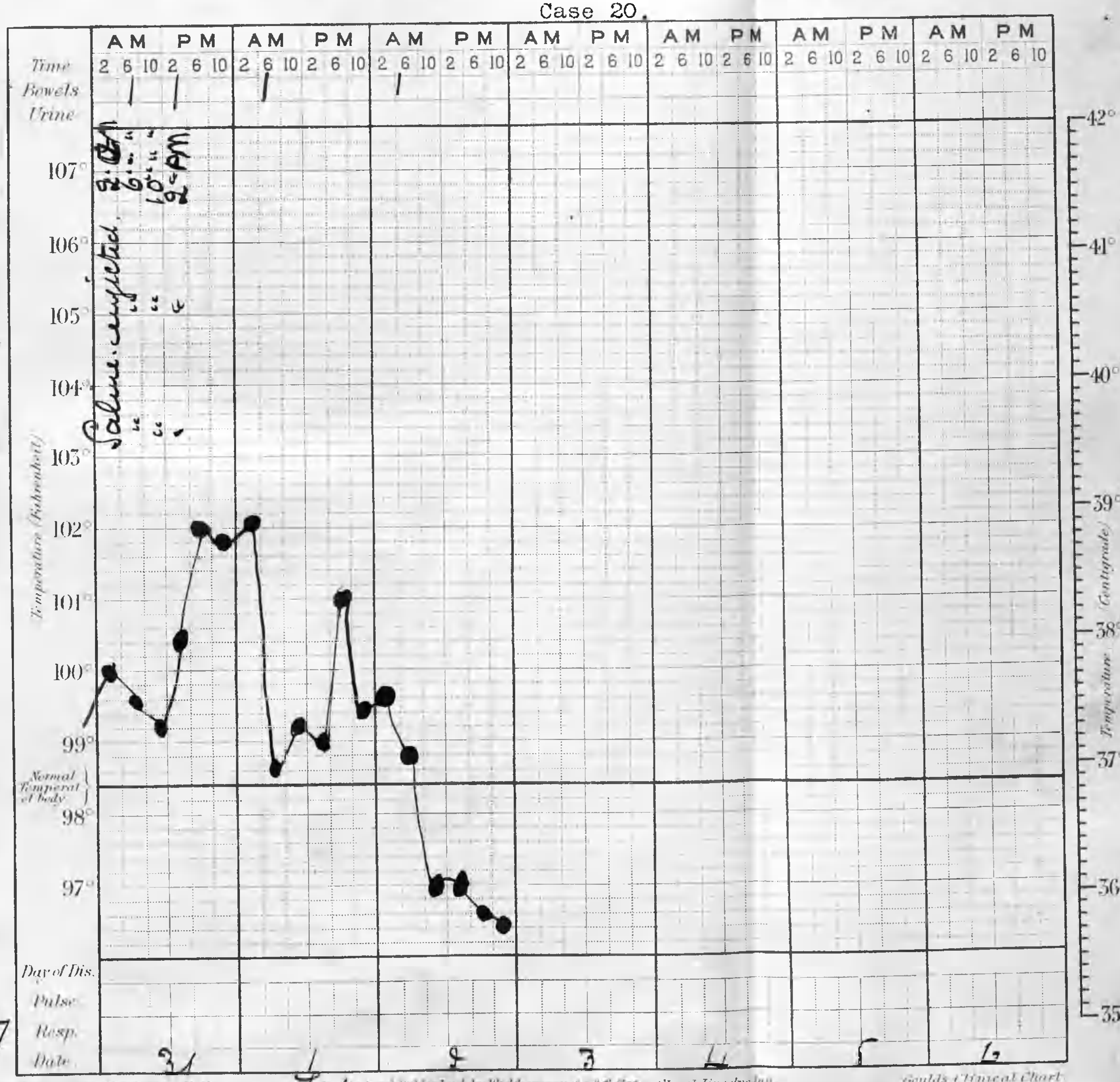
DISEASE.

Annie
McBride
[illegible] years.

[illegible]ok No.

Notes of Case

[illegible] of admission
[illegible] 24th 1907



Case 20.

OUR CHART.

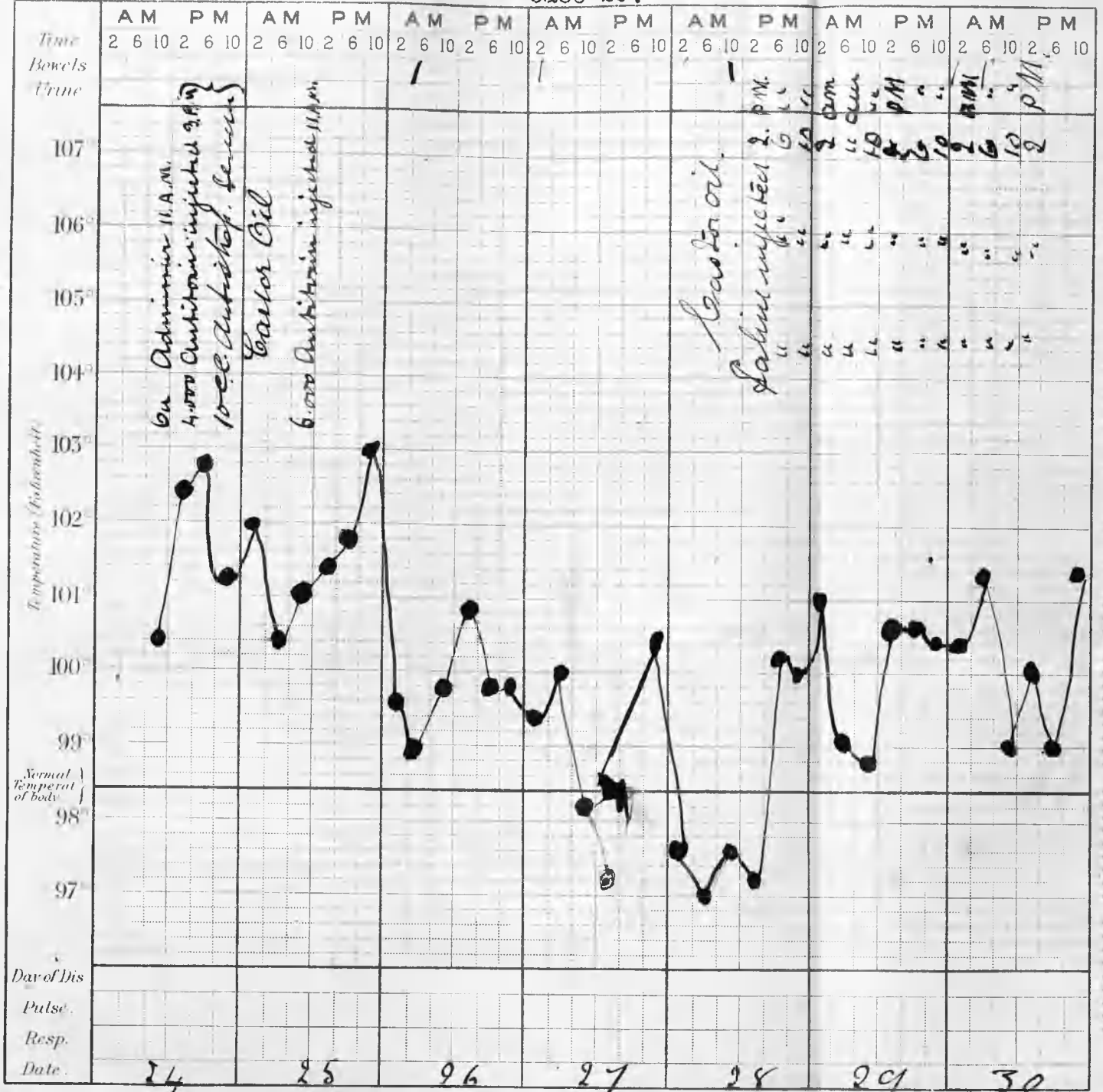
DISEASE.

Annie
Mc Bride.
6 yrs.

Book No

Notes of Case

Date of admission
24 Oct 1907



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Case 21.

E. M.,aged 10,was admitted to hospital on January 8, with a history of an illness of two days.

Ob admission,her temperature was 100.6° F.,and her pulse 100.

A rose-red rash was well-marked on the trunk and limbs; her tongue was raw and red,with prominent papillae;her throat was red,and the tonsils enlarged;there was general glandular enlargement.

There was no albuminuria,and the heart and lungs showed nothing abnormal.

The case took a perfectly normal course.Desquamation was well-marked,and had finished by February 19.

There was no discharge from either nose or ears,and the urine was free from albumin,- so that the patient was considered well enough to go home on the following day,after having been in hospital for forty-three days.

Case 21.

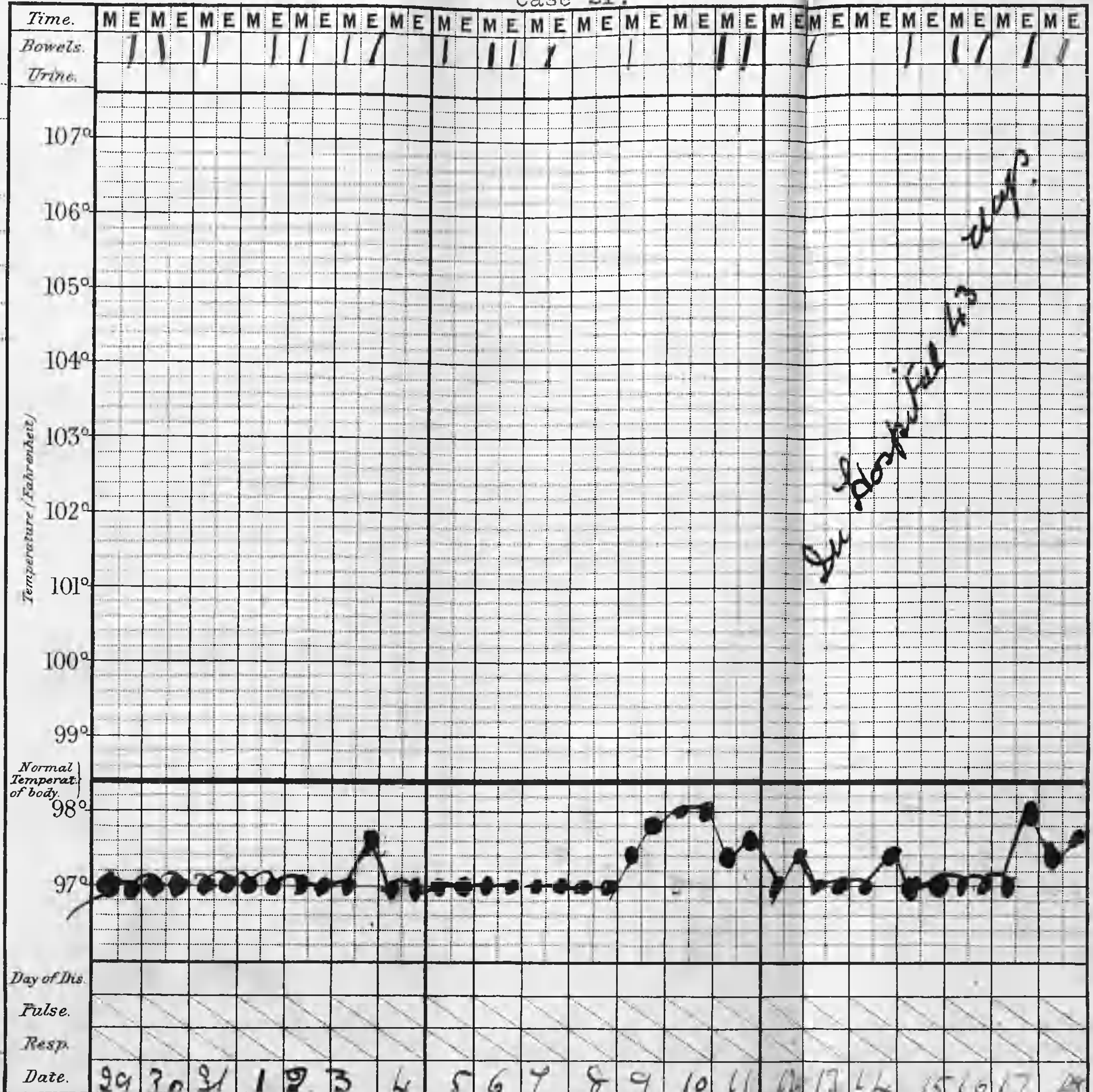
DISEASE.

Notes of Case.

...ve.
Plasterers
10 years.

Book No. ....

Date of admission.
Jan 8 /07.



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Case 27

DISEASE.

Notes of Case.

Eve

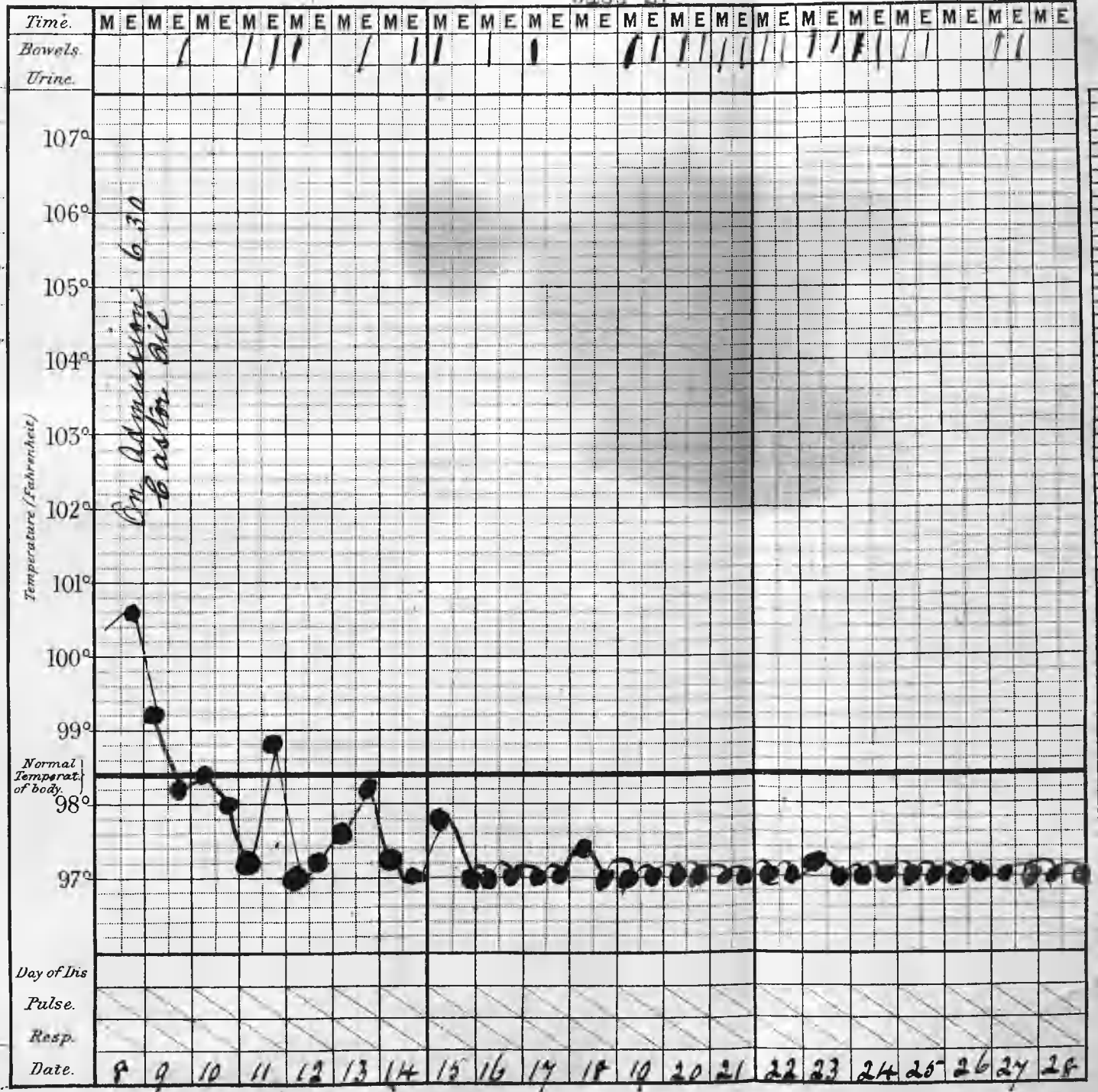
Masters.

10 years.

Book N°

Date of admission.

Jan 8th 1904.



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Case 21.

HOUR CHART.

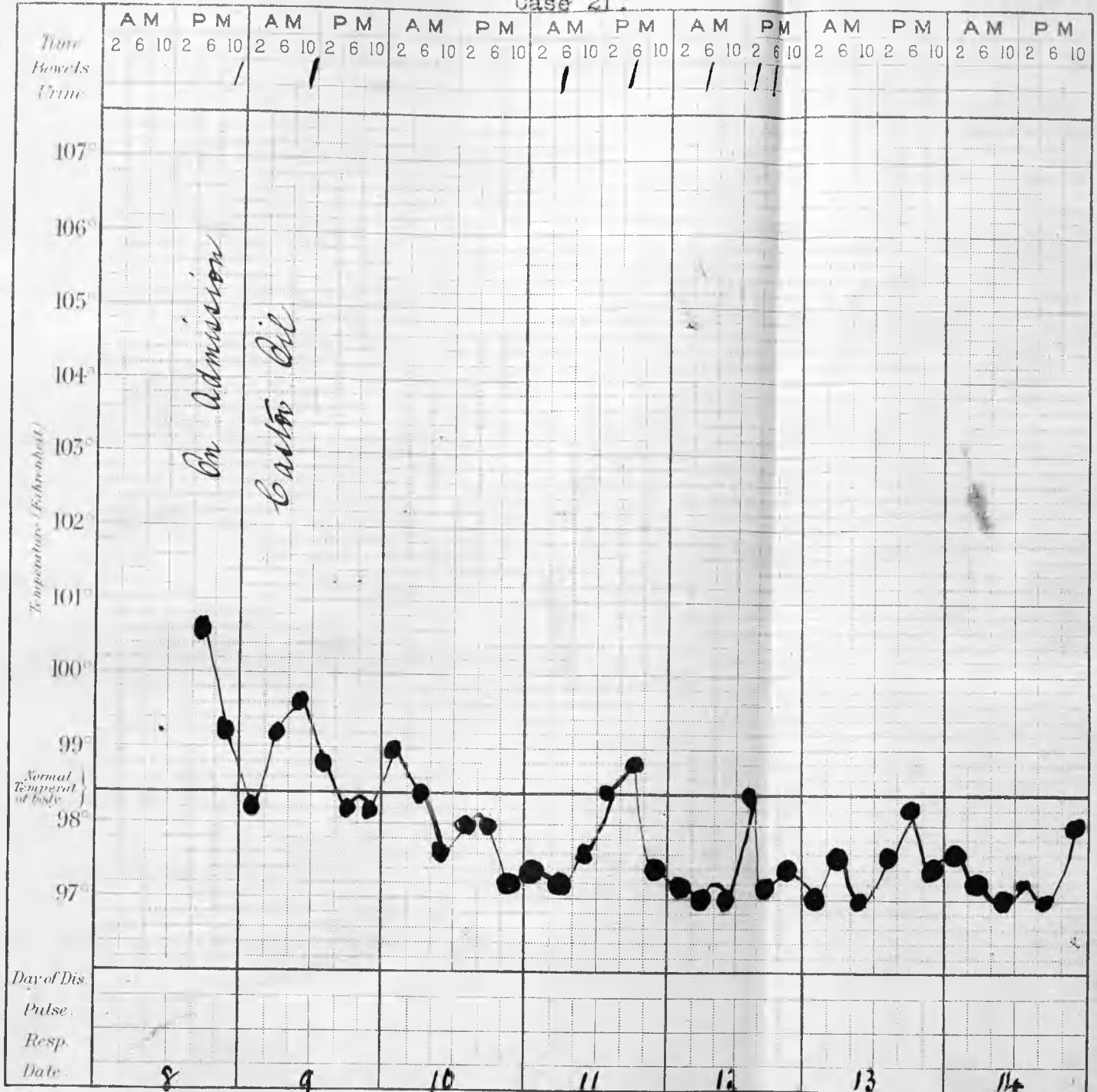
DISEASE.

Eve
Masters
10 years.

Book N°

Notes of Case

Date of admission
Jan: 8th 1907



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Case 22.

A. D., aged 12, was admitted to hospital on December 18, having been ill for three days.

Her temperature on admission was 101° F., and her pulse 140.

She had a typical scarlatinal rash, and a red tongue with enlarged papillae.

There was general glandular enlargement.

The heart and lungs were normal, and the same was true of the urine.

The nose and ears remained healthy; and the child was discharged cured on February 19, having been in hospital sixty-eight days. The lengthy sojourn therin was due to tardiness of desquamation.

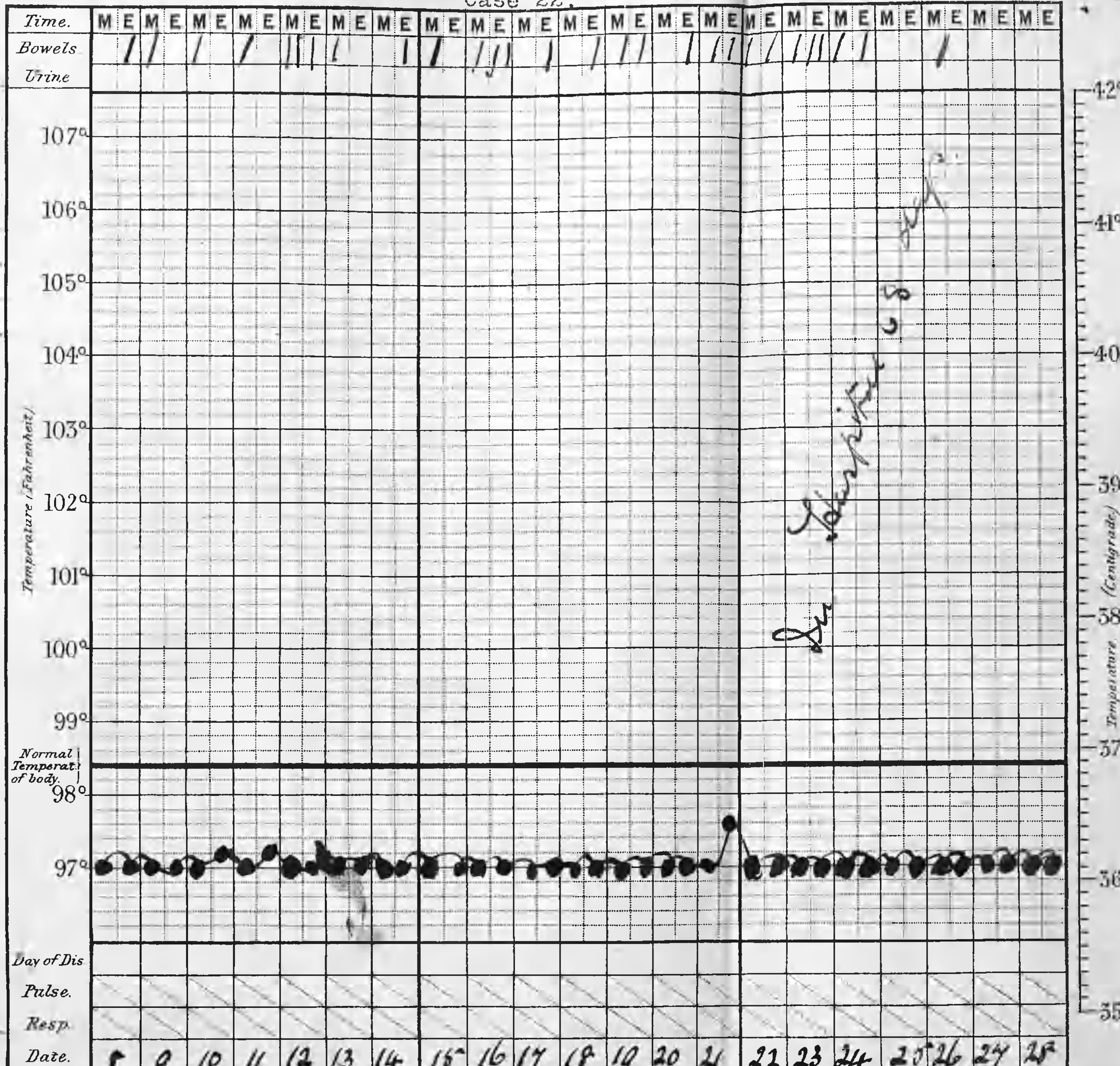
Case 22.

DISEASE.

Notes of Case.
Annie
Duncan.
12 years

Book No.

Date of admission.
18th – 1916



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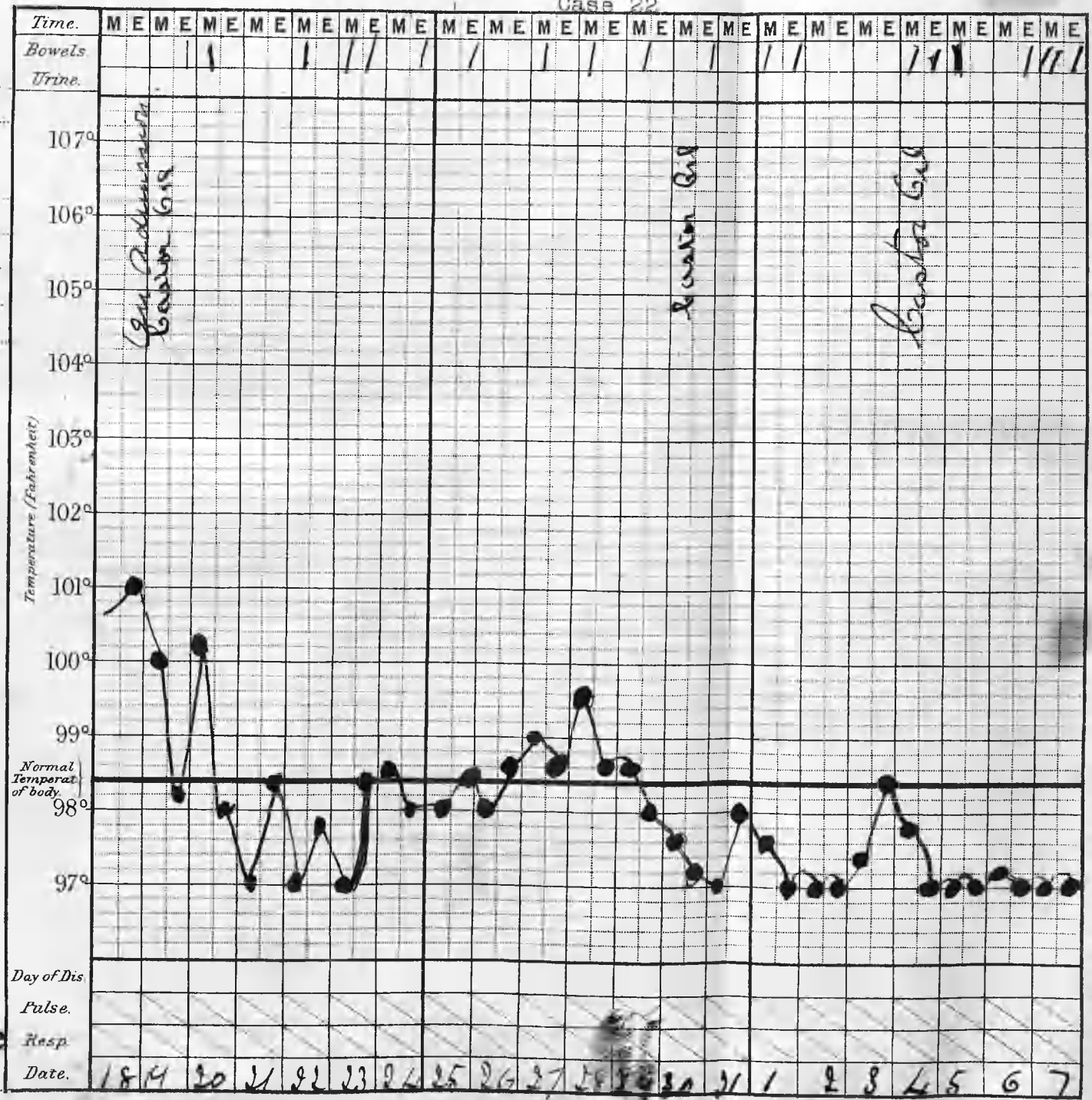
Case 22

DISEASE.

Notes of Case.

Anna Duncan.
12 yrs.

Book No.



of admission.
18 1402

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Gould's Clinical Chart.

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