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ON THE

INFLUENCE OF DIGITALIS

ON THE

WEAK HEART OF TYPHUS FEVER

BY

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PRESENTED
by the
AUTHOR.

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[Read before the Medical Association of the King and Queen's College of Physicians.]

ON the 8th of January my friend Dr. Little brought under the notice of the Society the subject of the use of digitalis in the failing heart and delirium of acute disease. On that occasion the author appealed to those present who had the opportunity to test the value of the drug in the treatment of the adynamic affections of fever. I determined to adopt Dr. Little's suggestion, and to make the trial in any suitable cases which might come under my care. It was suggested by my former colleague, Dr. H. Kennedy, during the debate which followed Dr. Little's paper, that digitalis should be given as a single remedy, in order efficiently to test its value. I endeavoured to carry out Dr. Kennedy's suggestion as far as possible. I believe the observations and cases which I am about to lay before the Society will confirm Dr. Little's opinions, and possibly add something thereto.

It may now be considered as an established fact that digitalis is a stimulant to the circulation, and Dr. Fothergill has suggested that it may be employed as such in the treatment of acute asthenic disease. By a

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stimulant to the circulation I wish to be understood as meaning a drug which has the property of maintaining that tone in the muscular fibres belonging to the heart and blood vessels, which is necessary to the maintenance of that degree of blood tension required for the efficient circulation of the blood.

Loss of tension is the great character of the pulse of acute adynamic disease, and this loss of tension is known by the frequent soft pulse, so particularly well-marked in typhus. Typhus is, therefore, the disease best suited for testing the value of digitalis as an agent for increasing the tension of the pulse. In the present paper I shall, therefore, confine my remarks to typhus, although I have employed digitalis as a vascular stimulant in other acute diseases, namely, pneumonia, enteric fever, and delirium tremens.

In the *Dublin Quarterly Journal of Medical Science* for February, 1867, was published a paper which I read before this Society during the session 1866-67, upon the pulse of typhus. I there pointed out the low tension characteristic of the typhus pulse during the height of the disease, and showed, I think, pretty clearly that this low tension depended upon two conditions, namely, great flaccidity of the capillary vessels and diminished power of the heart. I believed then and do so now, that the former of the two conditions is the cause of the low tension at the commencement of the disease, and that the latter condition is added after the disease has continued for some days.

We might, therefore, expect that a drug which either diminished the flaccidity of the capillaries by producing their contraction, or increased the contractile power of the heart, would improve the tension of the circulation, and therefore improve the character of the pulse. That digitalis can fulfil both these objects is the view now held by many of the highest authorities.

From the various experiments and observations by Brunton, Fothergill, Hanfield Jones, Dybkowsky, Pellikan, Hilton Fagg, Schiff, Valentin, Stevenson, Traube, Von Bezold, Blöbaum, and others, it is now definitely settled that digitalis increases the power of the ventricular contraction. It has also been shown by several of those observers that this drug also diminishes the calibre of the capillary vessels. These observations have been lately confirmed by those of Ackerman and of Rostock, the former of whom seems (for I have not seen the original paper of the author, and am trusting to the abstract which recently appeared in the *Practitioner*, a journal whose accuracy I confidently rely upon) to have almost exhaustively investigated this subject. Most of the authors I have noticed agree that the increased power and diminished frequency of the ventricular contractions are due to the power which digitalis possesses of increasing the inhibitory action of the vagus, in the same way that electrical or other

irritation increases that action. If this stimulation is carried to too great an extent, a reverse action follows (as seems to be usually the case in all kinds of excessive stimulation), and a state of paralysis sets in, which is shown by great slowness, and then increased frequency of the pulse, sometimes followed by sudden arrest of the ventricular action, and always by irregularity. This irregularity is referred in Ackerman's paper to the combination of large beats, caused by ventricular, and small beats, by auricular contraction. When this stage is reached it is stated that the heart never resumes its ordinary condition, and death is the result. I am glad to state this is not always the case, as shown by one, if not two, of the cases I have had under observation.

As to the cause of the contraction of the capillaries, there seems to be a difference of opinion between the authorities; Traube and Böhm believe it to depend on the action of the vaso-motor centre in the medulla oblongata; Ackerman to the direct action of the poison on the vessels, as proved by the experiments of Fothergill and others; Heidenhain believes there is increased cooling of the central parts of the body from increased rapidity of the circulation, bringing cooled blood from the surface; but according to Ackerman, this does not seem to explain the effect of digitalis in lowering fever temperatures, which he believes to be caused by an asthenic condition of the circulation in addition to the diminished frequency of the pulse. In the only case I have yet met with (Case II.) where digitalis seemed to produce dangerous symptoms, I believe the condition mentioned by Ackerman really arose; the pulse fell to 60 from 120, and the temperature from $101^{\circ}.4$ to 99° , accompanied with coldness and great depression, which continued for twenty-four hours, the former conditions being resumed on omission of the digitalis. It must, therefore, be a serious question whether sudden lowering of the pulse and temperature by the influence of digitalis is not a dangerous, instead of (as some believe) a beneficial practice. In the majority of my cases I found the temperature not lowered or materially altered from the usual course. Ackerman considers the use of digitalis in fever as of doubtful value, but of great value in certain heart affections, especially in the weak heart, as denoted by Dr. Stokes. Of this I have an example in the present paper (Case VIII.) I think, however, from the way the evil effects of digitalis in fever are spoken of in the abstract of Dr. Ackerman's paper, from which I have quoted, that he was not writing of fevers as we understand the term, for he writes of digitalis as *causing* loss of appetite, nausea, and vomiting. How it could cause loss of appetite in a patient who may be said to have no appetite I cannot understand, and in my hands I have but once found vomiting occur, and in that case (Case I.) the amount of digitalis used was very small, too small, in my opinion, to have produced any effect.

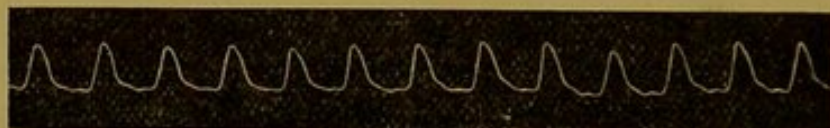
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If we compare together the low tension pulses of typhus at its height with the healthy pulse or the typhus pulse returning to its normal standard, the tension may be said to be lost, as shown in Figs. 1 and 2, where the

Fig. 1.



Fig. 2.



curve is a mere formless wave, or all but lost, as in Fig. 3, which is the

Fig. 3.



undulatory pulse of typhus as usually given in books. Now, it is evident that the test of the effect of a vascular stimulant in fever is the power that that stimulant has to improve the tension of the pulse, as shown by the sphygmographic tracing, or as felt by the physician of great experience. If we have a pulse of the form shown in Figs. 1, 2, or 3, and we can convert it into that shown in Fig. 4, or the healthy

Fig. 4.



form shown in Fig. 5, we improve our patient, and if we can prevent

Fig. 5.



the formation of a pulse such as that shown in Figs. 1 or 2, we prevent

the circulation of our patient falling into such a state of debility as to endanger his life.*

Fig. 6.



I trust that the following cases will satisfactorily illustrate the preceding remarks.

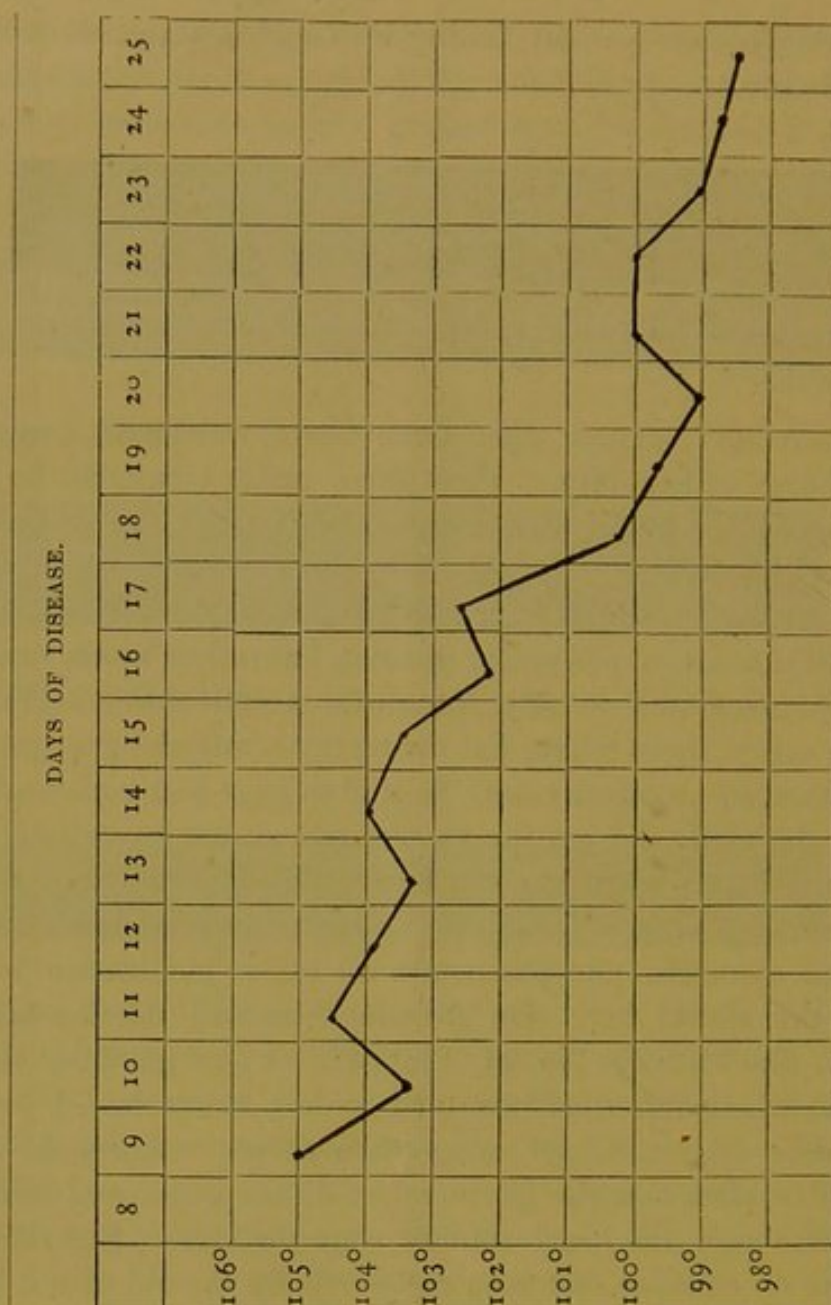
CASE I.—Anne Courtney, aged twenty-two, wardmaid, caught typhus in the discharge of her duty. First came under treatment on ninth day of illness, according to her own account, but I think she was about seven or eight days ill.

7th day (probably). Pulse 120, with fair tension, like White, No 9, Plate I.; temp. 105; heart sounds pretty distinct, but rather weak; tongue white with red tip, maculated densely. I meant this patient to get $\frac{3}{4}$ of infusion of digitalis every three hours, but owing to a mistake she got but $\frac{3}{8}$ in an $\frac{3}{8}$ mixture, so practically may be said to have had none until the next day, when she really did get the $\frac{3}{4}$ as directed, but immediately vomited. I do not think this vomiting can be attributed to the digitalis, as her stomach had been once sick before. I therefore tried to allay the irritability of the stomach, and postponed all other medication to the next (probably the ninth) day. On this day she was much weaker; pulse undulatory, like Mulally, No. 11, Plate II. I now gave her the digitalis as intended, which this time remained on her stomach. I continued to raise the dose daily until $\frac{3}{4}$ every three hours was reached. On the following day after this she got very cold, the pulse and heart became irregular, although the heart sounds were distinct. She seemed going into a state of collapse, but soon recovered by the aid of hot bottles and $\frac{3}{4}$ of whiskey made into punch. I continued the use of the digitalis on the following day without any evil effect. There was some bronchitis on the fifteenth and sixteenth days which did not become serious. She was convalescent on the twenty-ninth day, the pulse having resumed its tension on the eighteenth day, like Shelly, No. 12, Plate I., and the heart having a remarkably clear sound and strong impulse as convalescence took place.

Only three doses of whiskey of $\frac{3}{4}$ each were given during the whole course of this case; no wine was administered. There was some delirium between the seventh and eleventh days, but during this time the digitalis had not a fair chance. The pulse tension was never absolutely lost. The range of temperature (Fahr.) is given in Diagram I.

* For those unfamiliar with the sphygmograph I insert a tracing of the jerky pulse of a cerebro-spinal meningitis case, which closely resembles in feel that of the typhus pulse returning to its normal form under the influence of digitalis.

Diagram I.

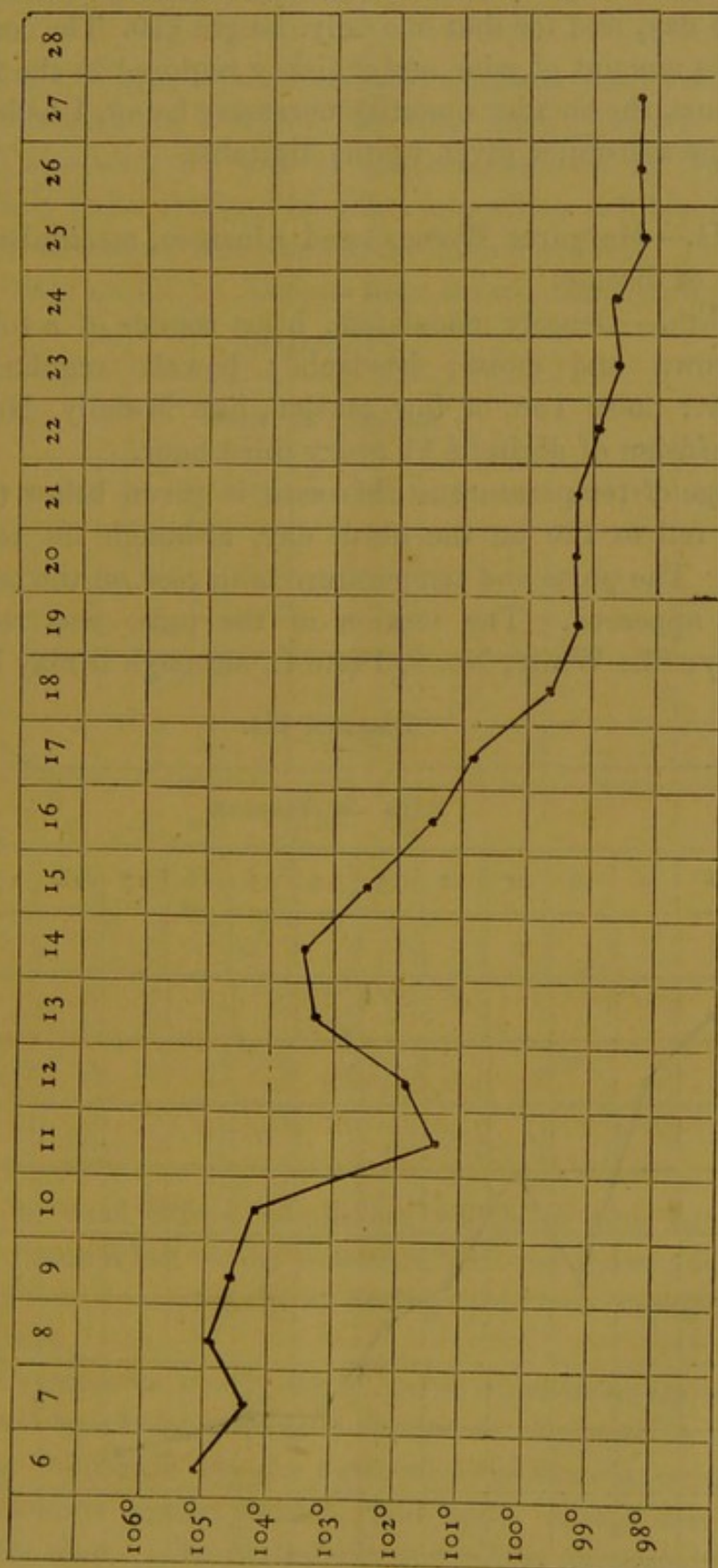


CASE II.—Edward Drew, aged twenty-four years, a sailor. This patient came from Boston, U.S., to the port of Dublin, and was ill from a few days after he started until his arrival in Dublin on November 3rd, 1872. He was admitted into the hospital, on the day after his arrival, in a state of apparent collapse, which, however, proved to be a febrile rigour. He had had a previous rigour of this sort on the voyage, and had two more during his stay in hospital. His debility was extreme, so much so that he required for many days large quantities of wine and whiskey to maintain vitality. This stimulation reached the amount of $\text{£}20$ of wine and $\text{£}8$ (in one day $\text{£}14$) of whiskey daily. The patient was attacked with phlegmasia dolens of the right leg, which lasted for about ten days. He was convalescent from the 14th of December until the 8th of January, when he unfortunately, before he had recovered his full strength, was attacked by typhus fever.

I need hardly say a more unfavourable prospect could scarcely be afforded than that of a man just recovered from a long, tedious, and complicated illness being attacked by typhus. He became densely spotted, his heart sounds became weak, and his pulse tension very low. On the seventh day it was like Shelly, No. 6, Plate I.; on the eighth, like Shelly, No. 7, Plate I.; on ninth, nearly the same as on eighth. The range of temperature (Fahr.) is given below (Diagram II.), from which it will be

Diagram II.

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seen that a high temperature was maintained for an unusually long time. Digitalis was used in this case at first in small $\frac{3}{2}$ doses of the infusion, but ultimately in $\frac{3}{2}$ doses every third hour. The pulse tension was quickly restored, and the heart sounds gained strength.

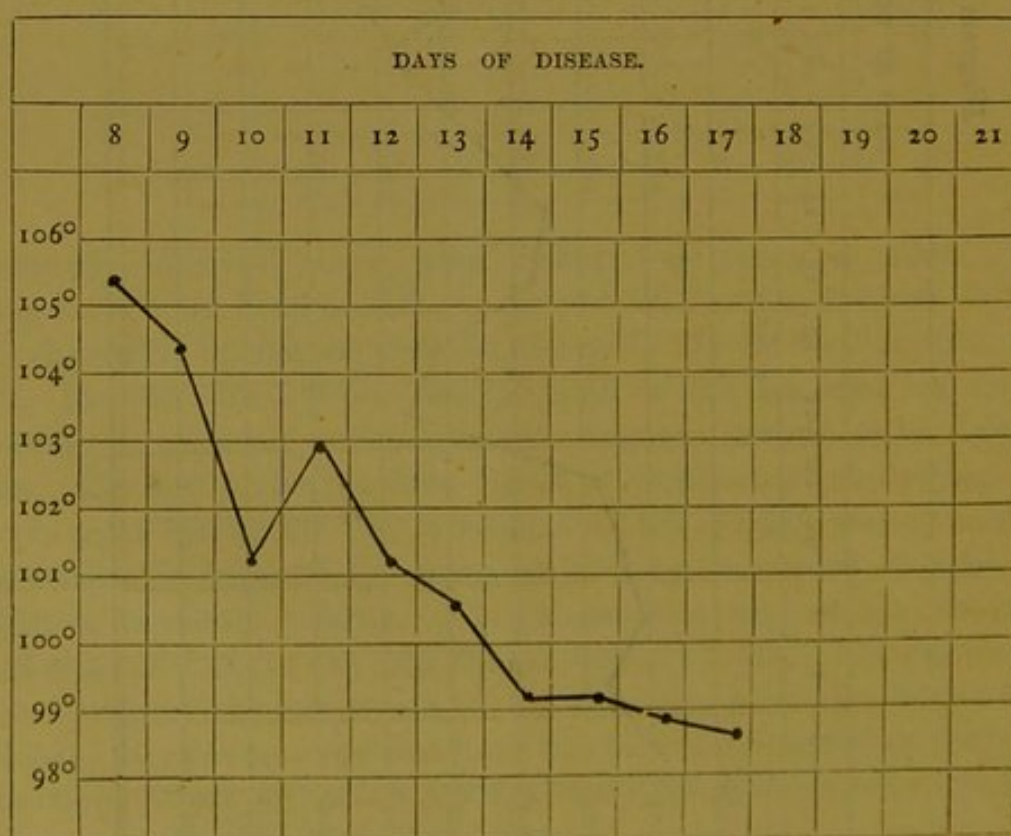
Knowing the great debility which occurred in this case in his previous illness, I did not like to rely altogether upon the digitalis, so gave him a little wine, at first $\frac{3}{4}$ of Marsala per day, which was increased to $\frac{3}{6}$, and on one day, and for that one only, he got $\frac{3}{10}$. The contrast is strong between the amount of wine and whiskey required in the first and in the second illness, the smaller quantity necessary being, I believe, altogether owing to the assistance given by the digitalis.

CASE III.—Margaret Byrne, aged nineteen, machinist; first seen on eighth day of disease.

Day eighth.—Densely maculated; heart sounds of a foetal character; tongue brown and moist; headache; bowels regular; temperature 105.2 Fahr.; pulse 136, of low tension, like Mulally, No. 8, Plate II. Ordered infusion of digitalis $\frac{3}{1}$ every third hour.

The range of temperature in this case is given below (Diagram III.) The pulse fell to 120 on the ninth day, although the tension was not improved. The pulse and temperature both rose on the tenth day, when bronchitis appeared. The tension of the pulse was restored on the twelfth day; like White, No. 9, Plate I., although it may be said to have

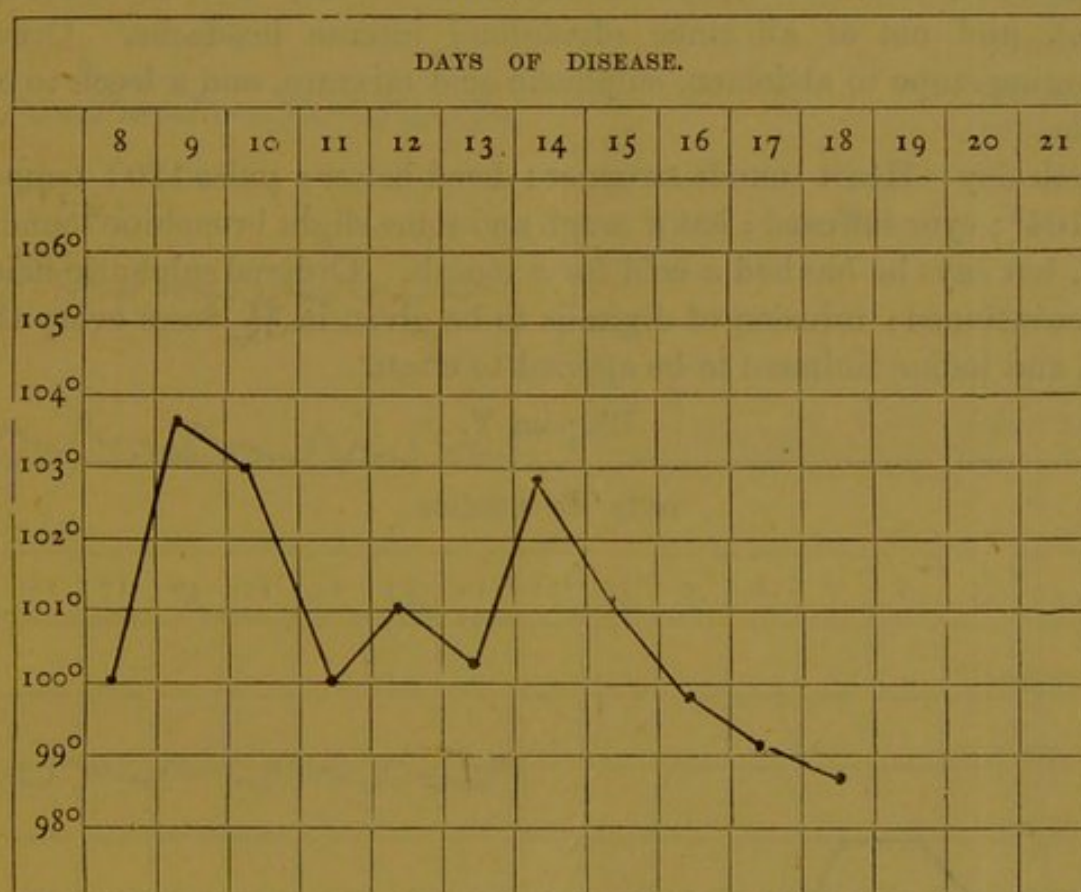
Diagram III.



been lost on the eleventh, like Fig. 2. The dose of digitalis was raised on the eleventh day to $\frac{3}{4}$ of the infusion, and turpentine was given with it on account of the bronchitis. No alcoholic stimulant was given at any time. No delirium occurred. There was no dryness of tongue, and the temperature seems to have followed the usual course, the rise on the eleventh day being due no doubt to the increase of bronchitis. Completely convalescent on twenty-first day.

CASE IV.—John White, a labourer, aged nineteen years; first seen on eighth day of disease; is a heavy, fat soft man, given to habits of intoxication. Pulse only 80, and of character shown in No. 8, Plate I., giving the daily pulse tracings of this case, which exhibits rather low tension, also well developed dicrotism and rounded summit. Temperature $101^{\circ}\cdot 1$ Fahr. (Diagram IV.). Tongue light brown, centre, edge, and tip,

Diagram IV.



red; had pain in head before admission, which is now nearly gone. Sounds of heart distinct but weak; some doubtful red spots, and doubtful typhus mottling; had slept a little during previous night. Ordered diaphoretic mixture.

On ninth day symptoms nearly same; pulse quicker, as shown in No. 9, and spots well marked; ordered infusion of digitalis in $\frac{3}{2}$ doses every third hour. On next day the pulse was the same as on the eighth day, but heart sounds much weaker, and spots darker but not very densely set on the skin. The digitalis was used to $\frac{3}{2}$ doses and $\frac{3}{4}$ of

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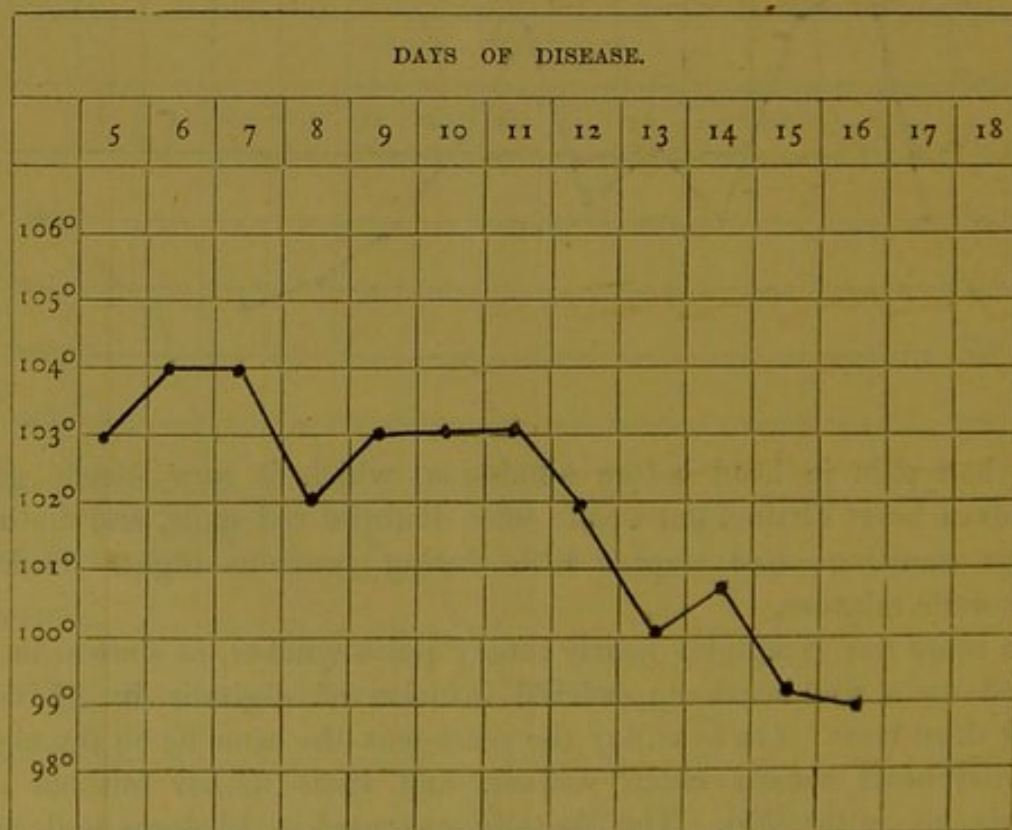
whiskey given. The case got a little worse the next, the tenth day, when the heart sounds were weaker and pulse not so distinct. The digitalis was increased to 36 doses. From this time the patient steadily improved and made a good recovery.

The pulse tracings in the case, as shown in Plate I., demonstrate that the tension never fell very low. There never was any delirium. The amount of whiskey necessary was extremely small, considering the habits, appearance, and symptoms of the patient.

CASE V.—John Shelly, a shoemaker, aged twenty-nine, admitted on fourth day of disease. First seen on fifth day; a thin, dark complexioned man; admitted to "drinking a fair share." On fifth day the heart sounds were very weak; pulse 120; temperature (Fahr.) 103° (see Diagram V.). There was a little dulness over the lower part of the back at the left side; the tongue was whitish; some abdominal tenderness and flatus, but no local tenderness; bowels had been "loose," but not frequently moved, and not at all since admission; intense headache. Ordered turpentine stupe to abdomen, sulphuric acid mixture, and a leech to each temple.

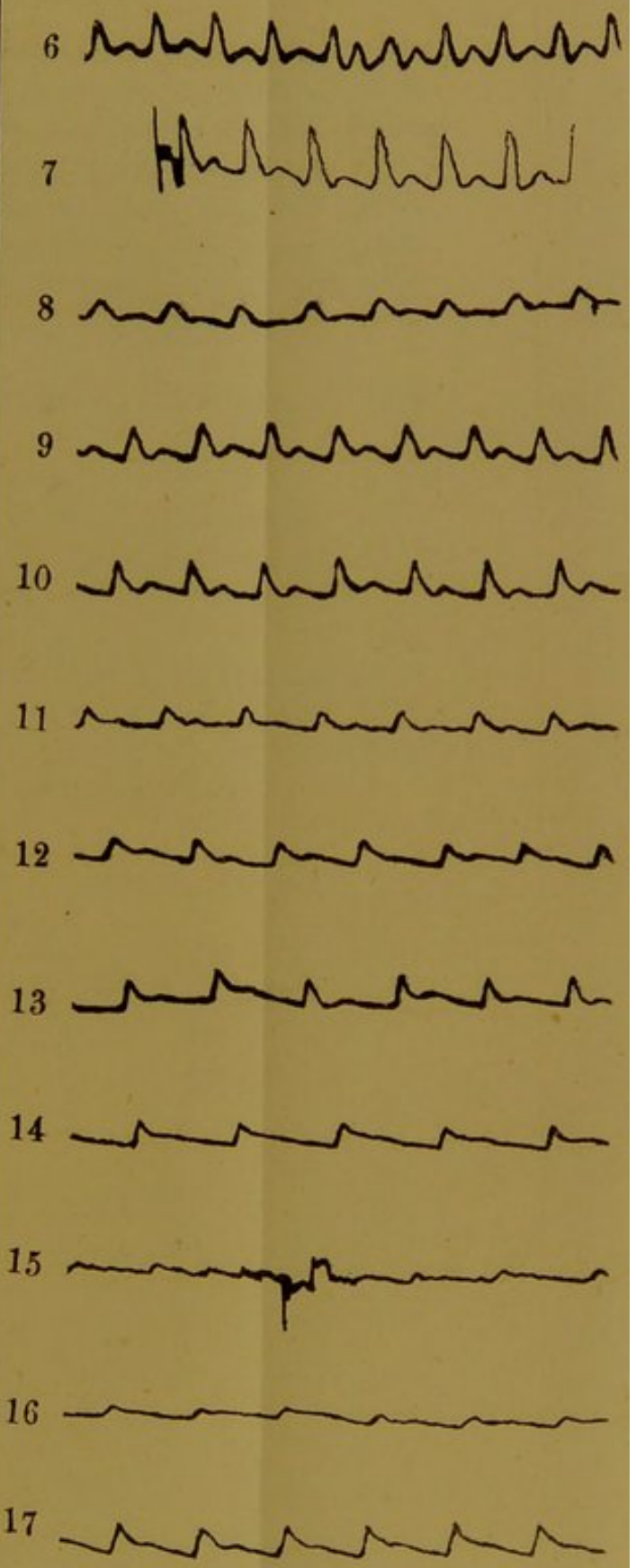
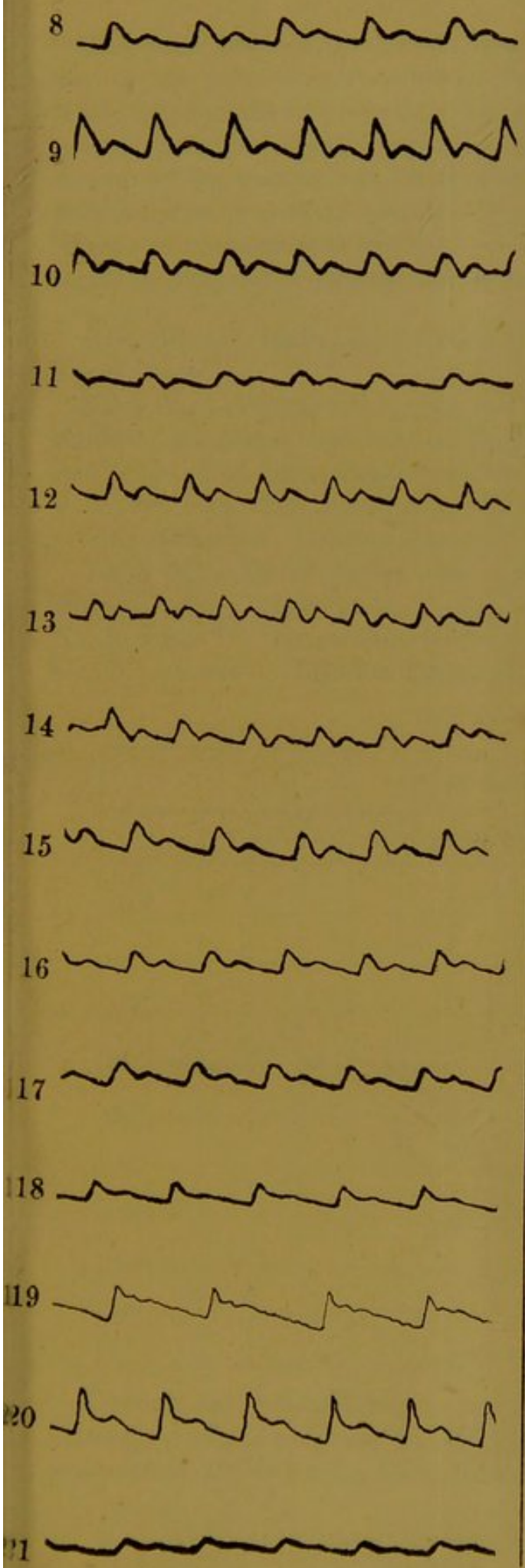
Sixth day—Heart sounds stronger; head better; pulse 120; temperature 104°; eyes suffused; has a cough and some slight bronchitic sounds in chest, but says he has had a cold for a month. Ordered sulphuric acid to be discontinued; infusion of digitalis to be given in $3\frac{1}{2}$ doses every third hour, and iodine liniment to be applied to chest.

Diagram V.



WHITE.

SHELLY.



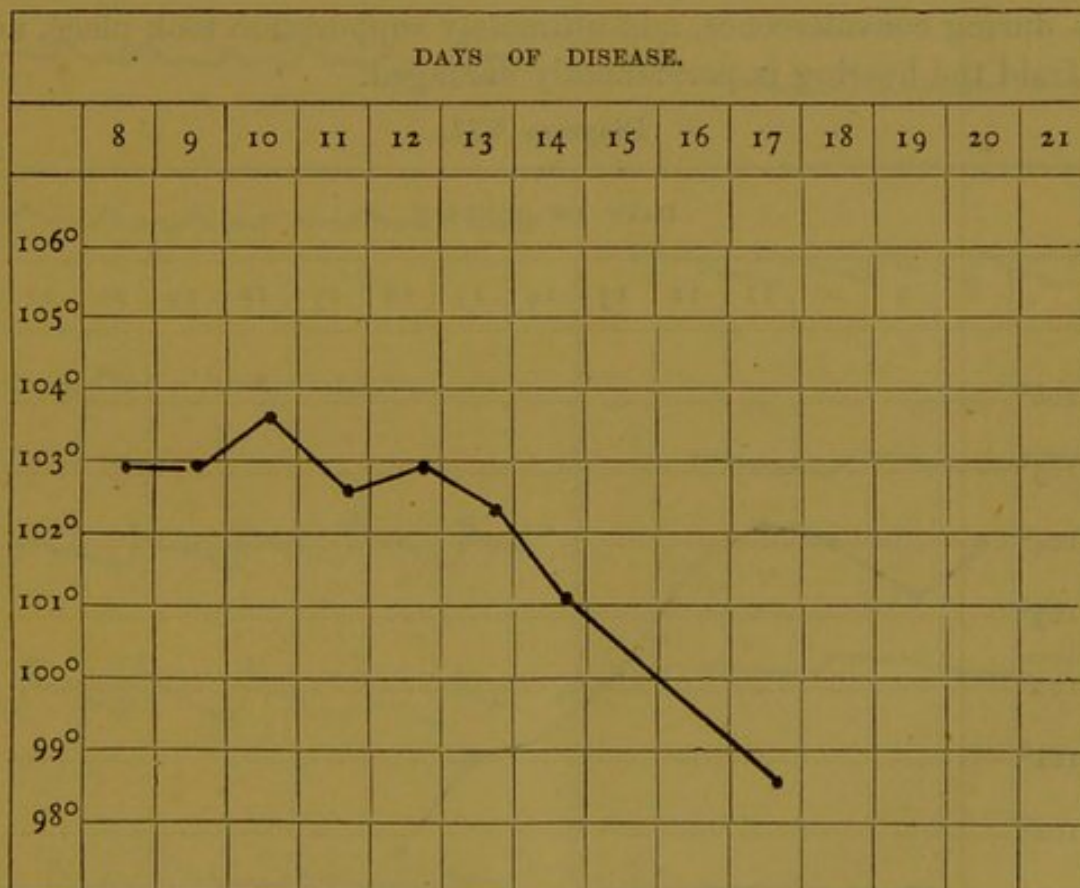
The pulse tracings in this case (see Plate I.) show that the tension of the pulse was very low at the beginning on sixth day, on which day digitalis was ordered. The pulse improved in character on the seventh, and then steadily improved until the pointed character of the summit of the tracing was attained on the thirteenth day, from which convalescence progressed quickly. No alcoholic stimulants were given. There was no delirium in this case. I believe here the pulse was maintained in comparative strength and improved by the digitalis.

CASE VI.—J. Healy, aged sixteen, a gasfitter. First seen on ninth day of illness.

Ninth day.—Tongue red at edges and tip, centre white, eyes very much suffused; maculated, especially on thighs, shivering, heart sounds good; said to have had hæmorrhage from bowels, but this seems doubtful, as there was none after admission; diarrhœa, dark in colour, but not in profuse discharges. Ordered dilute sulphuric acid 15 m. every third hour.

Tenth day.—Raved during night; passed urine and fæces under him without notice; tongue brown; pulse 104, of fair tension, like Mulally, No. 9, Plate II.; temperature (Fahr.) $103^{\circ}\cdot4$ (see Diagram VI.); heart sounds very weak. Infusion digitalis $3\frac{1}{2}$ every third hour.

Diagram VI.



Eleventh day.—Headache severe; heart sounds improved; spots as yesterday; tongue moist and fur lighter; some bronchitis on right side; temperature $103^{\circ}\cdot6$; pulse 120; tension improved; still passing under

him, but as there was some urine in the bladder a catheter was used, and a small quantity drawn off.

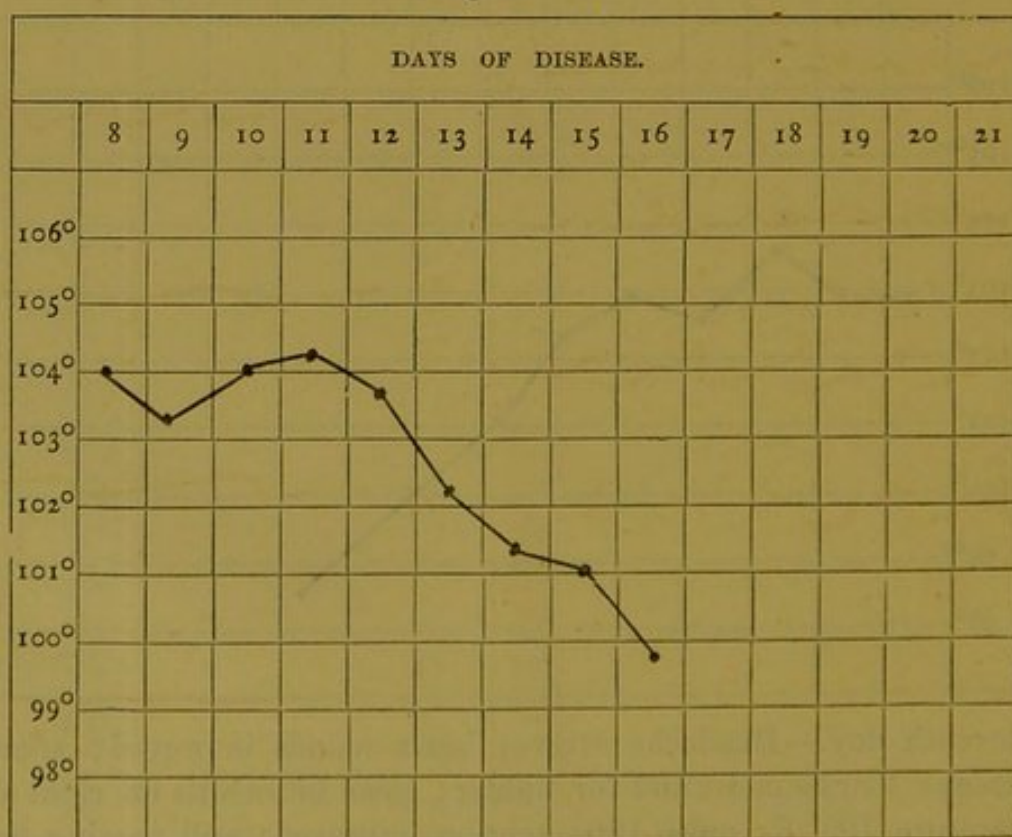
Twelfth day.—Sordes on teeth; tongue red; moaning all night; still passes under him; heart's action not so good; headache gone; temperature $102^{\circ} \cdot 7$; pulse 103. Infusion of digitalis 36 every third hour.

Thirteenth day.—Much same state, but spots fading. He was convalescent on the eighteenth day. No alcoholic stimulant was given.

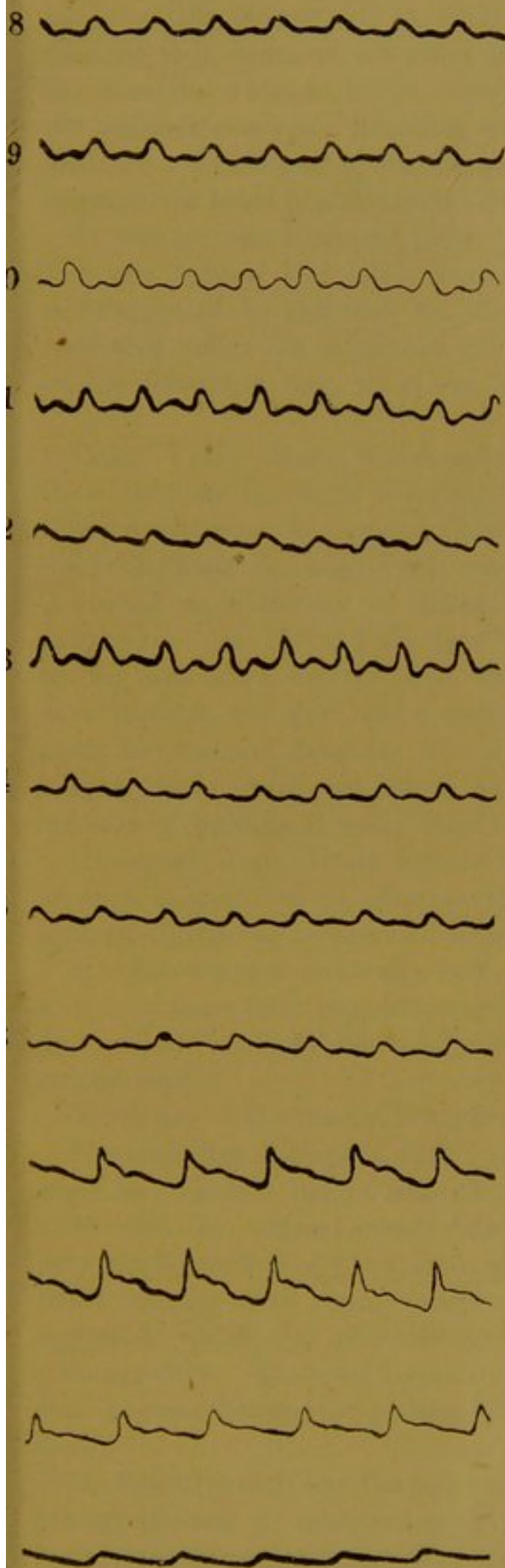
CASE VII.—John Mulally, aged twenty-eight. First seen on seventh day. The variations in the pulse of this case are seen in Plate II., and his temperature (Fahr.) in the diagram below (see Diagram VII.).

On the eighth day he was maculated; his tongue white; temperature 104° ; pulse 120, and of tension shown in No. 8, Plate II.; the heart sounds were weak; he was ordered $\frac{3}{4}$ of infusion of digitalis every third hour. He slept well on following night. His headache was so severe on the eleventh day that leeches were applied to the temples. On the same day he had some bronchitis, and the temperature rose. He was delirious on the night of the fourteenth day, but it was of a faint character, although he tried to get out of bed, but was easily restrained. He was convalescent on the seventeenth day. His heart sounds were restored on the eleventh day. After he had been up for a few days he was attacked with violent pain in the left ear, which returned several times during convalescence, and ultimately suppuration took place, and I am afraid the hearing is permanently damaged.

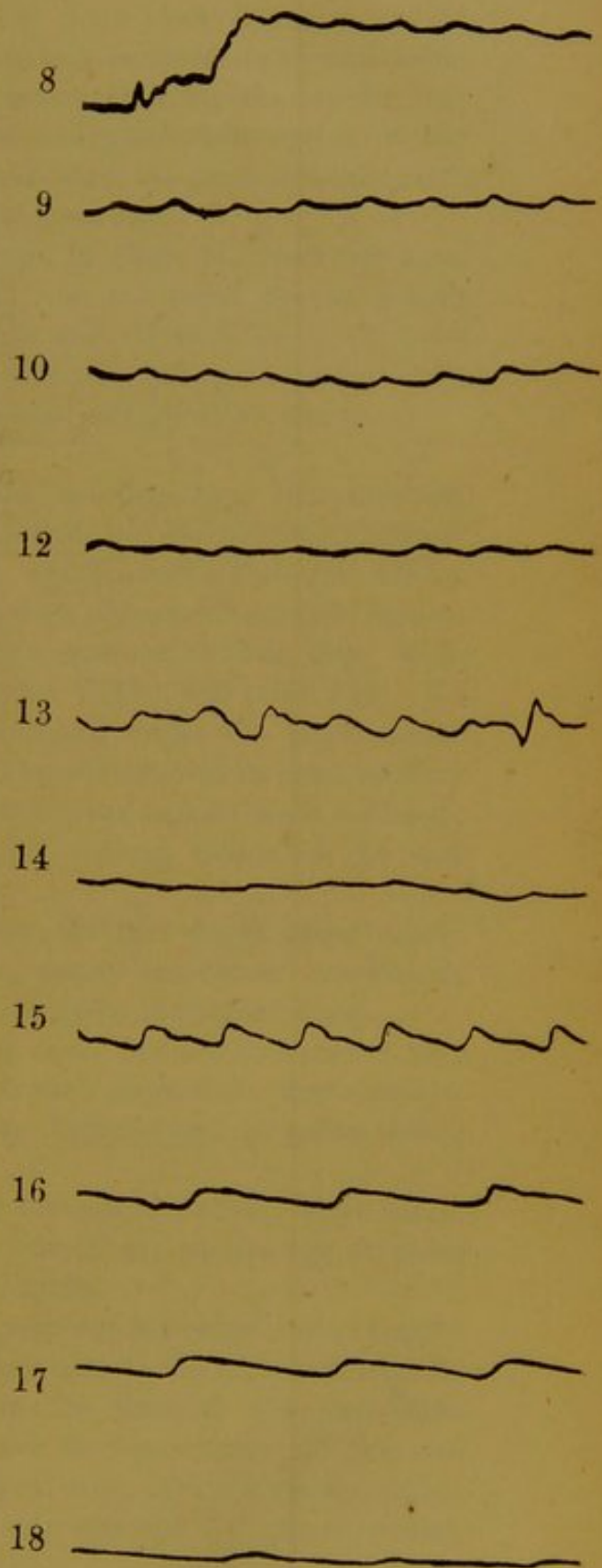
Diagram VII.

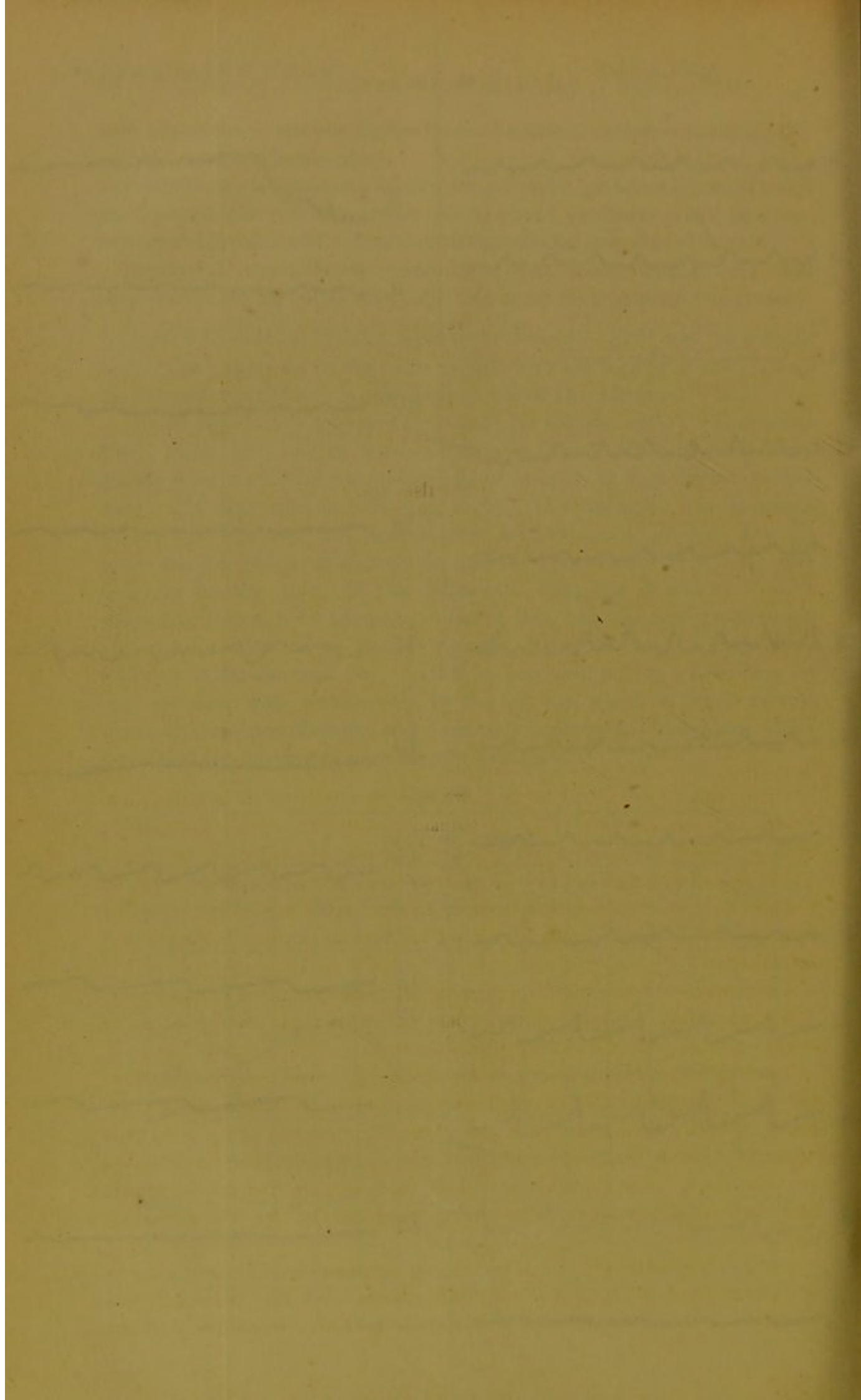


MULALLY.



MARY WALSH, aged 49.





This patient got no alcoholic stimulants; infusion of digitalis was given to the amount of $\text{ʒ}1$ every third hour from the tenth to the fifteenth day, when, as the pulse tracing had resumed its normal form, the dose was reduced to $\text{ʒ}\frac{1}{2}$. On the seventeenth day the tracing had the pointed character denoting sudden and quick contraction of the ventricle. The digitalis was discontinued when the pulse, though small, assumed the usual healthy form (No. 20, Plate II.).

It will be seen from the pulse tracings, in Plate II., from this case, that the tension had fallen very low, and the pulse became almost undulatory in its character on the tenth and eleventh days, but soon recovered under the continued use of digitalis, falling in tension only on the thirteenth day, when the bronchital complication arose.

CASE VIII.—Mary Walsh—the pulse tracings from this case are shown in plate II.—aged forty-nine, married, has had thirteen children, three of whom are in hospital, cases IX. and X., and a little girl with a mild febrile attack—is a fat soft woman, with arcus senilis around cornea. Admitted on sixth day of disease; first seen on seventh day, when temperature was $102^{\circ}\cdot2$ Fahr. (see Diagram VIII.), and pulse 110. No tracing was taken, but the pulse was small and weak; the heart sounds were distinct, but first sound weak. The patient was in great anxiety about her son and daughter who were sick; the bowels were confined; tongue white, with red edges and tip; ordered castor oil $\text{ʒ}\frac{1}{2}$ and infusion of digitalis $\text{ʒ}1$ every third hour.

On eighth day.—Heart sounds weaker, the first sound being nearly absent; tongue brown; other symptoms nearly the same; maculated; ordered digitalis as before, and whiskey $\text{ʒ}1$ daily, in divided doses.

9th day.—Spots unusually large and dark, but not numerous; first sounds of heart lost; says she is going to die; slept well; first sound of heart absent; add $\text{ʒ}1$ liquor strychniæ to digitalis, and give dose every second hour.

Tenth day.—Heart sounds improved; first sound audible; slept badly.

Eleventh day.—Slept a little; some subsultus; no tracing of pulse could be obtained; tongue brownish, but moist.

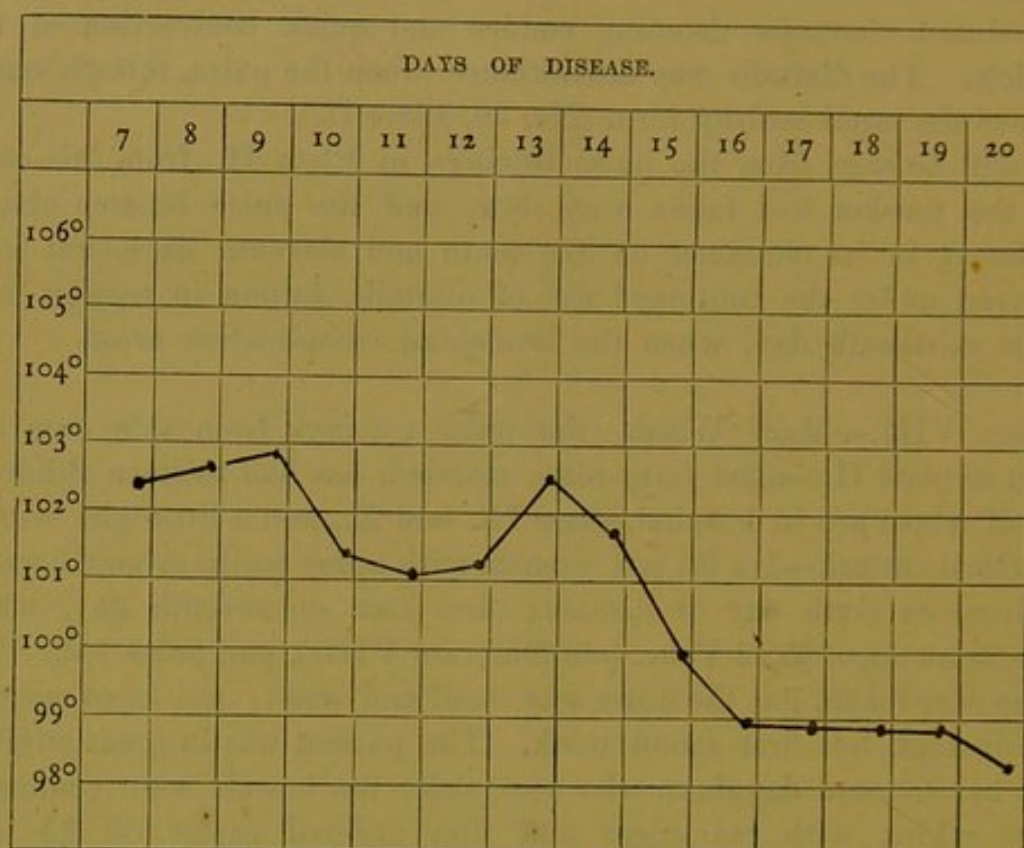
Twelfth day.—Heart sounds failed again, but recovered under temporary administration of $\text{ʒ}1$ of extra whiskey, and on the thirteenth day the heart sounds were again distinct. On the fifteenth day bronchitis appeared, which was preceded by a rise in temperature on the two previous days. The spots began to fade on same day, and the bronchitis soon became better, the patient being convalescent on the twentieth day.

On the thirteenth day the pulse tracing assumed the character which I am accustomed to associate with fatty heart, and this character was maintained during convalescence, namely, a tendency to squaring of the

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summit of the trace, as shown in sphygmograms for the thirteenth, fifteenth, and sixteenth days.

Diagram VIII.



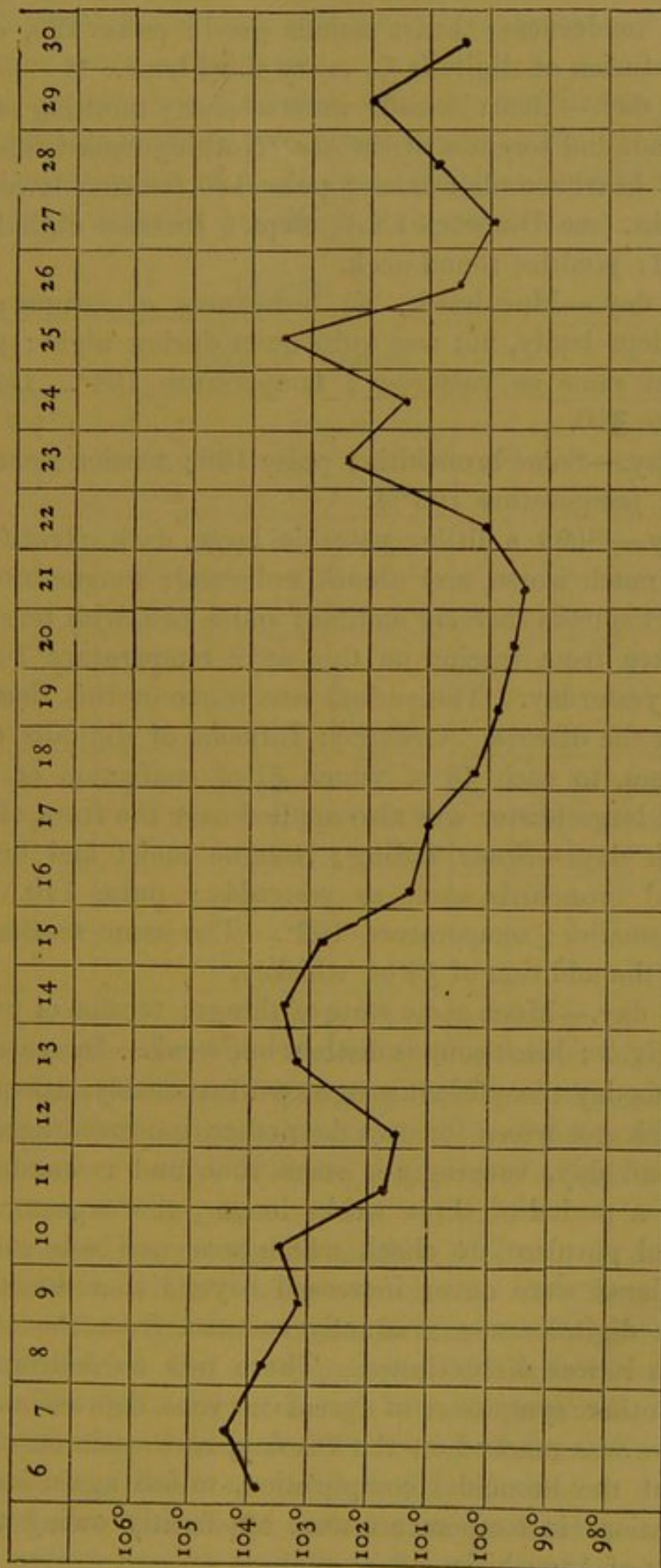
This I consider a very valuable illustration of the power of digitalis as a vascular stimulant. We had here a weak heart before fever commenced in a woman past middle age, who had borne a large family, and at the time of her illness subject to great mental anxiety, so great as to make her believe in impending death, a symptom which most physicians will, I think, agree with me in considering a very grave one. Such a case could scarcely have passed through such a serious illness in so comparatively a short time, without greater stimulation than was afforded by the whiskey given, never beyond $\bar{3}8$ in twenty-four hours, and that for but one day; on two other days she got $\bar{3}6$ of whiskey, and on others $\bar{3}4$, commencing with this on the eighth day. She also had small doses of strychnia, a drug which I consider of great value in the treatment of weak heart, whether of fevers or chronic disease. I have used this drug in consequence of being impressed with its value as employed by my friend Dr. Henry Kennedy.

The temperature of this case never rose high, a condition which I attribute to the presence of fatty heart, not to the digitalis treatment. I have observed this tendency to a range of temperature lower than usual in other patients whose hearts were affected by fatty degeneration when such were attacked with acute febrile disease.

CASE IX.—Mary Walsh, aged twenty, a dressmaker. Mother has typhus (Case VIII.); brother has typhus (Case X.); younger sister has febricula. Has been a delicate girl, although she seems in pretty good

Diagram IX.

DAYS OF DISEASE.



condition; "always" has had a cough; "nearly died of croup when a child."

First seen on sixth day of illness. Tongue white—centre slightly yellowish-brown; doubtful mottling of skin; bowels confined; slight abdominal tenderness; heart sounds good; pulse 120, of fair tension. Ordered infusion of digitalis $\bar{3}\frac{1}{2}$ every third hour.

Seventh day.—Heart sounds were weaker; mottling of skin distinct; pain in head, and soreness of throat. Nothing remarkable in appearance of throat; heart sounds weaker; pulse 130, tension lower; temperature $104^{\circ}\cdot 4$ Fahr. (see Diagram IX.); slept. Increase digitalis to $\bar{3}1$ doses; shave head; poultice round neck.

Eighth day.—Maculated; no brownness of tongue; heart sounds weaker; slept badly, but was quite quiet during night; pulse 134, with the tension same as yesterday; temperature 104° . Dose of digitalis increased to $\bar{3}10$.

Ninth day.—Some bronchitis; pulse 136; tension somewhat less than yesterday; temperature $103^{\circ}\cdot 4$.

10th day.—Slept a little; petechiæ large, dark, plentiful everywhere; bronchitis much worse, and almost universal; tongue brown and dry all over; heart sounds scarcely audible; pulse 136, with tension almost lost. Fig. 1 taken from tracing on this day; temperature $103^{\circ}\cdot 8$ —a rise of $0^{\circ}\cdot 4$ since yesterday. The patient was worse on this than on any other day during the disease. Ordered: Infusion of digitalis to be increased to $\bar{3}1\frac{1}{2}$ doses, to each $\bar{3}8$ of which $\bar{3}1$ of confection of turpentine was added. A large blister was also applied over the front of the chest.

Eleventh day.—Spots fading; tongue moist and brownish; heart sounds and bronchitis same as yesterday; pulse 110, tension nearly same but smaller; temperature 102° . The same treatment was continued with the addition of $\bar{3}4$ of whiskey.

Twelfth day.—Much same state of things; tension of pulse slightly improved; Fig. 2; heart sounds distinct but weak. Increase whiskey to $\bar{3}6$.

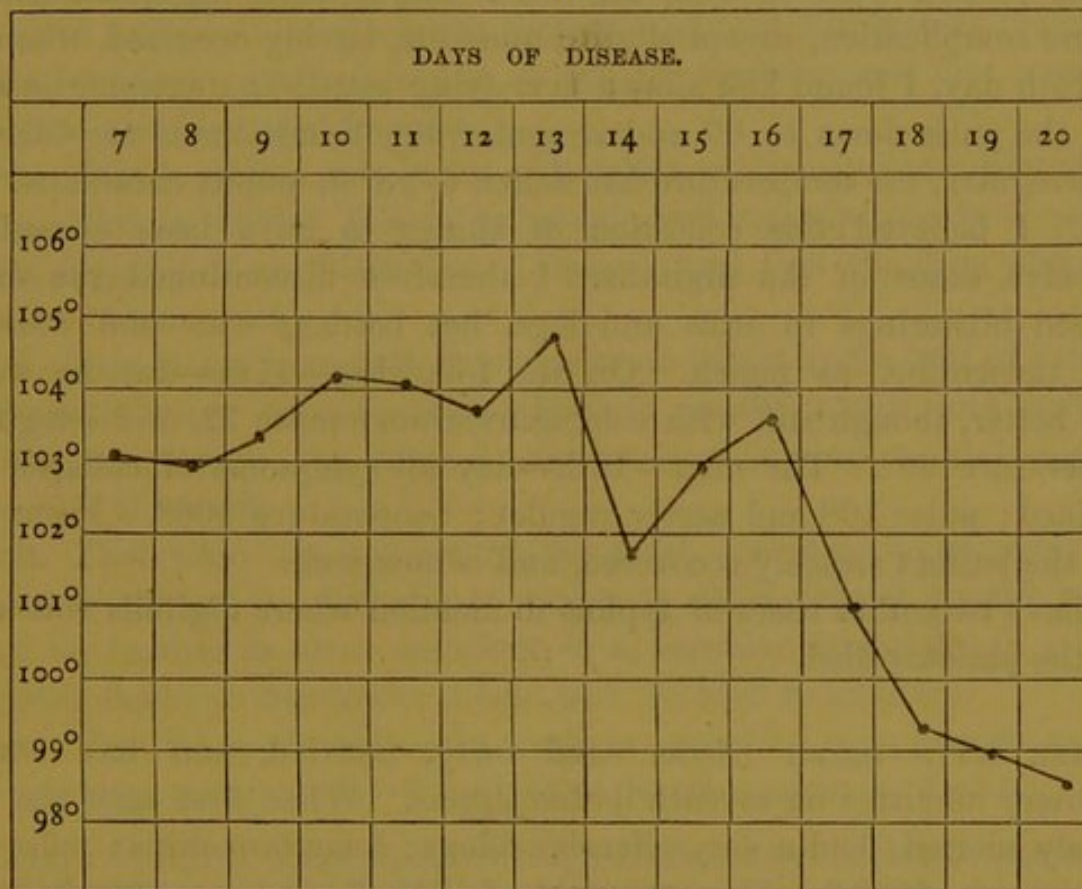
From this day the patient progressed favourably, excepting the bronchitis, which got worse for two days, then improved again to get worse on the 22nd day, varying for some time and remaining as the only disease for a period of three weeks longer, the expectoration becoming profuse and purulent, to check which uvæ ursi was successfully used. The stimulants were never increased beyond that reached on the 12th day. The digitalis was gradually reduced from the 16th day to the 21st, when it was discontinued. There was no delirium, and no subsultus or other symptoms of great nervous depression. The highest temperature was reached on the 7th day, rose again on the 10th, on the occasion of the bronchial complication, to fall again immediately; the other variations in temperature were apparently owing to variations in the amount of bronchitis.

In this case digitalis seems to have maintained the circulation under great difficulties and with little aid from alcoholic stimulants, to have prevented delirium, but not to have influenced temperature.

CASE X.—Michael Walsh, son of Case VIII., brother of Case IX., aged twenty-three years, a carpenter.

First seen on seventh day of disease, when he had intense headache; pulse 108, of tolerable tension; like White, Plate I., No. 9; temperature $103^{\circ}2$ Fahr. (see Diagram X.); no spots visible; doubtful mottling of skin; two leeches to temples, and diaphoretic mixture.

Diagram X.



Eighth day.—Quiet and slept during night; headache gone; maculated; heart sounds distinct, but weak; pulse 115, of lower tension than yesterday; temperature 103° . Ordered infusion of digitalis $\mathfrak{z}\frac{1}{2}$ every third hour.

This case progressed extremely favourably. There was no complication except bronchitis, which was worst on the 13th day, when the temperature reached its highest, as shown in diagram above. The pulse now nearly lost its tension, but never exceeded 120 in frequency. There was subsultus on the 12th day, although the heart sounds were good. There was no delirium or floccitatio, and no bad nights. There was no drug given besides digitalis, and no alcoholic stimulants. The highest dose administered was $\mathfrak{z}10$ of the infusion every third hour; thus he got about $\mathfrak{z}10$ of infusion of digitalis in 24 hours; this continued for

five days, when it was gradually lowered; the patient was able to eat on the 18th day, and was up on the 19th day for a short time.

CASE XI.—Thomas Geraghty, aged seventeen, eight days ill before admission—I believe he was not so long ill. First seen on following morning. He had slept badly, and was delirious and difficult to manage; heart sounds very weak and scarcely distinguishable; temperature $102^{\circ}3$; pulse 110; respiration 36; maculated; ordered chloral at night, and infusion of digitalis $\frac{3}{4}$ every third hour.

On 10th day better; had slept; headache gone; eyes injected; heart sounds weak; pulse 120; temperature $103^{\circ}6$.

The patient went on well, the heart sounds becoming quite distinct, and no complication, except slight bronchitis, having occurred, when, on the 16th day, I found him almost in a dying state; the extremities were cold, the pulse down to 60 and irregular, the heart sounds very distinct but irregular, the temperature had fallen to $98^{\circ}5$, pupils contracted and hard. I believed this condition of things to have been caused by excessive doses of the digitalis. I therefore discontinued the drug; ordered blisterings to arms and legs, hot bottles; wine and whiskey, with turpentine, as punch. On the following—17th—day he was a little better, though still with cold extremities; pulse 72, and irregular; temperature 99° . The next—18th—day all symptoms of collapse had subsided; pulse 108 and nearly regular; temperature 100° . From this date the patient steadily recovered, and is now well.

I have two other cases of typhus to mention where digitalis was used, and the patients died.

CASE XII.—Sarah Doyle, aged forty, married, and had several children; admitted on seventh day of illness. When first seen she was densely spotted; had a very offensive odour; some bronchitis; pulse 96; temperature $101^{\circ}6$. She was ordered digitalis and ipecacuanha wine, and counter-irritation over chest. As her pulse did not improve, wine was given next day, to which, on the following day, turpentine and whiskey were added, but no rally was ever made, and the patient died of the bronchial complication on the 14th day. There was no delirium in this case, and several quiet nights were spent in spite of the severity of the disease and the complication. This patient had also a presentiment of death when first attacked.

CASE XIII.—The second case was a boy, fourteen days sick before treatment commenced, where digitalis was used in combination with other stimulants, but no rally took place, and he died in 36 hours from the time of admission. He also had some bronchitis, which, as far as I could ascertain, was an early complication of the disease.

The conclusions which I have arrived at from the study of the foregoing cases are:—

1st. That digitalis does not shorten the duration of the fever.

2nd. That it has no influence on the range of temperature in typhus, which follows the usual course; in this my observations confirm those of M. Desnos (*L'Union Médicale*, Feb. 6, 1873).

3rd. That it prevents or diminishes delirium, as shown in the foregoing cases, in many of which there was no delirium, and in none was the delirium serious, nor was wakefulness a troublesome symptom—in fact it allays the symptoms of nervous debility.

4th. That it improves the tension and slightly diminishes the frequency of the pulse, and may even prevent serious loss of vascular tension if employed sufficiently early in the disease, and that it increases the power of the ventricular contraction, as shown by the increased first sound of the heart and increased impulse.

5th. That it seldom acts injuriously when cautiously administered.

6th. That a sudden fall in pulse-rate and temperature in a patient taking digitalis is an indication of danger, and that the drug should at once be discontinued.

7th. That doses from half an ounce to an ounce and a-half of infusion of digitalis every second or third hour is usually a safe and sufficient amount to produce the desired improvement in, or to maintain the tension of the pulse.

8th. That when the tension of the pulse continues to decrease after 24 hours' use of the digitalis in moderate doses, that it should not be relied on further as alone sufficient as a vascular stimulant in typhus, and that alcoholic stimulants should then be used in addition.

9th. That when alcoholic stimulants are required they may be used in less quantity when employed with digitalis than when used alone.

I have ventured upon no statistical calculations either as to the results of treatment or as to average doses, as I look upon such speculations as highly unsatisfactory, and calculated to do serious injury to practical therapeutics. I believe the number of cases I have brought forward to be only sufficient to suggest favourably a further trial of the drug, which I am bound to say has impressed me favourably as a vascular stimulant in typhus. I must here return my thanks to Mr. Moreton, my clinical clerk at Cork-street Hospital, for the great diligence and care with which he has recorded and assisted me in carrying out these observations.

