

further inference will be obvious—that it is in brain-workers whose nervous energy is diverted from the work of digestion, or in those whose mode of life is sedentary and whose general nerve-tone is low, or in persons depressed by anxiety and worry, that this form of dyspepsia is most liable to occur. One way, indeed, in which grief and worry and anxiety give rise to protracted sleeplessness is through the effects on digestion. Sleep will come to the relief of grief and even anxiety gives way to weariness and sleep, but nothing is more certain than the effect of mental depression on digestion, and when the sufferer is roused by flatulence or abdominal discomfort the distressing or agitating idea takes possession of the mind and banishes further sleep. Flatulent dyspepsia, again, is one of the causes of the sleeplessness which is said to belong to old age. It is not old age as such to which sleeplessness is to be attributed but to the infirmities attending it—to vascular conditions or functional derangements of one kind or another of stomach, bowel, or bladder. Flatulent dyspepsia very often interferes with sleep on first going to bed and may keep the sufferer awake indefinitely. This faculty it shares with various causes of sleeplessness, but one very common variety of sleeplessness is highly characteristic of flatulence. The patient, possibly a good sleeper naturally, falls asleep on getting into bed and then wakes punctually night after night at a given hour, at two o'clock, three o'clock, or four o'clock as the case may be, and then lies awake for the rest of the night. The explanation is that the last meal has not been entirely passed on into the duodenum. Fermentation takes place in the food which remains in the stomach and after a certain time sufficient gas and acidity have been developed to disturb the sleep.

The treatment of sleeplessness due to flatulence is, of course, that of the dyspepsia. This in itself would demand an entire lecture for its discussion and you will not expect me to enter upon it. All I need do is to enumerate the expedients for preventing the interference with sleep. The simplest of these is a tumbler of hot water at bedtime, and it is usually effectual. The stomach is stimulated to contract, much of the gas present in it at the time is expelled, and any fermenting contents are swept on into the small intestine where the antiseptic bile checks further fermentation and where flatulence gives rise to less disturbance. The hot water should be taken before undressing so that it may have time to clear out the stomach and expel the gas before the patient lies down. Should hot water not be sufficient sal volatile and carbonate of soda may be taken before it or an alkaline carminative draught may be given—carbonate and sulpho-carbolate of soda with aromatic spirit of ammonia, compound tincture of chloroform, or ether and peppermint or camphor water and sometimes bromide of sodium or ammonium may be added with advantage for a time. Friction over the epigastrium or between the shoulders may help to disperse the flatulence. I do not think it is well to allow even so simple and harmless a matter as a nightly dose of hot water to grow into a habit. As a rule it should not be continued for more than a week at a time as the response of the stomach becomes imperfect. It has seemed to me that an alkaline draught can be taken longer without losing its effect. I know several patients who wash out their own stomach at bedtime whenever they have sensations which lead them to apprehend a bad night.

Some individual causes of sleeplessness must be considered. Tea and coffee are looked upon as powerful agents in the prevention of sleep and there are no doubt many here who have found a cup of strong tea or coffee an excellent preparation for an evening's work. Certain kinds of tea and really good coffee do undoubtedly act as stimulants to the brain; they help the tired nurse to keep awake and fresh, and keep sleep at bay for the student who is working far into the night. They may, indeed, produce a condition of intense wakefulness. When, however, it is stated that a cup of tea in the afternoon will keep a given person awake all night, I doubt very much whether it is the tea, as such, which is responsible for the result. Imagination often plays a very influential part in the effect. Let such a person be confidently assured that pure China tea, brewed for not more than two minutes, is innocent of such evil properties and he or she will often take it with impunity whether it conforms exactly to the description or not. But afternoon tea is a very common cause of flatulent dyspepsia and in this way may be responsible as the cause of protracted sleeplessness. So with the after-dinner cup of black coffee, it is often the dinner and not the coffee which disturbs the night's rest.

Influenza has familiarised us with sleeplessness of a most obstinate character. There is always asthenia, cardiovascular and nervous, which must be borne in mind in the treatment. With the general effect on the nervous system there may be complications which contribute seriously to the prevention of sleep and may even interfere with the action of powerful opiates or sedatives. Among these is acute dilatation of the stomach, a not uncommon incident of an attack of influenza. It was present in the worst case of post-influenzal sleeplessness that I ever saw, in which there was not a wink of sleep for four days and nights. Sleeplessness following influenza must be treated as an acute affection and, unless there is speedy improvement under such tonics as arsenic or phosphorus, strychnine and quinine, together with measures for the relief of functional derangements, opiates may be given without hesitation and I think it better to have recourse at once to combinations of opium or morphine and hyoscyamus with carminatives than to try sulphonal, or trional, or chloral and bromides. In case of need morphine may be given hypodermically and it usually adds greatly to the efficiency to combine it with strychnine as well as atropine. The immediate effect of large doses of alcohol is torpor. A result of long-continued alcoholic excess is sleeplessness culminating in delirium tremens. The remedy here is total abstinence with considerable doses of strychnine or nux vomica and perhaps digitalis. At the same time the liver and stomach disorders resulting from the alcohol will demand attention as they may keep up the sleeplessness and are indeed frequently its main cause.

I do not know whether it is worth while mentioning some of the popular remedies for sleeplessness. Among them is the hop pillow which certainly sometimes seems to soothe. There is, again, the saffron bag applied to the pit of the stomach immortalised by Bulwer Lytton in "The Caxtons." Gently smoothing the hair is undoubtedly efficacious in many cases, as is also, but less frequently, sponging the burning palms. Dipping the face in cold water is one of the expedients of the worker late at night; some will sponge the entire head. Then there are the different ways in which people try to hypnotise themselves by watching and counting the invisible breath, slowly counting imaginary sheep as they pass through an imaginary gate, and the like. I have not ventured on the large subject of the employment of hypnotism. That it has its legitimate uses in inducing sleep I have no doubt. It has not been my good fortune to meet with a case where it has overcome the morphine habit or rescued the victim of chloral or sulphonal.

THE PROCESS OF DIGESTION AFTER RESECTION OF ABOUT SIX FEET OF THE SMALL INTESTINE.

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(Translated for THE LANCET.)

BEFORE proceeding further, the title of this paper requires some explanatory observations. The dimensions of the intestine when in the living body or when only just removed from it are, as every surgeon knows, subject to great variation. Surprisingly different results are obtained according as the bowel is measured in the completely collapsed condition or when containing gas and distended. In illustration of this mention may be made of an intestinal resection performed by me in a case of strangulated gangrenous hernia some weeks after the operation which is the subject of this paper. The piece of intestine as it lay on the table in the relaxed condition measured barely 50 centimetres (20 inches) in length, but when I, in order to test the resistance of the necrosed portion, filled the intestine with water, not using any additional force, the resected portion underwent elongation to 90 centimetres (36 inches). Trzebicky¹ has also called particular attention to these variations in the length of the intestine. The portion of intestine removed in resection is generally contracted to half

¹ Ueber die Grenzen der Zulässigkeit der Dünndarmresektion Archiv für Klinische Chirurgie, Band xlviii., p. 63.

its size, on which account measurements taken at that time must lead to delusive results. When I specify 192 centimetres as the length of the portion of the intestine resected in the present case it is to be carefully kept in mind that this number expresses the shortest length—i.e., what Trzebicky calls the deceptive measurement in the case of resected and contracted intestine. In order that accurate comparisons of this case with others may be made it is necessary at the outset to allude to this question of disparity in methods of taking measurements. For the due appreciation of a reduction of the absorbent area of the intestine there is an essential preliminary question: What proportion of the intestinal tract is removed in resection? The statements of text-books with regard to the total length of the intestine vary considerably; one² gives five and a half metres (18 feet) as the length of the small intestine, while another one³ gives eight metres (26 feet). Beaunis and Bouchard specify as the limits four metres and eight metres (13 feet and 26 feet); Trzebicky finds values ranging from 561 centimetres to 870 centimetres (from 18 feet 5 inches to 28 feet 9 inches); Vierordt finds values ranging from 560 to 770 centimetres (from 18 feet 5 inches to 25 feet 5 inches), the length of the large intestine being given as from 130 to 230 centimetres (from 4 feet 3 inches to 7 feet 6 inches). According to Beneke the ratio existing between the total length of the body and the length of the intestine is that for every 100 centimetres of the former there are 387.5 centimetres of small intestine (without the duodenum) and 91.5 centimetres of large intestine. The height (*Körperlänge*) of our patient being 172 centimetres (5 feet 8 inches), in accordance with the last of these estimates the length of the small intestine might be taken to be 666 centimetres (21 feet 10 inches). The portion resected would therefore amount to rather less than one-third of the total length of the small intestine.

To what extent may the human intestine be removed without entailing, if not actual death from inanition, at least serious interference with the function of absorption persisting as long as food continues to be supplied? This question is of great interest to the physiologist and under certain circumstances is also of the utmost practical importance to the surgeon. Attempts to discover the answer have been made in a variety of ways and have led to valuable observations. Senn⁴ first proceeded by the method of making experiments on animals. Of seven extensive resections of the small intestine performed on dogs and cats only two were available for the purpose in view. In both cases an intense, long-continued, and eventually fatal marasmus was the sequel of the resection. As the result of these experiments Senn came to the conclusion that excision of more than one-third of the whole length of the small intestine was an operation dangerous to life, productive of marasmus, and in this way fatal sooner or later. He also directed attention to a compensatory hypertrophy of the intestinal wall. Trzebicky assigned much wider limits for the intestinal resections permissible in dogs, supporting his conclusions by extensive resections of the small intestine performed by him on 28 animals. "Resections of half the small intestine were tolerated quite well; resections of two-thirds and upwards of the jejunum and ileum made such an inroad on the chemical and mechanical processes of digestion that the prolongation of life became impossible." There was incessant diarrhoea, followed at a later stage by vomiting; food was voided for the most part undigested, and in spite of a craving appetite the animals perished with symptoms of complete inanition. Trzebicky made an observation of even greater importance—namely, that the results of resection of the beginning of the jejunum were more serious than those of resection further in the direction of the ileo-cæcal valve. He attempted to apply to the human subject the results which he had obtained and declared that the shortest length of the small intestine being taken as 560 centimetres (18 feet 5 inches) resection of one-half of it—i.e., 280 centimetres—was quite permissible, presuming that no further complications were present. Monari⁵ did not consider that the limits assigned by Trzebicky were conclusive. The inferences from

his experiments, likewise made on dogs, even permitted a resection of seven-eighths of the small intestine without the production of important interference with metabolism. He believed that at least one-half of the small intestine might be removed in the human subject without the person's metabolism being influenced for the worse. In like manner with Senn, he also found hypertrophy and hyperplasia of the gastro-intestinal tract in the dogs which had been operated on.

The address delivered by Dreesmann⁶ at the last congress of German naturalists and medical men held at Düsseldorf supplied us with a summary of the extensive resections of the intestine which have hitherto been performed on the human subject, a summary for which our thanks are due to that author. Including the one observed by himself he found a total of 26 cases in which more than one metre (39½ inches) of the small intestine had been removed. The ultimate results shown by the statistics were not particularly brilliant. Of the 26 patients 17 survived the operation and five of the latter suffered from disorders of the digestive tract, leaving 12 whose digestion remained subsequently unimpaired. It is to be noted that in 10 of the last-mentioned cases the portion of intestine removed was less than two metres (6 feet 7 inches). Up to the present time six resections of more than two metres of the bowel have been successfully performed—namely, 205 centimetres of the small intestine (Köberle), 208 centimetres of the small intestine (Kocher), 215 centimetres of the ileum (Dreesmann), 234 centimetres of the ileum (Shephard), and 310 centimetres of the ileum (Fantino). The sixth and most extensive resection was that made by Ruggi—namely, 330 centimetres of the small intestine in an eight-year-old boy on account of circumscribed peritonitis. Subsequent disorders of the digestive tract occurred in four of these extensive resections, only two remaining exempt from them—namely, the first performed one with 205 centimetres removed, and, strange to say, the last one with 330 centimetres removed. Evidently this most unusual case of Ruggi's can be explained only by the youthfulness of the patient in question, for in early life compensatory hypertrophy of the remaining intestine can establish itself much more easily than in the adult. From these statistics Dreesmann draws the inferences (1) that resections of less than two metres do not provoke any disorders of the digestive tract except when complications are present; and (2) that resections of more than two metres may be performed without subsequent disorders of the digestive tract, provided that the patients are young. The disorders referred to manifest themselves chiefly as diarrhoea.

Fantino's case⁷ of resection of 310 centimetres (10 feet 2 inches) of the ileum deserves special consideration. The patient was a woman, 60 years of age. Notwithstanding her deficient assimilation of nutriment an increased supply of food succeeded in preventing emaciation. Fantino concludes his communication with the statement: "At all events, an important fact is now established—namely, the possibility of resecting three metres of the small intestine of an aged patient, provided that he or she possesses a normally-acting digestive apparatus."

With respect to the limits which are permissible in intestinal resection in the human subject it will be perceived from the foregoing short summary that opinions based on experiments made on animals present considerable divergencies. Extensive intestinal resections already performed on the human subject would supply a safer foundation on which conclusions might rest, but these operations are so few in number that any addition to the existing statistics of only six cases is very welcome. The account now to be given contains the essential particulars of the clinical history of a patient upon whom I operated in autumn, 1898, and whose small intestine was resected to the extent of about two metres, a length which nearly approaches the critical dividing line.

On the evening of Oct. 9th, 1898, there was a great disturbance and stabbing affray among Italians in Zürich, in the course of which a man, 23 years of age, was stabbed in the hypogastric region at 7 P.M. He immediately fell down and observed that his intestines protruded from the wound. His companions then conveyed him home, a distance of about 300 metres (320 yards); he did the whole journey on foot, being supported only underneath the arms. A medical man who was fetched an hour or two

² Gegenbauer.

³ Joessel und Waldeyer: *Lehrbuch der Topographisch-chirurgischen Anatomie*, II. 1899.

⁴ Experimentelle Beiträge zur Darmchirurgie. Deutsch von W. Sachs, Basel, 1892.

⁵ Experimentelle Untersuchungen über die Abtragung des Magens und des Dünndarmes beim Hunde. Beiträge zur Klinischen Chirurgie, Band xvi.

⁶ Berliner Klinische Wochenschrift, 1899, No. 16.

⁷ Contributo allo Studio delle Estese Resezioni Intestinali, Gazzetta Medica di Torino, 5 Marzo, 1896, No. 10.

afterwards applied a first-aid dressing and directed the removal of the patient to the surgical klinik. The patient eventually arrived at the Surgical Poliklinik (i.e., out-patient department) in a municipal ambulance vehicle at 3 A.M. on Oct. 10th, accompanied by three other Italians who had been stabbed. He was a man of middle size, strongly built, and well nourished; his mind was quite clear; his pulse was fairly strong, regular, and over 100; his extremities did not feel particularly cold; his thoracic organs presented nothing unusual. After removal of the first-aid dressing there was found lying on the right hypogastric region a voluminous coil of small intestine the length of which was estimated at two metres (six feet seven inches). The greater part of it was in colour from deep dark blue to black; the serous membrane was quite lustreless. At 4 A.M.—namely, nine hours after the infliction of the wound—the patient was anaesthetised with ether. After shaving the hair, the abdominal walls and especially the edges of the wound, together with the piece of intestine, were cleansed and sterilised with solution of corrosive sublimate (1 in 5000). The protruding intestine was tightly grasped by the little wound and was already in part undergoing necrotic change, so that reposition was not to be thought of and the only hope lay in total resection. With some trouble I succeeded in drawing the two ends of the piece of bowel further out of the wound in order that the resection might be performed in healthy tissue. After application of Wölfler's compressors to the healthy parts of the bowel at both ends and the shutting off of the affected parts by means of Péan's clamps at both ends, the bowel was cut through with scissors at one side, the healthy extremity cleansed with pads of iodoform gauze, and then the long piece of mesentery divided as far as the healthy portion of the other end of the piece of bowel, Péan's clamps being applied in rapid succession to the line of attachment of the bowel. The bowel was now cut through at the other end in front of the Wölfler's compressor, and the numerous clamps on the mesentery were replaced by ligatures. The edges of the gap in the mesentery were united by a row of interrupted silk sutures, so that the two intestinal orifices were made to meet one another by folding the peritoneum. The suturing of the two ends of the bowel was done in the following way. The edges of the serous membrane were first of all united posteriorly with a continuous silk suture, then those of the mucous membrane were united round the entire circumference, and finally, the edges of the serous membrane were brought together anteriorly. For greater security a third layer was added, consisting of a row of Lembert sutures in the serous membrane. The original wound in the abdominal wall, the narrowness of which had hitherto been regarded as a desirable shutting-off of the abdominal cavity from external infection, was now for the first time enlarged by an incision about five centimetres (two inches) long for the purpose of replacing the sutured parts. It was then found that the incision in the skin had formed the real constricting ring, the primary peritoneal wound being notably larger. The wound was about three fingers' breadth above the centre of Poupart's ligament on the right side and parallel to it; its length was a centimetre and a half (0.6 inch); its edges were quite smooth. After replacement of the sutured parts no effusion of blood was found in the abdominal cavity, neither were there any indications of perforation of the bowel. The wound was therefore completely closed by a continuous silk suture of the peritoneum and an interrupted silk suture of the muscles and the skin. The dressing consisted of iodoform gauze and adhesive plaster. The length of the portion of intestine removed was 192 centimetres (six feet four inches). From the corrugation of the mucous membrane it was obvious that the whole of it belonged to the ileum.

On Oct. 12th a note was made to the effect that the patient had scarcely suffered at all from the consequences of the operation. There was some vomiting when the anaesthesia was brought to a close. The highest temperature hitherto attained was 37.8° C. (100° F.) on the evening of the second day. Some tea was given to him by the mouth on the day of the operation. On this day for the first time a stool was passed of semi-solid (*breitiger*) consistence. On the evening of the 14th the temperature, which had not hitherto been febrile, suddenly rose to 38.3° C. (101° F.) and a copious eruption of urticaria appeared over the whole body. On the 16th it was noted that there was a complete absence of abdominal symptoms; the urticaria, however, still continued. The evening temperature on the previous day had been 39.9° C. (103.8° F.), but there had been a reduction in

the pyrexia since then and the evening temperature now was 37.5° C. (99.4° F.). On the 17th the dressings were changed for the first time. The wound was healthy and had firmly united; the sutures were removed. The urticaria was fading. On the 19th the urticaria had disappeared. On the 20th, while the dressing was being changed, some pus was evacuated by pressure on the lower part of the wound; there was no redness at that place and the pus evidently came from the muscular layer of the abdomen. On the 20th the patient's evening temperature rose to 38° C. (100.4° F.) in consequence of his having eaten a fried sausage that day; on the 21st, however, he presented no abdominal symptoms. On Nov. 3rd the patient felt perfectly well; his weight was 64 kilogrammes (140½ lb.) and he was on full diet. He was allowed to stand on the 9th. His weight on the 15th was 68 kilogrammes (149½ lb.). On the 29th it was 73 kilogrammes (160½ lb.), so that he had gained nine kilogrammes (19½ lb.) during the preceding three weeks. On Dec. 7th he was discharged recovered. He weighed 75 kilogrammes (165 lb.), his appetite was always hearty, and his bowels acted regularly almost every day. The young man's strength was good and he presented an appearance of exuberant health. He would have willingly resumed his work as a hodman if want of employment in consequence of the winter season had not compelled him to return to Italy.

The foregoing clinical history unquestionably shows that in the case of a powerful, well-developed man, 23 years of age, the loss of nearly two metres of the ileum was tolerated without the slightest subsequent derangement of the health. On ordinary hospital diet the patient remained perfectly free from any troublesome symptom, not even diarrhoea being experienced. Only one complication interrupted the normal progress of his recovery—namely, the appearance of urticaria over his whole body on the fifth day after the operation, this being a complaint from which he had never previously suffered. The relationship of cause and effect between the exanthematous condition and the immediately preceding operation on the intestine may be taken for granted, because disorders of the digestive organs often lead, both by their purely reflex and their chemical effects, to diffuse erythemata and urticaria.

In order that an opinion might be formed as to the conditions of intestinal absorption in the patient the assimilation of the ingested albumin and fat was followed up for nine consecutive days. I have to thank Dr. Plaut, scientific assistant at the Zürich Cantonal Hospital, for carrying out the researches which led to the results now exhibited. Special importance was attached to leaving the patient on ordinary diet as he was, with the most complete freedom of choice as regarded the nature and quantity of what he consumed. The investigations were made very laborious by the introduction of the last-mentioned considerations, but it was only when carried out in this way that they were able to give a correct insight into the habitual capacity for absorption possessed by the remaining portion of the intestinal tube. The man's daily consumption of food fluctuated between from 400 to 800 grammes (from 14 to 28 ounces) of milk, from 200 to 450 grammes (from seven to 16 ounces) of coffee, from 307 to 372 grammes (from 11 to 13 ounces) of meat broth, from 420 to 643 grammes (from 15 to 23 ounces) of soup, from 260 to 345 grammes (from nine to 12 ounces) of potatoes or 317 grammes (11 ounces) of macaroni, or from 50 to 224 grammes (from two to eight ounces) of stewed apples, from 123 to 163 grammes (from four and a half to six ounces) of veal, from 48 to 100 grammes (from two to four ounces) of eggs, and from 83 to 315 grammes (from three to 11 ounces) of bread. His daily allowance of wine was 400 grammes (14 ounces).

For the purpose of showing the relations between these figures and their values under ordinary circumstances some notes are subjoined on the conditions of assimilation in the normal state. In forming an opinion as to the assimilation of albumin it is to be kept in mind that with ordinary mixed, not specially selected, diet a loss of from 6 to 10 per cent. in the faeces is always to be expected.⁸ As regards fat, a waste of from 10 to 15 per cent. of the fat contained in the food is considered as normal and a matter of course when the quantity of fat in the food is small, as, for instance, from 25 to 40 grammes per day. But when, as in this case, the consumption of fat is larger and rises to 100 grammes of easily absorbed fat per day, then the foregoing percentage is much

⁸ Von Noorden: Lehrbuch der Pathologie des Stoffwechsels, Berlin 1893.

TABLE SHOWING AMOUNTS OF NITROGEN AND FATS ABSORBED.

Day of observation.	Day of month.	Ingested.		Excreted.					Difference.			
		Nitrogen (grammes).	Fat (grammes).	Urine.		Fæces.			Nitrogen.		Fat.	
				Amount (grammes).	Nitrogen (grammes).	Amount in grammes (dried).	Nitrogen (grammes).	Fat (grammes).	Grammes.	Loss per cent.	Grammes.	Loss per cent.
First	Nov. 15th.	26·5	96·1	1870	18·24	105	4·97	17·17	+ 3·29	18·75	+ 78·93	17·86
Second	„ 16th.	27·8	93·7	1960	18·5	—	—	—	+ 9·3	—	+ 93·7	—
Third	„ 17th.	27·6	96·18	2560	16·41	59	3·5	15·35	+ 7·69	12·68	+ 80·75	15·95
Fourth	„ 18th.	27·6	95·6	1960	17·3	45	2·74	15·88	+ 7·56	9·02	+ 79·72	16·6
Fifth	„ 19th.	39·4	102·3	2220	21·2	72	4·24	16·84	+ 13·96	10·76	+ 85·46	16·45
Sixth	„ 20th.	36·4	108·7	2060	18·2	84	5·25	22·04	+ 12·95	14·42	+ 86·66	20·26
Seventh	„ 21st.	37·9	110·9	1850	15·8	44	2·98	10·51	+ 19·12	7·86	+ 100·39	9·47
Eighth	„ 22nd.	27·7	95·4	2470	20·5	46	2·64	11·33	+ 4·56	9·53	+ 84·07	11·87
Ninth	„ 23rd.	35·1	109·4	2210	18·4	65	3·64	17·3	+ 13·06	10·37	+ 92·1	15·84
—	—	286·0	908·2	—	164·55	—	29·96	126·42	+ 91·49	10·47	+ 781·78	13·91

too high, for not more than from 4 to 6 per cent. will be lost.⁹ In the table under the heading "Ingested" what is striking is the astonishingly large quantity of nitrogen that was taken as well as the quantity of fat. Special attention is called to the circumstance that the patient was under no compulsion to over-eat himself, but required food to that amount. The column headed "Excreted" shows a loss of nitrogen in the fæces corresponding to the upper normal limit. From the column headed "Difference" the average is found to be 10·47 per cent. On the other hand, the assimilation of fat is at a disadvantage, the average being 13·91 per cent. with oscillations between 9·47 per cent. and 20·26 per cent. of unassimilated fat. Riva Rocci¹⁰ thoroughly tested the action of the bowel in Fantino's patient, a man, 60 years old, who had 310 centimetres (ten feet two inches) of his ileum removed. The loss of nitrogen in the fæces reached an average of 29 per cent., and the loss of fat an average of 23 per cent., with oscillations between 17·2 per cent. and 34·3 per cent. The column headed "Difference" also indicated a very great putting on of tissue during the short period occupied by the observations. Making use of the clinical history and the experiments on assimilation, let me now endeavour to state in precise terms the influence which the absence of these two metres of ileum exercised in the processes of absorption. If we adhere to the moderate estimate that not less than 192 centimetres of the bowel were resected, and if we take into consideration only the clinical history, the excellent condition of the patient at the time of his discharge from hospital and his remarkable increase in weight allow us to give a full and complete assent to the opinion formed on statistical grounds—the opinion, namely, that resections of the ileum with removal of two metres of its length are in no way dangerous to the organism so far as the digestive process is concerned. If, however, we base our inquiry on the experiments made in assimilation of food they render us more cautious in forming an opinion, although they may perhaps not succeed in contradicting the above-mentioned inferences. By the use of an appropriate dietary it might be possible eventually to make up for the impaired absorption of fat.

Now for the subsequent history of the case. In the beginning of 1899 I endeavoured to obtain information as to the patient's condition during the period that had then elapsed. In the end of January I received from Italy a letter from the hand of the patient himself in which he drew a very dismal picture of his state at that time. The slightest exertion fatigued him to such a degree that after doing a very small amount of work he often had to take to his bed immediately. The only food which he could take was veal, meat broth, and milk. Out of consideration for the poverty of his family he often tried to take the ordinary food of the place, but these attempts were always followed by severe

abdominal pains, not attended, however, by diarrhoea. This unfavourable report prevented me from immediately publishing the case last spring. At one time I thought that the subjective colouring of the report might, perhaps, be far too strong, but in view of the alleged deterioration in the patient's condition I considered that it was absolutely necessary to wait for a further opportunity of observation. It was found, however, that the procuring of more information presented great difficulties. Letters of inquiry sent to the patient remained unanswered. At last, in the beginning of June, eight months after the operation, I received from the patient's place of residence, through a reliable objective channel, the following communication, for which I was greatly obliged.

My informant, after a long search, was at last fortunate enough to find the patient. He (the patient) was not indoors but was at work in a field at a moderate distance from his house. He was fairly satisfied with his condition at the time and could do a little work, but he worked slowly and with many intervals for rest. He lived principally upon broth, soup, and animal food. To his great vexation he was quite unable to tolerate solid food, such as bread, polenta, cheese, &c. His weight at that time was 72 kilogrammes (158½ lb.); it was 75 kilogrammes when he left the hospital, so that there had been a loss of three kilogrammes.

This result, observed at a late stage of the case, may serve as a warning against hasty and too optimistic views with regard to the effects which extensive resections of the intestine produce upon the processes of absorption. Riva Rocci in his memoir on Fantino's case has cautiously expressed his conclusions in terms to the effect that resection of three metres of the small intestine in an elderly person interferes with the intestinal absorption, but not to the extent of constituting a danger for an individual who leads a quiet, easy life and has sufficient food. I am in a position fully and completely to apply this conclusion with its saving clause to my case of less extensive resection.

The question has now to be answered: Does my case belong to the resections with less than two metres or to those with more than two metres of bowel removed? If we adhere to the moderate estimate of 192 centimetres of bowel removed, the case, by reason of the important influence exercised by the removal of this amount, occupies an entirely exceptional position in the group which does not show any disturbance of the digestive tract. It may, however, with equal correctness be included in the group of cases with a minimum length of two metres of bowel removed, the justification of which will be found in the introductory paragraph relative to the measurement of the bowel, and if this be done the case shows that, contrary to what has hitherto been the received opinion, the function of the digestive tract is seriously interfered with, even in young persons, by the resection of more than two metres of the bowel unless precautions are taken to secure the requisite sustenance.

Zurich.

9 Von Noorden, p. 34.

10 La Funzione Intestinale dopo una Resezione Estesa del Tenue, Gazzetta Medica di Torino, 13 Febbraio, 1896, No. 7.