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LETS

Hupon — Les Tentes et Baraques

le Service de Santé militaire en Prusse

Beheke Apocatéonbeschaeungen

Macvicar Urea & uric acid

With the Translator's kind regards

(54)

CONTINUED OBSERVATIONS

ON

HÆMOPTYSIS.

By Dr VALD. RASMUSSEN.

TRANSLATED FROM THE "HOSPITALS-TIDENDE,"

Copenhagen, March 17 and 24, 1869,

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CONTINUED OBSERVATIONS

ON

HÆMOPTYSIS.

In a former essay,[1] based upon my own observations, I have endeavoured to give a description of hæmoptysis in its anatomical and clinical bearings; and, in particular, I have, in eight cases of hæmoptysis in patients with chronic pulmonary phthisis, to which, during the preparation of my paper, a ninth was added, demonstrated the constant origin of the hæmorrhage from cavities by rupture of ectasias or aneurisms on small branches of the pulmonary artery, running in the walls of cavities. Since that time I have had the opportunity of making two dissections of patients who died during attacks of hæmoptysis, which I shall now take leave to communicate, as they form a very satisfactory supplement to my former observations, which they in all points confirm, and in some respects extend and complete.

I. (10th) Case.—*Phthisis cavernosa pulmonum. Aneurisma ruptum art. pulmonal. in cavernam bronchiectat. Ulcerat. tubercul. coli.*—Emmy Emilie Larsen, aged 18½ years, unmarried, admitted on the 12th May 1868 into the second division of the Kommune Hospital. Her father died of disease of the chest; her mother, brothers, and sisters are said to be in good health. As a child she had ulcerations on the sides of the neck, on the arms and legs, which have left white, streaked, deep cicatrices. Regular menstruation, which commenced in her fourteenth year, ceased four months ago. She was always inclined to cold, with cough and dyspnœa. She was confined once a little more than a year ago; the child is healthy. During the last two months she has incessantly had troublesome cough, with expectoration speckled with

[1] *Hospitals-Tidende*, 1868, Nos. 9-13. Edinburgh Medical Journal, 1868, November and December. Translated by W. D. Moore. British and Foreign Medico-Chirurgical Review, January 1869, and elsewhere.

yellow, but never mixed with blood; the dyspnœa has increased, and she is greatly emaciated; her sleep has been disturbed, accompanied with violent perspiration. No appetite, great thirst, and latterly diarrhœa from four to eight times in the twenty-four hours. She has, however, got up, but has been so weak that she could not work (sew).

On examination, she was found to be emaciated, slight, very pale; her skin was burning hot, her chest emaciated, sunk in above and beneath the clavicles. On physical investigation, the usual signs of large cavities in the upper lobe of both lungs were met with, especially on the left side. The abdominal organs presented nothing abnormal. The tongue was half dry; she complained of a bad taste in her mouth, some thirst; pulse 84. On the 15th of May there was some improvement. On the 18th there were spots of blood in the expectoration, which disappeared the next day. On the 29th blood was again seen in the expectoration. The cough became more troublesome, the nocturnal perspiration and diarrhœa were very considerable, and her strength already began to fail greatly. On the 24th June the following entry appears in the journal:—"The patient's condition was yesterday as usual. Early this morning she got a fit of coughing, and brought up a mouthful of frothy blood, and immediately fell back and died."

The post-mortem examination was made twenty-eight hours after death. Cadaveric rigidity, body much emaciated, heart small, healthy. Both lungs very firmly attached to the thorax by dense cicatricial layers of connective tissue, especially in the apices, which layers, particularly in the right lung, were one centimètre in thickness. In the apex of this lung, a cavity of about the size of a duck-egg is seen, very much elongated and sinuous, bounded everywhere by an almost cicatricial tissue, in which are found only slight remains of pigmented pulmonary tissue. Beneath this cavity are found some smaller cavities, the smallest being only about the size of a nut, and lodged in a perfectly similar tissue. None of these cavities, into which bronchi everywhere open with eyelet-hole orifices, contain blood, but only a puriform, in some cavities, slightly chocolate-coloured fluid. Beneath this part, which occupies about the upper third of the lung, the tissue is completely permeable to air, with scattered miliary tubercles in moderate quantity, most frequently with a well-marked peribronchitic character. On more careful examination of the boundary between these two parts, a cavity of the size of a large pea is found, forming as it were an ampulla-like dilatation on a bronchus of the thickness of about a crow-quill. The bronchial wall itself can be traced in its continuity only a little beyond its entrance into the cavity; otherwise it is bounded by a layer of condensed pulmonary tissue of about one millimètre in thickness, outside which the tissue is permeable to air, with a moderate amount of the tubercles above mentioned. Into this cavity projects a swelling of the size of a large grain of shot. It is

situated close to the opening, and is found to be a small aneurismatic dilatation on a branch of the pulmonary artery accompanying a bronchus, which dilatation, when slit up, measures three millimètres.

This aneurism burst with a small slit-like fissure; from the opening a large, firm, decolorized coagulum projects, and the inside of the aneurism itself is invested with a thin layer of firm, light, red fibrin. All the bronchi to the lower lobe are filled with coherent coagula of blood, and likewise throughout the pulmonary tissue small light-red hæmorrhagic infiltrations are seen.

The bronchial glands are greatly swollen, of a light-gray colour, firm, here and there pigmented.

In the pleura and its adhesions is no perceptible miliary deposition.

In the left lung are similar smaller cavities not filled with blood; they are circumstanced in all respects essentially like those on the right side.

In the large bronchial trunks on both sides a large amount of blood is met with; it is found in smaller quantity in the trachea. In this, as well as in the larynx, nothing else abnormal is discoverable.

The spleen is somewhat enlarged, firm, with numerous and large follicles.

The kidneys are cyanotic, without any miliary deposition.

The liver also is cyanotic.

The mesenteric glands are only slightly swollen; they are pale.

In the small intestine, some follicular swelling is met with, especially about the ileo-cæcal valves. In the large intestine, several irregular, sinuous, large ulcers are found, partly smooth, partly with distinct miliary deposition; several seem on the point of healing.

This case is one of no slight interest. In the first place, as to the clinical course of the hæmoptysis, we see such occur, and for the first time, in a patient with pulmonary phthisis already far advanced, in the beginning only as a few spots of blood, and ten days later tolerably violently; it ceases, while the hectic condition is still further developed, though without signs of secondary pneumonic infiltrations, and not until a month later does the fatal hæmoptysis come on, not profusely, as we are accustomed most frequently to see it, but even very sparingly, only a tablespoonful of blood being brought up, while death nevertheless takes place very rapidly and suffocatively by obstruction of the bronchi in the hitherto sufficient parts of the lungs. This condition is, however, according to my former observations, not so striking; for, in such advanced phthisis, death may occur without even so much as a drop of blood reaching the mouth, as my sixth case shows.

This case presents greater interest, however, in an anatomical point of view; I shall therefore examine the results of the post-mortem examination more closely. We found in the apex of the

right lung a large cavity, bounded by dense, cicatricial tissue, and below it some smaller cavities lodged in a similar tissue. They contained no blood, nor was there, to judge from the cicatricial appearance of the whole of the adjoining tissue, any reason to suppose that the hæmorrhage could proceed from any of these cavities; on the contrary, the bronchi were everywhere filled with blood. This case seemed therefore really to afford decisive evidence in favour of the correctness of the opinion hitherto generally received as to the broncho-hæmorrhagic origin of the blood. I should scarcely have been in a position to demonstrate the true source of the latter, if I had not had in my previous investigations so firm a standing-point, and a decided conviction, thence derived, that it must be sought in a cavity. I therefore took three sections from the boundary between the completely condensed and the still permeable parts of the lung, and in this manner I soon succeeded in discovering the little cavity, which, notwithstanding its minuteness, had all the characteristic properties of a bronchiectatic cavity of some standing. A very small artery accompanied the bronchus leading to the cavity, and at the point where it touched the latter the small aneurismatic dilatation was found.

What further deserves our attention in this case is the coagulum met with. In my first essay, I had not concealed the difficulties which presented themselves in the explanation of the observation, so important in a clinical point of view, that hæmorrhage demonstrably proceeding from small aneurisms which have burst into cavities may occur remittingly or even intermittently. Those remitting hæmorrhages seem not to be accidental; for, of the four aneurisms in cavities observed by me, they were met with in three, and the same was the case in the two similar foreign observations of Cotton and Fearn. These remitting hæmorrhages stood in striking contrast to the sudden death occurring with violent hæmoptysis in ectasias in cavities with operculated rupture, and it was therefore evident that these remissions in the hæmorrhage in the aneurisms must be due to peculiar conditions in the latter. What would naturally occur to one in the first instance was, that in the aneurisms coagula existed, which, as in hæmorrhages from aneurisms in larger vessels, permitted only an oozing, or, at all events, the escape of only a small quantity of blood; but such coagula I had never been in a position to demonstrate in either ruptured or whole aneurisms; and although I hinted that in the first case they might possibly have escaped with the strong current of blood, I did not feel myself justified in abandoning the strictly anatomical foundation on which my essay was based. I had, in fact, at least in one case, unmistakably observed a punctated, fatty degeneration of the aneurismatic wall, and I therefore supposed, that from the first a small opening had probably formed, which had been closed by a coagulum, and that a larger rupture had taken place at a subsequent period of the progressive fatty degeneration. In this instance, on

the contrary, a distinct fibrinous deposit of some standing was found on the inside of the aneurism, and out of the ruptures protruded a large, firm, decolorized coagulum of some standing, which the comparatively feeble current of blood in all probability was not sufficiently powerful to carry away. It therefore appears to me that we are justified, according to this case, in assuming that these remitting hæmorrhages, as, moreover, seems most natural, were due to obstructing coagula.

The rapid occurrence of death in this instance was due, as I have mentioned, chiefly to the patient's advanced phthisis, and the slight power of resistance she consequently possessed. Had such a hæmorrhage occurred in a still vigorous individual,—for example in the patient formerly mentioned in our first case,—we shall, when we take all the circumstances in the earlier case into consideration, scarcely be able to deny the possibility that the hæmorrhage might have been definitively arrested, as the aneurism and its afferent little vessels had become filled with obstructing coagula, which had gradually been organized. Matters were here singularly favourable: a small aneurism on a little vessel, and a very small cavity with a single outlet. This case is therefore interesting also, as it seems well adapted, if not to prove—for a positive proof on this point can scarcely be adduced—at least to make it probable, that hæmoptysis during the course of chronic pulmonary phthisis, in many instances in which it does not directly induce death, depends on similar ruptures of small vessels in small cavities with insufficient outlets, as I described in my former essay. Without repeating what is there stated, I shall only once more allude to the fact that hæmorrhages, demonstrably proceeding from rupture of aneurisms into cavities, in no respect differ from any other hæmoptysis occurring during the course of chronic phthisis.

Further, it cannot be denied, that such a small bronchiectatic cavity as that in the case before us was in its development—as, moreover, its location in the transition to the permeable parenchyma indicated—may be found in an apparently healthy individual, and therefore may also become the starting-point of an hæmoptysis; and, according to my experience, it cannot be matter of surprise, that I look upon the cases of hæmoptysis in perfectly healthy individuals, reported by authors, with suspicion, and am inclined to refer the source of the hæmorrhage to such a small overlooked cavity. This is a view which I have on a former occasion expressed, after I had seen a cavity of the size of a nut give rise to fatal hæmorrhage, and which in this last observation, where the cavity was of the size only of a large pea, appears to me still more probable. I of course except those cases where the hæmoptysis is vicarious—if such vicariousness, of which I myself have no experience, really does exist—and possibly also the cases, though they are rare, of intermittent hæmoptysis in destructive malarial fevers (Febr. perniciosa hæmoptoica).

II. (11th) Case.—Chr. Fredr. Vilh. Schroeder, aged 41, formerly a periwigmaker, has, for many years, been an inmate of the General Hospital on account of chronic pulmonary phthisis. He has almost constantly been able to be up, but suffered from a persistent and rather violent cough, with expectoration; this has, for the last fortnight, been somewhat tinged with blood; but only on one day, three days before his death, was a small quantity of clear blood brought up. On the morning of the 7th December 1868, after he had drunk his tea, feeling as usual, he got, while he was at stool, an attack of profuse hæmoptysis—he complained particularly of violent pains in the præcordial region, which caused him to cry out.

He was at once transferred to the Infirmary, where the usual remedies were applied. The hæmorrhage seemed to diminish, but the violent pains in the præcordium continued, rendering the subcutaneous injection of morphia necessary. No sooner, however, was the point of the syringe pushed through the skin than the blood streamed afresh from his nose and mouth, and in a few minutes he was dead.

The post-mortem examination was made next day. Cadaveric rigidity; body rather emaciated.

The heart is of the usual size, flaccid; contains loosely coagulated masses, and scattered œdematous fibrinous coagula.

Both lungs, especially the right, are firmly adherent to the thorax. The right upper lobe is strongly retracted, changed into a cicatricial mass, in which only here and there are seen scattered remains of pigmented pulmonary tissue. On the surface of section are found some, most frequently elongated, small cavities with smooth, connective-tissue-like walls, and moderately dilated bronchi; in these, as well as in the cavities, is found abundant thin, rather dusky, blood. Nowhere are any miliary or peribronchitic depositions met with.

The anterior edge of the left lung and the upper part of its anterior surface has a rugged appearance, due to a very considerable emphysema, the vesicles in some places attaining to the size of a walnut. In the apex, and somewhat down along the posterior margin, is a cavity of the size of an egg, reaching posteriorly to the greatly thickened pleura. In passing from the anterior to the posterior wall, about the middle, on washing away the abundant, loosely coagulated or fluid blood, which forms the contents of the cavity, a prominence of the size and shape of a large pea is met with. This is formed by an aneurismatic dilatation, which, in the whole length of its upper surface, presents a gaping fissure, with thin, scarcely yellowish edges, which, nevertheless, inferiorly towards the passage of the aneurism into the wall of the cavity, become perceptibly thickened. On slitting up the pulmonary artery, the branch on which the aneurism is situated is found to have a diameter of five millimètres, and to be a branch only half a centimètre in length from one of the main trunks. The efferent branch is so minute that it admits only a horse-hair, and is quickly lost in the bottom of the

condensed wall of the cavity. This wall has inferiorly a thickness only of three or four millimètres, and to it the permeable pulmonary parenchyma directly reaches. On different parts of the wall of the cavity, eyelet-hole bronchi open.

The rest of the lung is permeable to air, only in the inferior lobe are here and there collected, in small groups, large yellowish tubercles with a distinct cavity, and in the immediate surrounding of these are scattered miliary tubercles. In all the bronchi, even to the lower lobe, is thin blood.

There is no evident miliary deposition in the pleura. The mucous membrane in the bronchi is thickened, deeply tinged with blood. In the larynx and trachea is nothing abnormal except blood. The follicles at the root of the tongue are greatly swollen.

The spleen is rather large, swollen, soft, with numerous large follicles; no trace of amyloid change.

The liver is very large and heavy, with characteristic and very extensive amyloid degeneration.

The kidneys are of the ordinary size, and exhibit only slight parenchymatous, but no amyloid changes.

The other organs present nothing abnormal.

In this case also we see hæmorrhages preceding the last fatal attack, at first sparingly, as an imbibition of the expectoration, and finally, three days before death, we have a more copious bleeding. Death occurred during a violent attack of hæmorrhage, which has, however, diminished, to return after the lapse of an hour, and immediately terminate fatally. The rupture of the aneurism was accompanied by an unusual phenomenon, which was never observed in any of the former cases—namely, an exceedingly violent pain in the cardiac region, for which the post-mortem examination did not indicate any special cause. It is remarkable that the complete rupture, with the extrusion of the obturating coagulum, which, in all probability, had been present and prevented instantaneous death, did not occur before, when the loud cry, which the violent pain forced from the patient, was uttered. That in this case, too, there had been an obturating coagulum, which had been forced out with the last and fatal hæmoptysis is indubitable; the great gaping slit in the aneurism, the tolerably large vessel on which the latter was situated, and the almost direct connexion of the aneurism with one of the principal trunks of the pulmonary artery, make it clear that the patient must have died instantaneously, if such a coagulum had not existed. The cavity was in this case large; it may, however, as our former observations show, be still larger, and it had the thin wall almost peculiar to these aneurism-bearing cavities, with which the relatively healthy and still permeable parenchyma is in direct contact.

The cases I have collected, and in a comparatively short time, are, therefore, eleven, in which we have demonstrated the constant

occurrence of the hæmoptysis from cavities; and it deserves to be remarked, that, since these investigations commenced, we have not had the dissection of a single case where this source of the hæmoptysis has not been demonstrated. This number, although in itself small, may, nevertheless, in proportion to those of other investigators, be even called very large; it is, at all events, sufficient to exclude every possibility of the accidental, and, as I hope, also to give a tolerably clear idea of the most essential circumstances under which these aneurisms and ectasias, so eventful for the patients, are developed. I shall further remark only, that I never remember to have seen any case of rupture of a vessel running in a trabecula passing through a cavity, as is generally stated by authors.

The reports from other quarters of cases of hæmoptysis from ruptured aneurisms are as yet but very few; I shall therefore refer to one recently published in the *Medical Times and Gazette*, January 16, 1869, page 66. The case occurred in the Victoria Park Hospital, under the care of Dr Birkett. The post-mortem examination was made by Dr H. G. Sutton. The reporter of the case calls attention to the interesting clinical fact, that rupture of the aneurism did not immediately cause death. He explains this, as I have done, by the presence of an obturating coagulum, and points out the resemblance of the minor hæmorrhages in this instance to what is frequently seen when aneurisms of the chest and abdomen open on mucous surfaces. Dr Sutton stated that, in 1859 and 1860, he observed two similar cases, which, however, are not described. It is further stated that, in the last eleven and a half years, 16 patients have died in the hospital of hæmoptysis, and 321 of phthisis; so that very little more than 5 per cent. of those labouring under and dying with phthisis have suffered from fatal hæmoptysis while in the hospital; and the writer therefore assumes, as almost all other authors do, that fatal hæmoptysis is very rare. In my former essay I have shown that it is not possible from hospital statistics to deduce any reliable inference as to its frequency, as it is a matter of chance whether the aneurism bursts during the patient's stay in hospital, and death usually occurs so rapidly that they have not time to reach it.

Secondary Hæmoptysis after penetrating Gunshot Wounds of the Chest.

Immediately after a penetrating gunshot wound of the chest, hæmoptysis usually sets in, and the amount of blood brought up is generally in proportion to the greater or less degree of direct violence the lung has suffered. These hæmoptyses are in general only of short duration, which is essentially due to the strong compression to which the lung is at the same time subjected, partly in consequence of the entry of air and blood into the cavity of the pleura, partly as a result of the pleuritic effusion which rapidly fills the cavity of the pleura; moreover, the secondary circumscribed

pneumonia ordinarily developed about the lacerated pulmonary tissue will, by filling the air-cells with a dense exudation, compress the vessels; and in all probability, too, the peculiar contusion which the pulmonary tissue suffers, from the passage of the ball through it, will favour coagulation in the torn vessels. No special importance is attached by military surgeons to these hæmoptyses, and they are of far less consequence than the following dangerous leading symptoms attending penetrating gunshot wounds: pneumothorax, hæmothorax, and pleuritis.

Hæmoptysis may, however, occur after penetrating gunshot wounds, long after the external wound is healed, and it is to these hæmoptyses, which may thus be called secondary, that I would direct attention, as, so far as I have had access to the literature of the subject, they are not mentioned by writers. The case which I have myself had an opportunity of observing is the following:—

Captain D., of the 3d Regiment, aged 39, who had formerly always enjoyed good health, with the exception of having, as it seems, in 1852 passed through a slight attack of pneumonia of the left side, was, at the capture of an outpost at Dybböl, on the 14th March 1864, wounded at a short distance by a rifle-ball in the left side of the chest. He at once fell to the ground, and the blood streamed out of his mouth; he had difficulty of breathing, and felt violent lancinating pains in the wound, from which only a small quantity of blood oozed out. After temporary bandaging at the ambulance, he was brought to the hospital at Augustenborg; on the way thither the dyspnœa increased considerably, so that he could bear the motion of the waggon only for a few minutes at a time, and the hæmoptysis continued. On more accurate examination of the wound, it was found to be penetrating.

For the first fourteen days he had moderate fever, but he seems, with the exception of the hæmoptysis, not to have had any of the prominent signs of a penetrating wound; particularly, there was no escape of air through the wound, nor any accumulation in the cavity of the pleura, and the hæmoptysis steadily diminished, so that even on the 31st March he was able to be removed to the hospital at Frederiksberg Castle. He was there placed under my care.

On examination, the track of the ball was found to be nearly six inches in length, in a direction from before backwards; the opening of ingress lying nearly in the anterior axillary line, close to the lower edge of the sixth rib; the opening of exit posteriorly about half an inch lower. The edges of the wound were swollen, red; the whole wound was painful to the touch, slightly suppurating; no fracture of the ribs was perceptible; respiration was superficial, rather free; on deeper inspiration the shooting pains in the wound became violent; the patient was allowed to lie only on his back. Only a single blood-coloured clot was brought up during the first days. Pulse natural, general state very good. Physical examination showed no sign of accumulation of air or fluid in the cavity of the

pleura, nor any infiltration of the lung; respiration was everywhere natural, only in the vicinity of the wound was it rather feeble.

During his further stay in the hospital the pains gradually diminished, the respiration became freer; splinters of bone of various sizes were repeatedly separated. On the 30th of April he was able to begin to get up. On the 1st of September the wound was healed, with the exception of a short fistulous passage, so that he was able to leave the hospital; the wound was not, however, perfectly healed until towards the close of the year.

On the 28th of November 1866, when feeling perfectly well, and without any cause, he suddenly got a very violent attack of hæmoptysis. From this time he continued to bring up clear blood, though in much smaller quantity, or a bloody gruel-like fluid with slight cough, generally after pricking pains, and a feeling of oppression in the region of the wound. He kept his bed for four weeks, after which time the hæmoptysis became less frequent, but it took place every time he either stooped down much or lay on the left side. The stethoscope revealed only slight feebleness of respiration in the neighbourhood of the wound. In July 1867 he went by easy stages to Eaux-bonnes, in the Pyrenees, where he remained for five weeks. The hæmoptysis, which had continued the whole time, and had, particularly on the journey, been considerable, almost wholly ceased towards the end of his stay at Eaux-bonnes, and he was so well that he was able to remain for a fortnight at the camp at Chalons, being during that time daily, and sometimes even all day, on horseback; so soon, however, as he recommenced railway travelling, the shaking lateral motion again brought on slight hæmoptysis.

After a course of the whey-cure in Interlaken he returned home, and was now particularly well; he had only a few slight attacks of hæmoptysis when he stooped much, until the 14th of March 1868, when, after having been long occupied in laborious writing, violent hæmoptysis once more came on, though less copiously than on the first occasion. In July he went once more to Eaux-bonnes; the hæmoptysis continued, being more severe while he was on the journey, but it again nearly disappeared towards the end of a three weeks' course of treatment. He then made another trial of the whey-cure at Interlaken, whence he returned home. An ulcer produced by moxa, which had been kept in a state of copious suppuration, was not closed until November. From that time he has been well, easily bears long marches, and takes part without inconvenience in field exercises; he is in good condition, his general health is quite satisfactory; only once did the hæmoptysis recur, namely, on the 16th of January 1869, when, on turning in bed, he suddenly brought up about three tablespoonfuls of clear blood. He has occasionally the usual cough, with which he brings up a single greenish yellow sputum; he states that he has a peculiar feeling of oppression in the region of the wound, which, as it were, compels

him to cough, and which is relieved when he has expectorated. A recent stethoscopic examination yielded the same result as before.

There can scarcely be any doubt, that in this case we had to deal with a penetrating gunshot wound, as was diagnosed immediately after the injury by an experienced military surgeon. It is true that there were wanting not only the absolutely certain signs —emphysema, pneumothorax, and the escape of air through the wound—but also the signs of an accumulation in the cavity of the pleura (hæmothorax, pleuritis); and this total absence of these almost constant symptoms can be explained only by pre-existing firm adhesions, of which we have, in the history of the case, a satisfactory reason in a preceding pneumonia. Of the ordinary symptoms we had properly only one, but in a diagnostic point of view a very important one, namely, the hæmoptysis; it was unusually violent and persistent, which is explained by the fact, that the lung, on account of the firm adhesions, which did not allow it to yield before the projectile, had been struck much more seriously than might have been expected from the size of the external wound, and from the absence of pneumothorax and hæmothorax, the importance of which in arresting the hæmorrhage has been above spoken of. Whether there may possibly have been a circumscribed pneumonia, which is said to have had a duration of only from eight to ten days, could not, when I saw the patient, be decided.[1]

Taking it, therefore, for granted that the ball perforated the lung, the next question is, what share this lesion has in the secondary hæmoptyses. That the gunshot wound stands in a definite and direct relation to the hæmoptysis is undoubted. For the possibility, which at first certainly existed, that the hæmoptysis might be due to pulmonary phthisis developed after the wound, as is stated by certain writers, must now, more than five years after the primary, and almost two and a half years after the first secondary hæmoptysis, according to the results of the physical examination, and the patient's otherwise perfectly good general health, be totally discarded. But, besides, the hæmoptysis has something so peculiar in it, which is not ordinarily observed, and which decidedly indicates a direct relation to the wound, as the lancinating pain in the region of the injury, which usually precedes the hæmorrhage, the occurrence of the bleeding when the patient lies on his left side, or makes certain violent movements, as in stooping—a circumstance which is so constant that he, unfortunately, has it, so to speak, in his power to produce hæmoptysis at will.

It is, however, much more difficult to give a satisfactory explanation of the circumstances under which these copious hæmoptyses occur, and it is only a more or less probable hypothesis which, after all, can be suggested, when every anatomical point in former examinations is wanting. A mere bullet-track through the lung, in an individual who survives the injury, is gradually filled by granu-

[1] Traité de Chirurgie d'Armée, par L. Legouest. Paris, 1863, p. 470.

lations, which, after a longer or shorter period, finally leave only a cicatricial streak; very often, however, as we shall subsequently see, a fistulous passage remains, which lasts for a long time, nay, even through the whole of life. That the track in the above case is not closed, at all events not completely, is indubitable; and the assumption appears to me to be most probable, that the bullet-track has remained open in a circumscribed spot, either by secondary osteophytic formation from the inside of the ribs—such a formation was distinctly observed on the outside—or by necrotic splinters of bone projecting into it; and, moreover, that the cavity so formed, being in open connexion with the bronchia, is partly filled by a spongy vascular granulation tissue. In the movements mentioned, especially stooping, in which a strong downward traction is exercised on the ribs, a more or less extensive hæmorrhage may, under such conditions, easily arise, purely mechanically, in consequence of the bony parts mentioned injuring the vascular granulation tissue. Under ordinary circumstances, only a purulent fluid is secreted from the walls of the cavity, filling it and giving the patient a sensation of pressure in the region of the wound; at last some of the contents escape into the afferent bronchia, causing the patient to cough and to bring up one, or at all events only a few purulent sputa, with simultaneous cessation of the feeling of pressure. Both from this, and from the negative result of the stethoscopic examination, it must be inferred that this cavity is only of small size.

It would hence appear that the prognosis in this case may be very favourable; it is to be expected that the cavity may gradually completely close, and the hæmorrhage therefore entirely cease.

As to the treatment, it was conducted on the ordinary principles; the visits to Eaux-bonnes seem to have had an unmistakably beneficial influence.

Case 2.—Private Peter Olsen, of the 6th Regiment, aged 23, received, on the 28th March 1864, at Dybböl, a gunshot wound in the back, the ball entering at the inner margin of the left scapula about one inch above the inferior angle, whence, fracturing the ribs it struck, it passed close under the skin to a little to the left of the spinous processes of the eleventh and twelfth dorsal vertebræ, where it remained, and was taken out the same day. During the first few days he had some hæmoptysis, and immediately after the injury very considerable external hæmorrhage. The day after he was admitted into the garrison hospital at Copenhagen. A violent empyema was now rapidly developed in the left pleura, with considerable discharge of pus from both openings in the back. This condition, in which the patient became greatly exhausted, continued, with varying intensity, until the spring of 1865; but from that time we succeeded, by continued drainage of the upper opening—the inferior, whence the ball was extracted,

had already closed—in gradually diminishing the discharge; but it was not until June 1866 that the patient could leave the hospital, and he had then, at the original opening of entrance, two fistulas, the one two or three millimètres in diameter, the other rather less. His general health was now, when he kept quiet, pretty good; he could, however, walk only very slowly, and all major movements of the left arm produced pain in the back, and sometimes cough.

In this state he continued, on the whole, until now, with the exception of the attacks of hæmoptysis, which he has had during the last two years, and the weakening effect naturally produced by them. The hæmoptyses, the first of which occurred on the 7th of February 1867, and the following, three in all, at intervals of about four months, had all about the same intensity, duration, and course. Violent movements of the left arm and walking rather quickly were, according to the patient's report, essentially co-operating causes of the occurrence of the hæmoptysis, as were cold and the increased cough produced thereby. The hæmorrhage commenced with the expectoration of some blood, then blood issued from the fistula, after which most blood came in this way, and only a little was coughed up. The discharge through the fistula and the hæmoptysis proper each time lasted about four days, and the quantity of blood lost is estimated at from 300 to 500 cubic centimètres (from about 10½ to about 17½ fluid ounces). During the last six months, in which the patient has kept the house, he has not had any hæmoptysis, but a considerable amount of pus continues, as it has done during the whole time, to be discharged from the fistula, occasionally mixed with small pieces of bone. When this discharge from the fistula perceptibly diminishes, the patient becomes short-breathed and gets a cough, which he otherwise usually has not, and while it continues, purulent expectoration is brought up. Into the fistula, in the immediate neighbourhood of which nothing abnormal can be discovered, and which passes in the direction of the highest point in the left axilla, an elastic bougie can be passed to a distance of eight centimètres, without apparently being much bent. On sounding, injecting, etc., no hæmoptysis ever occurred.

The sound on percussion is rather dull in the left infra-spinous and infra-scapular regions, otherwise it is normal everywhere, both on the left and on the right side. Respiration is everywhere vesicular; close to the fistula a faint metallic tinkling is occasionally audible.

The patient's general health is, as has been stated, good when he keeps quiet; but from the constant loss of substance by suppuration he is emaciated, and the caution with which he walks gives the impression that he is weaker than he really is. He cannot bear any exertion, and can occupy himself only with light manual labour.

For this, in many respects, interesting case, I am indebted to Hr. Chr. Krarup of Amager, under whose treatment the patient has latterly been. I shall, however, not at present touch upon

subjects to the discussion of which this case, considered as one of penetrating gunshot wound, might in many other respects give rise, but shall confine myself to the hæmoptysis and the points most closely connected with it. It occurred, as in the first case, very long, almost three years, after the injury, but was, in contrast thereto, much less frequent and less copious. While, in the former case, at least in the commencement, there might be doubt whether the hæmorrhage really proceeded from the wound; in the present instance, this was from the first indubitable, as the blood, for the most part, sought an exit through the fistula left after the original canal. By splinters of bone making their way into the lung, with secondary and persistent suppuration, the fistulous passage probably became much larger than should have been expected from the original direction and extent of the canal. The cavity thus formed is in connexion with the bronchia, which is evident on the one hand from the fact, that when the discharge from the fistula ceases, a purulent fluid is coughed up; on the other, from the circumstance that the patient has remarked, that in the unsuccessful attempt to effect closure of the fistula by stimulating injections, some of the injected fluids have, during the coughing so produced, reached his mouth, and also from his observation, that occasionally air blows out of the fistula. On the other hand, this communication cannot always exist, as in that case air should constantly pass in and out through the fistula, which it does not. The passage to the bronchia must, therefore, be assumed to be only narrow, as, moreover, the slightness of the hæmorrhage through the latter seems to indicate, so that it is easily plugged by the thick purulent secretion, and is opened afresh only on strong pressure, as by the injection of fluid through the fistula. That the cavity is only small is proved by its not admitting of the injection of more than two or three cubic centimètres of water, without producing violent cough.

The immediately exciting cause of the hæmorrhage seems in this instance also to be traumatic, especially violent movements of the arm, quick walking, and severe coughing, whereby strong pressure is exercised on the fistulous passage attached to the posterior wall of the thorax; possibly here also the retained spiculæ of bone play a part, but the bleeding granulations are evidently much less vascular and vulnerable in this than in the first case.

Case 3.—Observed by Dr F. Djörup, who kindly related it to me from memory. First-Lieutenant H. was, on the 23d April 1848, being then 33 years of age, in the retreat from Schleswig, wounded by a musket-ball, which entered at the inner edge of the inferior third of the right scapula, passed through the chest, and came out at the right side of the sternum. There was rather violent external hæmorrhage; the patient had not much pain except on movement of the right arm and on coughing, which was attended with copious hæmoptysis. During the following day he had smart

febrile symptoms, pain in the chest, with copious expectoration mixed with blood; the wounds discharged only a small quantity of bloody fluid, but subsequently a large quantity of pus flowed from them. The thoracic symptoms gradually diminished, and the wound in front was perfectly healed in the beginning of the month of June. Shortly afterwards he was admitted into Frederik's Hospital. There was then found at the lower margin of the right scapula a wound of healthy appearance, and of about the size of an eight-skilling piece, through which a probe could be passed to the length of twelve inches, and from which thick pus flowed out on pressure. The patient did not feel particular pain except on coughing, which produced lancinating pains through his chest. The cough was frequent, particularly in the morning, with copious puriform expectoration. He was pale, not emaciated; his general health was very good. The sound on percussion around the wound, especially inferiorly, was dull; in other respects it was everywhere natural, as was the respiration, which only in the parts mentioned was very feeble. Moist râles were heard over the whole of the right lung. The patient's health gradually improved; a number of splinters of bone was discharged through the wound, which, in the beginning of August, seemed to be healed, so that the patient left the hospital and went to the country.

The thoracic symptoms nevertheless continued, and the copious expectoration soon became chocolate-coloured, sometimes quite sanguineous. The posterior opening also gradually healed, but subsequently broke out again with precursory great difficulty of breathing, and, with the very copious purulent discharge, fragments of clothing and small pieces of lead were expelled. The track of the ball, indeed, closed again, but although his condition improved a little in the course of years, he still always suffered from some shortness of breathing, and from ordinary attacks of cough, with copious expectoration, and no year passed without the latter being at certain times more or less mixed with blood, usually presenting the appearance of grayish-red porridge. His general health, however, did not suffer; he even grew fat, and a striking change took place in the points of his fingers, these becoming completely clubbed, as is occasionally seen in congenital malformations of the heart. In October 1866 he died, with uræmic cerebral symptoms.

In this case we therefore had a chronic, suppurating, foul bullet-track, probably with secondary bronchiectasis. The secondary hæmoptysis was long-continued and frequent, but never very abundant or spontaneous. It seems to be most naturally explained by capillary ruptures in the bullet-track, produced by the violent fits of coughing.

These cases give me the opportunity of making a remark of a more general nature, namely, with respect to the relation of the hæmoptysis to pulmonary consumption. In my former essay I

have endeavoured to demonstrate the untenable nature of the doctrine recently adopted by Niemeyer respecting the development of pulmonary consumption from cheesy pneumonic infiltrations, produced by irritation of the blood in hæmoptysis retained in the bronchia and air-cells. One of Niemeyer's pupils, Bürger,[1] has, in support of this very theory, adduced the case of perforating gunshot wounds of the chest, and has especially appealed to Piorry, who as proof that "tubercles" may be developed as the result of hæmorrhages from the air-passages, adverts to the frequency of the occurrence of pulmonary tubercles after such wounds with hæmoptysis. In the three cases now before us, however, we have not, notwithstanding the long-continued and copious hæmorrhages, seen anything of the kind. If the occurrence of this secondary consumption after penetrating gunshot wounds of the chest should really be established, which our home experience does not bear out, it appears to me that it is more naturally explicable by the frequently persistent and exhausting suppuration from the bullet-track, with formation of fistula and pyopneumothorax, than by the primary hæmoptyses, which are seldom to any considerable amount; nor, according to my observations, do the secondary hæmoptyses seem to be attended with danger in this respect.

[1] Ueber das Verhältniss der Bronchial- und Lungenblutungen zur Lungenschwindsucht. Dissertat. v. Carl Bürger. Tübingen, 1864, p. 11.

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REPORT OF THE SUB-COMMITTEE

OF THE

ASSOCIATION

FOR PROMOTING THE EXTENSION OF

"THE CONTAGIOUS DISEASES ACT,"

OF 1866,

TO THE CIVIL POPULATION OF THE UNITED KINGDOM.

WITH A

LIST OF ITS MEMBERS.

LONDON:
PRINTED BY E. ELFICK, 22, LEINSTER TERRACE,
LANCASTER GATE.

REPORT.

The Sub-Committee, in reporting the main events connected with the Extension of the Contagious Diseases Act, 1866, which have occurred since the General Meeting of the Association in July 1868, beg to congratulate the members on the fact, that progress, though not so great as they desire, has been made in promoting the objects which led to the formation of the Association.

In June 1868, Viscount Lifford moved that a select Committee be appointed by the House of Lords to consider the Contagious Diseases Act, 1866. A few days later the Committee was named, and after much careful enquiry they issued their Report on July 2nd, and made the following recommendation—"The Committee recommend the introduction into Parliament, at the earliest practicable opportunity of a Bill giving to Her Majesty in Council power to apply the Act of 1866, first, to all Naval and Military Stations, and secondly to any locality the inhabitants of which may apply to be included in the operation of the Act, and be able to submit satisfactory proofs on the following points, viz., that adequate hospital accommodation can be provided and maintained; that the necessary arrangements can be made for the religious and moral care of the inmates of such hospital or ward, according to the provisions of the Act, and that the police force is efficient."

On February 25th, 1869, the Earl of Morley stated on behalf of Government, in answer to a question in the House of Lords, that "the Extension of the Contagious Diseases Act, 1866, had been under the consideration of the Home Office, and that a Bill would shortly be introduced, based

on the recommendations of the Committee which enquired into the subject last year."

On the same day Mr. Gladstone stated in answer to a question in the House of Commons, that "Government had under their consideration the course to be taken with respect to the Act of 1866, and would in a short time state the conclusion at which they had arrived."

On Friday, May 14th, Mr. Bruce, Secretary of the Home Department, moved that a select Committee be appointed by the House of Commons "to enquire into the working of the Contagious Diseases Act, 1866, and to consider whether, and how far, and under what conditions it would be expedient to extend its operation." The Committee was named on June 8th, and sat for the first time on June 18th—Mr. Childers in the chair.

In consequence of the above-mentioned statements respecting the intentions of Government, we did not think it necessary or desirable to promote Parliamentary action, but were not a little surprised on hearing that, in lieu of the promised Bill, it was proposed to add a second enquiry by a Parliamentary Committee to that made by the House of Lords in 1868.

It is understood that the enquiry now going on will, owing to the late period of the Session, refer exclusively to extension of the existing Act to additional Garrison and Seaport Towns, and that in 1870 further enquiry will be made as to the propriety, and best means, of extending the principles of the Act to the Civil Population.

These circumstances lead us to believe that some advance has been made towards the attainment of our objects. Till 1864 the question had attracted little public attention. It has since been proved by the almost unanimous evidence of medical men—and to them alone is known the extent of the evil—that the disease against which we fight is committing fearful ravages upon the population, and sapping the health

and strength of future generations; but, that from ignorance, apathy, and unwillingness to discuss a disagreeable subject, it has been too long allowed to take its course, unchecked and uncontrolled.

The formation of numerous branches of our Association, and the meetings which have been held, in many populous towns, the appointment of Committees for enquiry by both Houses of Parliament without a dissentient voice, justify us in thinking that public feeling is becoming favourable to our views, and we believe, that the fuller the enquiry may be, so much the more favourable will it still become.

We propose on behalf of the Association to continue in the course which we have adopted; to collect information, and statistics, on which legislation may sooner or later be founded; to circulate documents showing the enormity of the evil, and so to stir up our fellow countrymen to join us in doing our utmost, consistent with the claims of morality, to stamp it out.

Memorials signed by the Mayors of seventeen important towns, by a large number of magistrates, by the highest ecclesiastical and educational authorities, including Bishops, Deans, and Heads of Colleges at Oxford, Cambridge, Winchester, &c., by numerous Clergy and non-conformist Ministers, by Officers of the Army and Navy, and others, have been sent to us for presentation to Government: but as the prayer of them refers more especially to the Civil Population, and as that branch of the subject will not engage the attention of Parliament until next year, we propose to defer the presentation till then, and shall meanwhile urge all who are interested to promote similar Memorials, and to petition the two Houses of Parliament.

We think it desirable for the same reason to postpone for the present our next General Meeting.

The Committee of the Association added at their last

meeting the names of Viscount Lifford, and of Sir John Simeon, Bart., M.P., to the Sub-Committee.

The accounts have been audited by the gentlemen appointed for that purpose, and their statement is appended.

We append also the names of the Members of our Association, and call attention to them with feelings of satisfaction.

We conclude our Report with an expression of our sincere thanks to the Honorary Officers who have carried on, at great sacrifice of time, and with much trouble, the business of the Association.

July 1869.

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or
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Satchell, W. A., Fairfield, Staines.
°Sclater, Philip L., F.R.S., Sec. Zoological Society.
Scott, John, M.D., 8, Chandos-street.
Sedgwick, W., 12, Park-place, Regent's-park.
°Seymour, Admiral Sir Michael, G.C.B., 115, Eaton-square.
°Sharpey, W., M.D., Sec. R.S., Lawnbank, Hampstead.
°Sheriff, A. C., M.P., 9, Dean's-yard.
Shillitoe, Buxton, 34, Finsbury-circus.
Sieveking, E. H., M.D., 17, Manchester-square.
°Simeon, Sir John, Bart., M.P., 72, Eaton-place.
Sisson, Dr. R. S., 3, Warrington-terrace, Maida-hill.
°Skey, F. C., F.R.S., 24, Mount-street.
Smith, Right Rev. G., D.D., late Lord Bishop of Victoria.
Smith, Eustace, M.D., 44, York-street, Portman-square.
Smith, George, Paddock-hurst, Crawley.
†Smith, H. Spencer, 9, Queen Anne-street, *Treasurer*.
°Smith, J. Abel, 37, Chester-square.
Stagg, George, 2, Craven-hill-gardens.
Stephen, Andrew, M.D., Middlesex Hospital.
°Stephenson, Colonel Frederick, C.B., 12, Bolton-row.
Stevens, Rev. T. S., Vicar of All Saints, Blackheath.
Stirling, Edward, 34, Queen's-gardens.
°Stone, W. H., M.P., Dulwich-hill.
°Storrar, John, M.D., Hampstead.
†Stuart, Dr. W., 59, King-street, Woolwich.
°Sturt, Col. C. Napier, M.P., 61, St. James's-street.
Teevan, W. F., 10, Portman-square.
°Thompson, Sir Henry, 35, Wimpole-street.
Tolmé, Julien H., C.E., 1, Victoria-street.
°Tottenham, Colonel, 37, Belgrave-road.
Trotter, John W., Coldstream Guards'-hospital, Vincent-square.
Vinen, Dr. Hart, 6, Chepstow-villas West, Bayswater.
†Vintras, Dr., 141, Regent-street.
†Wakeling, C., 36, Gerrard-street, Soho.
Walker, H. R., Admiralty, Somerset-house.
Walker, J. B., 17, Clifton-gardens, Maida-hill.
°Waring, Charles, B6, Albany.
°Waterhouse, S., M.P., 66, Pall-mall.
°Watson, Sir Thomas, Bart., F.R.S., 16, Henrietta-street.
Way, John, M.D., 4, Eaton-square.
Webster, Geo., 22, Upper Gloucester-place.
Westmacott, Dr. 19, St. Mary's-terrace, Paddington.
°Westminster, Very Rev. Dean of, Deanery, Westminster.

Whichcord, John, 78, Kensington-gardens-square.
°Wilks, Samuel, M.D., F.R.S., 17, St. Thomas's-street.
°Williams, Colonel Owen, 24, Hill-street.
°Wilson, Erasmus, F.R.S., 17, Henrietta-street.
Wilson, Dr., Brixton-hill.
Wodsworth, Rev. G., Warlingham, Croydon.
Wood, Rev. Richard, 31, Leinster-gardens.
Wright, Rev. C. H., 19, Tavistock-street.
°Wyatt, Surgeon Major, 76, Cadogan-place.
°Wyndham, Hon. Percy, M.P., 44, Belgrave-square.

BATH.

Bond, Rev. John.
Buckle, Rev. G.
Dixon, Rev. James.
°Earle, Rev. John, M.A., Rector of Swanswick.
°Falconer, R. Wilbraham, M.D.
Hellins, Rev. C. J.
°Kemble, Rev. Charles, M.A., Rector.
Long, William.
Macnaught, Rev. J.
Methuen, Rev. J. P.
Murch, Rev. Jerome.
Sproule, Rev. James W.
Tate, Rev. G. E.

BELFAST.

°The Lord Bishop of Down and Connor.
McGee, W., M.D.
Reade, Thomas, M.B.
Thompson, Gordon.
MacCormack, Dr. W., *Hon. Sec.*

BIDEFORD.

Pedler, Christopher, Mayor.
Bazeley, Rev. F. L., Rector.
Dingle, Edward, J.P.
Hoyle, Richard C., J.P.
Tagert, Rev. John, Curate.
Thompson, J., M.D., J.P.

BIRMINGHAM.

°The Right Rev. The Lord Bishop of Worcester.
Holland, Henry, The Mayor of Birmingham.

Banks, Morris.
Bartleet, T. H., M.B.
Beilby, Rev. George, M.A.
Bittlestone, Rev. Henry, The Oratory.
Booth, Samuel.
Bunce, J. T.
Burges, Rev. J. H., D.D.
Bracey, Arthur.
Chamberlain, Richard.
Cope, C. R., J.P.
Collings, Mr. Councillor.
Coleman, E. M.
Dale, Rev. R. W., M.A.
Dawson, George, M.A.
Davies, Michael, Mr. Councillor.
Davies, John Birt, M.D., Coroner.
Denne, Henry.
Evans, William.
Emanuel, Rev. G. J., B.A.
Elliot, Rev. H. L., M.A.
Fleming, Alexander, M.D.
Foster, B. W., M.D.
Graham, John, J.P.
Griffiths, E., M.D.
Goodman, J. D., J.P.
Goule, Spencer J.
Heslop, T. P., M.D.
Hedges, James.
Hill, Mr. Registrar.
*Jordan, Furneaux.
Lawrence, J. T., J.P.
Lord, Rev. Isaac.
Lord, W. Wyley.
Lloyd, Thomas, J.P., *Treasurer*.
McCarthy, Rev. E. F. M., M.A.
Marshall, Rev. J. W., M.A.
Martineau, R. F.
Mason, A. T.
Marson, Rev. C., M.A.
Middlemore, W., J.P.
Milward, R. H.
Osler, Follett, F.R.S.
Osborne, Charles.
Pearce, William.
Peyton, Richard.

Ratcliff, Lieut.-Colonel.
Robinson, E., M.D.
Slack, J., B.A.
Smith, Mr. Councillor Brooke.
Smith, Rev. J. Hunter, M.A.
Southall, William.
Smallwood, Joseph, J.P.
Solomon, J. Vose.
Tonks, Edmund, B.C.L.
Tonks, Mr. Councillor.
Turner, J. P.
Vince, Rev. Charles.
Wade, W. F., M.B.
Walker, Mr. Councillor.
Wignall, F.
Wiggin, Henry, J.P.
Wilkinson, Rev. W., D.D., Rector.
Wilkinson, Rev. C., M.A.

Hon. Secs.

Blissard, Rev. J. C., M.A.
Bracey, Charles J., M.B.
Wilders, J. St. S.

BRIDPORT.

Evans, George M., *Hon. Sec.*

BRIGHTON.

Lester, Thomas, Mayor.
Bigge, Arthur, Police Magistrate.
Griffith, Rev. John, D.D., Principal of Brighton College.
Hollis, W. M., J.P.
Rutter, Joseph, M.D.

BRISTOL AND CLIFTON.

Adams, Francis, the Mayor of Bristol.
Anderson, Right Rev. David, D.D., Bishop, Vicar of Clifton.
Bartlett, J. Chairman of the Bristol Board of Guardians.
Beddoe, John, M.D., President of the Anthropological Society of London.
Caldicott, Rev. John W., M.A., Head Master of Bristol Grammar School.
Davies, David, Health Officer.
*Goodeve, Henry H., M.D.

Green, Henry William, Chairman of the Clifton Board of Guardians.
Heyworth, Rev. James.
°Hill, Matthew D., Q.C.
James, William, Minister of the Methodist Chapel.
King, W. P.
Marday, Rev., Henry, Canon of Bristol.
Percival, Rev. L., Head Master of Clifton College.
Phippin, Robert, High Sheriff of Bristol.
Smith, Wm.
°Symonds, John A., M.D.
Beddoe, John, M.D., } *Hon. Secs.*
Tibbits, R. W., }

CAMBRIDGE.

Adams, Rev. J. C., M.A., Lowndean Professor of Astronomy and Director of the Cambridge Observatory.
Atkinson, Rev. E., D.D., Master of Clare College, and Vice-Chancellor of the University.
Bateson, Rev. W. H., D.D., Master of St. John's College.
Brocklebank, Rev. T., M.A., Senior Fellow and Bursar of King's College.
Cartmell, Rev. J., D.D., Master of Christ's College, J.P.
Cookson, Rev. H. W., D.D., Master of St. Peter's College, J.P.
Cope, Rev. E. M., M.A., Senior Fellow and Tutor of Trinity
°Corrie, Rev. Dr., Master of Jesus College.
Drury, Rev. B. H., M.A., Tutor of Caius College.
Ferrars, Rev. N. M., M.A., Tutor of Gonville and Caius College.
Gunson, Rev. W. M., M.A., Tutor of Christ's College.
Kennedy, Rev. B. H., D.D., Regius Professor of Greek.
Maurice, Rev. F. D., Professor of Moral Philosophy.
Okes, Rev. R., D.D., Provost of King's College, J.P.
°Paget, G. E., M.D., President of the General Medical Council.
Phear, Rev. S. G., B.D., Tutor of Emanuel College.
Phelps, Rev. Robert, D.D., Master of Sidney Sussex College.
Porter, Rev. James, M.A., Senior Proctor of the University.
Power, Rev. J., M.A., Fellow and Tutor of Pembroke Coll.
°Selwyn, Rev. W., D.D., Lady Margaret's Professor of Divinity.
Somerset, Rev. R. B., M.A., Junior Proctor of the University.
Stokes, Rev. W. H., M.A., Rector of Denver, J.P.
°Thompson, Rev. W. H., D.D., Master of Trinity College, late Vice-Chancellor of the University

CARDIFF.

Evans, Thomas, Mayor of Cardiff, and Chairman of the Local Board of Health.
Alexander, William, Vice-Chairman of the Cardiff Union.
Bird, John do. do.
David, Thomas W., Chairman of the Board of Guardians of the Cardiff Union.
Howell, Rev. David, Vicar of St. John's, Cardiff.
Jones, R. O., Stipendiary Magistrate of the Borough of Cardiff.
Morgan, Rev. W. Leigh, Vicar of St. Mary's, Cardiff; Hon. Canon of Llandaff, and Rural Dean.
Pride, John, J.P., and Alderman of Cardiff.

CHATHAM.

°Cockburn, J. Balfour, M.D., R.E.
°Murray, Major-General Freeman.
Phillips, Rev. H. F.
°Smith, Col. J. W. S., C.B.
°Webster, Rev. A. R., M.A., Rector of Chatham.
Bailey, Rev. J. G., *Hon. Sec.*

CHELMSFORD.

Nicholls, James, M.D., *Hon. Sec.*

CHELTENHAM.

Barnard, Major.
Bell, Captain H.
Bell, J. P.
Boissier, Major.
Colledge, T. R., M.D.
Cooke, Rev. R.
Fallon, James.
Fenn, Rev. J. F., Incumbent of Christ Church.
Ker, C. B., M.D.
°Linton, Sir W., K.C.B.
Money, Colonel.
°Ramsay, Sir Alexander, Bart.
°Rumsey, H. W., M.D.
Thorp, Disney L., M.D.
Wilson, E. T., M.D.
Winterbotham, L., *Hon. Sec.*

DUBLIN.

°Adamson, Lieut.-Colonel.
°Banks, John, M.D.
°Byrne, Thomas, M.B.
Geoghegan, T. G., M.D.
°Hargrave, William, M.B.
Head, H. H., M.D.
Irvine, Hans, M.B.
Lentaigne, J., M.B.
Maclaen, Henry, J.P.
°Mapother, E. D., M.D.
Morgan, John.
°Porter, G. H.
Wilmot, G., M.D.
Labatt, Hamilton, *Hon. Sec.*

EDINBURGH.

Baird, Sir James Gardiner.
Bill, Joseph.
Faithfull, Rev. V. Grantham.
Moir, John, M.D., F.R.S., Pres. Royal Coll. Phy., Edin.
Ramsay, Rev. E. B., LL.D., St. John's and Dean.
Sanderson, James, Inspec. Gen. of Hospitals.
Sandford, Rev. Daniel F.
°Simpson, Sir James Y., M.D., D.C.L.
Sinclair, Alex.
Spence, James, Pres. Royal Coll. Surg., Edin.
Watson, P. Heron, M.D., F.R.S.
°Wood, Alexander, M.D.
°Wood, Andrew, M.D.
Gillespie, J. D., M.D., *Hon. Sec.*

EXETER.

Caird, T. Wilson.
°Delagarde, P. C.
Shapter, Thomas, M.D.
Grigg, J. Collings, *Hon. Sec.*

GLASGOW.

°Buchanan, G., M.D.
°Fleming, J. G., M.D.
Simpson, Dr. A. Russell, *Hon. Sec.*

GLOUCESTER.

°Gloucester, The Very Rev. Dean of.
°Ancrum, W. R., M.D.
°Evans, Thomas, M.D.
°Hayward, J. Curtis, J.P.
°Price, W. P., M.P.
°Tinling, Rev. E. Douglas, M.A., Canon of Gloucester.
Batten, Rayner W., M.D., *Hon. Sec.*

GRAVESEND.

°Armstrong, John, M.D., J.P.
Cheeseman, T.
Coates, Rev. R. P., Vicar of Darenth, J.P., and D.L. for Kent.
Fletcher, J.
°Gladdish, Col.
Gordon, Colonel.
Gould, J.
Hawkes, R.
Johnston, Rev. W. D., Rector of Milton.
Joynes, Rev. R., Rector of Gravesend.
Matthews, J.
Munns, James, J.P.
Pinching, C. J.
Robinson, Rev. C. E. R., Incumbent of Holy Trin. and Rural Dean.
Sanders, Dr.
Scarth, Rev. J.
Southgate & Son, Messrs.
Southgate, Rev. F., Vicar of Northfleet.
Spencer, C., J.P.
Startup, W.
Steward, V.
Taylor, G., J.P.
Townson, R.
Troughton, M., J.P., Chairman to the Board of Guardians.
Troughton, Thos., J.P.
Wates, E.
Wood, G.
Gramshaw, J. H., M.D., *Hon. Sec.*

GUERNSEY.

°Carey, Francis E., M.D.
°Corbyn, M. A. Bazille.
Collenette, Dr., *Hon. Sec.*

JERSEY.

°Dickson, Joseph, M.D.
°Vaudin, Charles.
Dunlop, Dr., *Hon. Sec.*

LEEDS.

George, T. W., Mayor of Leeds.
°Hey, William, J.P.
Lupton, Darnton, J.P.
Wilson, John, J.P.
Price, W. Nicholson, *Hon. Sec.*

LEICESTER.

Baines, John, Mayor of Leicester.
Baines, W., Chairman of Leicester Union.
Barclay, J., M.D.
Benfield, T. W.
Beanie, Rev. James N., LL.B., Vicar of St. Mary's.
Billson, W.
Bowmar, Charles.
Clarke, Samuel.
Crossley, C. R.
Harris, G. Shirley.
Harrison, Isaac, J.P.
Hill, Rev. Abraham, Vicar of St. George's.
Jacques, J. T.
Jones, Rev. T. Henry, M.A., Vicar of St. Matthew's.
Jones, Rev. T., M.A., Vicar of St. Margaret and Rural Dean.
King, J., Lieut. Com^{dt} Leicestershire Militia.
Knight, Captain J., J.P., Chairman of Blaby Union.
Maule, F. B.
Paget, T. T. High Sheriff.
Paget, Thomas, F.R.C.S.
Shaw, George, M.D.
Stafford, John, Chairman of Local Board of Health.
Stone, Samuel, Town Clerk.
Vaughan, Rev. D. C., M.A., Vicar of St. Martin's.
Marriott, C. H., *Hon. Sec.*

LIVERPOOL.

°Ven. Archdeacon of Chester.
Bowring, C. T.
Campbell, Rev. A., Rector.
Clay, Rev. Walter L., Prescott.
Desmond, L. K., M.D.
°Hickman, W., R.N.
Hubback, J.
Manifold, W. H.
Rathbone, T. H.
°Trench, W., M.D.
°Vose, Jas., M.D.
Wray, Rev. Cecil.
Harrison, Reginald, *Hon. Sec.*

MANCHESTER.

Lee, Right Rev. J. Prince, D.D., Lord Bishop of Manchester.
Archer, Rev. A. W., M.A., Rector of St. Mark's, Hulme.
°Armitage, Sir Elkanah.
Bentley, Rev. T. Rothwell, M.A., Rector of St. Matthews.
Birch, William.
Callendar, W. R., jun.
Dunn, Williamson.
Elton, Joseph.
Firth, John.
Fletcher, Mr. Councillor (Salford).
Fletcher, Wm.
Gibson, Rev. A. W., M.A., Canon.
Gill, Rev. Thomas Howard, B.D., Rector of Whalley Range.
Heywood, Charles.
Heywood, John.
°Mackie, Alderman.
Potter, Michael.
Roberts, John, M.D.
Rylands, John.
Syson, E. J., Medical Officer of Health, Salford.
Tambaci, Paul.
Whitelegge, Rev. W., M.A., Hon. Canon of Manchester.
Peatson, Dr. J. Chadwick, *Hon. Sec.*

MERTHYR TYDFIL.

Cresswell, Pearson, R., *Hon. Sec.*

NEWCASTLE-ON-TYNE AND GATESHEAD.

°Morrison, James, The Right Worshipful the Mayor of Newcastle.
°Newall, R. S., Worshipful the Mayor of Gateshead.
Angus, H., ex-Mayor of Newcastle.
Armstrong, Luke, Ass. Surg. to Newcastle Infirmary.
Armstrong, Sir W. G.
Bainbridge, T.
Bell, Anthony, Ass. Surg. to Newcastle Infirmary.
Brady, Henry.
Bruce, Rev. Dr.
Burnup, Martin, M.D.
Charlton, E., M.D., Physician to the Newcastle Infirmary.
°Cowen, Joseph, M.P.
Dickinson, G. T.
Embleton, D., M.D., Physician to the Newcastle Infirmary.
Gibb, C. J., M.D., Surgeon to the Newcastle Infirmary.
Goddard, D. H., Agent Bank of England.
Gregson, T. L., Councillor.
Green, R. Y., Under-Sheriff.
Grey, Hon. and Rev. Francis R., Rector of Morpeth.
°Headlam, Right Hon. T. E., M.P.
Heath, George Y., Surgeon to the Newcastle Infirmary.
Henzell, W. M.
°Hodge, George William, Sheriff of Newcastle.
Humble, Thomas, M.D., Phys. to the Newcastle Infirmary.
°Hutt, Right Hon. Sir W., K.C.B., M.P.
°Liddell, Hon. H. G., M.P.
Moody, Rev. Clem., Vicar of Newcastle.
Nesham, T. C., M.D., Phys. to Hospital for Women.
Philipson, G. H., M.D., Physician to the Newcastle Infirmary.
Pollard, Joseph, J.P., Alderman.
Potter, Addison, J.P., Councillor.
°Prest, Ven. C., Archdeacon of Durham.
Richardson, Edward.
Robinson, Joseph.
Russell, J., Surgeon to the Newcastle Infirmary.
Sanderson, R. Burdon, J.P., Northd. & Newcastle, Councillor.
Smith, C. S., Councillor.
°Smith, T. E., M.P.
Smith, Thos. and Wm.
Wilson, R. H., M.D., Phys. to Gateshead Dispensary.
Arnison, W. C., M.D., Surg. to Newcastle Infirmary, *Hon. Sec.*

NORTHAMPTON.

Vernon, L. M., Mayor.
Beaumont, Rev. F. M., Rector of East Farndon.
Becke, John, County Treasurer.
Becke, Charles, Coroner.
Dorman, Mark, J.P.
Eunson, John, C.E.
Francis, J., M.D.
Gedge, Rev. Sydney, Vicar of All Saints'.
Harrison, George.
Hughes, Christopher, Clerk of the Peace for the Borough.
Macquire, John, Alderman.
Mansfield, M. P.
Markham, A. B.
Markham, H. P., Clerk of the Peace for the County.
McKinnell, J.
Merrick, J. F.
Norman, J. B., J.P.
Phillips, W. G.
Phipps, Richard.
Phipps, John, J.P.
Portal, W. T., Alderman.
Prichard, Thomas, M.D.
Shoosmith, W., Town Clerk.
Spargin, H. B.
Williams, W., J.P.
Barr, Dr., *Hon. Sec.*

NORTH SHIELDS.

Shotten, Edward, Mayor.
Bourne, W., M.D.
Brutton, Rev. Thomas, Vicar of Tynemouth.
Hedley, John, Deputy Mayor.
Hewitt, J.
Peart, Robert S., M.D., *Hon. Sec.*

OLDBURY.

Hayward, W. H., *Hon. Sec.*

OXFORD.

°Acland, H. W., M.D., F.R.S.
°Chamberlaine, Rev. T., Vicar of St. Thomas's.
°Leighton, Rev. Dr., Warden of All Souls' College, Vice-Chancellor of Oxford.
Thompson, W. Allin, *Hon. Sec.*

PLYMOUTH AND DEVONPORT.

Hubbard, Alex., Mayor of Plymouth.
Rolston, John., M.D., Mayor of Devonport.
Bastard, John P. Baldwin, J.P., Co. Devon.
Bazeley, J.
Bellamy, Rev. Franklin A. S., St. Mary's Church, Plymouth.
Bennett, Rev. T.
Bennett, Rev. William, M.A., Plymouth Corporation Grammar School.
Bewes, Cecil.
Bone, Allan B., Coroner for the County of Devon and Borough of Devonport.
Brown, Henry, J.P., Plymouth.
Brown, Col. Geo. St., J.P.
Bullen, Rev. J. A., M.A., Vicar of St. James', Devonport.
Bulteel, Thomas H., J.P., Plymouth.
Carew, Timothy, J.P.
Collier, Mortimer.
Collier, W. F.
Courtney, Rev. F., Incumbent of Charles' Chapel, Plymouth.
Crossing, T., J.P., Devonport.
Cutcliffe, J. L., J.P., Devonport.
Dansey, Geo., J.P., Devonport.
Dawson, Ralph.
°Domville, H. J., M.D., R.N.
Drummond, Rear Admiral Superintendant.
Everett, Rev. H., M.A., Incumbent of St. John's, Devonport.
Graham, D. McWilliams.
Hobson, George F., Catholic Priest, Devonport.
Isbell, Warren, J.P. for Plymouth, F.R.C.S., &c.
Jonas, Rev. E. W., M.A., Chaplain of Devonport Boro' Gaol.
Kerswill, S., J.P., Devonport.
Laity, Rich. J., J.P. for Devon.
Luscombe, W., J.P., Plymouth.
Manley, Rev. Orlando, Vicar of Dawlish, late Chaplain of Royal Albert Hospital.
°Martin, Admiral Sir W. Fanshaw, K.C.B.
May, J. H. S.
May, Josh., J.P., F.R.C.S.E., Devonport.
Measham, Rev. Richard, Chaplain, Royal Navy.
Mills, J. Grant, T.C.D., Corporation School.
Norrington, Charles.
Norman, Alf., J.P., Devonport.
Oliver, William, J.P., Devonport.

Page, Rev. James, *Treasurer*.
Peek, William, J.P., and Chairman of Board of Guardians.
Radford, William, J.P., Plymouth.
Rendle, E. M. Russell.
Row, Chas., J.P.
Row, Fred., J.P., Devonport.
Ryder, John W., J.P., Devonport.
Soltau, G. W., J.P., for Devon.
Somerville, J. B., J.P.
Spencer, A., M.A., Corporation Grammar School, Plymouth.
Staveley, C., Major-General.
Square, Eldred.
°Square, W. J.
Stephens, W. B.
Swain, W. P., J.P., F.R.C.S.
Trevenen, James, J.P. for Cornwall.
Watson, R. W., J.P., Devonport.
Wilson, Dr.
Woollcombe, Thos., Chairman of Managing Committee, Royal Albert Hospital.
Square, Elliot, } *Hon. Secs.* for Plymouth.
Square, William, }
Dansey, G., *Hon. Sec.* for Devonport.

PORTSMOUTH.

The Mayor of Portsmouth.
°Deverell, John, J.P.
°Stone, W. H., M.P.

READING.

Hounslow, John H., Mayor of the Borough of Reading.
Andrews, Charles J., Alderman, J.P.
Austin, B. S., Deacon of Castle Street Chapel.
Ball, George, J.P.
Barcham, Thomas, Deacon of King's Road Chapel.
Blandy, William Alderman, and J.P. for the County of Berks.
Campbell, Rev. Colin, Offic. Min. Grey Friars Church.
Clutterbuck, Rev. A., Assistant Curate of St. Giles'.
Cust, Rev. Arthur P. Percy, Vicar of St. Mary's and Rural Dean.
Dalton, Rev. Joseph B., Curate of St. Mary's.
Darter, W. S., Alderman and J.P.
Eisdell, Arthur R., Deacon of Castle Street Chapel.
Exall, William, Alderman, J.P., Deacon of Castle St. Chapel.

Exall, William, Deacon of Castle Street Chapel.
Few, Rev. William Tebb, Curate of St. Mary's.
°Fosbery, Rev. T. V., Vicar of St. Giles.
Friend, Rev. Martin Thomas, Curate of St. Lawrence.
Harris, Thomas, Alderman, and J.P.
Hillard, Charles, Wesleyan Minister.
Hussey, Rev. P. F., Curate of St. John's.
Jenkinson, Rev. John H., Curate of St. Mary's.
Legg, William, B.M., Minister of Broad Street Chapel.
Maine, Rev. Lewin George, Vicar of St. Lawrence.
May, George, Sidmouth House, President of the Reading Pathological Society, on behalf and with the authority of the Society, which comprises 49 Members.
Merriman, Rev. G., Assistant Curate of St. Giles.'
Micklem, Edward, J.P.
°Monck, J. B., J.P. County of Berks.
Palmer, George, J.P.
Payne, Rev. William, Incumbent of St. John's.
Powys, Rev. William, Curate of St. Mary's.
Preston, Samuel.
Purvis, Edward, J.P.
Rogers, Thomas, Town Clerk.
Simonds, H. A.
Simonds, Henry.
Simonds, John.
Stevenson, Rev. John Frederick, LL.B., Minister of Trinity Chapel.
Taylor, John D., Chairman of the Guardians of the Reading Union.
Thomas, Rev. George James, Curate of St. Lawrence.
Timothy, Thomas W., Deacon of Castle Street Chapel.
Walford, T. L., J.P.
Walmer, Richard, Minister of Castle Street Chapel.
Ward, Rev. J. M., Curate of St. Giles'.
Wells, Edward, M.D.
Wilson, Henry John, J.P. County of Oxon.
Woodhouse, R. T., M.D., J.P.
Morris, J. T., Ex-Mayor, J.P., *Hon. Sec.*

ROCHESTER.

Aveling, Thomas, Mayor of Rochester.
Gunn, William, M.D., Deputy Inspector General, R.N.
Hare, Humphrey J., High Constable of Chatham.

Joseph, Rev. Alex., M.A., Hon. Canon of Rochester; Rural Dean and Rector of St. John's, Chatham.
Tribe, Herman Henry, M.R.C.S. Eng.
Whiston, Rev. Robert, M.A., late Senior Fellow of Trinity College, Cambridge, and Head Master of the King's School, Rochester.

SALISBURY.

°Cardell, J. M.

ST. LEONARDS.

Adey, C. A., M.D.

SCARBOROUGH.

Hales, Rev. W. A.

SOUTHAMPTON.

°Parkes, E. A., M.D., F.R.S.
°Stebbing, Alderman J. R., F.R.A.S., Mayor.
Symons, A.
°Wiblin, J.

TORQUAY.

Pollard, James, *Hon. Sec.*

WINCHESTER.

The Mayor of Winchester.
°The Rev. the Warden of St. Mary's College.

ON THE

TREATMENT OF PHTHISIS

BY

PROLONGED RESIDENCE IN ELEVATED REGIONS.

BY

HERMANN WEBER, M.D., F.R.C.P.,

PHYSICIAN TO THE GERMAN HOSPITAL.

[*From Volume LII of the 'Medico-Chirurgical Transactions,' published by the Royal Medical and Chirurgical Society of London.*]

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1869.

H. SPENCER SMITH, *Treasurer, in account with the Association for extending "The Contagious Diseases' Act," 1866, to the Civil Population, from May 28th, 1868, to July 19th, 1869.*

RECEIPTS.	£	s.	d.
Balance from last Audit	41	3	6
Annual Subscriptions	59	7	6
Life Subscriptions	27	6	0
Donations	9	12	6
	£137	9	6

PAYMENTS.	£	s.	d.
Printing, Stationery and Advertising	76	16	1
Reporting and Copying	13	1	0
Hire of St. James's Hall	2	2	0
Collector's Poundage	0	17	6
Hon. Secretaries' Expenses:			
Mr. Berkeley Hill 15 12 3			
Mr. Curgenven 2 14 6			
	18	6	9
Balance	26	6	2
	£137	9	6

July 20th, 1869.—Examined with the Vouchers and found correct,

C. INGLIS,
A. B. R. MYERS, } *Auditors.*

ON THE

TREATMENT OF PHTHISIS

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PROLONGED RESIDENCE IN ELEVATED REGIONS.

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HERMANN WEBER, M.D., F.R.C.P.,

PHYSICIAN TO THE GERMAN HOSPITAL.

Received Feb. 15th.—Read May 11th, 1869.

Our views of the nature of pulmonary consumption and tuberculosis, are so much in a state of transition, that the same term is used by different authors in a different sense. I therefore premise that I employ the old and simple term phthisis to signify, not only tubercular consumption, but also those other morbid conditions of the lungs which tend towards pulmonary consumption, and especially the various consequences of acute and chronic catarrhal or lobular pneumonia, so well described by the late Dr. Thomas Addison,[1] whose teaching "that inflammation constitutes the great instrument of destruction in every form of phthisis," was for a long time either ignored, or regarded as erroneous, by most of his contemporaries, as well in this country as

[1] "On the Pathology of Phthisis." By T. Addison, M.D. 'Guy's Hospital Reports,' 2nd series, No. V, 1845, p. 1; and New Sydenham Society's Collection of the published writings of Thomas Addison, M.D., 1868, p. 39.

abroad, because it was opposed to Laennec's views, which had taken hold of the minds of medical men in an almost incredible manner. Happily a change is being worked in this respect by some of the best observers, as well English as German.

The term "elevated regions" is used in this communication instead of the expression "Alpine climates" employed in a former paper,[1] because the elevated places where consumption may be cured, need not belong to the great alpine chains of Europe, America, and Asia, but may be situated on a lower level. The term is intended to comprise those localities where, owing principally, but not entirely, to their elevation, phthisis is either absent, or of rare occurrence amongst the inhabitants. The elevation, necessary for producing a certain degree of immunity from phthisis, varies considerably in different latitudes, and seems to become lower in proportion as we proceed from the equator towards the poles; thus in the tropical zone it may be regarded as above 8500 to 9500 feet, while in the temperate zone it is considerably lower. In the Peruvian Andes, between about the 8th and 15th° S. Lat, an elevation of immunity from phthisis lies above about 7500 and 8500, according to personal communications from Dr. Archibald Smith, who practised during twenty-five years at Lima, Cerro Pasco, and Huanuco; in Mexico, between about 20° and 30° of N. Lat., it lies, according to Jourdanet and other authors, above 6500 and 7000 feet; on the Sierra de Cordova, about 30° to 32° S. Lat., phthisis does not, or rarely, occur, according to a communication from Dr. Scrivener, not yet published, already at a much lower elevation; and Dr. Scrivener adds, "that it has been the custom from time immemorial, for the physicians in Buenos Ayres, to send their consumptive patients from the coast to the mountains." Quite lately I have learnt from an intelligent native of Kiachta, in Siberia, on the Chinese frontier, that consumption does not occur in that town, elevated, according to 'Blackie's Imperial

[1] "On the Influence of the Alpine Climates on Pulmonary Consumption," 'Brit. Med. Journal,' 1867, vol. ii.

Gazetteer,' 2220 feet above sea-level, and situated in lat. 50° 15′ N., lon. 105° 40′ E.

In the Pyrenees, 42° to 43° 5′ N. Lat., there are not many inhabited places of high elevation, but according to Schnepp's statement, it is already rare at Eaux Bonnes, 2450 feet, and Eaux Chaudes, about 2205, above the sea, and the result of personal inquiries made ~~many~~ years ago at Garvarnie 4580, Barèges 4100, Cauterets 3254, San Sauveur 3552, Bagnères de Luchon 2060, Bagnères de Bigorres 1760 feet above sea-level, is in accordance with this statement, viz., that phthisis is not absent amongst the inhabitants, but is decidedly less frequent than in the adjacent plains of France. In Switzerland, between 46° and 48° N. Lat., the frequency of phthisis, according to the statement of many local medical men, diminishes in most parts above 3000 feet, and it becomes very rare above 5000 feet. In the Black Forest, between 27° and 49° N. Lat., it is comparatively rare above 2500, and in the mountains of Silesia, Thüringen, and the Harz, 50° to 52° N. Lat., between 1400 to 1600. Fuchs[1] states that at Brotterode, in Thüringen, 1840 feet above sea-level, the percentage of phthisis is only 0·9, and Brehmer[2] assures us that in the neighbourhood of Görbersdorf, in Silesia (1700 feet) he has never seen phthisis amongst the inhabitants. Virchow[3] mentions that it is rare in the Spessart, the highest villages of which mountain range are from 1000 to 1400 feet above sea-level. Küchenmeister,[4] in a valuable contribution on the subject, endeavours to fix the elevation of immunity from phthisis, for every degree and fraction of a degree of north or south latitude, and from calculation is inclined to assume, that for the latitude of Germany and Switzerland the removal of one degree from south to north, would render the necessary elevation about 375 feet lower, while the removal in

[1] 'Medicinische Geographie,' 1853, p. 35.

[2] 'Die chronische Lungenschwindsucht.' Berlin, 1857, p. 134.

[3] "Die Noth im Spessart," 'Würzburger Verhandlungen,' vol. iii, 1852, p. 128.

[4] "Die hochgelegenen Plateaus als Sanatorien für Schwindsüchtige," von Dr. Friedrich Küchenmeister." Separatabdruck aus der 'Oesterreich. Zeitschrift für practische Heilkunde.' Wien, 1868, p. 17.

the southward direction would require a greater elevation, viz., for an entire degree of 375 feet, for ½ degree of 62½ feet, for $\frac{1}{10}$ degree of 37½ feet. Küchenmeister has even proposed a map, marking on the margin the elevation of immunity for every 6th part of a degree; he claims, however, himself only approximative correctness, and suggests the formation of an association of medical men for examining the relative frequency of phthisis in different elevations in Germany and Austria, according to the degree, and fractions of a degree, of latitude. Küchenmeister will do good service, indeed, if he can carry out this scheme, and if he can extend the examination also to other diseases and causes of death in different elevations. It appears to me, however, scarcely probable[1] that a fixed elevation of immunity will be found for every degree of latitude, decreasing in an arithmetical proportion from the equator towards the poles, and *vice versâ*. Even in the same mountain range there are differences in this respect. Thus, I have learnt from Dr. Unger at Davos, that Dr. Boner, of Klosters, not rarely met with phthisis at Spliigen (over 4700 feet), where he formerly practised, while it scarcely ever occurred to him in the upper part of Klosters (rather below 4000 feet); and at Andermatt (about 4700 feet) I have likewise ascertained the occasional occurrence of phthisis. Elevation, though probably a most important, is not the only cause at work, but there are other influences which may either assist or counteract it, as the situation of a place on table land, on the top of a hill, on the slope, or in a valley; the aspect to the south, west, north, or east; the configuration, and height of the surrounding mountains, if there are any, on which the stillness or motion of the atmosphere, and the direction of the currents, and the amount of light and sun, so greatly depend; the nearness or absence of sheets of standing water, or rivers, or marshy districts, the elevation of the residence

[1] I ought to state that Küchenmeister mentions in a letter, written subsequently to the publication of the paper quoted, that he likewise considers elevation only as one of the influences at work in the immunity from phthisis on high elevations.

above them; the neighbourhood of the sea; the proximity of large glaciers and snowfields; the occurrence or absence of fogs; the number of clear days; the amount of rain or snow, and the degree of humidity of the air. Subjects of special importance are the nature of the geological substratum, and the other conditions on which the dryness or dampness of the soil depends. The researches of Bowditch in America, and of G. Buchanan[1] in England, have quite lately thrown a new light on these questions. The fact that each of these two observers was unaware of the researches in which the other was engaged, and that they arrived at analogous results, increases the value of the latter. The diminution of phthisis mortality in many towns following almost immediately the drying up of the soil by improved drainage; and the further fact, resulting from Dr. Buchanan's inquiries, that less phthisis exists in the same countries among populations living on pervious soils, than among populations living on impervious soils, give great force to the conclusion, drawn as well by Mr. Simon, as by Dr. Buchanan himself, "that wetness of soil is a cause of phthisis to the population living upon it."[2] I might mention many other circumstances which, though generally not much considered, seem to me of great importance, as the manner of cultivation of the land, whether barren rock, with little grass, or covered with wood, or with pasture land, or with corn, etc.; the scarcity or density of population, and the nature of their occupations; the usual admixtures to the air, mechanical, chemical, and living; and further, the fact, whether a place is situated on a mountain range of limited dimensions, forming a more or less isolated elevation, or whether it belongs to an extensive mountain country, like the Alps or the Cordilleras, a fact by which the temperature, the moisture of the air, the nature of the winds, and other agents are considerably influenced. It may, perhaps, be

[1] 'Ninth and Tenth Reports of the Medical Officers of the Privy Council for 1866 and 1867.'

[2] 'Tenth Report of the Medical Officers of the Privy Council,' p. 16 and p. 109.

found that in a district deprived of high and massive mountains, a less elevation, sufficiently raised above the atmosphere of the lower districts, may procure the same degree of immunity as is due only to a higher elevation in another district provided with extensive and high mountain regions.

It is not impossible that elevation acts by favouring a certain constitution of the air, viz., a great degree of freeness, from deleterious admixtures, organic and inorganic, and that dryness of soil and air, cold, and other influences, act in the same direction.

I have not yet been able to learn the result of the researches of the Swiss Society of naturalists and medical men, on the prevalence or absence of consumption in the various parts of Switzerland; but as some of the best observers are engaged in the inquiry,—Lombard, of Geneva, among them —we may look forward to important information from their report on many of the questions alluded to.

I need not tell the Fellows of the Royal Medical and Chirurgical Society that there is nothing new in the idea of treating consumptive patients by a residence in elevated localities. The views of Archibald Smith, Lombard, Mühry, Hirsch, Jourdanet, Guilbert, and others,[1] are well known to them; but they will agree with me in saying that there is still a very strong prejudice, as well among the majority of the medical men as the public of this country, against giving a trial to the plan in question. In almost every case of incipient consumption in which I have advised a prolonged residence in St. Moritz, or Davos, or any other elevated region, it has happened that either the one or other of the relatives, or a medical man connected with the family, strongly objected to the plan because he thought it "injudicious to expose so delicate an invalid to a rough and cold climate," or "to place one predisposed to pulmonary hæmorrhage under the

[1] It is an act of justice to mention here that Dr. Brehmer, of Görbersdorf, was, to my knowledge, one of the first medical men in Europe who has carried out this idea in a systematic manner. He did not keep the patients during the cold winter months in high elevations, but he strongly advocated the plan for the milder seasons. 'Die chronische Lungenschwindsucht.' Berlin, 1857.

influence of a rarified air;" and in many instances, I confess, the objections had greater power than my advice. It is not my business to inquire how they fared in warmer and lower climates, but I can conscientiously say that at least no harm has arisen, that, with scarcely any exceptions, even great benefit has accrued to those who have given a fair trial to the elevated regions, as an examination of all the cases will prove.

Amongst the different objections, the two I have just mentioned seem to be the most prominent in the minds of most people; and yet I believe that before long it will be counted among the errors of the past—1st, that cold is injurious to those predisposed to consumption, or to those already exhibiting the signs of an early stage of the disease; and 2nd, that the moderately rarified air of a mountain health resort predisposes to pulmonary hæmorrhage; and I may mention also at once,—3rd, that popular idea that climates with a uniformly warm temperature are the best for consumptive people.

Cold can surely not be called a direct cause of phthisis; people may be, it is true, deprived by it of the means of obtaining food and clothing, and may be induced by it to crowd together in close, ill-ventilated rooms, and altogether to avoid out-door exercise; but if, under such conditions, a tendency to catarrhal inflammations and consumption is developed, it is clearly not to be ascribed to the low degree of temperature. A cold, dry air with a clear sky causes, when there is no want of clothing and food, an inclination to exercise, and to increased breathing; the mind becomes cheerful, the appetite and the nutrition improved, and the tendency to consumption is thus counteracted. In colder climates consumption is rarer, and less rapid in its course than in hot climates; we need only point to the great frequency and almost acute character of the disease, in the low and hot parts of Mexico, and at Panama,—of which latter place E. H. Richter,[1] in his excellent report on

[1] "Bericht über Medicinische Meteorologie und Klimatologie," Schmidt's 'Jahrbücher,' vol. cxxii, cxxviii, cxxxii, and cxxxiii.

'Medical Climatology,' truly says that few spots on earth have greater equability in the atmospheric pressure and in the temperature.

It has repeatedly been mentioned to me that consumptive people have been sent from warmer to colder regions, but I cannot remember the source of my information. Quite lately, however, I have learnt from Dr. H. Hunt, of Brook Street, that he has, to use his own words, "seen the greatest benefit from the residence in Labrador, and in the outlying fishing stations in Newfoundland, in strumous tubercular diathesis;" and I have had myself the opportunity of examining a German, about thirty years of age, who, after having in his native country suffered for several years from frequent catarrhal inflammations, offered the signs of deposits in both apices, coupled with considerable emaciation, when he received an appointment on the coast of Labrador, from whence he returned, after four years' stay, in robust health, having been free from cough for more than two years, and with but slight traces (flattening of the subclavicular region) of the former affection.

The fear of *hæmorrhage* in elevated health resorts seems to be based on the well-known theoretical reasoning on the influence of diminished atmospheric pressure, strengthened by the reports of Saussure, Humboldt, Boussingault, and other scientific explorers; but the heights where bleeding from the nose and gums occurred to them, were much greater than those recommended to consumptive patients; and what is still more, these men and their attendants had to make excessive exertions in ascending steep rocks and snow slopes. And whoever knows the violent palpitations of the heart caused by great ascents in those who are not quite in "condition," cannot be astonished at the occasional oozing of blood from their mucous membranes. Yet the best guides in Switzerland, the constant companions of our alpine climbers, can bear me out in saying, that even this is very rare, —at least, in the ascents of mountains of 13,000 to 15,000 feet; but even if it were frequent under such circumstances, it is evident that they are totally different from those in which

the invalid is placed who takes his limited exercise on almost level, or only moderately rising ground.

Independently, however, of such considerations, experience appears to be in favour of the view that hæmoptysis in consumptive people is less frequent in elevated, and usually colder, than in low, and generally warmer health resorts. Archibald Smith[1] teaches us that in Lima, where hæmoptysis is one of the most frequent affections, and the usual forerunner of phthisis, the removal to the mountain health resorts, about 9000 to 12,000 feet above sea-level, is regarded by the medical men, as well as the public, as almost omnipotent in the prevention and cure of hæmoptysis and consumption. With regard to my own limited experience, I may state that among the seventeen cases whose histories I shall give below, and the fourteen others who are still under observation, only one had slight hæmoptysis while residing on a high level, and that among these thirty-one cases, there are twelve who had from one to four serious attacks while residing in low elevations. These figures are too small to be regarded as decisive by themselves, but they may yet be useful as a contribution to others. They are not intended to show that hæmorrhage cannot occur in elevated regions to consumptive people, for it may, and does take place, but much less frequently, I believe.[2]

In a paper already mentioned it has been said, "One of the most frequent causes of pulmonary hæmorrhage is probably the rapid breaking down of lung tissue, and through this the lesion of blood-vessels before they have been oblite-

[1] "Climate of the Swiss Alps and Peruvian Andes compared," 'Dublin Quarterly Journal of Medical Science,' May, 1866.

[2] From repeated conversations with the late Dr. Archibald Smith, I can further state that the tendency to every kind of hæmorrhage, not only bronchial or pulmonic, appears to become diminished by prolonged residence on mountains. In aneurism, too, he found rather less disposition to bursting on higher elevations, and he has mentioned to me two cases which at last terminated fatally from rupture at Lima, while during repeated long stays in the mountains they felt very well and could undergo, without inconvenience, a certain amount of exertion. An analogous case has occurred in my own experience.

rated; and circumstances favouring such a process, are likely to increase the tendency to pulmonary hæmorrhage, while those unfavorable to it diminish the tendency, and I trust that such an influence may sooner or later be accorded to well-selected alpine climates."

Further experience has not changed my view in this respect—1stly, that there is in elevated climates a greater tendency to the absorption and cicatrisation of the products of chronic pneumonia; and 2ndly, that there is much less risk of the fresh occurrence of that class of inflammations which by some have been termed scrofulous, by others catarrhal and lobular pneumonia, and which often lead to the effusion of albuminous substances, giving the appearance of the so-called tubercular infiltrations, with a tendency to softening and formation of cavities. Another source of hæmoptysis, arising from catarrhal affections of the small bronchi, is likewise rarer on high elevations than in lower regions, because these catarrhal affections occur much more rarely on the former and have not the same tendency to spread to the smallest bronchi and the pulmonary tissue. One of the most prominent features, indeed, is that those who, at their usual places of residence, are very frequently troubled with "colds," *i. e.*, with catarrhal affections, commencing either as coryza, or as "sore throat," and thence extending to the bronchi, remain almost free from these affections during their prolonged stay in elevated regions. This leads me to another point.

I have often been told, "a great objection to the alpine plan is that your invalids, on account of the very low temperature, are obliged to stay at home on many days, or if they do go out, they contract pleuritis, pneumonia, and other febrile affections." The answer to the first part of the objection is, that the invalids do go out almost every day in spite of the deepest snow, and of a very low temperature. The heat in the sun during the midday hours is very considerable, and the delicate invalid is able to sit on the balcony, to walk and to drive in a sledge, even on the coldest days. Only just now Dr. Berry, of St. Moritz, wrote to me that a very delicate young lady who had been sent to St. Moritz conjointly by Dr. Gull and myself, on account of pneumonic deposits in both apices, enjoyed without any ill-effects, a drive from St. Moritz to Silvaplana and back (about three miles) in an open sledge, on the forenoon of the 23rd of January, when the temperature at 7 a.m. was 13° Fahr. below 0 (—25° C.).

With regard to the second part of the objection, it is for obvious reasons very difficult to give a decisive reply. I have stated already that the invalids are much more exempt from catarrhal affections than at home, "but how does the comparison stand," I am asked, "with regard to the so-called southern health resorts?" My opinion is again favorable to the mountains. It would be unreasonable to compare the thirty-one cases sent to high-level with thirty-one others sent to low-level health resorts (the Riviera, Rome, Naples, Palermo, Egypt, Algiers), but amongst the seventeen cases whose histories I give, there are ten who have spent one or several seasons in southern health resorts. All these ten said that they had been much more free from intercurrent acute affections on the high-level, than on the low-level, places, but only of five can I give more accurate data. These five cases spent an aggregate time of about 80 months in low-level, and almost 160 in high-level, health resorts; of these 80 months they were confined nearly 20 months, or $\frac{1}{4}$th of the whole time, to their rooms or beds, on account of intercurrent diseases, especially bronchitis, pneumonia, pleuritis, rheumatic fever, and hæmoptysis; while of the 160 months on high ground they were confined for the same reason less than 10 months, therefore not quite $\frac{1}{16}$th of the time. Here again, however, I must allow that my experience is too limited to permit of a decided inference.

Possibly two of the assisting accessory causes for the rarer occurrence of acute affections during the stay in elevated places are—1stly, that the invalids, especially during the cold winter, take greater care of themselves, being reminded by the snow and ice around them, that it is not the true season for light clothing, even if the heat of the sun is great, while in the lower and warmer health resorts invalids frequently think

they can do with a single coat, become heated by a long walk in the sun, and chilled by return into comparatively cold houses or shady streets, &c.; and 2ndly, that the social conditions in high regions offer less temptation; there are none of the friendly parties, especially evening parties, which delicate persons when they *feel* well, like so much to join. The isolation in the not much frequented mountain regions, is less agreeable to the taste of most people, but it possesses, notwithstanding, its own advantages.

As it is my earnest desire that the whole question should receive the impartial attention of the profession, I will give the outlines of all the cases which have been at one time or other under my own observation, and of which I have further reliable information.

Case 1.[1]—*Summary.*—Chronic catarrhal pneumonia; deposits in right apex and left lower lobe; night perspirations; great emaciation (subacute phthisis); arrest of symptoms, and cure by stay in the Black Forest; fresh outbreak and death from hæmoptysis after return into unfavorable circumstances.

J. H—, æt. 24, a clockmaker from the Black Forest, came to London in good health in 1848. From that time he had frequent attacks of sore throat and cough, and became a patient of the German Hospital in the summer of 1851, with dyspeptic symptoms, cough, slight dulness, and deficient respiration in the supra- and infra-clavicular region. Was better and worse, but gradually lost weight up to September 1852, when he was seized with broncho-pneumonia of the lower part of the left side, gradually creeping upwards, until in the beginning of November, the dulness reached on the back the upper third of the scapula, the crepitant rhonchus having ceased in the lower part of the dull space, but being persistent in the upper. On the right, the originally diseased side, the dulness extended from the apex to the fourth rib, and was accompanied by bronchophony and abundant rhonchi. There was much purulent expectoration, great emaciation, pyrexia every evening (102° to 103°), usually followed by profuse perspiration towards the morning. Pulse 110 to 120, and chest expansion 33 to 34 ¼ inches. In this condition he preferred returning to his mountain home in the Black Forest, about 2800 feet above sea-level. Here, living principally on milk, he soon lost the night perspiration, gained strength and flesh, and the cough and expectoration gradually became less, and had disappeared entirely when, to my astonishment, he presented himself to me in London, in July 1853. He had the appearance of a healthy man, there was nothing abnormal to be discovered on the left side, the upper part of the right was flattened, but the dulness extended only to the second intercostal space, and instead of bronchophony and rhonchi, there was only an absence of vesicular breathing, and a protracted rough expiration, without any rhonchi. Pulse 82, chest expansion 34½ to 36¾ inches; increase in weight 21 pounds. He resumed his occupation in a narrow street of Soho, and considered himself well up to the beginning of August, 1854. He then began to cough, but continued to work for some weeks, when he was suddenly seized with violent hæmoptysis, and died on the fifth day after its commencement.

Post-mortem examination.—The upper lobe of the right lung was adherent, the apex hard, contracted, consisting entirely of slate-coloured, dense, fibrous tissue, almost grating under the knife. The lower part of the same lobe was emphysematous. The two other lobes were free from old disease, but congested, containing some fresh apoplectic nodules, and several bronchi were plugged up with coagulated blood. The left lung was everywhere adherent. In the centre of the upper lobe was a small newly-formed cavity, with irregular walls, unprovided with epithelial lining; the cavity was filled with coagulated blood, and surrounded by grey, soft infiltration, taking up a considerable portion of the

[1] This and the four following cases have, in substance, been communicated in the 'British Medical Journal' in 1867, their further progress, as far as it is known, is added. They are again mentioned in order that the material from which the conclusions in this paper are drawn may be at hand, and that others may form their own inference.

lobe. In various parts of both lobes were fresh apoplectic nodules, and some bronchi were filled with coagulated decomposing blood. The posterior and inferior parts of the lower lobe, the seat of the pneumonic affection in 1853, contained much more black pigment than the remainder of the same lobe, and were slightly more dense, but they were everywhere permeable to air. The heart was fatty, the liver likewise fatty (nutmeg); the kidneys were congested.

Case 2.—*Summary.*—Chronic catarrhal pneumonia; deposits in right apex, and left lower lobe; rapid emaciation (subacute phthisis). Arrest of symptoms during stay in Switzerland; temporary cure; fresh outbreak two years after return into unfavorable circumstances; rapid death from hæmoptysis.

J. K—, æt. 22, a native of Switzerland (the Oberalp), formerly healthy, came to London in 1849, and was employed as a waiter in a city dining-room. He began to cough in 1850, and had hæmoptysis in February, 1852. Dulness and rhonchi extended from the right apex to the third rib. There was increase of cough and pyrexia in July. Pneumonic affection of the lower part of the left side was discovered in August. The dulness and crepitant rhonchi had ascended to the supraspinal region on the left side in November, and the older affection of the right side had much extended. The patient was never entirely free from fever, and had profuse perspirations once or twice daily. Loss of weight, 30 pounds in eight months; pulse 90 to 95; respirations 30 to 36; expansion of chest 34½ to 35½ inches. In this condition he returned home (in November) to an elevation of about 5000 feet, and there on an almost pure milk-diet he gradually improved, and came back to London in May, 1853, having gained 24 pounds.

The left side appeared normal, the upper part of the right was sunk in, but there were no rhonchi, and the dulness and defective breathing extended only to the second rib. Pulse 76; respirations 14; expansion of chest 35 to 37¼ inches.

He remained well until March, 1855, when he contracted

bronchitis, followed by pleuropneumonia of the right side, beginning at the apex, and extending rapidly downwards.

In June the upper part of the left side became likewise affected. Death ensued at the end of this month from hæmoptysis.

Post-mortem examination.—There were extensive adhesions on both sides. The upper lobe of the right lung was much contracted and puckered; the apex was occupied by several chalky concretions, surrounded by dense, fibrous, slate-coloured, airless tissue. The remainder of the right lung was in a state of soft grey infiltration, with several fresh irregular cavities. The apex of the left lung was in a similar condition, but the greater part of this lung was permeable to air; it contained many hæmorrhagic spots. There were no miliary tubercles. The heart was fatty. The kidneys were in the first stage of Bright's disease.

Case 3.—*Summary.* — Chronic phthisis, with hæmoptysis; temporary improvement during winter at Cairo and at Cannes and Nice; gradual progress of disease; arrest of symptoms on the Peruvian Andes; relapse at New Orleans; temporary cure on the plateau of Mexico. Fresh affection after six years, again arrested by a stay in the vale of Jauja.

H. F—, æt. 31, a German, came to London in 1852, had a chronic cough in 1853, and hæmoptysis in the summers of 1854 and 1856. He spent then seven months in Cairo, where he became better, without, however, entirely losing his cough. He had again hæmoptysis in March, 1857, in Cairo, and much cough during the summer of 1857 in London.

There was improvement during the following winter spent at Cannes and Nice, but he was much worse after his return to London. He was first seen by myself in July, 1858. He had lost 29 lb. in three years. There was dulness on the left side from the apex to the fifth rib, with broncho-phony, and crackling rhonchus in the supra- and infra-clavicular spaces, and an analogous condition on the back of the same side. Nothing abnormal was discovered on the right side. Pulse 85; thoracic expansion 35 to 36½ inches.

He went to Valparaiso, and had there again hæmoptysis. He spent then eight months on the Peruvian Andes, at an elevation of between 9000 and 10,000 feet, gained flesh and lost the cough entirely. He went afterwards to New Orleans, where he again began to cough and lose flesh. He was sent thence to the tableland of Mexico, where, to his own feeling, he entirely recovered his health. When seen by me in the autumn of 1860, the dulness on the left side reached only from the apex to the third rib. This portion was much flattened, and there was absence of vesicular breathing, but no bronchophony and no rhonchus. He had gained 24 pounds in twenty-seven months. Pulse 66; expansion of chest 36 to 38 inches. He remained well until the spring of 1866, when he again began to cough, was often feverish, lost much flesh, and had some hæmoptysis. When seen in the beginning of October, 1866, the old affection of the left side had remained almost unchanged, but on the right there was dulness from the apex to the fourth rib, with bronchophony, and occasional crackling rhonchus in the subclavicular space. He had lost 20 pounds in twelve months. Pulse 95; chest expansion 35½ to 37 inches. He went to the valley of Jauja in the Peruvian Andes, and lost his cough almost entirely; and when seen in August, 1867, he had gained 15 pounds. The dulness descended on the right side only to the second rib. There was no rhonchus, but scarcely any respiratory murmur over the dull space. Pulse 74; expansion of chest 36 to 38 inches.

In December, 1868, when I saw him last, he felt quite well, the local phenomena being nearly the same. He had spent the intermediate time in several healthy parts of Germany and Switzerland, and had been able to climb considerable mountains without any ill effects.

Case 4.—*Summary.*—Early chronic phthisis, progressing in spite of a winter at Bordeaux and Cannes; arrest of symptoms, and cure in Switzerland.

B. D., from the lower parts of Switzerland, came to London in 1864, æt. 22. He was much depressed by the

fogs and dulness of the atmosphere. He had repeated attacks of bronchitis during the winter, and in the spring of 1865 he coughed, and became emaciated during the summer. There was slight dulness in the left clavicular, and infra-clavicular region, with diminished respiratory sounds. He spent the winter at Bordeaux, and at Cannes; he never lost his cough entirely, and continued to lose weight. He returned to London in May, 1866. The dulness extended on the left side from the apex to the third rib. He had, early in June, an attack of sore-throat, which was with him, the usual forerunner of bronchitis; he became feverish, and by the end of the month a pleuro-pneumonic affection was discovered in the lower part of the right side, which gradually crept upwards to the upper third of the scapula. By the end of July, the pyrexia had almost ceased under a treatment of milk, quinine, and cod-liver oil; but the dulness over the back of the right side had not yielded. There was crepitant rhonchus over the upper part of the dull space, and absence of respiratory murmur over the lower; pulse 92 to 100; expansion of chest 31½ to 33 inches. The dyspnœa was great at every exertion, frequent cough, with about two and a half ounces of muco-purulent expectoration. Generally profuse perspiration towards the morning. He had lost 27 lb. in as many months' stay in London. In this state he went, towards the end of July, to the Righi; lived there almost entirely in the open air, and drank about two quarts of milk every day. In less than six weeks he was able to take considerable walks, and in October he had lost his cough almost entirely. He spent the winter in different parts of Switzerland, usually above 2500 feet above the sea-level. He had not a single attack of sore-throat and bronchitis, and when he returned to London, towards the end of May, the right side was quite normal; the left side was in front, in the supra- and infra-clavicular spaces, slightly sunk in; there was moderate dulness, and scarcely perceptible breathing from the apex to the second rib. He had gained nineteen pounds in weight during ten months, and felt in every respect perfectly well.

He was in excellent health in November, 1868, when I saw him last, and had almost remained free from cold while spending the preceding fifteen months in mercantile occupations at Malaga.

Case 5.—*Summary.*—Subacute catarrhal pneumonia, with fresh deposit in the lower part of the left, and old in the apex of the right, lung. Recovery; and absorption of the fresh deposit during a winter at Davos.

B. K., æt. 21, had pneumonia of the right side about ten years ago. He came to London in spring, 1865, and began to cough and lose flesh in the winter, 1865-66. Hoarseness supervened in spring, 1866, and the cough gradually increased. When seen in July he was thin and pale, with circumscribed red cheeks; he had chronic swelling of the tarsal portion of the eyelids; pulse 105 to 110; respiration 26 to 30; temperature every evening slightly increased. There was fresh pneumonic affection of the lower part of the left side; dulness and absence of respiratory murmur on the right, from the apex to the third rib. The evening pyrexia gradually subsided, under perfect rest and milk diet, but the pneumonic affection slowly crept upwards; the dulness extending on the posterior part of the left side, from the bottom to the upper third. When he left England, towards the end of August, there was crepitation with slight bronchophony over the greater part of the left scapula, and the older affection of the right side had remained unchanged. He was advised to go to the Davos, but went first to Germany, and only after having been attacked by fresh colds he repaired in November to Davos am Platz, where he stayed until the middle of April, and in spite of a rather unfavorable winter, entirely lost his cough, and gained seven pounds in weight, the spirometer showing an increase of pulmonary capacity amounting to more than 900 cubic centimètres. According to Dr. Unger's report at the time of B. K—'s departure from the Davos, nothing abnormal could be discovered on the left side, except, perhaps, slight dulness in the lower part; and the dull space on the upper portion

of the right side was likewise diminished. In addition, the affection of the eyelids, which had existed for several years, had entirely disappeared without remedial interference. When I last heard of this gentleman, at the beginning of the winter of 1867, he had remained quite well.

Case 6.—*Summary.*—Chronic phthisis progressing in spite of three winters in southern health resorts. Advanced affection in both lungs. Twice temporarily much improved by a stay on the Cordilleras; fresh attacks of hæmoptysis on return to the coast; at last entire cure by three years' residence on the Cordilleras.

C. A—, æt. 24, a member of a scrofulous and consumptive family, commenced to suffer from frequent coughs in 1849, at the age of 21; spent the winter of 1849 to 1850 at Nice, where he had an attack of pleuritis with effusion, by which he was laid up for three months, and was much reduced, but recovered strength and flesh during the summer of 1850, which he spent principally at Appenzell and Engelberg, in Switzerland. During the winter of 1850 to 1851 he was at Cairo, where he had a serious attack of hæmoptysis, but was on the whole much better than in the previous winter. The summer of 1851 was again occupied by a whey cure in Switzerland, and a long stay at Interlaken, which latter place, however, had not so good an effect as Engelberg in the preceding year. A second winter at Cairo, from 1851 to 1852, was again attended with an attack of hæmoptysis, by which he was kept in bed for five weeks. He returned to Switzerland in June, 1852, with a troublesome cough, much expectoration, and profuse perspirations; was again much improved by a prolonged stay at Appenzell, but was not free from cough, when, in September, 1852, he came to London on his way to Valparaiso, where he was to settle in business. He was pale and thin, with a long neck, had dulness of percussion, bronchophony, and gurgling from the apex to the fourth rib, in front of the right side, and likewise dulness and bronchophony in the right as well as left supra-spinal region; there were mucous rhonchi, without

dulness, and bronchophony in the left infra-clavicular region, and there was evidence of retraction of the lower lobe of the left lung, where the pleuritic effusion had occurred not quite three years before. The pulse was between 90 and 100; the appetite was uncertain, and he had occasional attacks of diarrhœa. To Dr. Archibald Smith I am indebted for the account of the progress of this case. He arrived at Valparaiso rather strengthened by the voyage; spent the first three months in tolerable health, but then had again two attacks of hæmoptysis in rapid succession; was advised to try Lima, where he saw Dr. A. Smith, who at once dissuaded him from remaining, and sent him to the valley of Jauja, 10,000 feet above sea-level. There he lost the perspiration and cough, and improved so much, that he considered himself cured after about eight months, and returned to Lima. He was well for about three months, after which he began again to suffer from indigestion and from cough, and had another attack of hæmoptysis; he was easily induced once more to take refuge in the Cordilleras, and in less than four months lost every feeling of illness, and after four months more, went to settle at Tacna, but only to have, after about five months, a return of all the old troubles,—indigestion, cough, nocturnal perspiration, hæmoptysis. He, at first, was disinclined to give up his work, but at last, having become very weak, and unable to make the slightest exertion, he accepted the doctor's advice to live for three entire years on high ground; he spent those years principally in the Peruvian Andes, but part of the time also at Quito, and another part in different places of Bolivia. He felt quite well after about three months' stay on the mountains, and had scarcely a day's illness during the remainder of the three years; he had some mucous expectoration in the morning, but no real cough. After this, he spent several years in business at various places on the west coast of America, and returned to Europe in the autumn of 1867, when I had the opportunity of examining him. He was well nourished, almost stout, and had a healthy appearance; pulse 70; digestive functions good. The upper part of the chest, on

both sides, flattened, more so on the right, where there was dulness from the apex to the third rib, scarcely any respiratory sound, with occasional distant mucous crackling, while in the lower parts of the same side, the respiration was quite normal, the lung having expanded below to the margin of the false ribs; the clavicular and supra-clavicular region of the left side was likewise dull, with absence of respiratory murmur, but from the first intercostal space downwards, the phenomena were normal as far as the sixth rib, where the intestinal sound commenced; the heart was entirely on the left side.

Case 7.—*Summary.*—Subacute phthisis, originated near the coast of Peru, only slightly checked by a stay at Huanuco, (7000 feet elevation), but more energetically by a residence at Jauja (10,000 to 11,000 feet) in the Peruvian Andes. Fresh hæmoptysis three years later at Lima, and almost entire cure by a second prolonged stay on the Cordilleras.

K. S—, a native of Germany, belonging to a family not free from scrofulosis and consumption, had been residing for several years at Tacna and Lima, when at the age of twenty-five he began, according to Dr. Archibald Smith's account, to suffer from dyspepsia and cough, and had severe hæmoptysis in 1859. Dr. A. Smith found dulness, bronchophony, and crackling over the upper part of the right side, as well in front as in the back, and sent him to the Cordilleras. He first went by his own choice to the vale of Huanuco (elevated about 7000 feet), which he described almost as a Paradise, but after four months he had made no sensible progress, when Dr. A. Smith advised him to go to Jauja (10,000 to 11,000 feet above the sea), where he rapidly improved, and entirely lost his cough and every feeling of illness. He returned to the coast after ten months' stay in the Cordilleras, and was well during more than three years; but then, under the influence of over-work and anxiety, he again began to cough and had another attack of hæmoptysis. Of his own accord he sought refuge in the Cordilleras, travelling about during eighteen months in different parts of Peru, Bolivia, New

Granada, and Ecuador, almost always at an elevation of more than 8000 feet above sea-level. He was afterwards engaged in business in several places on the west coast of South America, enjoying good health, and returned to Europe in 1866, when I had the opportunity of examining him, and found only flattening of the upper part of the right side of the chest, with dulness of percussion, extending from the apex to the second rib, and occasional mucous rhonchus on deep inspiration; the upper part of the left side was likewise slightly flattened, and the supra-clavicular space sunken in; there was no cough, the general health was perfect, and the nutrition of the body good. He has since resided in various parts of Germany and Switzerland, without any disturbance of health.

Case 8.—*Summary.*—Hæmoptysis and subacute phthisis, originating at Rio and Panama; temporarily checked by a stay at Quito; return of disease at Lima; entire arrest and cure by a longer stay on the Cordilleras; absorption of the fresh deposit; cicatrisation of the old affection.

D. H—, a native of Switzerland, had enjoyed good health up to his 26th year, when he went to Rio, where, after two years' residence, he had hæmoptysis, from which he slowly recovered; he went then by sea round the Cape to Panama, where he settled, but was soon again attacked by cough and hæmoptysis, which were followed by nocturnal perspirations, and great emaciation; he was then recommended to go to Quito, where he soon improved so much that he went to Lima; here, however, within less than a year, he was again taken ill with dyspepsia, cough, and hæmoptysis, and was much reduced. Dr. Archibald Smith found the upper part of the right, and the lower part of the left, lung extensively affected, the former old, the latter more recent, and sent the patient to Jauja where he lost his cough and regained strength; he resided during two years in different parts of the Cordilleras, and then went to New York. In the autumn of 1867, I had the opportunity of examining him, and found no trace of disease in the left lung, while there was flattening at the upper part of the right side, with dulness of percussion in

the supra- and infra-clavicular space, and absence of vesicular breathing. The nutrition and general health were quite satisfactory. He had no cough, and the spirometer gave 215 cubic inches, the height of the man being five feet seven inches. Towards the end of 1868, I saw D. H— again, on his way to Buenos Ayres; he had continued in good health.

Case 9.—*Summary.*—Subacute phthisis, occurring during residence at Lima; arrest of disease by stay on the Cordilleras; relapse some time after return to the coast. Permanent cure by a second and longer stay on the Cordilleras.

C. H—, a native of Scotland, went to Lima at the age of 24, in good health; after about one year's residence in 1858 or 1859, he lost strength, had dyspeptic symptoms, began to cough, and perspire at night; when this had lasted about two months, Dr. A. Smith found dulness, bronchophony, and crackling respiration at the upper part of the right side, as well in front as in the back, and the same signs, to a less degree, over the apex of the left lung; the patient had entirely lost his appetite, was much emaciated and feverish. As he did not improve under treatment, after four weeks, he was sent to Jauja, where he improved rapidly, and returned after eight months to Lima. There he had in 1861 a return of the same symptoms as before; he went again to the Cordilleras, where he regained his health, and after about a year he settled for some time in Guatemala (about 4500 feet above sea-level), and there continued well. Since then he has resided in various places of South America, and also at the coast, without having a return of the chest affection. When I saw him in January 1868, I ascertained considerable flattening of both infra-clavicular regions, which were sunken in and manifested dulness on percussion, extending on the right side to the second rib, and on the left only to the first intercostal space; there was no vesicular breathing over the dull space, and slight bronchial breathing over the right supra-spinal region. His nutrition and general health were good. The

spirometer gave 235 cubic inches, the height being five feet nine and a half inches.

Case 10.—*Summary.*—Chronic phthisis, only temporarily and slightly benefited by a winter at Cairo, and one at Algiers, but permanently arrested by a prolonged stay on the Cordilleras.

L. N—, a native of Belgium, having lost both parents and three brothers from consumption, began to cough after two years' residence in London; in the summer of 1859, had slight hæmoptysis; in the autumn of the same year, had dulness of percussion, and mucous rhonchi in the right clavicular and super-clavicular region, lost flesh, and had slight pyrexia towards night; he spent the winter at Cairo, and was tolerably well up to February, when he had bronchitis, and a more severe attack of hæmoptysis, by which he was confined almost two months. He went from Cairo first to Eaux Bonnes, where he gained much strength; on his return to London in June 1860, was found to have slight dulness in the left clavicular and sub-clavicular region, but he had almost lost the cough, and was better in general health; in September he began again to cough, and went to Algiers, where at first he likewise improved much, but had again bronchitis in January and February, by which he was much reduced. After having spent the months of April and May, and part of June at Arcachon and Eaux Bonnes he returned to London, much improved in strength, but with increase of local affection on the right side. In August 1861 he began again to cough, and had much purulent expectoration. He then made up his mind to settle at Valparaiso, but already in 1862 he there had again a severe attack of hæmoptysis, after which he was sent to the Cordilleras. He first went to Huanuco, but not improving sufficiently he proceeded to Jauja, where he lost his cough entirely; he then spent more than fifteen months in high elevations, and before returning to the coast he stayed several months at intermediate places (Guatemala and others). Since then he has remained quite well, and when I saw him last year, there was, beyond flattening at

the upper part of both sides, and diminished vesicular breathing, no trace of his former affection to be discovered. The spirometer gave 210 cubic inches, his height being 5 feet seven inches.

Case 11.—*Summary.*—Chronic phthisis, occurring in the low parts of Switzerland, only slightly improved by two winters at Nice and Algiers; greatly improved by a prolonged stay in the Cordilleras.

In August 1863, I saw, with the late Professor Griesinger, at Zurich, a gentleman, æt. 25, a native of Bâle, who had been suffering from cough and various attacks of bronchitis and pneumonia since 1860, and had spent on Griesinger's advice one winter at Nice, and another in Egypt, had had several inflammatory attacks at these places, but had been better while there than at home. There was dulness of percussion, with bronchial respiration, and moist rhonchi on the left side from the apex to the fourth rib, and also in the supraspinal region of the same side; he had lost ten pounds of weight during the summer, had a rapid pulse (90 to 95), and frequently perspired at night. We both urged him to spend the following winter at Davos, but he decided, on account of occupation, on going to Buenos Ayres, where, after an attack of hæmoptysis, he was advised to go to the Cordilleras of Peru. After eleven months' stay on high ground he felt quite well, and when, on his return to Europe he saw Griesinger in 1866, the Professor found him "much improved, far beyond his expectation, free from cough" and "almost fat," but the promised details of the condition of the chest I have not received.

Case 12.—*Summary.*—Chronic catarrh, hæmoptysis, subacute phthisis; great improvement by prolonged stay on the plateau of Mexico. Death from hæmoptysis at a later period in Spain.

H. S—, a German, æt. 22, of a consumptive family, suffered much from sore-throat and cough, while residing in London in 1858 and 1859. There were, however, no phy-

sical changes in the lungs discovered. I advised him to seek occupation in a brighter air, and proposed the Cape of Good Hope and Buenos Ayres; he spent a year at each place, being much better, but seldom quite free from cough; he afterwards found a favorable situation at Vera Cruz, where, however, he was seized with severe cough and hæmoptysis, and was sent to the plateau of Mexico and Puebla. On his arrival at Mexico almost the whole of the right lung was declared to be destroyed, but within eight months he had lost the cough and could climb high hills without ill-effects. The disturbed state of the country induced him to leave, and I saw him in June 1864, when he had been free from cough for more than a year. There was dulness of the upper part of the right side down to the third rib, and occasional rhonchi and slight bronchophony in the same locality; the general health and nutrition good. He considered it unnecessary to follow my advice with regard to a return to high elevations, and in 1865, while travelling in Spain, H. S— was seized, while apparently quite well, with hæmoptysis, and died there after a short illness. There was no post-mortem examination.

Case 13.—*Summary.*—Chronic phthisis, improved by a stay in subalpine places of Switzerland; fresh outbreak of acute nature at Panama, arrest by stay on the Cordilleras; renewed attack a year after return to Panama, with rapidly fatal termination.

In 1859 I saw B. D—, æt. 27, who had had several attacks of bronchitis in 1855 and 1856, and one of pneumonia in the spring of 1857; after a stay of five months in Appenzell and Engelberg, in Switzerland, he was much improved, and had remained almost free from cough. When I saw him, there was slight flattening and dulness on the upper part of the left side, but otherwise no morbid symptom. He was then on his way to Central America and settled at Panama in spite of an adverse opinion; in 1861, however, he had prolonged bronchial attacks, "passing into phthisis;" he was sent to the Cordilleras, where he soon improved, and after six months entirely lost his cough. He then returned to

Panama, "was at first quite well," but was again taken ill after a year, and died from "galloping consumption."[1]

Case 14.—*Summary.*—Early phthisis, with repeated attacks of hæmoptysis occurring in London and Hastings; cure by prolonged stay in the Upper Engadine.

A. E. S—, native of England, æt. 21, had in his ninth year, at Genoa, pleuritis with effusion, was afterwards affected with glandular abscesses on the neck; enjoyed tolerable health, with the exception of frequent epistaxis, from the eleventh year. In May 1865, when nineteen and a half years old, he had, while residing in London, hæmoptysis, followed by cough, from which latter he was not yet free, when he had a second severe attack of hæmoptysis at Hastings; a third and slighter attack occurred seven months later. In May 1866, he consulted Dr. Gull, who found the upper part of the right side of the chest flattened, with dulness of percussion, bronchial respiration, and moist rhonchi, and the same phenomena in the right supra-spinal region. The pulse was rapid, the digestion and nutrition of the body unsatisfactory. Dr. Gull regarded the case as one of "early phthisis," prescribed cŏd-liver oil, nitric acid with cascarilla, and advised a prolonged residence in the Upper Engadine. When A. E. S— arrived at Silvaplana in the Upper Engadine in July 1866, Dr. Berry, of St. Moritz, found besides the condition described by Dr. Gull, also defective respiration in the left apex; cough not very troublesome, expectoration scanty, greenish; pulse 85, respiration 38. The patient improved already in the summer, but the most marked progress occurred during the following winter, after his removal from Silvaplana to St. Moritz. The cough, expectoration and breathlessness disappeared; the appetite, digestion, nutrition, and strength increased. In February, 1867, he had gained 7 lb.; pulse 72 to 74; respiration 19; the dulness of percussion, bronchial respiration and rhonchi had disappeared. In September 1867, when I examined A. E. S— at

[1] The words between the inverted commas are from the report of the medical attendant.

St. Moritz, the breathing over the whole of the left side was perfect; on the right side, the upper part of which was slightly flattened, there was no marked dulness, but the breathing was rougher from the apex to the fourth rib, and the expiration prolonged from the second to the fourth rib. Pulse 64 to 68; respiration 16 to 17. Nutrition and general health satisfactory. He was able to walk three hours without inconvenience. He has remained at St. Moritz up to this by his own choice, and has not had any illness. In September 1868, when I again examined him, the roughness of respiration on the upper part of the right side was much less marked.

I am indebted to Dr. Gull for the early history of this case.

Case 15.—*Summary.*—Chronic catarrhal pneumonia in a delicate lady, repeatedly improved by residence in elevated regions, but not perfectly cured.

P. S—, a native of Livonia, married, and came to London in 1859; the family history of phthisis, the very delicate appearance, and the continued want of appetite, caused anxiety from the beginning. Had in rapid succession several confinements and miscarriages, was rarely free from leucorrhœa, suffered frequently from cough, had in the winter 1862 to 1863 severe catarrhal pneumonia, affecting the greater part of the right lung, and leaving imperfect breathing and slight dulness in the affected parts; great improvement during the summer of 1863, from prolonged stay at Görbersdorf, in Silesia, and in various parts of Switzerland; she was, however, rarely free from cough after this period. She gained much strength by spending the summer of 1866 at Davos am Platz, where she was almost free from cough; but under the influence of another confinement, great mental depression, the loss of a child, exposure to cold, and a low and damp residence, catarrhal pneumonia became again developed early in 1867, and this time principally in the left lung. When I saw her in April and again in May of that year, with Mr. Fox, of Stoke Newington, there was dulness with almost bronchial

respiration, and occasional rhonchi from the apex of the left side to the fourth rib in front, and in the supraspinal region on the back; the respiration in the right apex, and in the lower part of the right side, as well in front as on the back very indistinct, with slight dulness. Frequent hacking cough, with scanty sputa, occasionally tinged with blood; pulse feeble, usually between 105 and 115, when at rest; respiration 24 to 28; temperature between 99° and 101°5 Fahr.; great emaciation. Cod-liver oil, quinine, and morphia, and the application of stimulating liniments were advised, and a long stay at Davos, whither she went towards the end of May, 1867. There she gained strength, and when I saw her in September with Dr. Unger, to whom I am indebted for a careful report of this as well as the following case, and also Case 5, she had almost lost the cough, and was able to take a moderate amount of exercise. The dulness of percussion on the left side had disappeared; there was only a rough inspiration and prolonged expiration, the phenomena on the right side having remained unchanged; temperature still too high—98°6 to 100°5; pulse 82 to 86; respiration 20. During the winter 1867 to 1868 she was on the whole much better, and only in March, during the great thaw, she had influenza with increased bronchial affection, confining her to the house during several weeks. She left Davos for England in September, 1868. At my examination in November I found her less thin, the pulse stronger, 82 to 85, respiration 20; on the upper part of the left side inspiration still rough, but expiration less prolonged; phenomena on the right as before; cough very moderate. She has since then had several slight colds, and feels as if the air were too heavy for her, and is obliged to be much more careful than she used to be at Davos.[1]

Case 16.—*Summary.*—Long-continued anæmia in a delicate young lady, subacute catarrhal pneumonia; at first, great improvement at Davos, then, while there, fresh attacks

[1] The disease has remained perfectly quiescent up to this time, September, 1869.

of catarrhal pneumonia, not yet arrested at the time of departure.

M. W—, younger sister of the former, had suffered from anæmia and frequent cough for several years, and had never been pregnant when she came to Davos in June, 1867, where Dr. Unger ascertained dulness, feeble inspiration, and rough expiration from the right apex to the second rib, and also in the right supraspinal region. He found her very anæmic, but free from fever; pulse 72; cough and expectoration moderate.

In September of the same year, when I examined the patient, together with Dr. Unger, the morbid phenomena on the right side had almost disappeared, but moist rhonchi were heard over the apex of the left lung, and there was occasional pain in inspiration, in the posterior and inferior part of the left side, associated with mucous rhonchi, but without dulness of percussion. Cough slight, sputa scanty, mucous, mixed with much air; temperature 98°4 to 98°8; pulse 75 to 80; respiration 18. These morbid symptoms disappeared entirely, according to Dr. Unger's report, in the beginning of the winter, and she enjoyed good health up to the end of March, when, in the period of the melting of the snow, she was seized with influenza, which led to chronic catarrhal pneumonia, especially of the right lung; and she was not yet free from cough and pyrexia when she left Davos in August, 1868.

I ought not to omit stating that this patient, separated from her husband, was in constant anxiety and uncertainty from the beginning of March until the time of her departure from the Davos.

Case 17.—*Summary.*—Chronic catarrh; hæmoptysis; winter at Pau without material benefit; subacute catarrhal pneumonia; arrest of disease and absorption of the deposits during prolonged stay in elevated parts of Switzerland.

F. W—, a German, came to England in good health in 1861, æt. 22; had frequent colds since 1865; slight hæmoptysis in October, 1866, without any discoverable local alteration; spent the following winter and spring at Pau,

had, while there, two attacks of bronchitis; returned to London in May, 1867, considerably stronger, but had then slight dulness accompanied with mucous rhonchi from the apex to the third rib on the right side, and was not free from cough; had in July and August catarrhal pneumonia affecting principally the lower lobe of the left lung, with much purulent expectoration, dulness, feeble inspiration, subcrepitant rhonchi from the middle of the scapula downwards. Pulse 95 to 100; respiration 24 to 26; vital capacity of lungs 180 to 190 cubic inches (height 5 feet, 9 inches). Perspired profusely almost every night, and had still slight pyrexia every evening (100°0 to 100°5), when he left at the end of August for Badenweiler, on the Black Forest, where he recovered his appetite and gained strength; but he did not lose his cough and perspiration until he went to Engelberg, in Unterwalden, where, to his own feeling, he entirely regained his health before the end of October. He then spent the winter in different parts of Switzerland, usually over 3000 feet high, and the spring at the lakes of Como and Lugano. When he returned to London in June, 1868, he had gained 19 lbs. in weight, and 60 inches in spirometric capacity; pulse 68 to 72; respiration 14 to 15; temperature normal. He had no cough, and, excepting a certain roughness in the inspiration and a long expiration, there was no deviation from health in the previously affected localities. He remained well, with the exception of a slight bronchial catarrh, up to January, 1869, when he left for Buenos Ayres.

With regard to the *treatment* of this and the majority of the other cases during their stay at high elevations, I will only mention that it was almost entirely dietetic and hygienic. Milk as much as possible; meat—the supply of which is unfortunately sometimes defective—twice or three times daily; a moderate amount of wine; free ventilation of the rooms, which are to be situated on the sunny side, and not to be heated, if possible, above 60° Fahr.; regular exercise in the open air as long as there is no pyrexia. Some of the physicians practising on high elevations make regular use of

more or less powerful cold douches, and in many cases apparently with great advantage.[1]

These cases, though limited in number, will, I trust, offer to impartial judges some evidence in favour of mountain climates in certain forms of consumption. They are, as already stated, not selected, but they are all the cases with which I have come in personal professional contact, with the exception of those patients (fourteen) who are still under treatment, partly in Switzerland, partly on the Cordilleras, and the reports of whom, as far as they go, I may regard as very satisfactory.

Great importance I attribute to the four cases which, at a later period, terminated fatally. The first two occurred to me when I was not yet aware of the beneficial effect of elevated climates on consumption. They are curiously analogous. Young men in apparently good health, without hereditary predisposition, accustomed to pure mountain air, became lowered in general health under the influence of confinement and impure air; catarrhal affections developed themselves, leading gradually to catarrhal pneumonia, with the phenomena of subacute phthisis. In this condition they returned, of their own accord, to their mountain homes to die at least, as they both said, with their own families. The effect in both was cure for the time being; but too soon they again exposed themselves to the former unhealthy influences; at first apparently with impunity, but after some time they were attacked by fresh catarrhal inflammations, leading to grey infiltration, rapid breaking down of tissues, and the formation of small cavities; violent hæmoptysis accelerated the fatal termination. These two cases, therefore, as well as 12 and 13, convey the lesson that the return, at least the permanent return, into the circumstances under which the disease had arisen, ought to be postponed as long as possible. In the first two cases the

[1] Some of the patients, who were able to bear cod-liver oil, continued it during a great part of their stay in high elevations; some others also who could not bear it while in low situations were able to do so on high ground, but several patients who did well had neither any remedies nor any douches.

original affection had been truly cured, either by absorption or contraction, and the seats of the first affections were not again attacked by the fresh and fatal diseases. It may be said that they were cured of one attack of pneumonic phthisis, and that they died of a second attack. Cases 12 and 13 are impaired in their value by the absence of post-mortem examinations; but in these, too, the residence in elevated regions had, at all events, exercised a very beneficial influence, and would probably have led to permanent cure if it had been more prolonged.

Case 6 is perhaps still more instructive, by showing that occasionally, even in much advanced affections, elevated regions favour a curative process; the facts that the urgent symptoms twice entirely disappeared on the Cordilleras, and twice reappeared again after some stay near the coast, are very significant, and not less so the circumstance of a permanent cure after three entire years' residence on the mountains. It is also evident that, in this case, the influence of the warmer low-level health resorts was less favorable than that of the colder high-level localities. The same may be said of several other cases, especially Griesinger's (xi).

The two least favorable cases are 15 and 16, the only representatives of the fair sex, two sisters, of great delicacy, with an habitually bad appetite, the only offspring of a consumptive early deceased mother, and an asthmatic father.

Case 15, however, though not cured, may be regarded as having been greatly benefited by the mountain climate, the process having been, at all events, checked during more than eighteen months. The sister (16) had at first made satisfactory progress; the local deposit had been absorbed, the anæmia diminished, and the strength increased; but a little want of care, during the dangerous period of the general thaw, led to influenza and catarrhal pneumonia, which was not arrested during her stay at Davos. Although this was probably due, in a great degree, to most untoward influences acting on her mind, yet the case must be acknowledged as unfavorable.

I have taken up already so much time, that I can only, in a most cursory manner, allude to some other points which I should have liked to enter upon more fully. I will not venture on an explanation of the *modus operandi* of elevated places. The agents under which the invalid is placed are very complex. In a former communication I have used the words: "the air of elevated regions is lighter, more rarefied, and cooler, and it is usually free from the foreign admixtures found in towns, and also from the various kinds of malaria." It would be easy to mention several other attributes of the mountain air. If we only take the rarefication of the oxygen, viz., that a certain volume of air contains less oxygen than in low elevations, it at once gives rise to several questions which we are not yet prepared to answer. Is less oxygen inhaled, and the combustion retarded? or, does the diminished quantity of oxygen lead to increased respiratory movements? or, is there a greater "mobility of the atoms" in high elevations, "making atonement for the smallness of their number by the promptness of their action?" as seems to result from Frankland's[1] and Tyndall's[2] experiments on combustion on the top of Mont Blanc. Or, does the large amount of ozone increase the oxidizing power? Scientific experiments on tissue-change in man and animals, at high and at low elevations, are necessary for the settlement of these questions.

With regard to the "admixtures" to the air, Professor Tyndall has kindly directed my attention to the researches of Pasteur,[3] who has shown by experiments, that in plains, and at low elevations, the admixture of dust to the air is greater than at higher elevations, and further, that this "dust" contains not only inorganic, but also organic substances, leading to fermentation in fermentable fluids. He has found a total

[1] "On the Influence of Atmospheric Pressure upon some of the Phenomena of Combustion." By Dr. E. Frankland, F.R.S. 'Philos. Trans.,' 1861.

[2] 'Heat as a Mode of Motion.' By John Tyndall, F.R.S. 1863.

[3] "Mémoire sur les corpuscles organisés qui existent dans l'Atmosphère." Par M. L. Pasteur. 'Annales de chimie et de physique,' III Sér., vol. lxiv, 1862.

absence of the fermentation-producing constituents in the air of the Mer de Glace, near Chamounix, while the village of Chamounix was rich in them. This is, no doubt, a matter well deserving our most serious consideration, and is in harmony with the fact, that putrefaction does not so easily occur in high elevations, that meat can be dried by simple processes which could not prevent its decomposition in low elevations, and many other allied facts. The circumstance urged by Villemin,[1] that consumption is comparatively rare where the population is scanty, and that it increases in frequency as soon as the population becomes more dense, is likewise in accordance with Pasteur's experiments, and not less so the data given by Bowditch, Simon, and Buchanan in favour of the view that consumption becomes rarer by the drying up of the soil, for moisture favours the development of germs and putrescence, and especially the moisture emanating from the surface of soil charged with refuse of various kinds, and other organic matter.

The high mountain air contains less humidity and more ozone, than that of most lower regions. From observations made in the course of the present winter by Mr. Townsend, an experienced meteorologist, it appears that the quantity of ozone registered at St. Moritz, in the Upper Engadin, is very large. Whether the amount is as great during summer, is not yet known, but Dr. Berry has promised to continue the observations.

We must take also into consideration the effects of change of scene, food, occupation, the whole manner of living, and many other points, assisting in many, but counteracting in some, cases, the favorable influence of long residence in elevated regions. Many of the influences at work are not peculiar to elevated regions, but exist in the same, some even in a greater degree in others, especially maritime health resorts. I wish, altogether, by no means to be understood as if I were, under all circumstances, in favour of high-level, in opposition to low-level, health resorts. I only wish to

[1] 'Études sur la Tuberculose.' Par J. A. Villemin. 1868.

direct the attention of the profession to climatic agents, hitherto not generally appreciated in a great class of ailments, and morbid tendencies, in which our means of relief and cure are confessedly inadequate. Indeed, some of the best physicians, and even of those practising at southern climatic health resorts, would subscribe to the words of Dr. Gull, addressed to a delicate patient threatened with consumption, regarding whom I consulted him, "My experience with regard to the warmer health resorts is great, but it is unfortunately not favorable."

I venture to hope that the facts I have placed before the Society, assisted by the experience and opinion of medical men in other countries, will be deemed sufficient to induce to further and more extensive trial. I have scarcely a doubt that it would be an immense gain to the poor soldiers of the Indian army, threatened with consumption, if they were to be removed to the highest available mountain sanitaria of the Himalayas, instead of being invalided and sent home. It is, however, necessary to bear in mind that the elevation required is much greater in hot than in colder latitudes, and regard must be had to dryness of soil, and other local circumstances. It is possible that the military sanitaria, at present in existence, in the Himalayas, are not high enough for that climate, and that mountain range. It is further necessary to bear in mind that a few months, which is generally all that is given for the recruiting of health, is not sufficient in consumptive conditions; the apparently perfect cure after six or eight months, and the relapses repeatedly occurring in the cases which I have communicated, sufficiently show this.

With regard to places eligible for the English invalid, I wish I could mention many mountain health resorts of easy access, provided with good carriage roads, with comfortable hotels, excellent food, and genial society; but I will at once confess that these are things of the future. I do not know of any resorts in Europe equal to the valley of Jauja, in Peru, with regard to climate, or to the other towns of the Cordillera chain where some of the preceding cases have regained

their health; but it will be difficult for some time to come to induce most invalids from Europe to go so far. Even the journey to Mexico, the plateau of which, when once the country is settled, will offer excellent consumptive health resorts, will probably be considered by most people too great. In England there are not yet any inhabited places high enough to serve as mountain health resorts to the consumptive, but in all probability there are localities in the Welsh, Cumberland, and Scotch mountains which could be made eligible by drainage, and by the plantation of fir trees, as shelter from the sun in summer, and from the wind in other seasons. In Switzerland I have met with many suitable localities; but without well-arranged hotels, and skilful medical men, they cannot be recommended. The places which, at present, answer best, are the villages of St. Moritz (above 6000 feet) and Samaden (about 5500), in the Upper Engadine. Pontresina, Campher, Silvaplana and Maria, are likewise in favorable situations, especially for summer residences. The presence of several good carriage roads for sledges during winter is a great advantage in the Engadine. Similar advantages are enjoyed by the valley of Davos.[1] In Germany there exists at Görbersdorf, in Silesia, an institution for the cure of consumptive conditions, and the results obtained are, as far as I know, satisfactory. In the Bavarian Highlands we have Kreuth, which, however, is only open in summer. There are probably many other places in the different mountain chains of Germany which would be suitable as health resorts by their position if the other conditions were supplied. Küchenmeister (l. c., p. 53) particularly recommends *Königswart* in Bohemia, in the neighbourhood of the Spa Marienbad. Königswart is a chalybeate Spa, about 2200 feet above sea-level, lying on the southern slope of a wooded hill which is about 300 feet higher; it is at present only visited as a summer health resort, principally on account of its chalybeate springs, but the "Kurhaus" might easily be arranged for the reception of invalids during winter, and the fact that

[1] A description of the valley of Davos will be found in the 'Brit. Med. Journ.,' 1867, vol. ii, p. 58.

it is exposed to the south-east, south, and south-west is particularly advantageous. Dr. Coben, an intelligent physician, who lives in the village of Königswart, has assured me that consumption is excessively rare in this village, although it lies several hundred feet below the Kurhaus, and in a less dry situation.

A disadvantage of the Swiss, and of the German health resorts, is the unfavorable period of the general thaw in spring, when, especially in Switzerland, from the melting of the immense masses of snow the air becomes very damp, and the disposition to catarrhal affections is much greater than during the winter, as is seen from Cases 15 and 16. The commencement and termination of this period vary with the elevation; for the higher parts of Switzerland they may be said to extend from the middle of March to the middle of May. Those invalids who are able to travel, would do well to remove during this time to better localities; those who cannot travel must be particularly careful. It is, however, not easy to find suitable health resorts for this intermediate period, for spring is almost everywhere unfavorable. If it could be done, I should send the patients 2000 feet higher up, where the melting of the snow commences more than a month later, but this is impossible, for the simple reason that there is no accommodation so high up; it, therefore, is necessary to look for lower and warmer, not too distant localities, where this period is over when it begins in the higher regions; and here for the invalids wintering in the Engadine or Davos some places on the Italian lakes offer themselves, as Bellaggio, Menaggio, Cadenabbia on the lake of Como and also Lugano; for the western parts of Switzerland, Montreux on the lake of Geneva; for the most eastern portion of Switzerland and the Tyrol, Meran and Botzen; but none of these places answers our wishes, and delicate persons must be much more careful with regard to dress and exposure in those warmer localities than they were during the cold season in the mountains. All the invalids whom I have questioned on this subject agree on this point, and almost all of them are also in harmony in stating that the long cold *winter*, and not

the summer, is the most favorable time for them on the elevated health resorts, that they feel themselves better, are more free from cough and cold, and make greater progress during winter than during summer.[1] I must lay particular stress on this statement, because, in general, medical men, as well as the public, are inclined to admit the suitability of high alpine slopes and valleys during summer, but are afraid of the cold winter, which in reality seems to be the better season for most consumptive invalids.

As this communication has become longer than I had intended, I venture to sum up the principal points:

1. That the elevated regions deserve greater attention in the management of consumptive tendencies and affections, than they have hitherto received.

2. That they deserve this attention not only as summer, but also, and even more so, as winter health resorts.

3. That they offer great advantages in many cases of early consumption, or of tendency to consumption; in the disposition to catarrhal pneumonia, and the results of this disease, particularly the so-called tubercular deposits (cheesy deposits), and tubercular infiltrations (pneumonic infiltrations).

4. That in such cases fresh catarrhal, and other acute intercurrent affections appear to be less frequent in high- than in low-level health resorts.

5. That in elevated regions, the tendency to absorption and fibrous transformation or cicatrisation of pneumonic deposits is promoted, while the tendency to the rapid breaking down of tissue, and the formation of cavities is counteracted.

6. That the tendency to hæmoptysis is diminished, and not, as is usually believed, increased.

I cannot conclude this paper without acknowledging that

[1] I do not wish to mix theory with facts, but it would be easy to base theories on the prominent characters of the winter climate, as the dryness of the soil in winter, the ground being covered with hard snow and ice; the diminished humidity of the air; the low temperature of the air; the comparative freeness of the air from foreign admixture, especially of organic nature; the greater number of clear days.

I am, with regard to the questions discussed in it, under great obligation to the late Dr. Archibald Smith, of Lima and Edinburgh, who not only has filled up the gaps in the histories of several of the cases related, but has also furnished me with the particulars of several other cases, and has given me the most valuable hints on mountain climates. His instructive publications on the climate and diseases of Peru are scattered through various journals, and are not much known; but a careful study of them will convince the reader that Dr. Archibald Smith deserves a foremost place amongst medical climatologists in the widest sense of the term, and thus amongst the benefactors of mankind.[1]

[1] I have not attempted many bibliographical notices in this communication, but I ought to mention that it was only after I had delivered the paper to the Society that several important contributions on the subject have come to my notice. 1. Dr. Drysdale "On Alpine Heights and change of climate in Consumption," from the 'Transactions of the St. Andrew's Medical Graduates Association.' London, 1869. 2. The second edition of Dr. Brehmer's work, 'Die chronische Lungenschwindsucht und Tuberculose der Lunge, ihre Ursache und ihre Heilung.' Berlin, 1869. 3. Dr. Spengler's 'Die Landschaft Davos, als Kurort gegen Lungenschwindsucht.' Basel, 1869.

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On Hæmoptysis as a Cause of inflammatory Processes and Phthisis, with Remarks on Treatment. By HERMANN WEBER, M.D.

THE excellent paper lately read by Dr. Bäumler before this Society on 'Cases of hæmoptysis followed by inflammatory changes in the lungs,' induces me to communicate the principal features of three cases of a similar nature, and to make some remarks on the treatment of hæmoptysis.

CASE I.

Summary.—A. M. P., hereditarily predisposed to epistaxis and hæmoptysis, had himself repeatedly had slight attacks of hæmoptysis without their being followed by either pyrexia or impairment of the respiratory organs; had in 1858 again an attack, at first abating by rest, but afterwards rendered very violent by dancing; several days later, severe broncho-pneumonia, with pleuritis on both sides, terminating in gradual resolution and perfect recovery.

A. M. P., aged 20, a native of Sweden, belongs to a healthy family; his father, however, had before the age of 30 several attacks of hæmoptysis, and was considered consumptive, but has entirely recovered. Patient himself is of fair complexion, rather stout, has a healthy appearance, and well-formed chest; had as a child occasionally epistaxis, and at the age of five and fourteen slight attacks of hæmoptysis; has been in London since 1856, and enjoyed on the whole good health, but had several colds, with expectoration of small quantities of blood, which disappeared without medical advice. In December 1858, he began again to cough, and the expectoration was mixed with streaks of blood; there were no rhonchi to be heard, the percussion sound was everywhere normal, and there was no pyrexia; pulse 60 to 65; temperature 98° to 98·4° F. After a week's comparative rest, though he did not altogether stay at home, he was almost free from cough, and the scanty expectoration was scarcely tinged with blood when, against advice, he danced on several nights; and on

December 27 he expectorated several ounces of pure blood, with a sensation as if it came from the lower part of the left side. Had an irritating cough. There was some moist rhonchus at the lower part of the left side, as well in front as on the back; but there was no dullness and no fever; pulse 70; temperature 98·2° F.

Treatment.—Absolute rest. Morphiæ acetatis gr. $\frac{1}{6}$, plumbi acetat. gr. j.ss., sacchari gr. v.; ft. pulvis j.; a powder to be taken every six hours.

Dec. 28.—Had two violent attacks of hæmoptysis; expectorated with each about 10 oz. of blood. Treatment: Ice internally, and iced milk as food.

29.—No hæmoptysis since yesterday; no cough. Pulse 85; temperature 99·6° F.

30, 9. A.M.—Sat up last evening against advice; had again violent hæmoptysis during the night; slight pain in the lower part of the left side; moderate dullness of percussion; scanty subcrepitant rhonchus; absence of respiratory murmur. Pulse 85 to 90; temperature 101° F.

9 P.M.—Pulse 90; temperature 101·3° F.

Treatment.—Omit morphia and lead. Pil. coloc. co. gr. x., ft. pilulæ ij. hac nocte sumendæ.

31.—Fresh attack of hæmoptysis last night. Bowels not moved; pain in both sides; dullness of percussion on both sides, with occasional crepitant rhonchus and bronchophony, from the basis to the spina scapulæ. Feels sick and much oppressed.

4 P.M.—Pulse 80; temperature 102·8° F.

Infus. sennæ co. ℥ij., magnes. sulphat. ℥ij., ft. haustus statim sumendus.

Jan. 1, 1859.—Brought up some dark coagulated blood after violent coughing; feels much better since; bowels moved; no change in the local symptoms. Pulse 80; temperature 100·5° F.

3.—Scarcely any expectoration on the 2nd, but much irritating cough this morning. He expectorated about two ounces of very dark coagulated blood, mixed with yellow matter, consisting entirely of pus globules (white blood globules?). The dullness in the lower part of the left side extends only to the lower angle of the scapula. There is still bronchophony at the base. There is mucous rhonchus at the lower part of the front. There is now also slight dullness over the left apex, with crepitant rhonchus, and occasional friction below the clavicle. On the right side the dullness

still extends from the base to the spina scapulæ on the back and rather less high in the front. There is distinct bronchophony, scarcely any rhonchus, and no friction, although the patient complains of pain. The general condition is improved. Pulse only 70 to 75; temperature scarcely reaches 100° F.

7.—Cough has almost ceased. Expectoration scanty, purulent. The dullness on the left side is further diminished, but there is pain in the left axilla on deep inspiration, and he is unable to lie on that side on account of it. The dullness over the apex is likewise less marked; more mucous rhonchus. Dullness over lower part of right side still well marked; bronchophony less distinct; scarcely any respiratory sound. Great emaciation. Night perspirations. Scarcely any fever.

Treatment.—Nitric acid in an infusion of cinchona; cod liver oil.

Feb. 12.—The pyrexia and the nocturnal perspiration ceased entirely after the end of January. The appetite is good, but he does not yet gain flesh. Has lost 28 lbs. between the middle of December and the end of January.

There is still a certain amount of cough and purulent expectoration, with occasional admixture of blood. The lower part of the right side is less resonant, and there are moist rhonchi from the spina scapulæ downwards. The upper part of the left side is almost normal, with the exception of a certain roughness in the respiratory sounds; but he still frequently has pain in the lower part of the left side, where, however, excepting some mucous rhonchus, nothing abnormal is to be heard. Sometimes he has also pain in different parts of the right side.

This condition lasted, with slight change, to the end of April. He also occasionally brought up small quantities of blood, which he always was inclined to attribute to the left side, where he still frequently had pain. On some days he had also slight fever. From the end of April to the beginning of June he was at Ventnor, where he began to gain flesh, but was not free from cough and expectoration, which was still occasionally mixed with blood, and the movements of the left arm, as well as deep inspirations, caused pain in the lower part of the left side.

He spent the summer of 1859 on a little island near Gothenburg, in Sweden, where he almost, but not altogether, lost his cough. When he returned to London in September, he

had mucous rhonchus in the lower part of both sides, without dullness, and also occasional rhonchus over the left apex, but his general health was good. He then spent seven months at Malaga, in Spain, and afterwards settled at Bordeaux, where he has ever since enjoyed good health, and has become very stout.

Case II.

Summary.—F. H., æt. 28, while in apparently perfect health, was seized with hæmoptysis, without any manifest disease of the respiratory organs. The hæmoptysis recurred on several days. Six days after the first attack slight pyrexia, and signs of broncho-pneumonia of the upper part of the right lung. The fever disappeared within a fortnight, and the general health was likewise soon re-established; but the effects of the inflammatory attack of the right apex were still distinct, when, several months later, pleuritis with effusion on the same side supervened. Slow but perfect recovery, with slight flattening of the upper part of the right side.

F. H., æt. 28, is the only child of a father who died young from pneumonia. The mother is living. Had several attacks of broncho-pneumonia. Mother's brother died, to use the words of the patient, 'from hæmoptysis followed by phthisis.' Has always enjoyed good health, is stout and strongly built. On Jan. 18, 1863, he suddenly began to cough, and expectorated several tablespoonfuls of pure blood. The cough and expectoration then ceased; but the same occurrence took place once more in the evening after a walk. He then slept well, and remained free from cough until the 22nd, when he felt as if he had an ordinary cough, which, however, led to expectoration of blood, mixed with only a small quantity of puriform matter. There was some slight rhonchus in the larger bronchi, but nowhere a trace of dullness or pneumonic affection to be discovered. No pyrexia. Pulse 68; temperature 98° F.

Treatment.—Perfect rest; cold fluids; gallic acid 5 grains every 2 hours.

On the evening of the 24th, after some excitement, fresh attack of hæmoptysis. He then commenced to have pyrexia, the temperature being on the evening of the 24th 100·4°, and varying in the following week between 100·2° and 102·2° F. On the 26th, dullness, with occasional subcrepitant rhonchus and slight bronchophony, was discovered on the upper part

of the right side, from the apex to the third rib, and in the supraspinal region.

Treatment.—Rest; cold milk; a pill of a grain of acetate of lead with a grain of digitalis four times a day.

Feb. 2.—The cough is much diminished. There is no more admixture of fresh blood to the scanty puriform expectoration. There is more rhonchus in the right apex, which is still dull on percussion; there is also occasionally friction sound. He has no pain there, but he sometimes has a stitch in the lower part of the left side, where no friction sound but some mucous rhonchus is heard. No dullness on that part.

The temperature is now rarely above 99° F.; the pulse under 70.

Treatment.—Continued rest in bed, but more variety in diet without ice. Pill three times a day.

6.—The phenomena of the chest are unchanged, but he is quite free from fever. Great emaciation.

Treatment.—To leave the bed for some hours. Omit the lead and digitalis. To take a mixture of phosphoric acid with infus. aurantii, and to begin with cod liver oil.

At the end of February he went to Torquay. He then had only a slight cough, with purulent expectoration in the morning. The phenomena on the left side of the chest were quite normal, but on the right side there was still dullness and absence of breathing, from the apex to the third rib in front, and over the supraspinal region on the back, and he had occasional pain in various parts of the right side.

In the middle of May, when he returned from Torquay, where he had ridden on horseback almost every day, he had gained much flesh, and had lost the cough almost entirely, but the local phenomena over the right apex were unchanged. Towards the end of the same month, while we had cold east winds, he had again a considerable increase of cough, and pleuritis with effusion developed itself on the right side, extending from the base to the middle of the scapula on the back and to the fourth rib in front. The first symptoms of the pleuritic effusion showed themselves by pain and friction in the upper part of the right side over the second and third rib. The effusion was discovered two days later. His recovery was slow, occupying from the commencement of the attack to the complete absorption almost six weeks. He had no return of hæmoptysis during this illness.

When I examined F. H. again in the spring of 1864, the dullness over the right apex was much diminished, the re-

spiration was rougher than on the corresponding part of the left side, and the supra- and infra-clavicular spaces were flattened, but there was no other sign of the former illness.

Case III.

Summary.—F. X., æt. 23, hereditarily predisposed to epistaxis, has himself likewise frequently suffered from it, but otherwise enjoyed good health. Had after over-exertion, while affected with bronchial catarrh, several attacks of severe hæmoptysis, followed by inflammatory symptoms in different portions of the lungs, which had scarcely disappeared when fresh hæmoptysis occurred, again followed by inflammatory processes. The inflammatory symptoms were abating, when another accession of hæmoptysis led to immediate death by suffocation.

Post-mortem Examination.—Caseous deposits of different ages in different parts of both lungs, the oldest and largest being situated in the lower part of the right lung and in the upper lobe of the left where the centres of several masses were occupied by newly-formed cavities, in one of which the last fatal hæmorrhage seems to have occurred; the bronchi were filled with fresh coagula, a large branch, however, was plugged by an old coagulum, resembling in every respect a venous thrombus.

F. X., æt. 23, belongs to a healthy family, but his mother frequently suffers from severe epistaxis, and a younger brother likewise; patient himself bled often from the nose as a boy, but enjoyed otherwise good health. After having had a slight cold for about a fortnight, he took, on November 29, 1863, a very long walk in the country, in order to shake it off; on his return he coughed up several ounces of pure blood. The most careful examination of the chest did not show any local change. There was no pyrexia. Pulse 70.

Treatment.—Rest; iced fluids; five grains of gallic acid every three hours.

Dec. 2.—The cough and expectoration of blood had entirely ceased already on November 30. He went out last night without permission, and had during the night a very violent fit of hæmoptysis, coughing up within a few hours almost a pint of pure blood; the cough then abated, but at 11 in the morning he again began to cough up a large quantity of blood. At 2 P.M. he was very anæmic; pulse 102 very small; skin cold; temperature in axilla only 97·8° F.

Treatment.—Rest; ice on the chest, and ice internally: a mixture of 5 grains of gallic acid, and 15 min. of diluted sulphuric acid every three hours.

4.—Cough much diminished, expectoration moderate, dark blood mixed with puriform matter in streaks (white blood globules?). Pulse 85; temperature 98·2° F.

5.—Complains of pain in the lower part of the right side; there is some fine moist rhonchus, and slight dullness, but no friction sound. Expectoration almost puriform, with very little red. Pulse 95; temperature 101° F.

6.—Pain and pyrexia much increased; there is now also friction in the right axilla. Morning: Pulse 108; temperature 103·2° F.; respiration 38. Evening: Pulse 115; temperature 104·2° F.; respiration 44.

7.—In addition to previous symptoms, pain in the left shoulder and slight dullness and moist rhonchus, as well in the left supra-clavicular as in the supra-spinal region; moist rhonchus is heard also in the lower part of the same side. Temperature 103·6° F. in the morning; 104·8° F. in the evening.

Treatment.—More nourishing food. ℞ Quinæ dis. gr. xij., acidi sulphur. dil. ʒij., aquæ ad ℥viij. An eighth part four times a day.

9.—The cough and fever are much diminished. The temperature does not exceed 100·5° F.; the pulse not 100.

13.—Is much stronger, coughs only little, the expectoration is almost confined to the morning, of greenish colour, purulent. In the lower part of the right side, the dullness much diminished, there is no bronchophony, only some mucous rhonchus; the phenomena over the left apex are unchanged, on the lower part of left side moist rhonchus without dullness. Pulse almost always under 90. Temperature in the morning normal; in the afternoon slightly increased, but under 100° F.

16.—General health very good, but the local phenomena scarcely changed. Cough and expectoration have almost ceased. Pulse and temperature are normal.

Treatment.—Is allowed to leave the room. No medicine, except cod liver oil.

Jan. 1, 1864.—Had yesterday morning a few streaks of blood with his expectoration, but was otherwise quite well, sat up till after midnight, in exciting conversation, though he drank only little; he then slept till the morning, when on waking he had a violent attack of hæmoptysis. The

examination of the chest gave a similar result as on December 13; he was quite free from pyrexia, but much blanched and exhausted.

Treatment.—Rest, ice, and the mixture of the gallic and sulphuric acids as before.

2.—No fresh blood; very little cough and expectoration of dark blood mixed with pus.

3.—Pain in the lower part of the left side, with slight dullness and diminished respiration. Urine free from albumen. In the evening much fever. Temperature above 104° F.

Treatment.—Instead of the gallic acid mixture, that of quinine and sulphuric acid as above.

5.—The pyrexia is diminished. Temperature 100° to 103° F. There is not much cough, and the expectoration scarcely exceeds three tablespoonfuls in the twenty-four hours, is thick and of greenish yellow colour, without red admixture. There is distinct friction in the lower part of the left side, and moist rhonchus with bronchial breathing on different places: the dullness is not perfect, but it extends on the back to the middle of the scapula, and in front to the nipple. Perspires much during the night.

14.—Cough much diminished, expectoration very moderate, yellow, purulent. There is still slight dullness of percussion over the left apex, as well in front as on the back, and the same over the lower part of the same side with bronchial respiration, and large rhonchi over both regions, while in the intermediate zone the phenomena of auscultation and percussion are normal. Over the lower part of the right side there has been but little change since last month. The noctural perspiration has almost entirely ceased, the pulse is mostly under 90, and the temperature has not reached 100° F. during the last three days.

On January 19, during a long conversation with friends he became much excited; towards the morning he was again seized with violent hæmoptysis, and died during the attack, evidently from suffocation.

Post-mortem Examination.—The mouth and nose are enveloped in bloody foam. The trachea is filled with semi-coagulated blood, extending into both divisions, but especially into the left, where it can be traced to the upper lobe of the left lung which contains in its upper portion several large masses, filbert to walnut size, of caseous substance, surrounded by grayish-red infiltration; between these hard masses there is still some permeable tissue; several of

the caseous masses contain in their centres newly-formed cavities, one of which is filled with a fresh coagulum. The lower part of the upper, and the upper part of the lower lobe, contain between the normal tissue several yellow caseous nodules, of the size of a small pea to a bean, which the notes, taken at the time, designate as soft yellow tubercles, but there were no true miliary tubercles either in this or in any other portion of the lungs. The smallest bronchi, and pulmonary vesicles of many parts of the normal tissue, are filled with blood. The inferior part of the lower lobe is firm and heavy, almost airless; it has somewhat the appearance of gray infiltration into which are imbedded some caseous masses. A large bronchus, entering this part, is filled with grayish-red coagulum, firmly adherent to the thickened wall, and softened in the centre, exactly like an old thrombus in a vein. The upper and middle lobe of the right lung are almost normal, but they contain several small caseous masses, surrounded by grayish-red infiltration, and, besides, the smallest bronchi and air-vesicles are filled on several places with fresh blood. The lower lobe of this lung is everywhere adherent, it is heavy, and is occupied almost entirely by hard gray infiltrated tissue, in which are contained several yellow caseous masses, two of which show central softening; there is, however, a remnant of permeable tissue between the hard masses. The heart is soft and fatty, the liver nutmeg, the kidneys somewhat congested, the spleen rather enlarged and hard.

These three cases coincide with those related by Dr. Bäumler in this important peculiarity, that the lungs did not exhibit on examination any signs of organic disease at the time that the first hæmorrhage occurred, and that it was not until several days afterwards that symptoms of inflammatory processes of the respiratory organs manifested themselves, accompanied by a corresponding elevation of temperature. These processes were principally pneumonic, but there was also a considerable addition of pleuritis and of bronchial irritation. The pneumonic affection differed from typical croupous or lobar pneumonia in the irregularity of its course, in its protracted duration, and in its being scattered over different parts of both lungs, instead of involving the whole of one lobe. In all these respects it resembled rather lobular pneumonia. The first two cases show, as two of Dr. Bäumler's, that complete absorption and recovery can take place, though the time occupied by this

process is, as just mentioned, much longer than that occupied by a common lobar pneumonia. In the second case pleuritis with effusion took place, more than four months after the hæmorrhage, at a time when all the active symptoms of the consecutive inflammatory affection had apparently long subsided; this pleuritis occurred on the same side which had been the seat of the former inflammatory process, and I cannot help bringing the two in connection with one another, the more so, as the first sign of the pleurisy consisted in pain and friction over the second and third rib, where there was still some slight dullness from the former affection, and where probably an inflammatory nodule on the surface set up the pleuritic process which at first was local and then became more general. The case shows how distant the later effects may be from the original cause.

The third case, which at last terminated fatally, and which may be regarded as an example of a form of galloping phthisis, is still more instructive, by the result of the post-mortem examination. The first attack of hæmoptysis was followed after several days by inflammatory symptoms in the lower part of the right, and the upper part of the left lung. After about three weeks the fever had ceased, and the curative process seemed to progress satisfactorily, when, owing probably to excitement, a fresh attack of hæmoptysis occurred, which again was followed, after a few days, by an inflammatory affection in the left lower lobe. He again seemed fairly to proceed towards recovery, when after a long and excited conversation a fatal hæmorrhage occurred. The post-mortem examination showed cheesy nodules, surrounded by infiltrated tissue, with the commencement of the formation of cavities in the upper lobe of the left, and in the lower of the right lung, being of the same age, and corresponding to the inflammatory processes following the first hæmorrhage about seven weeks before death; there were further the changes of a later date in the lower lobe of the left lung, with the plugged bronchial branch, corresponding to the second hæmorrhage seventeen days before death; and there was besides the fresh blood of the fatal hæmorrhage, not only in the large bronchi, but filling also some of the smallest ramifications and groups of air-vesicles, which were felt from without as hard nodules.

I confess that at the time when these cases occurred to me, I was still preoccupied by Laennec's idea that hæmoptysis, in the generality of cases, is a sign of already existing, though perhaps latent, tuberculosis; that I was quite at a loss how to interpret them on this theory; and that I owe the clue to them entirely to Niemeyer's lucid explanation in his lectures on consumption,* and to various conversations on the subject with my colleague, Dr. Bäumler. According to Niemeyer's view, pulmonary hæmorrhage, from whatever cause it may take place, can give rise to inflammatory processes, by blood aspired into, and remaining in the finest bronchial ramifications and air cells, acting there the part of an irritant. The inflammation set up in the surrounding district may undergo the usual retrogressive changes, and the products may be absorbed sooner or later, together with the metamorphosed blood, but it may also lead to the formation of cavities and to phthisis.†

In two of the cases related there was a great tendency to epistaxis, and we may regard the hæmoptysis as having arisen from the mucous membrane of the bronchi in a similar way as epistaxis from that of the nose. The same explanation may be applicable to the third case, but it certainly is not applicable to all the cases of hæmoptysis, for in a great many of them the hæmorrhage is probably due to various morbid conditions of the vessels of the lung tissue, in consequence of inflammatory processes in the latter. In such cases, owing to local and constitutional changes already existing, it is of course less easy to show whether an attack of hæmoptysis gives rise to fresh inflammatory processes or not; but in several patients it has been quite evident to me that fresh inflammation has been set up by the hæmorrhage, and this is probably not very rarely the case.

With all gratitude to Niemeyer I am, however, inclined to think that he goes too far, when he says, 'that most cases of hæmoptysis are followed by a more or less violent irritation of the lungs and pleura.'‡ Since my attention has been directed to this question, I have had the opportunity

* F. von Niemeyer, 'Klinische Vorträge über die Lungenschwindsucht, mitgetheilt von Dr. Ott,' p. 48 seq. 2nd edition. 1867.

† Before Laennec's time the best observers have held the Hippocratic view that hæmoptysis is often the cause of phthisis, and Niemeyer, to whom the merit belongs to have re-established this view, quotes a remarkable passage from F. Hoffmann on this subject: 'Verum adhuc sunt alia phthiseos initia, maximeque hæmoptysis. . . . Tum enim facile sanguis e pulmonum vasculis intra vesiculas aëreas extravasatur et stasi concepta putrescit, partes vicinas corrodit ac demum sinuositates efformat, vel in nodos et tubercula coit.'—Friderici Hoffmanni 'Opera Omnia,' t. iii. p. 285. Genevæ, 1740.

‡ Niemeyer, loc. cit. p. 51.

of carefully watching nine cases of more or less severe hæmoptysis, during at least ten days after the occurrence of the hæmoptysis, and in five of them the hæmoptysis was not followed by any increase of temperature, or other sign of pleuro-pneumonia.

In conversation on this subject, I have repeatedly met with the objection that the blood remaining in the lungs after an attack of hæmoptysis could not act as a foreign irritating substance, and could therefore not give rise to inflammatory processes; but I think that this objection is entirely theoretical, and many of the post-mortem examinations performed a short time after the occurrence of severe attacks of hæmoptysis must refute them. The question can, perhaps, be decided by experiments on animals; but as yet I have not been successful. Healthy rabbits cough up the blood injected into the trachea very rapidly and completely, and exactly the same thing frequently occurs in man. Our surgical brethren may perhaps assist us in this respect by their experience on tracheotomy, during which operation blood may occasionally pass down into the bronchi, and by aspiration into the air-cells. In my limited experience lobular pneumonia has twice been the cause of death after tracheotomy, but I had no chance of a post-mortem examination.

It appears to me that not only blood but also morbid secretions of the respiratory organs themselves frequently act the part of irritants, as in various forms of bronchitis, especially those connected with whooping cough, and that the benefit derived from some remedies is due to their clearing the bronchi.

With regard to the treatment of hæmoptysis, I regard perfect rest as the most essential point, even in cases of very slight hæmoptysis, and I am convinced that in many instances, through this, more serious hæmorrhages are prevented; and, further, that even in many cases of severe hæmoptysis continued rest is alone sufficient to arrest the further effusion of blood, and that also the consecutive inflammatory changes are, to some degree, checked by it; but it ought to be continued not only till the spitting of blood has ceased, but until the thermometer has shown that the temperature has remained normal during five or six days after the cessation of the hæmoptysis. I will not enter into the value of gallic and sulphuric acids, of sedatives, of ice internally, and the restriction to iced fluids, because they

are generally used; but less frequently employed, and yet of great service in some severe cases, is continued application of ice bags to the chest, which have the additional advantage of obliging the patient to keep the same position. Another substance from which I have seen good effect in arresting severe hæmoptysis is ergot of rye in large doses, viz. from three to six drachms of the watery extract of our pharmacopœia in twenty-four hours.

The remedy, however, which I venture to mention particularly is the emetic. It is an old remedy, I do not know by whom first recommended, in hæmoptysis, but I well remember that it was highly spoken of by my excellent teacher the late Professor Nasse of Bonn. It has rather fallen into neglect, unmerited I think, not only in hæmoptysis, but also in many other pathological conditions in which it has formerly been frequently used. The fact that blood retained in the air passages can give rise to serious inflammatory conditions has induced me to employ it again in pulmonary hæmorrhage, and in four cases of obstinate hæmoptysis in which fresh accessions occurred during several days, and which were not yielding either to rest, or to the other remedies mentioned, the administration of the emetic was followed by a speedy cessation of spitting of blood; in two of these cases old coagulated blood mixed with purulent matter (cruor with altered white globules?) was coughed up between and after the acts of vomiting, and in none of these cases any marked inflammatory symptoms followed. The beneficial action of the emetic in many cases of bronchitis, especially bronchitis with whooping cough, offers some analogy; as the retention of purulent matter in the capillary bronchi, as already alluded to, likewise seems to be a source of irritation; and there is perhaps no remedy by which the smaller divisions of the bronchi are more effectually cleared than by the emetic. I do, however, not mean to say that this mechanical effect is the only action of the emetic; I believe it to be much more complex, and to depend partly also on the nature of the emetic remedies employed. This point I will not venture to discuss, but confine myself to stating that I usually combine ipecacuanha and antimony.

In cases where there is a tendency to hæmoptysis, climate is of great importance, and I am in the habit of recommending prolonged residence in alpine climates. I know that it is the general belief that elevated regions and rarefied air cause a disposition to hæmorrhage; but this idea is based partly

on theoretical reasoning, partly on the misinterpreted descriptions of the great ascents of Humboldt, Boussingault, and others who were, under circumstances totally different from those of the invalid, residing in a moderately high elevation. On the coast of Peru, where hæmoptysis is one of the most frequent affections, and the usual forerunner of consumption, the removal of the patient to the Andine valleys, especially the valley of Jauja, elevated between 10,000 and 11,000 feet above sea level, is, according to the testimony of Archibald Smith,* regarded as an almost certain cure. Among all the patients whom I have advised to stay at high elevations (in various parts of Switzerland, especially at St. Moritz, Pontresina, and Samaden in the Engadine, and at Davos am Platz, as also on the Cordilleras of South America) there is, to my knowledge, only one who had an attack of hæmoptysis while on high ground, although there are amongst them ten who had previously suffered from severe, and mostly from repeated attacks of hæmoptysis. I will not enter on the complicated modus operandi of high climates, but I may mention that the nutrition in general is improved by them, and that they seem besides to counteract, as I shall endeavour to show at another place, the tendency to catarrhal or lobular pneumonia and its consequences; infiltration, caseous transformation, rapid breaking down of tissue, and formation of cavities, processes by which the corrosion of blood-vessels and the development of aneurismatic conditions of the minute arteries are favoured.

I recommend alpine climates, however, not only as a prophylactic measure, against hæmoptysis, but also as a means to promote the cure of the effects of the inflammatory processes resulting from pulmonary hæmorrhage.

To facilitate the discussion, I will sum up the main points to which I wish to direct attention:—

1. That more or less violent hæmoptysis can occur without the existence of any disease of the lung tissue, from congestion of the mucous membrane of the bronchi.

2. That in many cases the hæmoptysis passes off without leading to any inflammatory changes in the lungs, or to any constitutional disturbance.

* Practical Observations on the Diseases of Peru, 'Edinburgh Med. and Surg. Journal,' No. 144; and Climate of the Swiss Alps and of the Peruvian Andes Compared, by Archibald Smith, M.D. ('Dublin Quarterly Journal of Medical Sciences,' May 1866.)

3. That in other cases, however, the retention of effused blood within the lungs gives rise to inflammatory symptoms, especially broncho-pneumonia, mostly lobular, from irritation.

4. That the products of this inflammation may be readily absorbed under favourable circumstances, while in other cases they may form the origin of a consumptive process, i.e. subacute or chronic phthisis.

5. That pulmonary hæmorrhages, occurring in already diseased lungs, may likewise, but do likewise not always, give rise to fresh inflammatory processes.

6. That with regard to treatment, perfect rest is the most important element, and in many cases sufficient.

7. That, however, in others especially, if the hæmoptysis does not soon cease, and remedies like gallic acid and ergotin do not succeed, and fresh attacks follow one another, the emetic is a remedy of great value, as well in arresting the hæmorrhage, as also in clearing the bronchi from effused blood, and thus preventing inflammatory processes.

8. That in the treatment as well of the tendency to hæmoptysis, as also of the effects of the latter, the alpine climates deserve the more general attention of the profession.

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Dr Parkes F. R. S
with the Author's kind regards

ON

MEDICINAL PEPSIN.

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ON MEDICINAL PEPSIN.

Since the introduction of Corvisart and Boudault's "poudre nutrimentive" into medicine, in the year 1854, pepsin obtained from the stomach of the pig,* calf, or sheep, in a state of greater or less impurity, has been extensively prescribed in dyspepsia and certain other affections. According to the testimony of some authorities of high standing, long experience in the use of this agent fully justifies Corvisart's predictions relative to its therapeutic value, which were originally based upon physiological reasoning. There are other authorities, however, equally eminent, who either express doubts as to the efficacy of pepsin, or positively state that it is totally devoid of medicinal power. This difference of opinion, in all probability, mainly arises from the circumstance that pharmaceutists supply medical men with various preparations, all bearing the same specific name of pepsin, but differing very considerably in their digestive powers and other qualities. In fact, so far as I have at present been enabled to collect evidence relative to the merits and demerits of pepsin, I find those who speak favourably of its employment in the treatment of disease have prescribed that prepared by the best makers; while those who express a doubtful or adverse opinion respecting its value have been in the habit of prescribing those varieties or makes which the experiments of myself and others have proved to be practically without any digestive activity. The relative digesting capabilities of several English and continental pepsins were investigated by Dr. Sieveking† in 1857, and a similar inquiry was conducted by Dr. Pavy‡ in 1863. The results of the experiments of both gentlemen indicated that there was not merely a difference in the qualities of the pepsin prepared by different makers, but that, as was particularly shown by Dr. Pavy, some of the samples examined were totally incapable of digesting muscular tissue. One would have thought that the publicity given to these facts in the medical journals would have caused the prescription of none but the best makes of pepsin, and that it would have induced those who had hitherto fabricated an inferior article to have either aban-

* First brought into notice by Dr. Beale.
† *Medical Times and Gazette*, 1857, vol. i. p. 534.
‡ The *Lancet*, April 25th, 1863.

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doned its manufacture or to have improved the methods they employed for its preparation. Such, however, is not the case, for pharmaceutists at the present date continue to vend, and medical men continue to prescribe, both the good and bad qualities of pepsin. Only a few days ago an old established and well known wholesale druggist told me that a customer applied to him for two ounces of pepsin. He asked the customer whose make he required. The reply was "the cheapest." On examining the kind of pepsin supplied on this occasion, it was found to be absolutely worthless as regards its power of digestion. Nevertheless it will be used medicinally, and if the patient derives no apparent benefit from its administration, the practitioner who prescribed it may be induced to condemn pepsin *in toto*; or should the patient soon get better, the improvement will in all likelihood be attributed to a preparation which is perfectly inert. In the first case, injustice would be done to a medicine which, when properly prepared, is said by many eminent practitioners to possess great therapeutic value; and, in the second, a worthless preparation would receive credit for performing a service it is totally incapable of rendering.

Being about to conduct some investigations on artificial digestion, and requiring for my purpose considerable quantities of medicinal pepsin, possessing the highest digestive energy, I purchased, in March last, samples of the principal English makers; also some of a French, as well as one of a German maker. These were examined in the manner hereafter described; and as the results arrived at corroborate substantially those obtained by Dr. Pavy seven years ago, although the methods of investigation adopted by that gentleman and myself differ,* I beg permission to lay the following account of them before the readers of the *Lancet*, in the hope that it may induce those who are in doubt as to the value of pepsin as a therapeutic to reinvestigate the medicinal action of an agent which, according to theory, ought to render good service in cases in which the secretion of gastric juice is either deficient in quantity or defective in quality.

Ten samples of pepsin, obtained from different sources, were examined. The preparations of the several makers are distinguished from one another by letters in the following manner:—

A, A 1 } Same make, but purchased at different houses.
B, B 1 } Ditto, ditto.

* Dr. Pavy noticed the relative solvent action on frogs' legs of mixtures of pepsin and dilute acid.

C, C 1, C 2 } Same make, but purchased at different houses.
D
E
F.

EXPERIMENTS UPON ALBUMEN.

Fresh eggs were kept in boiling water for an hour, and then allowed to get quite cold. After depriving them of their shells, the whites were cut into the thinnest possible slices,* and great care was taken to reject any portions of yolk, as well as all slices of white of ununiform thickness. A weighed portion of coagulated albumen thus prepared was placed in a two-ounce wide-mouthed bottle, and covered with distilled water containing one per cent. by volume of concentrated hydrochloric acid.† These operations were conducted during the latter part of the day. Next morning the required amount of pepsin was weighed out, and added to the mixture of albumen and dilute hydrochloric acid. The bottle and its contents were then placed in a water-bath, and kept at a temperature of 38° Cent. (100°·4 F.). Digestion was regarded as complete when, at the end of four hours, particles of albumen could no longer be seen, and when the insoluble residue consisted of a very minute quantity of fibrous or membranous matters only. These observations were easily made, except in the experiment upon samples of pepsin containing large quantities of starch. In such cases, when digestion appeared to be finished, the result was not recorded until the contents of the bottle had been carefully elutriated, or strained through fine muslin, so that it might be ascertained with certainty, by the appearance of the residue in the bottle or on the filter (muslin), whether or not the whole of the albumen had been dissolved.

In the first series of experiments upon albumen, five grammes of coagulated egg-albumen, and twenty-five cubic centimetres of distilled water, containing one per cent. of hydrochloric acid, were employed. The quantities of pepsin used are stated in the subjoined table, which is intended to show the relative amounts of the different makers (A, B, C, D, E, F) required to digest the same quantity of albumen in four hours. Two comparative experiments were in every instance set going at the same time.

* It is easier to observe the progress of the digestion of albumen if it be sliced than if it be minced.

† This degree of dilution was adopted from the circumstance that the results of special experiments indicated that it was more favourable to digestion than an acid of greater or less strength. It was also ascertained that water containing five per cent. of hydrochloric acid appeared to completely prevent the digestive process taking place. Is it, therefore, wise to administer acids along with or immediately after pepsin, in cases in which the stomach already contains an excessive quantity of acid?

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Table showing Results of First Series of Experiments on Albumen (25 cubic centimetres of acidulated water).*

Weight of Pepsin employed in Grammes.†	MAKE OF PEPSIN.					
	A.	B.	C.	D.	E.	F.
0·050	Digested.	Not digested.	Not digested.	Not digested.	Not digested.	Not digested.
0·075	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·100	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·150	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·175	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·200	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·250	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·300	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·400	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
0·500	...	Digested.	Ditto.	Ditto.	Ditto.	Ditto.
1·000	...	...	Ditto.	Ditto.	Ditto.	Ditto.
1·500	...	...	Ditto.‡	Ditto.	Ditto.	Ditto.
2·000	...	...	...	Ditto.	Ditto.	Ditto.
3·000	...	...	...	Ditto.	Ditto.	Ditto.
4·000	...	...	...	Ditto.	Ditto.	Ditto.
5·000	...	...	...	Ditto.	Ditto.	Ditto.

It having been found impossible to continue the experiments with make C with more than 1·5 gramme of pepsin, in consequence of the inability of 25 cubic centimetres of acidulated water to keep the mixture in a sufficiently liquid state, a second series of experiments was performed, in which 50 instead of 25 cubic centimetres of diluted acid were employed. The weight of albumen used was the same as that in the first series—viz., 5 grammes.

Table showing Results of Second Series of Experiments upon Albumen (50 cubic centimetres of acidulated water).

Weight of Pepsin employed in Grammes.	MAKE OF PEPSIN.					
	A.	B.	C.	D.	E.	F.
0·050	Digested.	Not digested.	Not digested.	Not digested.	Not digested.	Not digested.
0·250	...	Ditto	Ditto.	Ditto.	Ditto.	Ditto.
0·300	...	Ditto	Ditto.	Ditto.	Ditto.	Ditto.
0·400	...	Ditto	Ditto.	Ditto.	Ditto.	Ditto.
0·500	...	Digested.	Ditto.	Ditto.	Ditto.	Ditto.
1·000	...	...	Ditto.	Ditto.	Ditto.	Ditto.
1·250	...	...	Digested.	Ditto.	Ditto.	Ditto.
5·000	...	...	...	Ditto.	Ditto.	Ditto.

* 1 cubic centimetre = 15·432 grains. † 1 gramme = 15·432.

‡ Experiments with this make of pepsin were here discontinued, in consequence of the 25 grammes of acidulated water employed being insufficient to maintain the requisite fluidity of the mixture.

From the results of the experiments detailed in the foregoing tables, it will be seen:—

1st. That, in order to effect the digestion of a given weight of albumen, very different quantities of the pepsin prepared by makers A, B, C are required.

2nd. That, taking the digestive power of C as unity, the digestive ratios of A, B, and C are as follows:—

C=1 (1·25 gramme dissolves 5 grammes of albumen.)
B=2·5 (0·50 „ „ „ „)
A=25 (0·05 „ „ „ „)

In other words, A is ten times stronger than B, and twenty-five times stronger than C.

3rd. That, inasmuch as coagulated albumen mixed with acidulated water and equal weights of D, E, and F gave not the slightest indication of being digested, even at the expiration of twenty-four hours from the commencement of the experiment, it is evident that such so-called pepsins are, to say the least, practically destitute of the power of digestion. A 1, B 1, C 1, and C 2 were tested in precisely the same manner as the other samples; and it was found that their digestive powers did not materially differ from the corresponding samples A, B, and C, which, it will be remembered, were prepared by the same makers, but obtained from different sources.

The evidence afforded by the results of the experiments already referred to, will doubtless be considered quite sufficient to prove the existence of a wide difference in the digestive energy of certain of the pepsins met with in pharmacy, and the utter worthlessness of others. Nevertheless, the following series of experiments upon fibrin was undertaken for the purpose of ascertaining whether or not the results would accord with those obtained in the previous investigations upon albumen.

EXPERIMENTS UPON FIBRIN.

In these experiments 5 grammes of finely minced fibrin (lean of rump-steak) were mixed with fifty cubic centimetres of distilled water, containing 1 per cent. by volume of concentrated hydrochloric acid, and the quantities of pepsin stated in the following table. Temp. 38° Centigrade (100°·4 Fahr.); duration of experiment, four hours. Two comparative experiments invariably set going at the same time. When, in consequence of the presence of starch, the progress of digestion could not be satisfactorily watched, the mixture was strained through fine muslin for the purpose previously named when describing the mode of experimenting with albumen.

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Table showing Results of Experiments upon Fibrin.

Weight of Pepsin employed in Grammes.	MAKE OF PEPSIN.					
	A.	B.	C.	D.	E.	F.
0·45	Digested.	Not digested.	Not digested.	Not digested.	Not digested.	Not digested.
1·00	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
1·50	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
2·00	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
3·00	...	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
4·00	...	Digested.	Ditto.	Ditto.	Ditto.	Ditto.
5·00	...	...	Ditto.	Ditto.	Ditto.	Ditto.

We are now enabled to see—

1st. That the relative digestive powers of A and B on fibrin are very nearly the same as those upon albumen, the ratios being

10 A to 1 B on albumen;
8·88 (in round numbers 9) A to 1 B on fibrin.

2nd. That inasmuch as five grammes of fibrin were undigested by equal weights of pepsins C, D, E, and F, these preparations are practically destitute of medicinal value.*

Having shown, from the results of nearly three hundred experiments upon albumen and fibrin, that the pepsin distinguished by the letter A is far superior in quality to that of any other make, it appears to me simply an act of duty to the medical profession, and of justice to the undermentioned firm, to state that it is prepared by Messrs. Bullock and Reynolds, of Hanover Street, Hanover Square.† In conclusion, I beg to thank my very able assistant, Mr. E. Lapper, for the aid he has rendered me during the prosecution of this inquiry.

August, 1870.

* The fibrin remained undigested even at the end of twenty-four hours from the commencement of these experiments.

† Dr. Pavy also showed in 1863 that the pepsin of Messrs. Bullock and Reynolds was much more active than that of any other maker.

CLINICAL OBSERVATIONS

ON

HYDRATE OF CHLORAL

AS A

HYPNOTIC IN TYPHUS.

BY

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NEW therapeutic agents often disappoint those who are not satisfied with mere novelty, and who prefer old and tried methods of producing effects to those which are commended by their strangeness rather than by superior efficiency. The hydrate of chloral, as an anæsthetic, will scarcely rank even with protoxide of nitrogen and bichloride of methylene, in feeble rivalry of chloroform. As a narcotic, on the contrary, I believe that it will establish itself as not only new, but specially useful, preferable in certain circumstances to opium. In the treatment of the cerebral complications of febrile disease, opiates have proved in my experience, sufficiently capricious, and even precarious, to lead me eagerly to make trial of new sedatives, in the hope of finding among them one safer and even more certain in action. The hydrate of chloral has proved so successful in both respects that I hasten to state the results of even a limited trial.

I shall first present, in a tabular form, such information as to the circumstances of administration, the dose, and results, as can be so compressed; and then make some remarks founded on this table, and on the minute clinical notes—taken in some cases by my assistants, Drs Tennent and M'Kellar—but mostly by myself. At the outset I must apologize for their scientific defects. In the midst of an epidemic, with crowded wards, it is impossible to extend observations beyond the easily notable and practically useful phenomena. The hypnotic action of chloral was therefore almost solely watched for; such phenomena as the temperature being necessarily left over for future study.

TABLE OF RESULTS OF ADMINISTRATION OF CHLORAL IN TYPHUS.

No. of Case.	Circumstances preceding Administration.	Day of Fever.	Age.	Dose.	Slept. How soon.	Slept. How long.	Effect as of Sleep.	Condition Afterwards.	REMARKS.
				Grs.	Mins.	Hrs.			
I.	14 hrs. A.D., ...	2nd week.	25	40	(20)	Prolonged and broken.	...	Unchanged.	Pulse irregular 3 hrs. afterwards.
—	(Same case.)	Do.	25	40	10	2"	+	No recurrence.	Vomited at once.
II.	54 hrs. D. Ferox, ...	10th.	25	40	(30)	2	...	Rational for a time.	Stimulated. Pulse not irregular.
—	(Same case.)	12th.	...	40	(20)		+	D. recurred next day.	...
III.	D.T. of Typhus, ...	12th.	20	40	5	½	...	Unchanged.	Pulse irregular 11 hrs. afterwards.
IV.	D.T. of Typhus, ...	2nd week.	18	30	5	3½	...	No recurrence.	Do. 9 hrs. afterwards.
V.	Acute Mania, ...	...	30	30	5		...	Unchanged.	...
VI.	D.T. of Typhus, 72 hrs. without sleep, ...	14th.	19	30	30	4	...	No recurrence.	...
VII.	Night of A.D., ...	...	...	30	30	Prolonged and broken.	...	Do.	...
VIII.	D.T. of Typhus, 28 hrs. without sleep, ...	14th.	28	30	2 hrs.	4	...	Unchanged.	...
IX.	Nearly 2 days sleepless,	7th.	30	30	6	½, broken.	...	Do.	Tubercular Meningitis, with T.
X.	Sleep light.	11th?	30	30	10	1	+	Tranquillised.	...
XI.	(Same case.)	13th.	47	30	...	...	+	Unchanged.	...
XII.	(Same case.)	17th.	...	30	12	...	+	Do.	...
—	Do.	12th.	...	30	...	Short and broken.	+	Do.	...
XIII.	36 hrs. D.	12th.	18	30	...	Do.	+	Do.	...
—	Sleepless night. ...	12th.	...	30	720?	...	+	Tranquillised.	...
XIV.	D.T. of Typhus, ...	12th.	19	30	15	Prolonged and broken.	...	No recurrence.	...
XV.	36 hrs. sleepless, ...	8th.	24	30	5	2	...	Do.	...
XVI.	A.D. last night, ...	7th.	25	30	10	Short and broken.	...	Unchanged.	...
—	(Same case.)	10th.	25	30	...	...	+	Do.	...
XVII.	A.D. for 36 hrs., ...	7th.	14	30	At once	Prolonged and broken.	...	No recurrence.	2nd dose 9 hrs. after 1st.
XVIII.	D.T. of Typhus, ...	10th.	14	30	15	Do.	+	Do.	...
—	(Same case.)	12th.	...	30	13	3"	...	Unchanged.	...
—	Do.	14th.	...	30	20	...	...	No recurrence.	...
XIX.	D.T. of Typhus, ...	10th.	22	30	2 hrs.	Prolonged and broken.	...	Unchanged.	...
XX.	D.T. of Typhus, ...	10th.	22	30	(30)	½	...	No recurrence.	...
XXI.	A.D. for 36 hrs., ...	10th.	12	15	(30)	Prolonged and broken.	...	Do.	...

Note.—A.D. = Acute Delirium. (—) Asleep then, but not observed how long. D.T. = Delirium Tremens. * Inert. † Partially soothing. ‡ Decidedly soothing.

Physiological action of chloral.—Although the chloral was administered for therapeutic ends, the notes of these cases in some particulars illustrate the observations of Liebreich, Bouchut, Personne, and Richardson, as to its physiological effects. The full development of these effects depends, of course, upon the dose; and since, from the papers of these gentlemen, I was led to exhibit at first what proved to be an overdose, viz., 40 grains, the action of the drug went further than was necessary. I therefore give the notes of two such cases in full. At the close of the paper will be found some speculations as to the cause of this susceptibility.

Case I.—Janet N——, aged 25, on 12th Dec., 1869, had been six days in hospital with very severe typhus of unknown duration, aggravated by debility from 15 months' lactation. On the forenoon of that day, although her pulse was falling and her bowels were free, *she had not slept for* 14 *hours*, but had sung and talked constantly, and was only held in bed by the canvas sheet.

12.50 *p.m.*—Pulse, 120; good. Temperature in rectum, 100·5°. Face flushed and whole aspect excited. *At this hour* 40 *grains chloral were given.*

1.10 *p.m.*—Pulse, 118; decidedly *smaller and softer*, and indeed *seems to falter at times.* Lies quietly half on back; eyes shut; respirations interrupted by a constant short cough. Eyelid lifted without awakening patient; *pupil almost pin-hole.* On pinching arm severely she awakes, looks up, and *pupils, at first small, become natural.* Coughs, and dislodges a quantity of mucus.

1.30 *p.m.*—Pulse, 124. Roused by nurse, contrary to orders, to take milk, and is, though not restless, noisy.

2.20 *p.m.*—Pulse, 112; soft. Quiet; saying "Awe! awe!" in a dreamy tone.

3 *p.m.*—Pulse, 110; soft. Still more absent and drowsy, but repeating "awe! awe!"

3.40 *p.m.*—Pulse, 84; small, *feeble, irregular.* As before; tranquil.

4.20 *p.m.*—Pulse, 82 to 86; *improved in quality, but irregular.* Same dreamy tranquil state. Evidently alive to what is being said. Passed urine in bed.

5 *p.m.*—Pulse, 92; *improved in quality, and rather steadier.* General condition unchanged.

5.40 *p.m.*—Pulse as before; asleep, but wakened by counting it. Has had no food or stimulant since draught. Give milk.

6.20 *p.m.*—Pulse, 112; *quality good, and quite regular.* Temperature in rectum, 102·5°. No more sleep; passive; talking to herself.

8.20 *p.m.*—Pulse, 120; good. Quiet, but talking, and waving hands in air. 30 *grains chloral in half-an-ounce of water and syrup given, but vomited at once.*

11 *p.m.*—Pulse, 120. Excited, and constantly chattering. *Give* 40 *grains chloral again, in* ℥iss. *water and syrup.*

11.30 *p.m.*—Pulse, 116; much softer. Patient became quiet in about *ten minutes after draught*, and now *sleeps calmly.* Respiration is sometimes slow and full, sometimes hurried and short.

Dec. 13*th*.—*Slept for three hours after last dose;* then became wakeful and excited for about 6 hours, but again slept soundly. Patient *never became restless again*, but passed into convalescence.

Case III.—Helen C———, aged 20, was in the 19th day of severe typhus, with *general bronchitis* and *partial congestion of lungs;* bowels free; *delirium of nervous semi-hysterical type.*

Dec. 16*th*, 12.30 *p.m.*—Pulse, 120; good. No sleep for some 48 hours. *Got 40 grains chloral at this hour.*

12.40 *p.m.*—Pulse, 120; still awake and chattering. Face blue; flushed.

1 *p.m.*—Pulse, 110; full and strong. Respirations 46; full and deep. *Sleeping soundly;* not disturbed by counting pulse.

1.30 *p.m.*—Pulse, 108; soft; asleep, but roused by counting pulse.

6.40 *p.m.*—Pulse, 136. Slept till 5.40; at times talking, but always falling over again. Is now in peevish delirious state once more.

11 *p.m.*—Pulse, 136; *intermits three times in* 15 *seconds.* Give teaspoonful of whisky every hour and Liebig.

17*th*.—Pulse, 124. Had a restless night, but afterwards, although irritable and hysterical, obtained abundant sleep, and recovered, although tediously.

In these cases, after a 40 grain dose, the toxic effect upon the heart was manifest. In one case only, the 4th, irregularity was developed by so small a dose as 20 grains, but lowered frequency was not uncommon. The large dose was given also twice to a bulky, robust man, but did not affect the heart, so far at least as to cause irregularity. The pulse seemed, but with exceptions, at first and that speedily to improve in quality, but in an hour it became soft and small, sometimes lowered in frequency, and finally the action of the heart became irregular. Although it is difficult to eliminate from the sedative effects of mere repose on the respiratory and circulatory organs of a delirious person, those which are due to the drug which induces the repose, there can be little question that the chloral acted directly and specially on the heart in these instances. In many of the cases also, from the aspect of the countenance, flushed and full, and from the improved colour of the rash, brightening when petechial,—the impression of stimulated action which we have said the pulse at the very first, and for a short time, conveys, receive further confirmation. The breathing also is quickened and short, but not laboured. These phenomena are, however, of the most transient description, and soon give place to those with which we are familiar in natural sleep. The state of the pupil is the same—contracted to the utmost, as in the "pin-hole pupil" of Graves;

but, differing from the contracted pupil of narcosis, it expands in the chloral sleep immediately the patient is awaked. The power of voluntary motion seemed never to be in abeyance, but always at command as in natural sleep; and no change in the susceptibility of sensation was present. The sedative effect on the brain and nervous system was sometimes visible in a few minutes, but seldom became developed into true sleep and unconsciousness until from 10 to 20 minutes. The transition from waking to sleeping was noted to be often very sudden. If disturbed by any external or internal irritation, as by counting the pulse, for instance, the patient often looked up, with natural pupils, then turned on one side, seemed to sleep *at once*, and on lifting eyelid, no movement was caused, and the pupil was found to be almost abolished. According to Richardson, thorough narcosis from chloral is accompanied, in the rabbit at least, by dilated pupil. In Case I., it will be observed that the pupil remained for a perceptible period contracted, as in opiate narcosis, after the patient had been roused by pinching. Dilatation was never observed from the doses employed in my cases.

Therapeutic action of chloral.—The therapeutic action desired was sedative and hypnotic, and as such the table shows that it was successful in almost every form of cerebral excitement incident to febrile disease, with remarkable uniformity and rapidity. Case II. illustrates its efficiency in a well-marked instance of *delirium ferox.*

Case II.—Archibald B———, aged 25, on the 10th day of well-marked typhus, without previous warning, after a good night's sleep, suddenly jumped out of bed, and smashed a window in his endeavours to escape through it. Was forced into bed against violent resistance, and retained there by jacket and sheet. Bowels quite free.

Dec. 15*th*, 2.30 *p.m.*—*After a pertinacious resistance,* 40 *grains chloral was administered.*

3 *p.m.*—Pulse, 96. Apparently *sleeping quietly.*

4 *p.m.*—Evidently sleeping soundly.

7 *p.m.*—Pulse, 96; soft. Slept about 2 hours altogether. Is now awake, but *quiet and rational.*

17*th*, 2.30 *p.m.*—Pulse, 132. Has been sleepless since last note, and is now as violent as ever. 40 *grains chloral again given.*

3 *p.m.*—Pulse, 128; fuller. No sleep. Nurse thinks him quieter; but *no effect further than this followed this dose.*

Patient died on 15th day.

Chloral seems to have a more immediate and permanent curative action on such cases of acute delirium, at the acme of typhus, than in the *delirium tremens* of the second and third weeks, when the blood is loaded with the products of the fever, and there are general tremors and subsultus.

In the former class of cases, its action was sometimes quite magical, as in Case XIV., for example, where, in 7 minutes, the patient was calmed from a state of fiery excitement.

Case XIV.—Ellen T——, aged 9. Well-marked typhus.
Jan. 8th, (9th day) 12.58 *p.m.*—Pulse, 140. After *sleepless night*, spent in shouting and getting out of bed, *got 10 grains chloral at this hour*. Bowels free. Pupils slightly dilated.
1.5 *p.m.* (7 minutes after)—*Quite quiet*, but opens eyes dreamily for a second as I look at her.
1.20 *p.m.*—Pulse, 128. Respirations, 48. *Sleeping soundly*. Aspect calm and perfectly natural. *Pin-hole pupils*.
11.30 *p.m.*—Pulse, 128. Has been *always tranquil, generally sleeping, throughout the day*.

No recurrence of delirium. Recovered.

Case XVII. is an equally good example, where two hours' unbroken sleep, followed by interrupted sleep during the entire day, was produced by 10 grains in a boy of 14. In both instances the patient became sensible and continued so. This permanently curative action was frequent, as the table shows, and more common in the active than in the adynamic form of delirium. Although this adynamic delirium, or the *delirium tremens* of typhus, as I call it, was less promptly amenable to chloral, as it is to all sedatives, Cases VI., XIII., and XVIII. show excellent results. Indeed there is no other sedative but chloral which I should have ventured to administer, still less to repeat, in the last two. Seeing that the delirium depends in such cases on the presence of impurities in the blood, the elimination of which is a process requiring time, all that we can expect from a sedative which does not act by hastening elimination, is to soothe from time to time, and to check vital exhaustion until the process is completed by the natural channels. In this aspect, the chloral appears in no case to better advantage. We shall quote Case XVIII. as an illustration of its beneficial action in one of the worst cases of such adynamic delirium I have ever seen. It will be observed that it even controlled the subsultus for a time.

Case XVIII.—John M'D ——, aged 23. Very severe case of typhus, with prominent cerebro-spinal symptoms from the 10th day.
Jan. 14th, (12*th day*) 2.30 *p.m.* Pulse, 128. Pupils natural. No sleep during night. *Delirium tremens of typhus*; ceaseless chattering, movement of hands in air, universal twitchings. *Got 20 grains chloral at this hour*.
7 *p.m.*—Pulse, 150; small and soft. Has been seen at intervals, and there has been *no sleep whatever*. Nurse thinks him on the whole quieter, but this is doubtful.
15*th* (13*th day*)—Pulse, 114. Nervous symptoms abated, but not a wink of sleep. No motion for two days. Give castor-oil.
16*th* (14*th day*)—Bowels were moved yesterday by the oil. Still, has had *no sleep since the 13th*. Nervous symptoms aggravated. Every muscle seems to twitch in turn. Rash petechial and copious.
11.30 *a.m.*—Pulse, 108; soft and small. Pupils natural. *At this hour* 20 *grains chloral given*
11.50 *a.m.*—Pulse, 102; considerably improved. Has just fallen over. *Aspect entirely that of a person in deep natural sleep*. Snores. Hands are lying quietly on breast, and *only a rare twitch is observed*. Eyelid lifted, and *pupil* found to be *pin-hole*.
12.20 *p.m.*—Pulse, 104; good. *Sleep continues*, but is disturbed by slight muttering and subsultus.
12.50 *p.m.*—Pulse, 100. *Quietly and soundly asleep*, as at first. Passed urine copiously 5 minutes ago, having become very noisy and excited just before that, but falling quiet immediately after.
7.5 *p.m.*—Pulse, 100; pretty good. *Sleep continued until about* 2.30 *p.m. unbroken*. Has dosed and waked all afternoon.
17*th* (15*th day*) 2 *p.m.*—Pulse, 120. Has had *no sleep* all night. Nervous symptoms as bad as ever. *At this hour*, 20 *grains chloral given*.
2.20 *p.m.*—Pulse, 120. Respirations, 30. *Sleeping soundly*, and has done so for more than 5 minutes. *No subsultus*.
4.20 *p.m.*—Pulse, 124. *Still sound asleep*.
6.20 *p.m.*—Pulse, 124; but from subsultus difficult to count. Has slept and waked by turns during afternoon; but is now restless again.

Progressed favourably afterwards.—No recurrence.

In Case XIII., there was bronchitis and congestion of both lungs—a state of matters which forbids the use of opium—but chloral was given from time to time, producing sleep without promoting pulmonary stasis. In Case XV., the restlessness of tubercular meningitis supervening on typhus, in an infant aged 18 months, was temporarily calmed by a dose of 2 grains. The general statistics of results in all cases are as follows:—Chloral was administered 32 times in the treatment of 21 cases. Of these 32 doses, 24 were followed by sound and well-marked sleep, lasting without interruption from 1 to 5 hours, and nearly always prolonged by a succeeding period of broken sleep and general tranquillity, 3 doses had a decidedly, 4, a partially soothing effect, and 1 proved inert; but this last dose was immediately vomited,

and ought not therefore to be counted. Looking to the 21 individual cases, we find that *not one proved insensible to the chloral when repeated.* I never met with an equal number of consecutive cases of delirium, &c., in which any other sedative showed such uniformity of action, or even approximated to it.

Comparative effects of chloral and other hypnotics.—In the treatment of fever one has necessarily an unusual opportunity of studying the effects of hypnotics and sedatives. Very few cases pass through the physician's hands without at some period demanding the use of some means of producing sleep artificially; and the question which to employ is neither unimportant nor easy of solution. I have a very decided opinion as to the danger attending the use of opiates in fever, no matter how guarded with eliminants, as antimony, grey powder, &c. Nothing astonishes me more, as being opposed to my whole experience of their disastrous results, than the free and unguarded way in which preparations of opium, either alone or combined, are recommended even in treatises on fever,* and employed by some practitioners. From the want of a better agent I have hitherto, after Graves, used Battley with tartar-emetic (5 drops to $\frac{1}{12}$ grain), but I never order such a draught without apprehension, and have repeatedly seen patients put into a dangerous state of narcosis even by *one* such minute dose, a state always requiring active and prompt measures to save the life, and not unfrequently ending in fatal coma, or pulmonary engorgement or congestion. As is well known, opium always cripples the eliminating functions, especially of the kidneys; and as antagonistic to this action, I always combine with it some diuretic. Even in health you cannot develop the narcotic action of opium without this effect on the excretions. The general action on the nervous and

* See *Reynolds' System of Medicine*, Vol. I. Article on "Typhus Fever," by Dr Buchanan; p. 534. Also, even *Murchison* gives this questionable special indication for opium, "delirium approaching to typhomania or *delirium tremens*." (p. 276.) The dangers of opiates in fever are given with great clearness and good sense by Hudson. "*Lectures on Fever.*" (p. 376.)

muscular tissues is also paralyzing. The bronchial muscles and epithelium, and the external muscles of respiration, share in the narcotic paralysis. Hence the invariable tendency in opium poisoning to stasis of the blood in the pulmonary vessels, and of the bronchial secretion in the bronchi. Suppose now a case of typhus in the second week, in a state of sleepless delirium from the circulation of poisoned blood through the brain. The cerebro-spinal nervous system manifests the results of its impaired nutrition by violent excitement, or low muttering insomnia; the muscles also, voluntary and involuntary, suffer changes of structure, which can be seen under the microscope; the external muscles of respiration are partially paralyzed, and stasis, set agoing in the lungs by the altered relation of the impure blood to the capillaries, is promoted by the imperfect expansion of the chest wall. The external and internal pathological conditions act and react on each other. When therefore we give an opiate to a typhus patient, we combine two similar pathological tendencies, and may precipitate into narcosis functions which were previously on the brink, and by cautious management might have been preserved in some measure of vital activity. It is impossible to say what dose will *not* have this effect. As I have said, 5 drops of Battley and $\frac{1}{12}$ gr. of antim. tart. will do it. In rare cases I have seen even the slight lowering of vital action, which accompanies natural sleep (in this case, however, sleep coming without artificial aid to a blood-poisoned fever patient), develop in a case such as I have described, congestion of the lungs, general lividity, and partial coma. But as a rule, in natural sleep there are no such dangers, and it is the almost perfect analogy between natural sleep and the sleep induced by chloral, in properly adjusted doses, which commends that drug to my mind as the best hypnotic in febrile diseases. I am well aware that the clinical experiments here recorded are but limited, and that my conclusions must be subjected to prolonged trial and observation before they can be thoroughly established. Still I see in the chloral sleep something different from opium sleep, and both positive and negative

properties in the former drug, which mark it as safer than the latter. 1. The action of the pupil to which I have already alluded illustrates excellently the close approximation to a natural sleep which chloral bestows, and the difference between it and opium in physiological effect. In all forms of sleep the pupil is contracted to the utmost. But in natural sleep, the moment the sleeper is roused, and the eyes are opened, the pupil expands; while in an opium sleep the pupil remains contracted, it may be only for a few seconds, or for minutes, or hours. This illustrates in little the general condition of the nervous and muscular system in natural and chloral sleep, and in opium and other narcotic forms of sleep. As we have seen, the chloral sleeper may be roused at any time. He is at once in the full command of his functions, may take food, pass urine, cough with full strength, expectorate, &c.; and whenever the temporary excitation ceases, he may drop over again into unconsciousness. Indeed as a rule, the chloral sleep consists of a continuous initiatory stage, followed by a period which may extend over 6, 8, or more hours of sleep, interrupted by intervals in which food, &c., may be given without the necessity of waking the patient, or any risk of re-establishing the excitement. This was specially noted in some of our cases, as in Case VII. "8 p.m. Sleeping; had drinks at intervals, falling asleep at once afterwards." Not so with the patient after an opiate which will produce an equally sedative effect. His pupils are small; if his lungs are gorged with mucus, he has neither the intelligence to see the necessity, nor the muscular energy at command to cough and expectorate. 2. The excretions are not affected by chloral. They are by opium. The bowels are made costive, the urine scanty, the mouth parched, and the skin dry. 3. The administration of an opiate to a child is in any circumstances a procedure which the practitioner adopts with misgivings. Chloral may be given with perfect safety, and with perfect success. 4. Opiates, even as combined by Graves, with tartar emetic, are uncertain, very frequently quite futile. As already stated, I have met with no patient who resisted the action of chloral.

I have contrasted chloral with opium at much length, because opium is really the only hypnotic of sufficient value to be contrasted with it. Having in the course of practice gradually acquired the opinions regarding its dangers in fever, to which I have already given strong expression, it was natural that I should employ any drug or method which promised good results as a sedative. Space forbids any lengthened reference to this partly experimental practice. For some time, the bromide of potassium and cold-sponging have almost entirely displaced Graves' mixture, and Battley and ether, which, for a long time, were my only sedatives. The bromide formerly tried, but imperfectly, and thrown aside, was revived by Dr Tennent, at the request of the Professor of Materia Medica in the University, and has been extensively used. It is capricious, sometimes acting with excellent effect, but oftener proving useless in apparently similar circumstances. We give it in drachm doses, three times repeated, at intervals of an hour. It rarely acts, even when the best results ultimately follow, within forty-five minutes, or an hour. No dysphagia or other toxic effect has ever been observed, and its narcotic action manifests none of the dangerous tendencies of opium. Chloral, however, far excels the bromide in efficiency and certainty. In cases IV., VI., and VII., where chloral produced prolonged sleep, followed by no recurrence of delirium, it was appealed to after the bromide had failed. *Cold sponging* again, soothes by the abstraction of heat from the periphery, and is consequently useful only in the acute delirium and insomnia of the acme of fever, when the skin is pungently hot, and the condition such as I usually describe by the adjective "fiery." In these circumstances, sponging with iced water every 2 or 4 hours, has often a calmative effect. During the prolonged course of Case V., various sedatives were used. The following notes will show their comparative action. The effects of the bromide, though not so rapidly produced, were quite as good as those of the chloral in this case.

Case V.—Elizabeth H———, aged 30. A case of severe typhus, with prominent cerebral symptoms throughout, which ultimately outlasted the

fever, and passed into *acute mania*; the second case of the kind I have seen after typhus. Both cases went on, unchecked by treatment, to a *fatal termination*. The following sedative agents were employed from time to time in the present case.

1. Tartar emetic, $\frac{1}{12}$ grain; Battley, 5 drops; once, no effect; and once, half hour's sleep.
2. Tartar emetic, $\frac{1}{12}$ grain; tinct. digitalis, 5 drops; every 4 hours. No effect.
3. Bromide of potassium, in drachm doses, repeated for three successive hours. Given on 4 occasions, with excellent effect on three, but no effect on one.
4. Battley, 10 drops; chloric ether, 20 drops. No effect.
5. Blister to scalp; twice. No effect.

Dec. 21*st*.—Pulse, 124. Wild delirium for at least 24 hours. At 2.30 *p.m.*, 20 *grains of chloral given.*
3 *p.m.*—Pulse, 116; soft. *Sleeping soundly and naturally; fell asleep in 5 minutes after administration.*
4 *p.m.*—Pulse, 108. Continues in same placid sleep.
5 *p.m.*—Pulse, 100; soft. Sleeping soundly.
6 *p.m.*—Pulse, 132; feeble. Just wakened, and as *maniacal as ever.*

Dose of chloral. Mode of administration. Dangers.—My first cases proved conclusively, that for the class of patients under my care, 40 grains is a toxic dose. It produced depression and irregularity of the heart's action. In my cases, all the benefits without the dangers of chloral were obtained with 20 grain doses for adults; 2 grains for an infant of 18 months; 3 grains for two of 3 years; 10 grains for children of 9 and 14 years. The drug was given in an ounce of water sweetened with half an ounce of syrup.* Children take the draught quite readily in this way, and like it. If not sufficiently diluted, the medicine is vomited, as in Case I., where 30 grains were dissolved in only half-an-ounce of water and syrup. When sufficiently diluted it may be borne by the most irritable stomach, as it was in Case X., in which nutrient enemata were required from obstinate vomiting, and yet the chloral was not rejected. The dangers of an over dose of chloral are manifest from the cases in which 40 grains were administered. The depressing action of chloral on the cardiac ganglia is then developed. For the sake of the purity of the experiment, in some of my cases, all stimulants, and to some extent even food, were prohibited. This is, however, un-

* This dilution is enough for the lessened sensibility of a fever patient, but, from personal trial, *not for ordinary use*.

necessary, especially in view of the readiness with which the chloral, like the natural sleep, may be broken and resumed. Indeed, the same rule applies here as to all the circumstances of a fever patient,—not to interrupt the regular administration of food for any cause, and remembering that we are dealing with a drug which has a special action on the heart, we should first be cautious in adapting the dose to the age and vigour of the patient; and then, having given it, should watch the pulse at intervals, more particularly during the next six hours.

The mode of action of chloral.—This theoretical question assumes some practical importance when we employ chloral in typhus. According to Liebreich, the ultimate physiological action is not that of chloral, but of chloroform produced by the decomposition of chloral by the alkalies of the blood. This theory is strongly supported by the fact that chloral mixed with fresh blood does evolve chloroform. M. Personne and Dr Richardson agree with Liebreich. Indeed M. Personne has gone further in the proof of the theory by demonstrating the presence of *chloroform in the blood* of dogs, to whom *chloral alone* had been administered.* Now it is well known that the tendency of the typhus process, as it advances, is to *increase the alkalinity* of the fluids of the body. Ammonia can be detected in all the excretions in an amount much greater than in health. The urine, at the close of a severe case, gives off free ammonia so copiously as to cause lachrymation, and to be sometimes quite unbearable by one auscultating the back, for example, of a patient passing it involuntarily. "There is good reason for believing," says Murchison, "that the unnatural fluid state [of the blood] in typhus results from an abnormal amount of ammonia." Whatever may be the precise pathological product, there is no doubt of the fact that typhus blood is more highly alkaline than the blood in health. Hence, if its action depends upon alkalinity at all, and M. Personne seems to have demonstrated that fact, then chloral must be *par excellence*, the hypnotic suited for typhus. Liebreich's theory is in itself beautiful and attractive, and

* *Gaz. Hebd.*, November 19th, 1869.

in the words of a recent reviewer, "it is impossible not to feel a genuine admiration for the stroke of genius which is indicated in the prediction, from purely chemical considerations, that chloral would yield up chloroform to the blood in precisely the form in which it might be expected to do the maximum of good and the minimum of mischief." The illustration of the theory furnished by the rapid and magical effects of chloral in typhus involves an idea even more attractive. We transform a pathological into a therapeutic process. The fever-products liberate the soothing agent, and so calm the excitement which they themselves have made.

The subject of special susceptibility in typhus patients to the influence of chloral, in reference to the theory of its action, is one which must be reserved for future investigation. But it is entirely confirmatory of my supposition to find that there is such a susceptibility. The chemical conditions on which, according to Liebreich, the physiological action of chloral depends, exist in typhus in excess. The physiological effects of chloral ought therefore to be developed in a typhus patient with smaller doses and with greater rapidity. My experiments are few, but they are all *positive in their result.* Liebreich states that *the nervous power of the heart is the last which suffers.* Richardson says—"In fatal cases the functions destroyed are: 1. The cerebral. 2. The voluntary muscular. 3. The respiratory. 4. *The heart.*" In my observations on *physiological action,* it will be seen that a dose so small as 40 grains, in two out of three cases, proved toxic to the extent of developing the ultimate of the series of functional effects—that upon the heart; and that in one case even 20 grains seemed to produce this result, while the whole series of cases illustrates the striking facility with which small doses produce the primary effect on the brain and voluntary muscles, and sometimes lower the frequency of the pulsations.

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INFLUENCE OF THE VAGUS

UPON THE

VASCULAR SYSTEM.

BY

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INFLUENCE OF THE VAGUS UPON THE VASCULAR SYSTEM.

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The innervation of the vascular system is a subject which has engrossed the attention of physiologists ever since the days of Galen. Yet, notwithstanding the number of distinguished observers who have advanced our knowledge regarding it, there are still many points of importance which are enveloped in obscurity, and not a few regarding which opinion is most conflicting.

During the past three years I have been more or less engaged in experiments, which have been chiefly directed to the influence which the pneumogastric nerve exercises over the vascular system. In order that their bearing may be more clearly comprehended, I shall give a brief sketch of what is at present known regarding the innervation of the heart and blood-vessels.

Innervation of the Heart.

That the heart possesses within itself the conditions necessary for its rhythmical movement is a theory which was advanced by Galen, and is now believed by all physiologists.

The peculiar nervous arrangements essential for the rhythmical movement are as Remak pointed out, ganglia situated in various parts of the organ.

It is moreover admitted by all that the movements of the heart may be influenced by certain nerves connecting it with the cerebro-spinal axis. These are branches of the sympathetic and vagi. The sympathetic filaments take origin in the brain and medulla oblongata, pass through the cervical portion of the

[1] Abstract of a paper to be read before the Royal Society of Edinburgh on 3rd May, 1869. *All* references will be given and the experiments fully detailed elsewhere.

spinal cord, the last cervical and first dorsal ganglia, (M. and E. Cyon, Reichert's *Archiv*, 1867, p. 389), and from thence to the heart. These nerves convey to the cardiac organ influences which accelerate its action. Von Bezold thought that they do so continually, but Ludwig and the brothers Cyon have conclusively shown that there is no ground for such a supposition. That cardiac motor filaments are also to be found in the trunk of the *cervical* sympathetic was maintained by Von Bezold, but has been denied by Ludwig. Regarding this point, I have performed three experiments on rabbits. I never observed any effect on the heart follow irritation of this nerve, provided that the electrical currents were prevented from reaching the inferior cervical ganglion and thereby from affecting the cardiac branch derived from the spinal cord. Only when this ganglion was implicated did acceleration of the heart ensue. These observations lead me to conclude with Ludwig that the trunk of the cervical sympathetic nerve is not a cardiac nerve at all.

The heart is connected with the trunk of the vagus in the neck by a superior and an inferior branch. The former in the rabbit leaves the vagus with the superior laryngeal branch, courses down the neck in close proximity to the sympathetic, joins one or two branches of the inferior cervical ganglion with which it proceeds to the heart where its terminations have not yet been minutely traced. According to Cyon and Ludwig (*Journal de l'Anatomie*, Nov. 5, 1867) when this nerve is divided and its cranial end irritated, the blood pressure falls owing to dilatation of abdominal blood-vessels effected through the medulla oblongata and spinal cord. Because of the remarkable power which it possesses of lowering the blood-pressure, they have termed it the "depressor" nerve. They suppose that it is thrown into action when the heart is overloaded with blood, in order that by dilatation of blood-vessels the resistance to its contractions may be diminished. In six of my experiments on rabbits I took occasion to examine the influence of stimulation of this nerve upon the blood-pressure, and can bear testimony to the accuracy of Cyon and Ludwig's observation.

The inferior cardiac branch of the vagus arises with the inferior laryngeal nerve, and according to Bidder terminates in the cardiac ganglia. The nature of the influence exerted by it

upon the heart has been much disputed. According to Willis, Lower, Valsalva, Schiff, Moleschott, Lister and others it is a *motor* nerve of the heart, while in the opinion of the brothers Weber, Volkmann, Pflüger, Von Bezold and others, its function is to inhibit or restrain the heart's movements, so as to diminish their frequency and even to bring the organ for a time into a state of complete rest.

For the purpose of ascertaining which of these theories is correct, or whether there be not some truth in both, I have performed a number of experiments the results of which will presently be given.

In this as in the case of other nerves, we must study the effect of division and of irritation. Owing to the difficulty of dividing the inferior cardiac branch of the vagus, and the almost impossibility of irritating it without implicating other cardiac nerves if the thorax be not opened, most of my experiments like those of previous observers, have been performed on the trunk of the vagus in the neck. It will be convenient for us to consider the result of irritation previous to that of division.

Effect upon the Heart of irritating the lower end of the Vagus after it has been divided in the Neck.

In 1845 the brothers Weber (Müller's *Archiv*, 1846, p. 497) discovered that on irritating the vagi or those portions of the central nervous system from which they spring, the heart beats more slowly and may even come to rest in a state of relaxation. From this observation they concluded that the vagus exerts an inhibitory or controlling power over the heart's action. No one has called in question the accuracy of their experiment, but their interpretation, though it receives the support of many physiologists, is at the same time energetically opposed by Schiff, Moleschott, Lister and others. These observers, while admitting that *powerful* irritation of the cardiac end of the vagus arrests the heart's action, maintain that *gentle* stimulation *quickens* it, and they thinking that the slowing or arrest of the heart's action is due to exhaustion of the nerve or the cardiac ganglia, therefore conclude that the vagus (inferior cardiac branch) is a motor nerve of the heart. As the quickening of the heart by *gentle* stimulation of the nerve is the fundamental observation upon which they base this theory, it is of great importance to ascertain whether or not it be true. Pflüger and Von Bezold, deny that such is the case, but Schiff and Moleschott have simply replied that these observers have not performed their experiments with sufficient care. In most of the experiments the nerve was stimulated by inducted currents, and according to Schiff it is so difficult to hit upon the proper degree of strength which the current must possess in order to quicken the heart, that unless the greatest care be taken to apply the electrodes properly to the nerve and to prevent the latter from becoming exhausted, the experiment will fail.

In 1866—67 I performed a number of experiments in a manner which is, I imagine, less open to objection than the methods adopted by previous experimenters. In all the experiments I opened the larynx anteriorly in order that movement of the arytenoid cartilages might be perceived. On applying the electrodes to the lower end of the vagus divided in the neck, I invariably watched the arytenoid cartilage of the same side to see whether or not it was moved. In this way I was able to compare the effects of the stimulant upon the laryngeal muscles and the heart, and thereby to give a degree of precision to my experiments which, but for this test, they could not have possessed.

After having divided both vagi in the middle of the neck, I stimulated the lower end of one by means of Faradic currents, obtained from Du Bois Reymond's induction apparatus. In this machine the strength of the currents can be varied with great nicety by altering the distance between the primary and secondary coils. The secondary is pushed to or from the primary coil along a grooved board having a millimetre scale attached to it which serves to indicate the distance between the two coils, and in that way to give an idea of the comparative strength of the currents employed. I always began the observations on the influence of excitation of the nerve, by ascertaining the weakest current necessary to stimulate the filaments of the recurrent laryngeal nerve in the trunk of the vagus. Having determined this, I made the current still weaker and proceeded to stimulate the lower end of the vagus at intervals. The strength of the current was very gradually

The following will serve as an example of 17 experiments, 1 upon a dog, 4 upon frogs and 12 upon rabbits.

STRONG RABBIT. *Trachea and Larynx opened. Both vagi divided in the neck.* One Daniell's element employed.

Time.	Distance in millimetres of primary from secondary coil of induction machine.	Cardiac beats in 10 seconds.		State of arytenoid muscles.
		Before irritation of vagus.	During irritation of vagus.	
			Cardiac end of left vagus.	
4·22	740	—	—	Contraction.
4·23	800	51	50	Rest.
4·24	800—750	52	52	,,
4·25	750—730	52, 52	52, 52, 52	Contraction.
4·26	730—700	51, 52	52	,,
4·27	700—670	51	51	,,
4·28	670—640	52, 52	52, 52	,,
4·30	640—620	51, 52	52, 51	,,
4·31	620—630	51, 50, 51	51, 50, 50	,,
4·33	630—640	50, 51	51, 50	,,
4·38	640—600	52, 51	50, 51	,,
4·40	600—550	51, 50	51, 51	,,
4·41	550—500	50, 50	51, 50	,,
4·44	500—450	50	50	,,
4·45	450—400	50	49	,,
4·48	400—350	52, 50	50	,,
4·52	350—300	50, 50	50, 48, 49	,,
4·54	300—250	48, 49, 50	49, 50	,,
4·59	250	50, 49	49, 49	,,
5·1	250—230	48, 50	33, 29	,,
5·5	250	48, 48, 48	48, 48	,,
5·8	240	48, 48, 49	19, 19	,,
			Right vagus.	
5·15	240	47, 48	47, 48	,,
5·17	230	46, 47	47, 47	,,
5·18	230—225	42, 45, 46	45, 44	,,
			Left vagus.	
5·23	225	45, 45	38, 37	,,
			Right vagus.	
5·27	210	42, 41	38, 37	,,
5·29	200	42, 42	35, 34	,,
5·32	190	43, 43	34, 34	,,
5·35	160	42	32, 33	,,
5·38	140	40	30	,,
5·40	100	41	Stoppage	,,

increased in order that the influence of weak currents might have a fair trial, and in order that currents of every intensity might be used, they were always strengthened by drawing the secondary towards the primary coil while the nerve was being irritated and the effect upon the heart observed. The cardiac pulsations were counted with the aid of a stethoscope immediately before and during each irritation of the nerve.

In the above experiment the heart was usually counted for two or more successive periods of ten seconds in order that any variation in its rapidity might be detected. With weak currents the stimulation of the nerve was usually continued for about half a minute.

The foregoing results show no acceleration of the heart. They thereby indicate the general result of my experiments. It must be mentioned, however, that the observations made on the heart, while the animal exhibited signs of uneasiness, have not been recorded. *These generally showed quickening of the heart's action*, unless the irritant was powerful enough to slow the heart in spite of the excitement. Whenever the animal struggled I invariably repeated the observation and I found that if there was no struggling there was no quickening of the heart. The same results followed irritation of the inferior cardiac branch of the vagus; but it was observed that during its stimulation the animal much less frequently struggled, unless the heart was arrested. The experiment also very clearly shows that a much more powerful stimulus was required to slow the heart than was necessary to throw the laryngeal muscles into action. This seems at first glance to lend support to the idea that the slowing results from exhaustion of the cardiac ganglia produced by a too powerful excitement. It must however be remembered that the case of the laryngeal muscles is very different from that of the heart. In the former, there is no opposition to the muscles being thrown into contraction, while in the heart there are influences at work which cause movement, and these must be overcome by a stronger influence ere the heart can be brought to rest. As it is, however, none of the so-called "too powerful" currents are in ordinary cases able to completely arrest the heart's action for more than a few seconds: the influences which prompt the heart to contract

become so strong that stimulation of the vagus, be it ever so powerful, fails to prevent it.

The theory, that the inhibitory influence of the vagus upon the heart is due to exhaustion of the cardiac ganglia produced by over-stimulation seems to me irreconcilable with the following fact which I have repeatedly observed and demonstrated. If any irritating vapour, such as that of chloroform, ether, alcohol, acetic acid, &c. be brought before the nose of a rabbit, it instantly closes its nostrils and ceases to breathe—often for 30—40 seconds. Within three seconds after the cessation of respiration the heart comes almost to a stand-still, and continues to beat very slowly until respiration be re-established. This arrest of the heart is due to stimulation of the inferior cardiac branch of the vagus by the asphyxiated condition of the blood, for the slowing of the heart does not set in until death approach, if the vagi have been previously divided. The perfect calmness with which a rabbit will often sit with its heart almost stopped seems to forbid the idea that in such a case the vagi are over-stimulated.

Wundt has said (*Verhandlungen des naturhistorisch-medizinischen Vereins, Heidelberg*, 1860) that curara produces such an influence upon the vagus that its irritation no longer slows but quickens the heart. As shown by Von Bezold, this substance, and also atropia, paralyse the inferior cardiac branch of the vagus; that is to say—they so affect the nerve that its stimulation however powerful does not retard the heart's action. In a rabbit I divided both vagi in the neck and stimulated the lower end of one of the nerves with a powerful current. (Secondary 40 mm. distant from primary coil. One Daniell.) The heart's action was arrested. I then injected $\frac{1}{60}$th grain sulphate of atropia into the jugular vein. When two minutes had elapsed I stimulated the same nerve with a current of the same strength. The heart's action instead of being arrested as before was quickened. This acceleration took place when the animal exhibited no signs of excitement, and it seemed to indicate that in the inferior cardiac branch of the vagus there are cardiac *motor* fibres which are not paralysed by sulphate of atropia; but another experiment proved that a different explanation is necessary. In a rabbit I divided the *inferior cardiac branch of the right vagus* after having cut the *trunk* of the nerve on the *left* side of the neck. I then severed the *trunk* of the *right vagus* in the neck and irritated its lower end. The heart was quickened, as in the former case; and this, although the electricity was carefully localised, and thereby prevented from reaching the inferior cervical ganglion and its cardiac nerves. I observed that the laryngeal muscles, œsophagus, stomach, and intestines, were thrown into violent movement by the irritation; and it occurred to me that possibly the excitement of these organs might produce an influence on the cerebrum or medulla oblongata sufficient to excite the cardiac motor nerves. The quickening could not be ascribed to increased blood pressure, for irritation of the lower end of the vagus produces scarcely any effect thereon. This experiment seems to me to give the finishing blow to the notion that the vagus is a motor nerve of the heart.

The foregoing experiments lead me to regard the inferior cardiac branch of the vagus as an inhibitory nerve of the heart, and also to think that it cannot, in any sense, be looked upon as one of its motor nerves. I can only account for the discrepancy between my results and those obtained by Lister, Schiff, and others, by supposing that they frequently regarded the effect of general excitement upon the heart's movement as the direct result of irritating the vagus, or as Eckhard has hinted (*Experimental Physiologie*, 1867, p. 201) that the currents which they employed were not sufficiently localised in the vagus, and thereby prevented from reaching the sympathetic (motor) nerves of the heart.

The arrest of the evolution of energy in the cardiac ganglia seems to be owing to a direct action of the nerve upon the ganglionic cells. It has been shown that the nerve ends in the cells. Brown-Séquard and Traube suppose that it is a vasomotor nerve for the coronary vessels, and that the arrest of the heart during its stimulation is due to spasm of these. This theory seems to be irreconcilable with the fact observed long ago by Erichsen, and confirmed by Von Bezold, that closure of the conorary arteries produces no immediate change on the heart's movements. Irritation of the vagus usually arrests the heart within a second or two. Moreover, after the

heart has been for some time stopped by excitation of its inhibitory nerves it again begins to beat, and notwithstanding the continuance of the irritation it often attains its former speed. This seems to be due to increased blood pressure in its right cavities, exciting the incident nerves of the ganglia so powerfully that the inhibitory influence is no longer able to prevent the evolution of energy from taking place within them.

Effect upon the Vascular System of Division of the Vagi in the Neck.

(a) *Effect on the Rate of Cardiac Action.*

The majority of observers agree that after division of both vagi in the neck the heart usually beats with increased rapidity. On the other hand, Lister (*Proc. R. S.* IX. 374) divided the vagi four times in rabbits and once in a calf, and found that in no case was the heart accelerated. According to Von Bezold it is quite exceptional for division not to be followed by increase in the heart's speed. He considers that this only occurs when the heart is acting with unwonted frequency previous to the section, thereby indicating that the vagi are exercising no restraint upon it. My experiments show that non-acceleration of the heart is by no means uncommon after such an operation. The probable cause of this will presently be explained.

Cause of the Increased Rapidity.

Dr John Reid ascribed the quickened cardiac action to "the struggles and terror of the animal produced by division of the nerves." (*Physiological Researches*, 1848, p. 132). Undoubtedly this is to some extent true, but I have frequently noticed that the quickening took place when all struggling was prevented by a small dose of curara.

Moleschott (*Jl. de la Physiologie*, v. 131) believes that irritation of the inferior cardiac nerve produced by its section is the cause of the acceleration. But even were this a motor nerve of the heart, it would be difficult to believe that the

irritation due to an incision could produce a change in the heart's speed lasting for hours.

Brown-Séquard (*Jl. de la Physiologie*, v. 656) believes that it is owing to the stimulating influence upon the cardiac motor nerves of an excess of carbonic acid in the blood. This theory is plausible, for it is well known that after division of both vagi the respirations usually become much slower. But I have observed the acceleration in cases where in order to prevent asphyxia I maintained a thoroughly hyperoxygenated condition of the blood by artifical respiration both before and after division of the nerves. Further, recent researches by Voit and Rauber (*Centralblatt*, 1868, No. 47) show that until the pulmonary textures undergo inflammation the increased *depth* of the respirations after division of the vagi entirely compensates for their diminished frequency, so that the amount of oxygen and carbonic acid in the blood undergoes no change.

These facts therefore seem to me to show that an asphyxiated state of the blood cannot be regarded as the cause of the acceleration of the heart.

Von Bezold (*Untersuch. über die Innervation des Herzens*, 1te Abtheilung 1863, p. 84) thought that the cardiac inhibitory filaments of the vagi are in *constant* action, and to freedom from their restraint he ascribed the acceleration of the heart which follows their division. At the present moment this theory is generally believed. Its importance is such that it demands a most careful examination of the data upon which it rests. The only fact advanced is that section of the vagi is generally followed by accelerated cardiac action. It occurred to me, that if this be only due to loss of the inhibitory power of the inferior cardiac branches of the vagi, no acceleration of the heart's action ought to follow division of the vagi, if these have been previously paralysed by Sulphate of Atropia (vide supra). Accordingly in 9 dogs and 4 rabbits I paralysed the cardiac inhibitory branches of the vagi by sulphate of atropia, and found that in 5 dogs and 1 rabbit, division of the vagi in the neck was followed by increased speed of the heart. The following experiment is also of great importance. In a rabbit I divided the trunk of the left vagus and the cardiac inhibitory branch of that on the right side. No change in the heart's

speed ensued, but when the *trunk of the latter nerve* was divided in the neck *decided acceleration was the result.* It is therefore certain that the increased activity of the heart which follows section of the vagi may be due to division of other filaments than those which retard the heart's action.

The consideration of this will be resumed when we have attended to another effect of the section, viz.

(b) *Effect on the Arterial Blood-pressure.*

Bernard, Volkmann, Jacobson, Ludwig, Traube, Von Bezold, and others have observed that section of the vagi is generally followed by a rise in the arterial blood-pressure. So far as I can make out every one has ascribed this change to the accelerated action of the heart, but I have repeatedly observed that the heart's speed may undergo very considerable variation without producing any change in the blood-pressure; for example, in a rabbit the heart beat 228 times in a minute, and very shortly afterwards the number was only 180, yet the mean pressure remained constant. In another rabbit the mean pressure was the same, although at one time the heart gave 204 and at another only 156 pulsations in a minute. Moreover in another instance I found on dividing the vagi of a rabbit that although the arterial pressure rose to the extent of half an inch the rapidity of cardiac action remained the same. It is therefore evident that the rise in the blood-pressure which follows division of the vagi must in general be ascribed to another cause than the heart. By a number of experiments I have proved that this is to be found in the state of the abdominal blood-vessels, chiefly those of the stomach. If the vagi be divided during digestion the blood-pressure rises, while if the animal be fasting it usually undergoes no change. This remarkable fact will however be more clearly comprehended after a brief account has been given of what is known regarding the

INNERVATION OF BLOOD-VESSELS.

By the investigations of Bernard and Brown-Séquard, it has been established beyond a doubt that the contractile elements of the blood-vessels are supplied by motor nerve filaments derived from the sympathetic. Diminution in the calibre of blood-vessels is produced by the action of these nerves. According to Ludwig and Thiry the most general centre for the vasomotor nerves is situated in the medulla oblongata. Lister (*Phil. Trans.* 1859, p. 625) supposes that it exists throughout the whole spinal cord and in the posterior part of the brain in frogs at any rate; and further, his observations on the changes which the vessels of the frog's web undergo after division of the sciatic nerve lead him to suppose that there exists in the *limbs* of that animal "a local co-ordinating apparatus—probably ganglionic—capable of independent action, although, under ordinary circumstances, in strict subordination to the spinal system."

The existence of these ganglia in the limbs has not as yet, however, been demonstrated.

The cerebro-spinal vasomotor centre is in a more or less constant state of activity whereby vessels are usually maintained in a state of semi-contraction. The amount of contraction may be increased or diminished *reflexly*, that is, by the action of incident nerves upon the cells of the vasomotor nerve centre. Bernard was the first to show by experiment that vessels may be dilated by the irritation of certain nerves. He found that this takes place in the sub-maxillary gland when the chorda tympani, and in the parotid when the auriculo-temporal nerve is stimulated. He also discovered that dilatation of the vessels of the ear in rabbits follows irritation of the central end of the auricular nerve. The dilatation in this case is preceded by slight contraction. Lovén (Ludwig's *Arbeiten*, 1866, p. 1) has confirmed this observation of Bernard's, and has shown that dilatation of vessels in the leg of the rabbit succeeds irritation of its afferent (sensory?) nerves; in short, that dilatation of the vessels of a part may be produced by reflex action. Like Bernard, he found that transient contraction of the vessels generally precedes the dilatation so induced.

Eckhard (*Beiträge*, Giessen, 1863) and Lovén (*Lib. Cit.* p. 18) have shown that irritation of the nervi erigentes in the dog produces erection of the penis by causing dilatation of vessels.

Dreschfeld (Bezold's *Untersuchungen*, 1867, p. 326) found that the blood pressure is lowered owing to dilatation of blood-

vessels when the cranial end of the vagus is irritated in the neck. But the most remarkable instance of a nerve capable of producing vascular dilatation was discovered by Cyon and Ludwig (*Sächs. Acad. Bericht*, 1866, p. 307; *Jl. de l'Anat.* 1867) to be the superior cardiac branch of the vagus. When the cranial end of this nerve is stimulated, dilatation of abdominal vessels takes place without any previous contraction.

These facts seem conclusively to show that the contractile elements of the blood-vessels are like those of the heart presided over by two systems of nerves, one motor, the other inhibitory. The dilatation effected by the inhibitory nerves is passive, and is simply due to the elasticity and blood-pressure being no longer opposed by the contraction of the vessel. The inhibitory nerves, whether they convey influences to the medulla oblongata, salivary glands, heart, or penis, seem always to end in ganglia; in short, they appear to end in vasomotor nerve cells whose evolution of energy they are capable of diminishing. Perhaps these vaso-inhibitory nerves form a system distinct from those which convey influences to produce reflex *action* or sensation.

The facts observed by Bernard and Lovén admit, as the latter has shown of the general statement, that the vessels of a part may be *dilated* by nervous action. A similar idea however has long since been entertained regarding the congestion in inflamed parts. But although facts already ascertained render this idea extremely probable, its truth has not hitherto been demonstrated; for no one has succeeded in actually showing that these vaso-inhibitory nerves *are* in action during congestion of a part which is the seat of active nutritive change.

In numerous experiments upon dogs and rabbits, I have found that if the vagi be divided *during* digestion, the blood-vessels of the stomach, which are then in a state of dilatation contract. The blanching which takes place is usually quite perceptible to the naked eye. There is no evident change however when the division of the nerves is made during fasting; the blood-vessels being then already in a semi-contracted state. This fact shows that during digestion, influences pass through the vagi to keep the vessels of the stomach dilated. These travel *from* the stomach *to* the medulla oblongata, and not in

the contrary direction, because, when the vagus is cut across and the gastric portion excited, no change in the vessels ensues; while if the cranial end be irritated, these although they are often contracted are also sometimes dilated[1]. The influences which pass to the medulla appear to inhibit the splanchnic nerve filaments supplying the gastric vessels, because section of the vagi produces no change in the blood-vessels of the stomach, if the cervical portion of the spinal cord, or the splanchnic nerves have been previously divided. The conclusion at which I have arrived is—that whatever be the action of the vis á fronté in producing congestion of a part—its chief cause is the action of the tissues upon their vaso-inhibitory nerves whereby the vessels are partially or completely paralysed.

As I have already said, it is the state of the gastric blood-vessels which in general determines whether or not the blood-pressure will rise on section of the vagi. In 3 dogs and 4 rabbits I divided the vagi *during digestion*. In all, the blood-pressure rose. I divided the nerves *during fasting* in 3 dogs and 6 rabbits. In 2 of the former and 5 of the latter the blood-pressure underwent no alteration, while in the third dog it was slightly increased, and in the sixth rabbit it was diminished. In many of these experiments I guarded against the possibility of increased cardiac speed or struggling after division of the nerves—being the cause of the increased pressure, by paralysing the inferior cardiac branches of the vagi by sulphate of atropia, and the voluntary nerves by curara.

The increased speed of the heart which follows division of the vagi seems in general to be *owing to the increased blood-pressure*. I have come to this conclusion from finding that in 6 dogs and 2 rabbits, whose *inferior cardiac nerves were paralysed by sulphate of atropia*, division of the vagi was followed by increased blood-pressure and cardiac rapidity. Like other observers I have found that increased blood-pressure is not always followed by increased cardiac action (vagi being divided); in 1 dog and 1 rabbit the rapidity was unaltered, while in 1 dog

[1] This seems to be owing to the fact that the vagus like most afferent nerves contains filaments which produce vascular contraction, as well as those which bring about dilatation. As regards the gastric vessels the result of dividing the vagi is more satisfactory than that of irritating the upper ends of the nerves.

and 1 rabbit it was slightly diminished although the pressure was increased.

In a fuller account of my experiments I will detail a number of other points of less importance than the foregoing which this research has brought to light. I will now briefly sum up the *chief* results of 120 experiments which I have performed with reference to this question.

1. The inferior cardiac branches of the vagi are inhibitory nerves of the heart, and their function cannot in any sense be regarded as motor.

2. There is no evidence that they are in constant action as Von Bezold and others have supposed: indeed a state of activity seems to be the exception.

3. The increased rapidity of cardiac movement which often follows division of the vagi in the neck may be owing to increase of the blood-pressure merely.

4. The increased blood-pressure which often results from section of the vagi is not in general due to increased rapidity of the heart's action, but to contraction of the gastric blood-vessels.

5. Additional support is given to the theory that the contractile elements of the entire vascular system are presided over by two kinds of nerves, one motor, the other inhibitory. The former brings about contraction, the latter throws the motor nerves and contractile elements into a state of rest.

6. The vessels of the stomach are dilated during digestion chiefly by the vaso-inhibitory action of incident filaments of the vagi upon the splanchnic nerves.

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CHLORIDE OF AMMONIUM

A

SPECIFIC THERAPEUTIC AGENT

IN THE

TREATMENT OF HEPATITIS AND ABSCESS OF THE LIVER,

WITH ILLUSTRATIVE CASES

BY

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PREFACE.

The pages which follow have been drawn, to some extent, from a paper, "On the use of Chloride of Ammonium in the Treatment of Suppurative Hepatitis, and chronic affections of the liver," contributed to the Lancet in the latter part of December 1869, and which was published in that Journal of May 7th, 1870.

At that time, I cherished the belief, that a more extended experience in the use of "the remedy" would not fail to furnish fresh proof of its efficacy, in certain hepatic diseases—and so far, I am glad to say, my most sanguine expectations have been fulfilled. It now remains to be seen whether it will prove equally efficacious in a variety of climates, and in other hands, and whether I am justified in now conferring on it, for the first time, the title of "a specific" in the cure of Hepatic affections. Time will decide both points; meanwhile I have received favorable accounts, concerning its use, from Tonghoo a place which is said to be somewhat similar to Hyderabad Deccan in climate, where Hepatitis is so prevalent and fatal.

The season of the rains in India, is rapidly approaching, in which, and in the succeeding cold season, many fall victims to the hepatitis which then prevails. I am induced therefore to lay the following pages (hastily put together and sensible of their faults) before my professional brethren in this country, believing that they will be serviceable in the alleviation of suffering, the saving of life, and, in however slight a degree, the advancement of the healing art.

If, however, we desire to attain success, we must deserve it; and if, in the course of a severe and protracted illness, the means recommended in these pages, be faithfully and carefully carried out, in most cases, success may be confidently expected; but on the contrary should, a desultory practice be followed, and the medicine be not regularly and perseveringly administered, and attention to the diet and nursing be not strictly enforced, nothing but disappointment need be looked for.

W. STEWART M. D.
Surgeon 2-21st *Fusiliers.*

Rangoon,
3rd June 1870.

CHLORIDE OF AMMONIUM

A SPECIFIC IN

HEPATITIS AND HEPATIC ABSCESS.

Hepatitis is a disease, which is the cause of much sickness, invaliding, and mortality, among the European forces in India, and its tendency to eventuate in hepatic abscess, renders it one of the most formidable with which the practitioner in this country, has to contend. The treatment of suppurative inflammation of the liver is acknowledged on all hands to be very unsatisfactory; mercury is not only useless, but pernicious, and we search in vain among the numerous text books, for a therapeutic agent of sufficient efficacy to combat the disease.

Such being the case, I am induced to bring to the notice of the profession, a remedy which has proved of signal value in my hands, in the numerous cases in which it has been employed by me, and I may add, also, by others who have witnessed its remarkable success, and have in consequence been induced to give it a trial.

Chloride of Ammonium has been for a long time used by the Germans in frequently repeated small doses in hepatitis, and both the Germans and French, esteem it a valuable remedy in many

diseases, in which we either employ mercury, or other alterative deobstruents. Morhead in his researches, in a foot note states, that he has no experience of the remedy, but says the Indian practitioner will do well to try it. Dr. Clement Williams now of Mandalay, formerly in the 68th Light Infantry and first Political Agent at Mandalay, informed me that, when in his regiment, he was in the habit of using the Chloride of Ammonium in hepatic affections with marked success.*

Should a more extended trial in other hands, and in other parts of India, under a variety of climates and circumstances, contribute on the whole to like favorable results, the much dreaded suppurative hepatitis may be as effectually controlled and cured, as its twin associate dysentery, by the reintroduction of the Ipecacuanha treatment in large doses—thanks to the labors of a few Army Medical Officers.

Before proceeding to the cases which I am about to give, it will be necessary to make some brief remarks on the disease and its general treatment, for the better explaining the action of the Chloride of Ammonium, the stage of the disease in which it is applicable, and the points to be observed in its administration.

When hepatitis occurs in an individual of good diathesis, and is seen early and met by judicious treatment, the symptoms, local and general, will

* Most systematic writers on the practice of Medicine, in treating of hepatitis, make no mention of Chloride of Ammonium in its treatment; a few, allude to it cursorily, among the medicines which have been recommended in Chronic hepatitis (cirrhosis) (*Watson, Tanner*), or as an eliminant when suppuration has taken place *Morehead*), or merely as a mild tonic in Hepatic abscess. (Copland).

for the most part gradually disappear, and the patient be restored to health. It is found however in actual practice, that in consequence of bad diathesis, advanced stage, or other cause, recovery by resolution does not take place, suppuration occurs, and hepatic abscess is formed. It is of importance to detect this event promptly and without hesitation, and to mark its progress, because it calls for a line of treatment different from that suitable to the antecedent stages.* In the earlier stages, the antiphlogistic regimen and treatment are indicated according to the acuteness and severity of the symptoms, local and general, and the constitution of the patient. Should there be no accompanying dysentery, a mild purgative may be administered at the commencement, with a view of clearing out the primæ viæ and relieving congestion of the portal circulation; afterwards saline diaphoretics and diuretics, in frequently repeated small doses, should be administered; till their action is well established, after which, they may be given in larger doses, and at longer intervals. I have found a mixture containing Liquor Ammonice acet: drs. ii. with Tinct: Hyoscyami m. v. in each dose, administered every half hour or hour, to give most relief, allaying the feverish symptoms and calming the nervous system: while the administration of from Dr. ss. to Dr. 1. of the latter (Tinct: Hyoscyami) at bed time, after the repeated small doses during the day, will often have the effect of inducing a a little refreshing sleep, a point of great importance in this disease. The local application of ice, for a considerable period, watching well its effects, or fomentations, or bran poultices to the seat of pain in the right hypochondrium, will also act as

* See Morehead's Researches.

powerful auxiliaries and give much relief. In some few cases, the application of six or eight leeches, when there is much pain and tenderness and the patient is not reduced, may be necessitated, but in general even this amount of local depletion is not required.

The diet should consist of arrowroot, sago, milk and water ; barley water may be taken freely as a drink, and afterwards beef tea may be allowed.

By a careful adhesion to the above system of treatment in a considerable number of cases, in which the inflammation has not gone beyond the stage of vascular turgescence or commencing exudation, resolution may be effected ; and here it must be borne in mind that complete restoration of the inflamed portion or portions of the liver, (for it is rarely that general inflammation exists,) is not coincident with the cessation of febrile symptoms and local sense of pain, and symptoms referable to the affected part; in fact, recovery must be considered incomplete till several days have elapsed from the cessation from pain and febrile disturbance.*

During this time, the patient must be confined to bed, with strict attention to diet, carefully watched, and any derangement of secretions corrected by gentle means. But the symptoms instead of being removed may be only moderated by the above treatment ; exudation of plastic lymph may have taken place, degenerating into pus and terminating in abscess, the deranged state of the capillary circulation in its immediate neighbourhood preventing its removal by absorption.

* See Morehead's researches.

On the other hand it frequently happens, especially in Military practice, that the disease does not come under treatment in the early stages, and not till the peculiar symptoms pointing to abscess either impending or already formed, are manifested. In either case, the treatment above described as suitable in primary acute hepatitis is no longer indicated, the treatment must now be tonic and restorative,—the diet should consist of milk, light puddings, broths or animal jellies,—and wine or other stimulants may be cautiously administered, if these do not excite the pulse, or produce irritation of the gastro-intestinal surfaces.*

At this period of the disease, when the acute symptoms have been allayed, and suppuration is either threatened or already established,—or, in the event of the patient having come under observation in the primary acute stage, as soon as the symptoms, local and general, shall have been abated, and diaphoresis freely established, by the means described at page 3, the Chloride of Ammonium should be administered in doses of grs. xx. morning and evening, noting carefully its effects, which are striking and remarkably regular in the order of their occurrence.

As a general rule, about fifteen minutes after taking the medicine, the patient experiences a sensation of warmth in the epigastrium, which, by and by extends, pervading the abdomen, and gradually becomes diffused over the entire cutaneous

* Chloride of Ammonium, being itself, a general stimulant, does away with the necessity for the employment of alcoholic stimulants, in the considerable quantities otherwise required; and unlike them, exercises, I believe, a specific therapeutic action on the liver, instead of tending to increase the diseased condition, which it is our object to remedy.

surface. The nervous system is at the same time exhilirated sympathetically, and probably also through the circulation, for the patient now feels "light headed," (as he generally expresses it), and at times drowsy. The acute pain previously experienced, in the right hypochondrium and along the margins of the lower right ribs, extending, as the case may be, forwards across the epigastrium, or backwards to the lumbar region, is either entirely removed, or in its stead, pain is sometimes referred to a point higher up, and towards the base of the axillary region, where before, none was complained of. At this stage of the operation of the remedy, patient often falls asleep relieved of all his distressing symptoms.

After the lapse of another quarter of an hour, a free and equable perspiration takes place over the entire surface, which lasts for a period varying from one to two hours: in the mean time, the pain which had shifted from the lower margins of the inferior ribs of right side, will again manifest itself, at or near its original position, or may be referred to one totally different, as the lumbar region, or even the right hip. With the evening dose, similar effects will be observed to take place, with like regularity and certainty; and with each succeeding one, the interval of relief from pyrexia and pain referred to the part affected, as well as sympathetic pains of shoulder, arm etc. (which latter are at times distressing), will gradually become longer, till at length, in favorable cases, the relief becomes complete and constant. After several doses of the medicine, the urine is much increased in quantity, (particularly in the cold season), is limpid, and passed without uneasiness. The increase is chiefly at night, causing the patient to awake

suddenly, perhaps three or four times, for the purpose of micturition. *

After a few days the appetite is much improved, and patient craves for more food, which may be given provided it be light, nutritive and easily digested; but solid food should on no account be permitted, as its ingestion would in all probability provoke a recurrence of all the acute symptoms.

During the use of the medicine, care must be taken that patient does not catch cold when perspiring; and when perspiration has ceased, the surface should be dried with warm towels, otherwise chills may be experienced.

In no standard work on Therapeutics which I have consulted, do I find the slightest allusion to the above remarkable train of effects following on the exhibition of Chloride of Ammonium. In

* The effects on the pulse, taken in conjunction with the above, may be interesting. The observations were made in the case of a patient suffering from Hepatitis, and may be taken as an illustration of the effects generally.

Before taking medicine.—Pulse 78, full and regular. Skin cool and dry. Complains of pain in right hypochondrium, and along the margins of the right lower ribs.

8 Minutes after taking Medicine.—Feeling of gentle heat in epigastrium which gradually pervaded the whole body. Pain shifted to axillary space.

30 Minutes after taking Medicine.—Pulse 82. Soft and compressible. Surface bathed in perspiration and a little above the normal temperature.

1 hour after taking Medicine.—Pulse 68. skin below normal temperature. Perspiration gradually ceasing. Patient feels comfortable.

2 hours after taking Medicine.—Pulse 76. skin covered with perspiration. Temperature normal, pain returned to a point midway between the margins of ribs and axilla.

one work it is described as a general stimulant, in another as a diaphoretic, while in a third it is merely noted as a laxative. In one only is it said to be useful combined with taraxacum in cirrhosis. The remarkable effects so constantly following its use in hepatitis are nowhere mentioned.

The silence of authors on the above points, coupled with the fact that in some cases in which I have used it, either as an experiment in health, or as a remedy in diseases, other than hepatitis, it has either been without appreciable effects, or, if any, these have been but slight, and not characteristic, seems to point to the inference that the medicine is not only a specific in certain hepatic affections, but that its peculiar action, being manifested in any given obscure case, may be considered as diagnostic of hepatic disease. The above observations however are thrown out as only probable, and suggestive of further enquiry.

A remedy which is at once found to possess the several properties of a stimulant of the capillary circulation, general and special, which is at the same time a powerful diuretic and diaphoretic, and withal anodyne, cannot but exercise a remarkable influence on the processes of nutrition and absorption, secretion and excretion.

The secretions of the skin, kidneys, and liver, abound in salts ; one of these organs may therefore become vicarious of another in removing those matters from the system. The researches of Dr. Beale also render it probable "that in disease, cer-"tain saline substances are accumulated, in large "quantity, at the seat of disease, at the expense "of some secretion of which they form a normal "constituent."

By its marked diuretic effects, solely, Chloride of Ammonium is capable of exercising a powerful influence in relieving the portal circulation, and bringing about a healthy state of the capillary circulation of the liver, thereby causing absorption and elimination of diseased products. In veterinary practice, says Dr. Joy *(Library of Medicine)* diuretics are used with excellent effects in combatting pulmonary, and other internal inflammations, as well as for getting the animal speedily into condition, and improving the state of his hide, and it is probable they are capable of more extensive application than is commonly supposed.

The cases which follow will serve to illustrate the treatment pursued in many others, and, I may add, with equal success. The first, is a case of well marked acute hepatitis, the second, third, and fourth, are cases of hepatic abscess, and the fifth, which serves to illustrate the efficacy of the remedy in chronic hepatitis, is by Dr. W. Alexander, Staff Assistant Surgeon (formerly doing duty with the 2nd Battalion 21st R. N. B. Fusiliers) and is given verbatim.

Case I. Pte. A. McK.—Upwards of six years in India. (had an attack of hepatitis in 1865.) Admitted on the 18th September 1869, complaining of acute pain, of right side, extending from the epigastrium round the margins of lower right ribs to spine—aggravated on the slightest pressure; severe pains of right shoulder, extending down outer side of right upper arm; unable to lie on left side on account of dragging pain in right hypochondrium when in that position. Complains also of severe pain at intervals of some minutes shooting through temples ; burning pain in eyeballs; skin hot; tongue furred (white); pulse frequent. The above symptoms, in a minor degree, had been present for some time previous to admission—evening chills with cold clammy sweats and general pyrexia—towards early part of night. Was ordered a tepid bath with cold applications to head—bran poultice to side and to have Mist Diaphoret. oz. i. with Tinct. Hyosc. m. v. every two hours.

20*th.*—Febrile symptoms have subsided; pain of side and shoulder much abated. To have Chloride of ammon. grs. xx in oz. ii. Cinnam:water, morning and evening; Beef Tea diet and lemonade as drink.

25*th.*—Is much better, Continue medicine.

28*th.*—Since the 26th complete freedom from pain of side and shoulder; cutaneous and renal secretions much increased; appetite improves can take deep breath and lie on left side without pain or uneasiness.

2*nd.* Oct.—Discharged convalescent. *

Case 2 Dr. D. B.—Nearly two years in India, admitted on the evening of the 5th Oct. 1869. Complained of purging frequently during the day and previous night, also of acute pain over entire surface of abdomen. There was great tenderness over right hypochondrium and abdomen generally, and the slightest pressure of the finger caused great increase of pain—Countenance expressive of suppurative hepatitis—anxious, pale and bathed with cold perspiration, tongue coated; skin dry but of natural heat; pulse frequent.

Owing to the great severity of the pain, six leeches were applied to the side and the patient had a tepid bath with much relief to the symptoms, local and general. Had Ammon: Chlor: grs. xx.—and in case the purging continued, was ordered, Pil:—Hydrarg: gr. viii; Pulv: Ipecac: Comp. gr. xii. m. divide in pil: iv:—one to be taken every two hours.

6*th.*—After consultation this morning it was agreed that the case was one of undoubted abscess of the liver, of a severe nature, and in which the prognosis was anything but favourable. Surface was now cold; face and hands bedewed with cold sweat; pulse 92, small and weak; was not purged during the night. To have brandy flip and three pints beef tea as nourishment. 1½ P. M. surface still cold, pulse 92,—another brandy flip, continue bran poultice, and to have Ammon: Chlor: grs xx. 4 P. M. surface warm, pulse 92, perspiring freely; passed a large quantity of high coloured urine during the day. To repeat Chlor: Ammon:—

7*th.*—Bowels moved five times during night, motions feculent; passed urine six times during the night; perspired a

* *Note.*—After attending hospital for a short time this man returned to his duty and up to date 26th Decr. 1869 has had no recurrence of pain or other symptoms and his general health is better than it had been for a long time previously.

good deal. Repeat pills ordered on the 5th, to take one every two hours. Beef tea diet, four ounces port wine.

8*th.*—Pulse 84, feels better, bowels quiet.

11*th.*—Pain of side much relieved, looks better, bowels regular. Had some sleep during the night; pulse 80. Complains of short dry cough which commenced yesterday about noon and continues to be troublesome. Tea diet, two pints beef tea, two pints milk, six ounces port wine, and barley water for drink. Continue medicine.

17*th.*—Since last report has continued pretty much the same with slight accessions of pain in side and febrile symptoms from time to time; last night pain was very severe, easier this morning. Continue medicine; apply ice to side. *Vespere*—Feels the ice agreeable, pain easier—pulse 76.

18*th.*—Much relieved, slept well last night, appetite good. Continue Chlor: ammon:—

27*th.*—Since last report has continued gradually to improve; appears cheerful this morning, feels and looks much better; Can lie on either side with perfect ease; on taking a deep inspiration feels a slight catch in breathing. Continue Chlor: ammon:—

20*th Novr.*—Since last report his health and spirits have improved daily; is now able to move about the ward without pain or uneasiness; fulness of side, which was observed from an early period of the disease, has disappeared and patient can bear considerable pressure over hepatic region without pain.

Note.—Up to date, (20 Decr. 1869) Patient has continued in hospital convalescent and is now taking Chloride of Ammonium in grs. xv. doses twice a day; his appetite is good and he is gradually gaining strength.

Case 3.—Drummer J. S. 2-21st Fusiliers, 5 years in India, admitted into Hospital on the 21st December 1869, complaining of acute pain and tenderness over the entire abdomen, towards evening pain of right hypochondrium was also complained of, Decubitus dorsal, unable to turn on either side, or take a deep inspiration. Countenance sallow and anxious, skin hot; pulse frequent, tongue furred, white; six leeches were at once applied to affected side, after which he had a tepid bath, and bran poultice to right hypochondrium. Was ordered Liquor: Amon: acet. Drs. ii, with Tinct. Hyoscyami m. v, every half hour. Barley water to drink.

22*nd*.—Abdominal pain relieved. Pain of right side and along inferior margins of lower right ribs continues, the slightest pressure being intolerable. Skin cool and moist, pulse frequent; to have Chloride of ammonium grs. xx, twice daily. Beef tea two pints; barley water four pints.

23*rd*.—(*Vespere*).—Was seized with sickness of stomach, and vomited a quantity of green bilious fluid, when he says he "felt something tear" in his right side.

December 24*th*.—The medicine yesterday had the effect of relieving local pain and tenderness, and induced free action of the skin and kidneys, Pulse 102, irritable; skin bathed in cold perspiration, Tongue cleaning;— pain of side relieved: feels weak. Ordered beef tea four pints, (to be boiled down to two). Six ounces of Port wine; barley water for his thirst.

Vespere:—During the day patient became alarmingly ill, and was, for a short time, semi-collapsed, requiring the exhibition of stimulants. etc., with the effect of restoring the pulse and heat of surface. Well marked hectic fever; surface bathed in cold clammy perspiration; countenance sunken, anxious and murky; pulse 124, small and irritable. Continue medicine; diet as before.

25*th*.—Expresses himself as better this morning. Slept some during the night. Pain of side relieved, but from time to time returns slightly. Each dose of the medicine brings the usual two hours or more of relief—Pulse 108; surface bathed in perspiration. Cont: med: Diet as before with two pints of milk.

26*th*.—Slept during the night—looks more cheerful, skin cool, tongue clean; pulse 98. Pain of side is now but slight. Expresses a wish to have the medicine more frequently,—owing to the relief from pain experienced after its ingestion; repeat the medicine, thrice daily.

27*th*.—Is better,—pulse 96—Cont: Med:

29*th*.—Since last report, hectic fever, with evening exacerbations and profuse sweating, has been present. There is considerable fulness of right hypochondrium and toward margins of right inferior ribs; but there is little pain of those parts except on pressure or lying on left side. Cont: Med: etc.

January 2*nd* 1870.—Since last report has steadily improved; Countenance bright and cheerful—Appetite improving. Cont. med, twice daily.

4*th*.—Still some fever, increasing towards evening. Is however on the whole improving and looks hopeful and cheery. Pulse 92, soft and pretty full. Cont: Med:

8*th*.—Progressing favorably—Pulse 88, appetite good. Fulness of right side gone, and moderate pressure over hepatitic region causes no pain. Febrile symptoms are now but slight.

11*th*.—Since last report fever has returned with evening exacerbations. Skin hot, pulse 104, irritable. Cont: Med: thrice daily.

12*th*.—Felt much better yesterday evening after midday dose, slept well during the night. Pulse, 90, skin cool and moist.

19*th*.—Since last reports has been almost free from fever; pulse 88, skin cool, appetite good.

23*rd*.—Is daily gaining health and strength; pulse 86, fuller and stronger.

27*th*.—Permitted to sit up a little during the day. Low pudding diet and two eggs.

February 9*th*.—Since last report has steadily improved in health and has been able to take exercise on foot in the hospital enclosure. Has taken no medicine for several days. Discharged to proceed to England with the invalids of the season, for change of air.

Case 4. 7*th May* 1870.—Private R. T. $11\frac{2}{12}$ years in India, was admitted into Hospital yesterday from off guard, doubled up with acute pain of right hypochondrium, extending round to loins and upwards to top of right shoulder, was unable to stand erect. Surface bedewed with cold perspiration. Had a bran poultice to his side, and an anodyne draught. For the past nine months has suffered pain from time to time in right hypochondrium, with accompanying chills at night, pyrexia, and cold sweating. The liver is enlarged and acute pain is felt at a point between the 5th and 6th ribs, midway from their extremities, aggravated on the slightest pressure. Decubitus dorsal—unable to lie on either side; tongue slightly furred, moist, broad and flabby, presenting at the sides, indentations of the teeth; skin perspirable; pulse of good volume, 84; urine high colored. Or-

dered Liquor ammon : acet. drs. ii, with Tinct, Hyoscyami, m. v, in barley water every hour. Six leeches over the seat of pain in right hypochondrium, and at 5 p. m. to have grs. xx, Chloride of Ammonium.

8th May.—The usual characteristic effects followed the exhibition of the medicine yesterday evening, but, (as in the case of Pte. F———, another case of hepatic abscess at present under treatment), patient felt a chill and a sensation of cold for some time before the sensation of heat commenced. (This phenomenon was however, a purely subjective symptom as was evidenced afterwards by thermometric observation, and may depend on difference of climate, the rains having just commenced). Patient felt drowsy, and fell asleep in about half an hour after the dose, and awoke, in an hour or so, as he expressed it, "light and refreshed, and able to bear the weight of his own body" which before distressed him. This morning he feels no pain in the recumbent position, and can move slightly in bed without pain; pulse 98. Tongue slightly furred. Continue Chloride of ammonium grs. xx, twice daily.

9th May.—Is much easier; no pain of side except on a deep inspiration; pulse 100; marked hectic symptoms have been present since yesterday, pointing unmistakably to the existence of Abscess of the Liver.

10th May.—Yesterday it was hot and oppressive and patient was bathed in perspiration, his pulse was weak and frequent and he was ordered four ounces of port wine. This morning he is much better; pulse 79, pretty full; countenance cheerful. Perspires much less. Continue medicine.

13th May.—Progressing favorably since last report; but there is slight pyrexia especially towards evening, evidenced in increased heat of hands and arms—and forehead and face feels hot at times. Pulse this morning 64, full and regular. To have a dose of simple diaphoretic mixture at 11 A. M, and again at 2 P. M.

15th.—Is much better; Diaphoretic mixture relieved the feverish symptoms; skin now cool and perspirable, tongue clean; pulse 62, appetite returning. Continue Chloride of Ammonium morning and evening; Liquor: Ammon: Acet: Dr. i. with Tinct: Hyoscyami: M. V. in the interval, as before.

18th May.—Doing well—pulse 56, full, slow and regular; port wine, four ounces.

26th May.—Since last report, has continued steadily to improve; tongue clean, smaller, not so flabby as formerly and indentations caused by teeth disappearing. Hepatic dullness commences over sixth rib of right side, and extends about half an inch below margin of right lower ribs in a gently curved line upwards towards epigastrium. Pari passu with the improvement of the symptoms, local and general, the action of the medicine has been less and less manifested, so that its effects are now not so marked.

30th May.—Since last report, patient has been allowed to sit up, from time to time, daily; he is now convalescent, and beyond feeling side a little stiff is free from pain or other uneasiness. The edge of the Liver can no longer be traced under the margins of lower ribs, and firm pressure causes no pain over the hepatic region.

Case 5. Chronic Hepatitis.—Pte. D. M. 2-21st Fusiliers. A stout muscular man of intemperate habits; with ten years service, six of which has been spent in India, was admitted into the detachment hospital at Port Blair on August 1st 1869, having a tumour which is described by the Medical Officer in charge, as follows:—

"A swelling the size of an orange was discovered in the epigastric region, exactly in the mesial line, perfectly circumscribed and immovable when grasped by the hand or when the body is turned on either side. He states that he strained himself a few days before admission and never saw the swelling until then."

He remained under treatment till the middle of September when he was forwarded to the Regimental Hospital at Rangoon, with the history of the case from which the above is taken. On presenting himself at Hospital he was carefully examined by both Dr. Stewart and myself: but we failed to detect any tumour or swelling of any kind. He was admitted however and kept under observation and in a few days the case was diagnosed as one of Chronic Hepatitis; the chief symptoms being a constant pain in epigastrium and hepatic region, a furred tongue, feeling of nausea after food and constipation. Leeches were applied followed by poultices, and Nitro-Muriatic acid, was administered with considerable benefit and relief; but it was not till I commenced to give Muriate of Ammonia in 20 grain-doses that he got rid of these symptoms: first the pain became less annoying and gradually ceased, the tongue cleaned, at the

same time the secretions (especially the urine) increased in quantity.

The effects of the medicine are described by the patient as producing a glow of heat and a feeling of warmth and comfort, followed by copious perspiration and an increase in the quantity of urine. Ten days after commencement of the treatment he was discharged well.

It will be seen that purgatives, commonly recommended at the onset of the disease, have been carefully avoided, and for this reason, that, I believe in many instances, the exhibition of such irritants, lays the foundation of the dysentery so often an accompaniment. A mild purgative may be prescribed at the outset, if indicated; but, with the use of Chloride of Ammonium, its repetition will seldom be required.

Counter-irritants, too, with the exception of sinapisms, in a few instances, have not been employed: blisters are contra-indicated, owing to their irritant action on the kidneys, which would prevent the due elimination of diseased products by those emunctories.

There is a risk also "that the cutaneous and "sub-cutaneous fulness, caused by serous effusion, "consequent on the irritation of a blister, may, "if present at, and below the margin of the right "ribs, be mistaken for the sign of liver enlarge-"ment, and an erroneous inference, in regard to "the progress of the disease, be therefore enter-"tained." *(Morehead.)*

It would be superfluous to give any more cases in detail—Many interesting ones, however, are on record in the Hospital books. Since the first of September 1869, from which time the systematic treatment of Hepatitis by Chloride of Ammoni-

um first commenced, (a period of 9 months) 31 cases of the disease, have been treated, either by myself, or the Assistant Surgeons of the Battalion; and of these, 6 were undoubted cases of Abscess of the liver, presenting the physical signs, the general symptoms, and the well marked hectic fever, diagnostic of the disease under such circumstances. In four of the cases, the hectic fever was severe; in one especially so, and accompanied with excessive wasting of the tissues, and extreme prostration of the vital powers, patient exhaling the cadaveric odor, at times observed in low and exhausting disease with typhoid symptoms.

Hepatitis is a disease of this Station, and has been the occasion of much mortality here, as elsewhere. From a statement, kindly furnished by Dr. Shelton, Principal Medical Officer, British Medical Service, I find, that in the Head Quarters 2-24th Regiment, Rangoon, and Detachment Port Blair, out of a total strength of 795, there were, during the year 1868, 32 admissions and 5 deaths from Hepatitis. "The P. M. in each instance shows the cause of death to have been hepatic abscess."

During the same period (1868) in the 2-21st, Fusiliers at Secunderabad, out of an average stength of 868, there were 86 admissions, and six deaths, from the same cause. The disease was treated on the usual expectant plan, and with a result not very satisfactory. Compare these figures with those which follow, and see how different the result obtained under the treatment by Chloride of Ammonium.

Since September 1st, 1869 to May 31st 1870 (a period of 9 months) there have been 31 ad-

missions from Hepatitis, at this station, out of an average strength of 608. Of these, 6 were undoubted cases of abscess of the liver, and in several, abscess was strongly suspected. All of the above were successfully treated, without a single death. It is also remarkable, that, since the arrival of the Battalion at this station at the end of December 1868, up to 31st May 1870, embracing a period of 17 months, there have been 58 admissions from Hepatitis and but one death. The fatal termination, in this instance furnishing negative proof, corroborative of the testimony already adduced, of the very great success of the Chloride of Ammonium treatment; for it is to be observed that the patient died at a period, antecedent to the introduction of that practice, that dysentery of a very severe type supervened, uncontrolled by any of the remedies employed, and that the autopsy revealed the existence of abscess, which occupied almost the entire liver, the structure of which, was reduced to a mere shell,—the large intestine was ulcerated throughout its entire extent, and in places gangrenous.

In not one of the cases treated by Chloride of Ammonium, was there the slightest tendency to Dysentery observed.

According to the Army Medical Department, Report for 1867, out of a total strength of 56,896 European Troops in India, there were, during the year, 3078 admissions from Hepatitis, and 157 deaths. During the same period 368 were invalided on account of the disease, and 96 were discharged the service at Netley.

I confidently look forward to a gradual and great reduction of this vast expenditure of life

and health, in time to come, if the means pointed out in these pages, be faithfully and earnestly carried out, recollecting that it is by attention to small, and seemingly unimportant matters, as regards regimen, diet and nursing, as much as by the prescribing of medicine, that success will be attained. The medical man must think nothing beneath his care and attention, particularly where untrained orderlies and soldier attendants, possessing no knowledge of nursing, are placed over cases of serious illness. The words of the poet are particularly applicable to affairs medical:

> "Think nought a trifle, though it small appear;
> Small sands the mountain, moments make the year."

At the risk of being considered tedious, and unnecessarily prolix, I cannot refrain from making the following quotation from a leading article in the Lancet of 30th October 1869, wherein the writer speaking of the difficulties which the Doctor encounters in civil life, in obtaining aid in the management of the sick room, goes on to say:—

"In all matters about which he (the Doctor) "may omit to give explicit directions, the most "fatal errors are frequently made. For example, "it is very common for patients to be killed, after "enfeebling illness, and when with proper care, "they would recover, by being suddenly raised "from the recumbent to the semi-erect posture for "the purpose of taking nourishment. No practi-"tioner who neglects to lay down very strict rules "on this point will fail, to have many unexpected "and sudden deaths amongst exhausted patients; "deaths for which he may not always be able to "account, but which may be shown, on enquiry, "to be traceable to the cause we have indicated."

Whether the patient be very low or not, the

condition of an inflamed liver, is not unlike that of an inflamed joint, demanding strict quiescence in the recumbent posture; and therefore a steady and intelligent attendant should constantly wait on the patient in all severe cases, and the bed pan, and urinal, should, at all times be at hand, so that the patient may not have the least occasion to quit his bed.*

In the foregoing pages my remarks have been chiefly confined to the therapeutic uses of Chloride of Ammonium in the primary acute stage of Hepatitis, and in Hepatic Abscess; in Chronic Hepatitis, however, it is equally efficacious, as is well illustrated in case 5. In short, I have found it valuable in hepatic affections of whatever form, whether depending on organic disease, or functional derangement. I have also found chronic dysentery, associated with chronic disease of the liver, yield to a few xx. grs. doses of the Chloride of Ammonium, after Ipecacuanha, and other remedies had failed; and I have before me, notes of the case of a young Officer, similarly affected, whose dysentery was checked after a few doses of 8 grs. each. † In such cases from v. to xx. grs.

* Whilst writing, an instance has presented itself, which shows forcibly, how easily a recrudescence of inflammatory action, may be brought about by a cause, which, at least, in this instance, was entirely under the patients control. A man in Hospital, suffering from a severe attack of acute Hepatitis, was suddenly seized with a recurrence of the acute symptoms, local and general, (after these had been allayed for a considerable period, by the previous treatment). The reason was easily discovered; on enquiry, I found, that the patient, having become tired of lying on his back, turned on his side for a short time, and in this simple manner caused the mischief.

† In passive congestion of the liver, I have found a few doses (grs. xx) of the medicine effect a remarkable reduction of the enlarged viscus, and afford great relief to all the symptoms.—In fact, the specific action on the liver, is manifested in almost all the diseases to which that organ is liable.

may be given, dissolved in ounces ii. of infusion of cascarilla, twice or thrice daily, according to circumstances: and to cover the saltish taste of the medicine, a little Ext; Glycyrrhizæ (say grs. v.) may be added to each dose.

It may be interesting to note the number of grains of the medicine administered, in the treatment of the 31 cases of Hepatitis, in the Hospital 2-21st Fusiliers, from 1st September 1869, to 31st May 1870, taken from a record kept by Passed Hospital Apprentice M. Devanboo, attached to the Battalion.

Total number of grains	21,926.
Average No. of grs. administered to each patient	707.27
Maximum do do in any one case *(abscess of liver)*	2,490.
Minimum do do do *(Hepatitis)*...	120.
Average do exhibited to each patient in 6 cases abscess of liver	1,428.
do do do do do in 25 cases Simple Hepatitis*	569.

*Several of these were strongly suspected to be cases of latent, and deep seated abscess.

It will be seen from the above figures that the Medicine is used pretty freely, and that in some cases very large quantities have been required; in fact its use should be persevered in, till its sensible effects be no longer manifested, or only in a slight degree; and it is well to continue it for sometime afterwards in smaller and more frequently repeated doses, in the event of liver enlarge-

ment, with feeling of stiffness, weight, or other uneasiness continuing. *

Since going to press, I have received the following letter with case from F. Maynard Esqr., Surgeon, Health Officer, Port of Rangoon, which, with his permission, I gladly publish.

The case is an interesting one, faithfully recorded, and well illustrates the therapeutic use of the remedy, and the chief points to be observed in its administration.

RANGOON, June 6th 1870.

MY DEAR STEWART,

I have much pleasure in sending you the notes of a case of Acute Hepatic Abscess under my care and which you kindly saw with me on two occasions.

Having had the advantage of reading your paper on the treatment of Hepatitis with Ammon : Chlor:, I have taken some care in noting its therapeutic effects throughout the treatment, and in the report have taken down the exact effects of the medicine, as described by the patient himself; and which seem to agree in a marked manner with the notes of those cases treated by yourself.

*It may be worthy of note, that in India, Chloride of Ammonium is obtainable at a cheap rate in the bazaar, under the Hindustani name ——(*Nowsadar*)—— (*Duk*)—— (*Nowsagar*). † I have obtained the salt sufficiently pure for medicinal purposes, in the Rangoon Bazaar for Rs. 1/12 per viss (equal to 3½ lbs. avoirdupois). I mention these facts, because, on one ocasion, while I had several serious cases under treatment, I ran out of the salt completely, and none was obtainable in the medical Stores, a circumstance likely to happen in Indian Mofussil Stations as hitherto the drug has been but little in demand, having been used chiefly in the prepartion of Cold and other lotions.

†The Burmese name, is, *Zaweza*.
In Tamil, it is called, *Nuraich-chlorus*.
In Ceylon, it is known under one of its Tamil names *Nacchchlorus*.

I would remark that instead of using the hot fomentations as usually adopted by you in Hospital practice, I find that in "private practice" it is better to use hot applications in a dry form, as from want of proper attention, or through neglect, or from the greater trouble in using hot fomentations, I seldom find my instructions carried out, and even if they are, the patient generally complains of great discomfort, and sometimes chilliness, from having his clothes, bed linen, and bed saturated, which often tends to produce evil results.

The plan I adopt, and which is easily carried out, is,—to place two bricks on a burning charcoal chatty, on the top of these I place 2 bags of the size required, and only ⅔ filled, with 1 part salt and 2 parts bran. I do not fill the bags, as they would not then become so readily conformable to the shape of part required.

The heat is retained longer then with hot fomentations and is much pleasanter to the patient, and I believe has an equally beneficial, if not better effect. One bag is always kept hot during the application of the other.

Although this is the first case of Hepatitis that I have treated with the Hydrochlorate of Ammonia, I shall (from the decided therapeutic effects I have seen produced in the treatment of my own recorded case, and from the experience I have gleaned from having had the opportunity of seeing the same treatment adopted with such success in your own Hospital) undoubtedly carry out a similar plan in all cases that may hereafter come under my care, and I trust and believe with like beneficial results. I sincerely hope that the perusal of your pamphlet may lead more medical men to give this treatment a trial, and I feel sure that if the rules laid down are properly carried out, they will meet with similar success to cases recorded, and will look upon the Ammon : Chlor : as an almost specific therapeutic agent in the treatment of Hepatitis. If you think my report of any interest I leave you to make what use you please of it.

I remain

Yours sincerely,

F. MAYNARD.

Case of Acute Hepatic Abscess under the care of

F. MAYNARD *Surgeon.*

Health Officer, Port of Rangoon.

May 4th 1870.—10. 30. A. M. Mr. W———ætat 35, "Eurasian," born in Burmah (of highly nervous temperament, accustomed regularly to take his 3 glasses grog daily, besides exceeding when in company) visited me, and complained of acute pain in the right hypochondrium, extending over nearly the whole of right side of abdomen, and more especially severe in the iliac region, was unable to stand upright, or take an ordinary deep inspiration, and constantly cried out with pain. On examination found slight fulness below margin of right ribs, and great tenderness on the slightest pressure, over whole of right side of abdomen. Skin hot, pulse 126, an anxious expression of countenance, sallow complexion, tongue furred. Stated he had suffered from pain in hypochondrium for 6 days, that 3 days ago he had a distinct rigor, followed with fever, and that the pain had been increasing up to date. I advised his return home immediately, and ordered perfect rest, hot application to the side, and Pulv: Doveri grs. 8 immediately, and to repeat in 4 hours. At 2-30 was visited by Dr. Stewart and myself; found him lying on his back, with legs drawn up, and unable to move owing to the acute pain. His skin was slightly moist, and pulse reduced to 116 (excessive action of heart on first examination, probably attributable to the exertion of walking to see me under existing circumstances). Was unable to bear percussion, or the slightest pressure on any part of right side of abdomen. Ordered 8 leeches to side and Liquor. Ammon: Acet: Drs. 2 Tinct: Hyoscyami M. v. in barley water every hour, and at bed time Tinct: Hyoscyami Drs. i. Hot applications with salt and bran bags to be constantly applied after removal of leeches.

May 5th.—Passed a bad feverish night; had no sleep, pain more or less removed from iliac region and centered over the hepatic region, and especially just below the margin of right inferior ribs, where it was very severe; unable to bear the slightest pressure, or turn on either side. Bowels open once during the night, dark coloured and very offensive. Skin slightly moist, and pulse 102. At 9-15 A. M. administered Ammon: Hydrochlor: grs. xx. in cinnamon water, at 9-35—20 minutes after, he described that he had a sensation of warmth in the stomach, which gradually extended over the whole surface of body. General perspiration gradually followed, and the pain

in hypochondrium was sensibly relieved; and he began to think he was "getting all right again." (His own words). He felt drowsy, and inclined to doze off to sleep, but shortly a kind of twisting pain came on in his right groin, and gradually extended up, returned to its former seat below margin of right inferior ribs. Visited at 2 P. M. found abdomen much distended with flatus, of which he was constantly passing large quantities. Had made urine twice, high coloured and scalding; Pulse full, 102. Tongue dry and furred, complaining of great thirst; ordered milk and water and barley water, and to continue hot applications. Visited him at 6 P. M. Had made water once since 2 P. M., had slept ¾ hour, and on the whole pain greatly reduced. Abdomen less distended, and feeling altogether more comfortable. Pulse 100.—Tongue dry and furred and constant thirst. In addition to his barley water and milk, an egg to be beaten up with milk. Repeated Ammon: Hydroch: haustus at 5 P. M. Same symptoms as described after first dose, ensued; at 5-30, pain removed towards centre of abdomen, 3 inches below umbilicus.

May 6th.—Visited at 10-15 A. M. After last evening's draught, the pain was relieved for some time, but gradually returned to old spot; he had passed a bad night, no sleep. First thing in morning, vomited eggs and milk, and stated that afterwards pain had shifted over to left side. At 8 A. M., took Ammon: Chlor: haustus, and 13 minutes after; had a great deal of pain in stomach, which only lasted 5 minutes, and at 8-30 sensation of heat of the whole cutaneous surface set in, followed by perspiration.

9. A. M. Had a moderate, soft, dark and offensive motion; after this he dozed off, and I found him asleep when I called.

Visited at 1-30 p. m. Had taken a cup of chicken broth with relish, made water more abundantly. Pulse 108, smaller. Skin moist; pain in hepatic region less. Unable to turn on either side.

Visited again at 6-15 p. m. passed one motion since 1-30 p. m. light colored and watery. Took chicken broth at 3 p. m., took Ammon: Hydroc: haustus at 5. p. m.; on this occasion, no peculiar sensation about epigastrium observed, but ½ an hour after, general sensation of warmth, perspiration and drowsiness gradually ensued. No pain in hepatic region, excepting when moving, and can now allow slight pressure below margin of right lower ribs, where there is a distinct prominence. Makes water much more abundantly. Thirst still great.

May 6th.—Pulse 102. Skin moist, tongue furred, the bran and salt bags have been kept constantly applied, and from these he states he experiences great comfort and relief.

May 7th.—Visited at 10-30. Had slept a little last night, bowels opened 8 times since 11 o'clock last evening, dark brown, watery and offensive, accompanied with a large amount of flatus. Has an anxious expression of countenance, with sallow complexion, and conjunctivæ slightly injected; is very hysterical, and low, but though feeling very weak, he describes himself as better, as he can turn over on to the left side without pain, and has only slight pain at margin of lower ribs on right side, when he tries to raise himself up; pulse 96. Tongue cleaner, thirst still excessive; to continue former diet with addition of beef tea. The morning draught only caused sensation of warmth and perspiration over head and extremities. Visited at 8 p. m. had no perspiration after evening draught, but feels inclined to sleep; complains of pain again in the old spot occasionally. Pulse 102.

May 8th.—Visited 8-45 a. m. slept well, but had four motions during night. Pulse 90. Tongue less furred. Ordered Pil: Hyd: Gr: i. Pulv: Doveri Grs: iii, every second hour during day. Diet and treatment as before.

Visited at 7 p. m. Pulse 90. Skin cool and moist, makes large quantities of water, pain less.

May 9th.—Visited 9 A. M. States that the Ammon: Hyd: Haustus has not now the same effects as formerly, only producing drowsiness and slight perspiration. Seems very low and desponding. Ordered port wine and jelly in addition to former diet.

2 P. M. Visited by Dr. Stewart and self; case considered by Dr. Stewart to be progressing favourably. Can bear slight pressure over hepatic region; but as no good can result from these examinations, I forbear making them. Enlargement of side decidedly decreased. To omit Pil: Hydr: Pul: Doveri.

May 10th.—No pain referred now to hepatic region; but a dragging sensation described, can breathe freely, and turn over on both sides. Pulse 90. To continue same diet and treatment.

May 11th.—Visited 10-30 A M. Slept well last night, has no pains on turning or getting up; only experiences the dragging sensation as described yesterday when he gets up or takes a deep breath. Tongue clean and moist. Pulse 84. Perspired profusely last night about the head and face; bel

hot; bowels once open, of better consistence. Ammon: Hyd: taken night and morning, no perceptible effect produced but that of drowsiness. Slept off and on greater part of day.

May 12th.—Had profuse perspiration all last night, and towards morning, his head, hands and feet were burning hot; this passed off, and at 10 a. m. he stated that he felt quite well, only weak. Pulse 84.

May 13th.—Last night experienced same profuse perspiration, and heat of hands, &c. as described yesterday, and lasting 3 or 4 hours. This morning for 1st time felt pain in right shoulder which lasted about 2 hours; at 10 a. m. had a distinct throbbing sensation under margin of lower right ribs, which lasted a few hours, and apparently relieved by the constant application of salt and bran bags. Pulse 90.

May 14th.—Visited 11-45 a. m. Pulse 90. Skin generally dry; hands hot and dry. Slept from 7 o'clock to 12 last night, and after that, very restless; profuse perspiration of head and face, and great heat of surface of body and extremities; this passed away towards morning. Tongue furred and parched. Incessant thirst. No pain except in right shoulder.

May 15th.—Visited at 3 p. m. Went to sleep at 8 o'clock last evening, and awoke at 10 with sensation of great heat in head and extremities, and especially in palms of hands; this lasted about 20 minutes, and then profuse perspiration ensued. Slept for 4 hours, and awoke feeling well. Pulse 92. Bowels opened 3 times, passing much wind. The Ammon: Hyd: Haustus to be omitted in morning, and a Diaphoretic Mist: ordered during day.

May 16th.—Visited 12-30. Had no return of fever last night. Bowels relaxed. Pulse 86, skin soft and moist. Treatment as yesterday.

May 17th.—Visited 11-30 a. m. Pulse 75. Skin soft and moist, Tongue cleaner, slept pretty well. Bowels open once today; has occasional throbbing pain in hepatic region.

May 18th.—Altogether better, pulse 76. No pain; slept well. Has no thirst; continue Diaphoretic mixture, and Ammon: Hyd: only at bed time.

May 20th.—Same as yesterday, &c.

May 21st.—Pulse 80. Had a hard costive motion. To discontinue Diaphoretic mixt: and continue Ammon: Hyd; bis in die.

May 25th.—Has been gradually improving; can get up by himself, turn round, and walk without pain, and can bear firm

pressure over whole hepatic surface. *Allowed* to sit up. Ammon: Hydrochl: reduced to grs x, bis in die c. Decoct: Cinchon: nocte maneque; ordered mutton chop and 3 glasses port wine daily.

May 30th.—Has a good appetite, tongue clean, bowels regular. On examination I find great enlargement of liver which, on standing up, extends to 3½ inches below margins of inferior right ribs, and is hard, firm, and the size of a flattened orange. No pain experienced on firm pressure or percussion over this. Patient describes himself as feeling perfectly well, free from any pain, and gaining strength daily, can take moderate morning and evening exercise, and is gradually commencing his ordinary diet. Considered convalescent.

This case will be carefully watched, and notes of interest recorded.

Die fettige Degeneration der Parenchyme des Thierkörpers, insbesondere auch die der Muskeln und namentlich des Herzens, eine allgemeine pathologisch-anatomische Form der acuten und chronischen Intoxicationen durch organische und anorganische Gifte.

Vorläufige Mittheilung

von

Dr. Hugo Senftleben.

Frühere Studien über Infection mit gefaulten Proteinsubstanzen, sowie eine neuere Untersuchung über Phosphorvergiftung, welche ich demnächst anderweitig zu publiciren gedenke, führten mich zu einer ausgedehnteren Reihe von Experimenten, die ich mit verschiedenen organischen und anorganischen Giften unternommen habe, und als deren Resultat ich in Kürze Folgendes berichte:

1. Die neuerdings von verschiedenen Beobachtern gefundene fettige Degeneration der Parenchyme bei Vergiftung mit unorganischen Substanzen (von MUNK und LEYDEN bei der Schwefelsäure- und Phosphorvergiftung, von KLEBS bei der Kohlenoxydgasintoxication, zuletzt von SAIKOWSKY und GROHE bei der Arsenikvergiftung), sowie bei Blutkrankheiten organisch-septischen Ursprungs (bei der acuten Fettdegeneration der Neugeborenen von BUHL, bei der Lähme der neugeborenen Hausthiere von FUERSTENBERG, bei Inoculation der Hospitalbrandjauche auf Thiere von FISCHER) ist eine constante Erscheinung bei allen das Blut verunreinigenden und die Oxydation der Blutkörperchen störenden Affectionen. Sie findet sich mehr oder weniger ausgesprochen in allen Organen.

2. Sie tritt meistens schon sehr früh auf, wo diese Verunreinigung überhaupt den Character der Vergiftung annimmt und kann je nach der Intensität der toxischen Wirkung, nach der Thierspecies und der Individualität des Geschöpfes schon nach wenigen Stunden microscopisch bemerkbar werden.

3. Im Allgemeinen ist sie am frühesten an der Herzmusculatur deutlich zu constatiren, wenn der Tod nicht in sehr acuter Weise erfolgt.

Virchow Archiv 1866

ON THE DEVELOPMENT

OF

TORULÆ IN THE URINE,

AND ON

THE RELATION OF THESE FUNGI

TO

ALBUMINOUS AND SACCHARINE URINE.

BY

ARTHUR HASSALL, M.D., Lond. M.R.C.P.

[*From Volume XXXVI of the 'Medico-Chirurgical Transactions,' published by the Royal Medical and Chirurgical Society of London.*]

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BY

ARTHUR HASSALL, M.D., LOND. M.R.C.P.

Received November 16th.—Read November 23d, 1852.

PART I.

BEFORE proceeding to offer any remarks of my own on the subject of the present communication, I propose to place before the Society the opinions and observations in relation to torulæ in urine, entertained and recorded by others up to this time.

"Diabetic urine," writes Dr. Griffith,[1] "if left in a warm place, becomes covered with a frothy white layer, as if its surface had been sprinkled with flour. This is quite characteristic, and when once seen cannot be mistaken. This white froth is composed of a number of minute vegetable organisations, which have been denominated *torulæ;* they occur in all fermenting liquids, and their growth is by some considered, in relation to fermentation, in the light of cause and effect. They are figured in pl. ii, fig. 35; their development is very interesting. When first formed they are very minute spherical globules, composed of two coats, and filled with a liquid containing in suspension a number

[1] Practical Manual, pp. 49, 50.

of extremly minute granules; the globules enlarge, rise to the surface, and form the white scum. Some of the internal granules also enlarge, and become distinct nuclei. These continue expanding, the primary globule becomes elongated, and one of the enlarged nuclei bursts through the envelopes of the maternal cell and appears as a bud; this enlarges, others increase in the same manner. As the globules enlarge they become elongated, finally forming long, slender, jointed vegetables, as in pl. ii, fig. 35. These contain several nuclei, which are ready to bud out in the same manner as their parents have originally done. They seem to increase in two distinct ways: one is the budding process above mentioned, the other is the division of the parent cell. It is first divided by the increase of two, three, or more nuclei into as many separate parts. It then becomes contracted opposite the spaces between the continuous extremities of the internal young cells, finally forming distinct and independent plants, capable of further propagation in a similar manner."

Under the head of Torulæ in Diabetic Urine, Dr. G. O. Rees states,[1] "This fungoid vegetable growth, which is delineated on the plate, fig. 15, is characteristic of the existence of fermentation, and its presence may be regarded as a very correct microscopic test of the presence of sugar."

Dr. Golding Bird[2] gives the following account of "Torulæ" in saccharine urine:—"It is well known that in all saccharine fluids undergoing the alcoholic fermentation, minute confervoid, or fungoid vegetations, called torulæ, appear, and pass through certain definite stages of development. There is, indeed, considerable reason to believe that these vegetations bear to fermentation the relation of cause and effect. The arguments lately advanced by Professor Liebig, in opposition to this opinion, do not, to my mind, afford a satisfactory answer to the observations previously made on this subject.

"When urine contains but very small portions of sugar,

[1] Analysis of the Blood and Urine, 2d edit., p. 217.
[2] Urinary Deposits, 2d edit., p. 289.

too little even to affect its specific gravity materially, or to cause it to assume a diabetic character, certain phenomena are developed connected with the production of the vegetation of the genus torulæ or saccharomyces, which will at once point out the presence of sugar. These indications are of very great value, as a saccharine condition of the urine is not uncommon in dyspepsia and some other affections, and is, of course, of the highest importance in directing our treatment.

"When saccharine urine is left in a warm place, a scum soon forms on its surface, as if a little flour had been dusted upon it. This consists of minute oval bodies which soon enlarge from the development of minute granules visible in their interior. These continue expanding, and dilate the oval vesicle containing them into a tubular form; soon afterwards the internal granules become larger and transparent, and project from the exterior of the parent vesicle-like buds. The whole then resembles a jointed fungoid or confervoid growth, which ultimately breaks up, and a copious deposit of oval vesicles or spores fall to the bottom. All these stages of development, fig. 46, require but a few hours for their completion. If the deposited spores be placed in weak syrup, they rapidly germinate, and exciting fermentation, produce a new crop of torulæ. During the growth of the torulæ, bubbles of carbonic acid gas are evolved, and the urine at length acquires a vinous odour, sometimes accompanied by an odour of butyric acid. There are two kinds of urine which may be mistaken for saccharine, by the occurrence of a kind of fermentation not unlike that of fluids really containing sugar. I refer to the form of viscous fermentation which occurs in urine, and ending in the appearance of much ropy mucus. This has occurred to me repeatedly in specimens of urine containing cystine, the odour evolved being, however, disagreeable and sulphurous, quite distinct from the vinous odour of the alcoholic fermentation. Somewhat similar phenomena are occasionally presented by the urine of persons exhausted in health from scrofulous or syphilitic cachexia."

"Torulæ," observes Dr. Bence Jones,[1] "are by no means diagnostic of saccharine urine; but though they form very soon and very plentifully in diabetic urine, yet they may be constantly found in urine which contains no trace of sugar; and though they may lead you to look for sugar, they must never lead you to assert that sugar is certainly present in the urine in which they occur."

In his 10th Lecture on Albuminous Urine,[2] Dr. Jones also makes the following remarks:—

"There is a peculiar microscopic appearance in acid albuminous fluids to which M. Andral has directed attention. In the 'Annales de Chemie,' vol. lxxxiii, p. 385, there is a paper on the development of the penicilium glaucum, under the influence of acidification, in the albuminous fluids of health and disease, by MM. Andral and Gavarret. Serum of the blood diluted with twice its volume of water, and acidified by dilute sulphuric acid, usually, in twelve hours, gave vesicles, which elongate rapidly, forming a long, branching, jointed vegetable, of which drawings are given in the different stages of its development; albumen and acid are necessary for its growth: if, therefore, this vegetation is met with in the urine, we may immediately conclude that albumen exists in solution, and heat and nitric acid will certainly confirm the truth of your opinion."

The above observations comprise nearly all the information contained in the writings of English authors in reference to torulæ in the urine.

It appears then, from these extracts, that Drs. Griffith, G. O. Rees, and G. Bird, on the one side, regard the development of fungi in urine as affording a very valuable and decided test of the presence of sugar, the latter observer even considering it to be so delicate as to be capable of detecting such small portions of sugar as are too little even to affect the specific gravity of the urine materially, or to cause it to assume a diabetic character.

On the other hand, Dr. Jones states, that torulæ are by

[1] On Animal Chemistry, p. 121. [2] Loc. cit., pp. 109-10.

no means diagnostic of saccharine urine, although they form very soon and very plentifully in diabetic urine. In making this statement, however, Dr. Jones does not adduce the reasons which have led him to adopt this view; the opinion, however, as we shall see hereafter, follows as a necessary consequence from the inquiries of MM. Andral and Gavarret, on the development of penicilium glaucum in acid albuminous fluids.

Dr. Jones likewise states that, "If this vegetation is met with in the urine, we may immediately conclude that albumen exists in solution, and that heat and nitric acid will certainly confirm the truth of your opinion."

There is therefore a very considerable discrepancy of opinion as to the value of the torulæ test as an indication of sugar in the urine.

I will now proceed to record the results of my own observations on the Development of Torulæ in Urine.

I set aside, in the first place, at different periods, a considerable number of samples of non-saccharine urine of all kinds; some of these were acid, others alkaline, a few contained albumen, but the majority were non-albuminous. The changes which ensued in the several samples were observed and registered from day to day. In a large proportion of the samples torulæ quickly became developed, while in others they did not appear at all; they presented many distinct appearances and conditions of development, all of which, after a time, however, were ascertained to belong to, and to be characteristic of, one and the same species of fungus, of which the following is a description. Three distinct stages in the development of this plant may be recognised, each of which we shall describe separately under the heads of sporules, thallus, and aërial fructification.

Sporules.—Of these two kinds exist.

The *first* make their appearance in urine at an early period, usually in the course of a few hours, the precise time is determined, however, by the nature of the urine and the temperature of the weather; they are first visible as innumerable minute vesicles or cells, of a perfectly globular

form, reflecting, when seen with an object-glass of one fourth of an inch focus, bright centres and dark outlines, and presenting a tolerably uniform size; when viewed, however, with a glass of one eighth of an inch focus, the shaded outlines nearly disappear, and the sporules are then observed to present considerable differences of size, from the $\frac{1}{2500}$th of an inch in diameter to the $\frac{1}{1000}$d of an inch; the larger all include a vesicular nucleus, sometimes placed in the centre of each sporule, at others it is eccentric; but the smaller sporules are not nucleated, and resemble in size and appearance the nuclei of the larger sporules; the cavities of all are occupied by a fluid containing granules. (Pl. 1, fig. 1.)

In a short space of time, generally in a few hours, the sporules multiply to such an extent as to form, first, distinct circular patches and afterwards a continuous scum on the surface of the urine, as contained in a bottle or glass. In this scum the sporules are not heaped up over each other, but form a delicate stratum, constituted of a single layer of sporules, which, while they evidently repel the water, yet adhere to each other. Sometimes the patches, although small, cease to grow; in other cases they extend, until they touch each other, and from being circular become angular from mutual compression, the several patches yet remaining distinct; very frequently, as soon as they touch each other, they run together and form a continuous stratum, as noticed above: this may remain, as indeed it often does, without undergoing further change, or it may become wrinkled, or thrown up in a waved manner; both these appearances arise from the extension of the single layer of sporules, which having covered the entire surface of the urine, and being unable to spread itself out further, becomes variously folded or plaited. In general, the patches, whether small or large, are thin, delicate, transparent, and film-like; but in some cases they appear dry and white, resembling flour; upon what this difference depends I am not clear, but I believe it is connected with the amount of phosphates present. It is in this latter state that the surface of the urine presents the powdery aspect considered by so many

observers as characteristic of saccharine urine. The smaller patches are usually, but not always, composed of the rounded sporules above described; sometimes the sporules have lost their spherical form, and this is almost constantly the case in the larger patches, and elongating slightly, become oval. (Pl. 1, fig. 2.)

The elongation of the sporules is not constant, for sometimes the development of the fungus ceases with the formation of the globular sporules. This change of form occurs when the condition of the urine is such as to favour the growth of the fungus; under such condition the sporules quickly extend themselves, and become three or four times longer than broad, when they resemble short threads of nearly equal diameter (Pl. 1, fig. 3), having rounded extremities; after a time, the sporules becoming still further elongated, pass into separate filaments, which consist of cells placed end to end, and all enclosed in a common transparent membrane; the threads are more or less curved, and increase in length sometimes by the extension of both extremities, but usually only of one, which is distinguished by its smaller diameter.

From this condition, which is frequently attained on the second or third day, the fungus passes into the higher state of *thallus*. (Pl. IV, fig. 1.)

The *second* kind of sporules, which for the sake of distinction I shall call *vesicles*, are many times larger than the ordinary sporules; their surface is frequently hirsute, like the pollen granules of the compositæ; they are globular, and from each proceed one, two, or three buds or shoots, which gradually extend into filaments, at first simple and afterwards branched, thus forming, as the sporules did in the previous case, the thallus.

Now while the ordinary sporules during growth are merged entirely into and lost in the filaments, the vesicles remain as prominent swellings or enlargements on the threads, not unfrequently increasing in size with the growth of the threads themselves. When the vesicles give origin to but a single filament, they are seen as terminal inflations; when to two

or more, they of course are situated in the midst of the ramifications which have emanated from them. (Pl. 1, fig. 4.)

The number of vesicles present varies greatly in different cases: in general, the ordinary sporules alone are met with; in others a few vesicles only occur mixed up with the common sporules; in others, the number of vesicles has been considerable; and again in a few rare cases, I have detected vesicles only in a state of germination.

Of the sporules and vesicles we shall shortly have to speak again.

Now in some urines the growth of the fungus goes no further than to produce the sporules and vesicles; at this point, and even at any stage, all development not unfrequently ceases. The cause of this singular circumstance will be explained hereafter.

We will now pass on to the description of the thallus.

Thallus.—The thallus, then, it appears, takes its origin either in the sporules or vesicles. The filaments or threads, at first simple, which proceed from these, afterwards become branched, and the myriads of threads developed interlace together. It is therefore a compound structure, made up of innumerable perfectly distinct plants, which are held together simply by the interlacement of the filaments.

Like the sporules, it forms a layer upon the surface of the urine often of considerable thickness, several days being usually required for its complete formation. The growth of the thallus takes place principally from the extremities of the filaments; these mostly lie the deepest in the fluid, and it is near the extremities also that the branchings are most numerous, and therefore best seen.

The filaments forming the thallus are comparable to the roots of higher plants, and they extend themselves for some distance through the fluid in which they are developed in search of the nourishment by which the fungus is sustained.

The cavities of the jointed and branched filaments, like those of the vesicles and sporules, are filled with granular and vesicular material.

Now the thallus is met with in urine in two states,—it either forms patches on the surface, or one continuous stratum, these states depending upon the number and distribution of the sporules which precede it. As is the case with the sporules, the development of the thallus may be arrested at any stage of its growth.

When this happens, it soon breaks up and dies; before the breaking-up of the threads occurs, however, I have frequently observed the granular and vesicular contents of the filaments to collect into little rounded or oval masses, which escaping through the common investing sheath of the threads, become so many sporules. When in a mass of thallus, some filaments are seen transparent and destitute of contents, while others contain little rounded or oval bodies; and when a large number of sporules are lying about intermixed with the threads, we know that this elimination of sporules has occurred.

Every perfect fungus developed in a fluid consists of two parts, an aquatic and an aërial. The thallus represents the aquatic portion, and the filaments of which it is formed readily imbibe the fluid in which they are immersed; on the other hand, the stems and sporules which form the aërial portion of the fungus, repel the water and manifest an affinity for the air.

The last stage, then, in the development of the fungus, is that of aërial fructification:

Aërial Fructification.—After the lapse of a still further time, a mouldiness appears on the surface of the already-formed thallus. This follows exactly the distribution of the thallus itself; if it be in patches, then the mouldiness will appear only in places on the surface of the urine; but if the thallus form a continuous stratum, the mould or mildew will do the same.

The mould or aërial fructification presents the following structural peculiarities:—

If the surface of the thallus be carefully examined sometime previous to the appearance of the mould or fructification, a number of short upright stems or threads will be observed.

Each vertical stem having attained a certain height, divides into one or two branches, each of which becomes subdivided into several other very short and slightly moniliform branches,—thus a tuft or head is formed; at the extremity of the several branches rows or strings of circular bodies appear; these, on the slightest movement, become detached from the head, and fall either on the thallus or into the water (Pl. IV, fig. 2); now these circular bodies are identical with the sporules first described, and each represents a separate plant. It is in these sporules that the glaucous green colour so characteristic of this fungus in its perfect state of development is located; the colour varies, however, greatly in different cases; sometimes the patches or stratum of the fungus possess scarcely a tinge of green, at others they are not in the least green, but of a fawn colour; lastly, in some cases in which the spore-bearing heads are not formed at all, the vertical threads, upon which when present they are supported, become considerably elongated, and then the patches resemble pieces of white wool.

Such is a short sketch of the development of this fungus in its different stages; it is to be observed, however, that the several conditions described do not always keep separate from each other; thus, frequently, the sporules and thallus coexist, and in some cases we find sporules, thallus, and fructification, all more or less mixed up together; in certain urines, successive generations even of sporules may be seen passing through the several phases of their development.

It has already been stated that the growth of this plant, from a cause to be mentioned presently, is frequently arrested at any one stage of its development; but this is not all, for soon afterwards it begins to decay, and finally disappears from the urine; the only trace of its presence remaining is a deposit of sporules, circular in form, but irregular in size, and situated at the bottom of the urine. After the plant has once attained its full development, however, many days must elapse before its total destruction and disappearance.

We will now conclude this description by a few remarks on the propagation of this fungus.

Its perpetuation appears to be provided for in several ways.

First.—By the sporules thrown or pinched off, as it were, from the reproductive tufts, and which therefore appear to be nothing more than definite and minute portions of the mother plant, each being endowed with independent vitality and capability of reproduction.

Second.—By the generation of secondary sporules within the cavities of the primary or first-formed sporules.

Third.—By the granular and vesicular matter which occupies the cavities of the filaments and cells forming the thallus; in these cavities circular bodies resembling somewhat sporules, but much smaller, may be seen, and it is probable that it is by their means that the species is perpetuated in those cases, of very frequent occurrence, in which the plant has been destroyed before attaining its full development.

Fourth.—By vesicles; these I regard as sporangia, analogous to the vesicular bodies, met with in the tribe of algæ, as parent-cells in fact, containing a number of germs.

The vesicles or sporangia are not confined to this one species, but are frequently to be met with in many other fungi, some belonging even to distinct genera.

Two other facts connected with the development of this fungus yet remain to be mentioned.

The first is, that it will develope itself with nearly similar facility, and in the same quantity, in urine passed directly into a new bottle and immediately corked, as in urine exposed to the air.

The second is, that sporules and even filaments may be detected in some urines almost immediately after they have been passed; from this it becomes probable that the development had commenced even in the bladder itself.

We have now to enter upon the consideration of the conditions necessary to the development of this fungus. The first step which I took with a view to determine what these conditions are, was to put aside in bottles, all corked,

a variety of urines, fixing the dates to each, and noting from time to time the changes which ensued; the results of this proceeding are given in the following table:—

1st Sample:—*Aggravated Dyspepsia.* Urine very acid, non-albuminous, passed 24th August; on the 28th inst., a scum of circular sporules appeared; on the 2d of September, there was much of the fungus fully developed, with a few spherical sporules; on the 5th inst., the fungus was in the same state.

2d Sample:—*Chlorosis,* with œdematous feet. Urine acid, passed on 17th of August; on the 20th inst., a scum of spherical sporules became visible; on the 2d and 8th of September, the sporules were in the same state.

3d Sample:—*Dyspepsia.* Urine alkaline, non-albuminous, passed on the 22d of August; on the 24th inst., no sporules; on the 2d of September, no sporules.

4th Sample:—*Disease of Liver,* Anasarca. Urine albuminous, alkaline, passed on the 19th of August; on the 23d inst., no trace of fungus; on the 2d of September, still no fungus.

5th Sample:—*Dyspepsia.* Urine somewhat, but not strongly acid, non-albuminous, passed on the 17th of August; on the 20th inst., a few oval sporules; on the 2d of September, a scum of spherical sporules; on the 8th inst., sporules in same condition.

6th Sample:—*Disease of Kidneys,* Anasarca. Urine albuminous, decidedly acid, passed on the 23d of August; on the 27th inst., a scum of elongated sporules and filaments; on the 2d of September, a thick and continuous stratum of the fungus fully developed.

7th Sample:—*Disease of Kidneys.* Urine albuminous, feebly acid, passed on the 17th of August, examined on the same day, sporules with a few short filaments were visible; on the 20th inst., a few sporules, circular; on the 2d of September, sporules in the same state.

8th Sample:—*Articular Rheumatism.* Urine somewhat acid, non-albuminous, passed on the 18th of August; on

the 20th inst., an incipient scum of spherical sporules; on the 2d of September, a very dense film of oval sporules; on the 8th inst., sporules in same condition.

9th Sample:—*Chorea.* Urine passed on the 28th of August, not very acid, non-albuminous; on the 2d of September, a dense scum of spherical sporules; on the 14th inst., scum on surface of urine all gone, a few sporules irregular in size, at the bottom of the bottle.

10th Sample:—*Phthisis.* Urine decidedly acid, slightly albuminous, passed on the 2d of September; on the 8th inst., spherical sporules abundant, with much fungus in a state of perfect fructification.

11th Sample:—*Dyspepsia.* Urine neutral, non-albuminous, passed on the 2d of September; on the 8th inst., no sporules.

12th Sample:—*Fever.* Urine feebly acid, non-albuminous, passed on the 19th of September; on the 20th inst., a few spherical sporules; on the 28th inst., the same; on the 2d of October, no increase in the number of sporules.

13th Sample:—*Inflammation of Kidney.* Urine non-albuminous, acid, passed on the 21st of August; on the 26th inst., a scum of spherical sporules; on the 2d of Sept., sporules much elongated; on the 8th inst., fungus in same state.

14th Sample:—*Disease of Kidneys,* Anasarca. Urine neutral; albuminous, passed on the 16th of August; on the 20th inst., no fungus; on the 2d of September, none.

15th Sample:—*Typhus.* Urine alkaline, non-albuminous, passed on the 24th of August; on the 30th inst., no fungus; on the 2d of September, none.

16th Sample:—*Fever.* Urine feebly acid, non-albuminous, passed on the 20th of August; on the 23d inst., powdery patches of circular sporules; on the 2d of Sept., a few sporules only.

17th Sample:—*Aggravated Dyspepsia.* Urine somewhat acid, non-albuminous, passed on the 16th of August; on the 20th inst., a scum of spherical sporules; on the 2d of

September, a dense film of sporules; on the 8th inst., sporules in same state.

18th Sample:—*Congestion of Liver.* Urine decidedly acid, non-albuminous, passed on the 21st of August; on the 26th inst., a scarcely perceptible scum of spherical sporules; on the 2d of September, sporules still circular; on the 8th inst., a patch or two of thallus.

19th Sample:—*Disease of Brain.* Urine alkaline, non-albuminous, passed on the 21st of August; on the 24th inst., no sporules visible; on the 2d of September, none.

20th Sample:—*Dyspepsia.* Urine alkaline, non-albuminous, passed on the 17th of August; on the 20th inst., no fungus; on the 2d of September, none.

21st Sample:—*Fever.* Urine alkaline, non-albuminous, passed on the 28th of August; on the 30th inst., no fungus; on the 2d of September, none.

22d Sample:—*Typhus.* Urine alkaline, non-albuminous, passed on the 19th of August; on the 23d inst., no fungus; on the 2d of September, none.

23d Sample:—Urine acid, non-albuminous, passed on the 16th of August, at night; on the morning of the 18th inst., sporules appeared, some oval, others elongated; on the 20th inst., a dense scum of oval sporules and filaments; on the 2d of September, fungus in same state; on the 8th inst., still in the same condition.

24th Sample:—*Phthisis.* Urine very acid, non-albuminous, passed on the 21st August; on the 2d of September, a scum of oval sporules; on the 8th inst., fungus fully developed.

25th Sample:—Urine strongly acid, non-albuminous, passed on the 28th of August; on the 30th inst., an abundance of spherical sporules; on the 8th of September, a continuous scum of fully-developed fungus.

26th Sample:—Urine acid, non-albuminous, passed on the 17th of August; on the 22d inst., spherical and oval sporules; on the 2d of September, a dense scum of circular sporules; on the 8th inst., sporules in the same state.

27th Sample:—Urine acid, non-albuminous, passed on the 19th of August; on the 22d inst., a thick scum of spherical sporules; on the 2d of September, sporules in the same state; on the 8th inst., sporules less numerous, many having sunk to the bottom.

28th Sample:—*Typhus.* Urine feebly acid, non-albuminous, passed on the 18th of August; on the 20th inst., a few somewhat oval sporules; on the 2d of September, sporules in the same state.

29th Sample:—Urine strongly acid, non-albuminous, passed on the 4th of September; on the 8th inst., circular sporules, with patches of fully-developed fungus.

30th Sample:—Urine strongly acid, non-albuminous, passed on the 4th of September; on the 8th inst., sporules and filaments of fungus; on the 14th inst., fungus in perfect fructification.

31st Sample:—*Phthisis.* Urine acid, non-albuminous, passed on the 30th of August; on the 8th of September, a scum of spherical sporules; on the 12th inst., no further development of the fungus.

32d Sample:—Urine acid, non-albuminous, passed on the 30th of August; on the 8th of September, a scum of spherical sporules; on the 14th inst., sporules in the same state.

From an analysis of the above table it appears therefore—

1st. That the fungus was developed in twenty-four out of the thirty-two urines submitted to examination.

2d. That in thirteen samples the development did not proceed beyond the sporule-stage.

3d. That in two it was arrested when in the condition of thallus.

4th. That in the remaining nine urines, it attained its perfect state, viz., that of aerial fructification.

5th. That those urines in which the fungus made its appearance, were invariably more or less acid, the degree of development varying with the acidity.

6th. That those urines in which it failed to make its appearance, were either neutral or alkaline, or though acid when passed, very quickly became first neutral and then alkaline.

7th. That the fungus appeared alike in albuminous and non-albuminous urines, provided these were sufficiently acid.

The frequency of the presence of this fungus in the urine is thus clearly established. One of the conditions necessary to its development, as we have seen, is an acid state of the urine; the degree of acidity and the length of time during which the urine remains acid, regulating to a considerable extent the growth of the plant. When the acidity is great, and of some days' duration, other causes being favorable, the fungus is enabled to pass through all the stages of its development, and to reach the state of mould or perfect fructification; when, on the other hand, the acidity is but feeble, the growth proceeds but slowly, and ceases entirely at whatever stage it may happen to have attained on the passing of the urine from an acid to an alkaline condition, and which, as appears from the Table above given, very frequently occurs when the fungus is still in the first stage of its development, that of circular sporules.

As is also shown by the Table, for some days after the urine has ceased to be acid and has become alkaline, the fungus does not appear to undergo any material alteration, but at length it begins to decay, and finally disappears.

The condition of development of this fungus in any urine is therefore, to some extent, an indication of the degree of acidity once possessed by that urine; it must be remembered, however, that although this plant is never developed in alkaline urine, it is yet sometimes present in it, the urine having been in the first instance acid, and having become alkaline subsequently.

We have now to seek for other conditions necessary to the development of this fungus.

When it is remembered that fungi contain nitrogen in their composition, and when their constant association with dead or diseased organic matter is called to mind, the idea that the presence of the species under consideration in the urine is closely connected with the animal matter contained in that fluid will at once appear as highly probable.

Now, animal matter, and even albumen, as in mucus and epithelium, are constantly present in the urine in greater or less amount, the albumen being contained in the epithelial scales and mucous cells; and hence this fluid ordinarily supplies another of the conditions requisite for the growth of this fungus.

With the view to ascertain whether the notion just referred to was correct, I procured a number of urines. I divided each sample into two portions, one was carefully filtered so as to remove at least part of the animal matter, the other was allowed to remain just as it was passed; the whole of the samples were set aside in corked bottles, and examined from time to time. The results obtained by this proceeding were as follow:—

1st Sample:—Urine passed on the 13th of September; on the 20th inst. there was a very decided scum of sporules upon the surface of the unfiltered urine, but none upon the filtered; and on the 22d inst., still no appearance of fungus upon the surface of the latter.

2d Sample:—Urine passed on the 13th of September; on the 17th inst. a thick scum of sporules upon the unfiltered, but none upon the filtered urine; on the 22d inst. fungi on both, but the layer thickest on the unfiltered portion.

3d Sample:—Urine voided on the 9th of September; on the 14th inst. a scum upon the unfiltered, but none upon the filtered urine; and on the 17th inst. the scum was upon both, but much less thick upon the filtered portion.

4th Sample:—Urine voided on the 9th of September; on the 17th inst. no scum upon the filtered, but a slight one upon the unfiltered urine.

5th Sample:—Urine passed on the 10th of September; on the 17th inst. no scum on the filtered, but a very decided one upon the unfiltered.

6th Sample:—Urine voided on the 14th of September; on the 20th inst. a very decided scum upon the unfiltered, but none upon the filtered urine; on the 22d inst. still no scum upon the filtered portion.

It is thus evident that the removal of even a portion of the animal matter contained in urine, exercises a very marked influence over the development of the fungus, and there is no doubt that if it were more completely separated the results would be still more obvious.

The separation of the whole of the nitrogenised matters almost invariably present in urine, can seldom be effected by filtration; nor do I know of any unobjectionable means by which, without altering the chemical condition of the fluid, it may be removed; were it in any case completely abstracted, it is certain that no development of the fungus would take place.

The condition, then, of the development of the fungus is likewise, to some extent, an indication of the amount of animal matter, especially albumen, contained in the urine; if the fungus be in patches only, then it is certain that the quantity of nitrogenous matter is but small, but if the fungus form a continuous stratum over the whole surface, then it may be inferred that the amount is considerable, sufficient indeed to excite a *suspicion* of the presence of albumen.

The necessity for the presence of animal matter is shown by the fact, that when a little albumen is added to any slightly acidulated solution, the same fungus as that ordinarily met with in the urine makes its appearance in the course of a few hours; without such addition the solution might be kept for any length of time, and no development of the fungus would occur.

A second condition necessary to the growth of this fungus is therefore the presence of animal matter.

But there are still probably other conditions requisite. The abundant growth of this fungus in bottles nearly filled with urine and corked, would appear, at first sight, to show that atmospheric air was not necessary, and from this fact it certainly appears that a very free or large supply of air is not required.

That some portion of air is, however, indispensable, is shown by the following circumstances:—1st. If the bottle containing the urine be well corked, and filled within a

very short distance of the neck, the development of the fungus will be retarded, and sometimes altogether prevented. 2d. Occasionally it has happened to me to notice that, after the removal of the cork for a minute only and the admission of air, the plant, which had previously been in a stationary condition, has grown surprisingly. 3d. The fungus will not grow in an atmosphere of carbonic acid, an experiment which may be easily tried by means of a bell jar filled with urine, inverted, and into which a small quantity of carbonic acid has been passed.

A third condition, then, is the presence of a certain amount of atmospheric air, or, rather, of the oxygen of which the air is in part constituted.

We have next to inquire, is the fungus so frequently found in urine a new species, or is it identical with one already known and described? From a careful comparison of this plant, in the several stages of its growth, with the well known *Penicillium glaucum*, it becomes evident that the fungus common to the urine is that species. *Penicillium glaucum* is a very common fungus, and is that which imparts the mildewed appearance so frequently presented by a variety of decaying vegetable and animal substances.

It is now proper to mention, that some of the particulars above referred to in the account given of the conditions necessary to the development of penicilium glaucum, are not altogether new.

That an acid fluid and albumen were conditions essential to the growth of this fungus was first made known by Dutrochet,[1] who recognised the plant, however, only in its filamentous state. These conditions have subsequently been further elucidated by MM. Andral and Gavarret,[2] who also have given a much more complete account of the development of penicilium glaucum, than existed up to the

[1] Mémoire pour servir à l'Histoire Anatomique et Physiologique des Végéteaux et des Animaux, t. ii.

[2] Recherches sur le développement de Penicillium glaucum sous l'Influence de l'Acidification dans les liquides Albumineux Normaux et Pathologiques, 'Annales de Chimie,' t. lxxxiii, p. 385.

time of the publication of their memoir. These well-known observers were likewise the first to show that the presence of atmospheric air, or rather oxygen, was necessary to its growth; this they did by replacing the air over the surface of the fluid with carbonic acid; the development of the plant was entirely arrested for ten days, when the air being readmitted or oxygen supplied, the growth proceeded as before.

The fluids experimented upon by MM. Andral and Gavarret, were the serum of the blood, white of egg, the serosity from the peritonæum, from a hydrocele, and from blisters, also pus; the urine, the most important and interesting in a pathological point of view of all the animal fluids, being so entirely overlooked as not once to be alluded to even in the whole course of their investigations; lastly, one of the conditions laid down by these observers as essential to the development of penicilium glaucum, is really not so, since the fungus makes its appearance and grows in acid solutions containing animal matter which is not albuminous; as, for example, the aqueous humour of the eye diffused through water, a substance which is not congulable by heat.

From a review, then, of the whole of the facts and observations above recorded, the following conclusions may be deduced:

1st.—That there is very frequently developed in urine a species of fungus known by the name of penicilium glaucum.

2d.—That this fungus ordinarily passes through three stages of development, any one of which is characteristic of the species; it exists first as sporules, these pass into thallus, and from this proceeds the perfect or aërial fructification.

3d.—That the conditions necessary for the development of this plant are, animal matter, especially but not exclusively albumen, an acid solution and oxygen, its growth being likewise much influenced by temperature.

4th.—That it may be developed at will in a variety of

other animal solutions besides the urine in which the above conditions are fulfilled, as in solution of white of egg, acidified with acetic, phosphoric, or any other acid.

5th.—That one of these conditions, viz. the presence of albumen, exists in almost all urines, whether neutral, alkaline, or acid.

6th.—That inasmuch as one of the requisite conditions is wanting in neutral and alkaline urines, the fungus never makes its appearance in these, no matter how much albumen they contain.

7th.—That the plant may, however, be developed at will, in even neutral and alkaline urines, simply by rendering such urines acid by means of phosphoric or any other acid.

8th.—That its presence may be regarded as, to some extent, an indication of the degree of acidity of the urine.

9th.—That it is not characteristic, as has been supposed, of the presence of an abnormal quantity of albumen in acid urines, since it is frequently developed in many urines which contain only a normal amount of epithelium and mucus, and in which also not a trace of albumen can be detected by means of heat and nitric acid.

10th.—That, nevertheless, it affords some indication of the amount of animal matter contained in acid urines; for where this is large, the fungus is usually developed in considerable quantity, and in all such cases it is proper that the urine should be tested for albumen.

11th.—That this fungus is no indication whatever of the presence of sugar in the urine, since the observations above recorded were all made upon non-saccharine urines, and since the fungus may be developed at will in solutions which it is certain do not contain a particle of sugar.

I have now to remark, in bringing the *first part* of this communication to a conclusion, that the observations detailed on the development of penicilium glaucum in the urine under different conditions, were made principally in the summer and autumn of the year 1849.

Part II.

I come in the next place to the consideration of the second division of the subject—viz. the development and growth of Torulæ in saccharine urine.

From the quotations given in the first part of this communication, it appears that, up to the present time, great difference of opinion prevails as to the value of the torula-test as an indication of sugar in the urine—some asserting that it affords positive evidence; others denying altogether that it is a reliable test. From the facts and observations already advanced, it is at least certain that torulæ in urine are not, in all cases, indicative of the presence of sugar. It has yet to be determined, however, whether the torulæ contained in saccharine urine are not characterised by such peculiarities as constitute a satisfactory test for sugar when present in that excretion.

For the determination of this point, a number of samples of diabetic urine were placed in distinct vessels, the changes which ensued being observed from day to day. Each sample was divided into two, and sometimes three, portions.

The first was placed in a glass, and freely exposed to the air; the second, in a bottle, air being admitted to a limited extent only through an aperture in the cork; and the third was enclosed in a tightly-corked bottle.

The following changes were observed by the eye alone to occur in that portion of the urine which was exposed to the air:—

In the course usually of two or three hours after being voided, the urine began to lose its transparency, and to present a milky appearance.

At the end of from 24 to 36 hours, cloudy, gelatinous-looking masses appeared suspended in the urine just beneath the surface, but extending some depth into the fluid. Although visible on the surface, the form and size of the masses were best seen from a side view. These masses, being exceedingly soft and delicate, quickly broke into

pieces on the least disturbance of the glass, and slowly subsided to the bottom; the same thing happened occasionally when the masses had attained considerable size—an inch or more in diameter—even when the urine remained undisturbed. Thus, after a few hours, the exact time varying according to temperature, there was an accumulation of these gelatinous-looking masses, not only on the surface of the urine, but also at the bottom of the glass, forming a cloudy sediment, the turbidity of the whole urine now having become very considerable.

Entangled in the masses, particularly those near the surface, were numerous bubbles of gas; these, separating from time to time, escaped into the air. Many bubbles were also thrown off from the masses at the bottom of the vessel, rising slowly to the surface; occasionally a number of globules became developed in these masses, which ascending, carried with them the masses in which they were included.

This elimination of gas was continued for some days, and was so great as clearly to indicate an active fermentation in the fluid. The gas generated was ascertained, by the following simple proceeding, to be carbonic acid gas:

Two or three ounces of the urine were placed in a wide-mouthed glass jar. In this a second vessel filled with lime-water was suspended, the mouth of the jar being well secured. The lime-water was soon observed to become turbid, and at the end of two days a considerable deposition of a white powder had taken place in the inner vessel. This precipitate effervesced on the addition of acetic acid, showing that the gas which had escaped from the urine and combined with the lime was the carbonic acid gas. A modification of this experiment was performed by means of a *Woolfe's* apparatus.

One of the flasks was partly filled with the urine; the other, with lime-water. A bent glass tube adapted connected the two, one end dipping into the lime-water. The gas, as it was evolved from the urine, passed through the tube, rendering the lime-water turbid, and producing a

precipitate, which effervesced as before on the addition of an acid.

For the next two or three days, reckoning from the end of the first 36 hours, the urine continued to present nearly the same character, except that the masses increased in size and number, became whiter, and acquired greater consistency; the globules of gas eliminated also becoming larger and more numerous.

At the end of about the fifth or sixth day the gelatinous masses had disappeared, some having subsided to the bottom, while others had gradually merged into and formed a continuous stratum of a fawn colour, having, to a certain extent, the consistence and characters of beer-yeast.

This stratum, from day to day, acquired increased firmness; so that, at the end, usually of seven or eight days,—sometimes earlier,—it might be removed as a distinct and coherent layer. By degrees its texture became altered, and it soon presented a woolly and filamentous appearance. Lastly, a crop of delicate transparent threads sprang up from the surface, bearing on their summits minute spherical heads of a black colour, barely visible with the naked eye.

In the course of a few days, the stratum, now of considerable thickness, gradually altered in colour—became brownish—and, after a further time, soft and brittle, ultimately breaking up and sinking to the bottom of the glass.

These changes, visible with the eye alone, are so marked and peculiar, that when once carefully noted, they cannot be mistaken. But there are still other more important changes and peculiarities corresponding with the several outward changes above described, and for the determination of which the microscope is necessary.

Examined with that instrument, the cloud-like masses were found to consist of the minute sporules of a fungus, imbedded in a mucoid base. These sporules were very irregular in size; some, when viewed with an object-glass of $\frac{1}{4}$th of an inch focus, being visible as mere black points, while the largest did not exceed the $\frac{1}{2500}$th of an inch in

diameter. These masses, composed of the minute sporules, constitute *the first sub-stage* of the development of the fungus. (Pl. II, figs. 1, 2.)

The soft, fawn-coloured scum is composed, for the most part, of circular sporules many times larger than the former. These, although usually separate, are occasionally feebly united in rows formed of two, three, or even more sporules; sometimes the sporules collect together in groups, the smaller surrounding the larger, or parent-cells. Intermixed with the sporules are also a few jointed and beaded threads.

These sporules, like the former, vary considerably in size, the smallest being scarcely the $\frac{1}{1000}$th of an inch, whilst the largest are as much as the $\frac{1}{500}$th of an inch in diameter, the medium size being the $\frac{1}{900}$d of an inch. (Pl. II, figs. 3, 4. Pl. III, fig. 1.)

Between these sporules and those first described, it will be observed a considerable difference of size exists; this, for a time I was at a loss to explain; the explanation is furnished, however, by a consideration of the manner in which the sporules are developed.

The sporules are multiplied by the constant escape, from the interior of the larger sporules, of other and smaller cells, these, on their escape, appear on the surface as buds, and are usually included in a pouch-like protrusion of the parent-cell wall, which with its contained nucleus, is finally thrown off, becoming a new and independent sporule.

This evolution of sporules at the early period of the development of the fungus, is so rapid and continuous as not to allow any of the sporules to attain a large size. Subsequently, however, as the quantity of sugar becomes diminished, the evolution is less rapid, and time is afforded for a large proportion of the sporules to acquire the size characteristic of the fungus in *the second sub-stage* of its development.

The more consistent stratum is made up of branched and jointed threads, intermixed with a few separate circular sporules. These threads are frequently beaded, the beaded

cells being sometimes placed in the course, but more frequently forming the termination of the threads. In the latter case, the beaded extremities are often raised above the surface of the urine, and project a short way into the atmosphere. (Pl. v, fig. 1. Pl. III, fig. 2.)

Not unfrequently single cells several times larger than the others are observed; these are placed in the course of the beaded portion of the threads; but sometimes they are seen lying loose; these cells appear to be of the nature of vesicles. (Pl. III, fig. 3.) This forms the second stage of the development of the fungus, that of thallus.

The stratum presenting a woolly structure is divisible into two parts; the one, rests upon and is immersed in the urine; the other, projecting into the air, may be termed aërial. The first consists principally of the thallus above described, while the second is made up of the slender, transparent, jointless, and occasionally branched stems which here bear the globular heads.

The state and appearance of the heads vary with the development. At first they present a smooth outline from being covered with a delicate membrane. (Pl. v, fig. 2.) This afterwards bursting and becoming retracted, a rounded mass of circular sporules of a brownish colour is disclosed to view. The sporules falling off, leave the dilated extremities of the threads or filaments exposed.

These changes constitute the third or perfect stage of development of the fungus, that of aërial fructification.

The rapidity with which the fungus is developed is dependent, to a great extent, on temperature; heat, as the warmth of summer, greatly accelerates, while cold retards the growth to an equal degree. So much is this the case, that it is doubtful whether the sugar fungus would be developed at all in mid-winter, and when the thermometer was below the freezing point.

The observations upon the development of the diabetic fungus, above recorded, were made during the summer months; the periods given are those which were found to correspond to the several stages of the growth of the fungus at

that season of the year. It must be remembered, however, that the development is influenced considerably by variations of temperature, even in summer.

Although the appearances above described were all noticed in the first sample of saccharine urine subjected to observation, yet a variety of other samples, which were afterwards submitted to similar investigation, furnished results in all essential respects identical.

Such is a brief description of the changes which ensued in samples of saccharine urine exposed to the atmosphere. We have, in the next place, to notice those changes which occurred in the two other portions of the first urine, to one of which air was admitted to a limited extent, and from the other entirely excluded.

The portion of urine partially excluded from contact with the air quickly became, like the first, whitish and opaque; the cloud-like masses appeared as before, broke up on the slightest motion, and subsiding, formed a copious sediment. Many globules of carbonic acid gas arose from all parts of the liquid, and after accumulating on the surface escaped into the atmosphere. The masses were, however, fewer and smaller than in the sample freely exposed to the air, and the globules of gas were much less numerous, and their evolution ceased at an earlier period.

Examined with the microscope, the masses were ascertained to consist, as in the first portion, of myriads of minute sporules.

With the formation of the masses, the development of the fungus ceased; the only ulterior changes being, that the masses gradually became whiter, and more consistent.

The sporules, no matter how long the urine was kept, never attained the large size which distinguishes them in a more advanced condition of development.

The urine contained in the closed vessel was turbid when introduced; this turbidity afterwards increased somewhat, and bubbles of carbonic acid gas became evolved here and there. At the end of a few hours, however, the weather being extremely warm, the bottle burst with a loud ex-

plosion, breaking into many pieces, which were scattered far and near; the liberated urine effervescing on its escape, as though it were so much ginger beer. The same occurred in a second sample; but in other trials, this result was obviated by employing a Woolfe's apparatus. One of the flasks was partly filled with lime water, which, by absorbing the gas as quickly as generated, removed the pressure, and so prevented the bursting.

The changes which took place could now be readily noted: the urine, slightly turbid at first, soon became more opaque, and some carbonic acid gas was evolved, yet its opacity was soon lost; the elimination of gas ceased, and ultimately it became perfectly transparent. The few minute sporules which were originally diffused throughout the liquid fell to the bottom, forming a slight sediment, and for whatever period the urine was kept, no gelatinous masses were developed in it, nor was any stratum of fungus formed.

From the great differences observed in the fungus in the several portions of urine, it is very evident that free exposure to the air is a condition indispensable to its perfect development; deprived of this, its growth is quickly arrested.

It is also very evident from the description and illustrations now given, that the fungus developed in saccharine urine is a species very different from that treated of, in the first part of this communication, viz., *Penicilium glaucum*.

Further, a comparison of the diabetic fungus with the yeast plant, shows that the two are identical; a point of very considerable interest. The figures which accompany this communication contrasted with those of the yeast plant, published in the 'Lancet,' vol. i, 1850, are in themselves sufficient to establish this identity.

Up to a very recent period, great uncertainty, and even mystery, hung over the development of the yeast plant; the efforts made by able observers, to trace it through all the phases of its development, having for the most part completely failed.

In the communication referred to,[1] I gave a description of the yeast plant; and traced it through several stages of development; I followed the transformation of the sporules into branched threads, or thallus; detected the beaded threads and the large sporangia-like cells; and at that time thought I had really traced it, step by step, to its final condition. I have since ascertained, however, that under favorable circumstances, perfect aërial fructification is produced, precisely similar to that described as constituting the last and perfect stage in the growth of the diabetic fungus.

Now the changes described, as occurring in the three portions of the same sample of diabetic urine placed under such opposite circumstances, were with slight differences repeated in a variety of other samples, some obtained from patients labouring under diabetes in different degrees. So there is no doubt, but that these changes, under similar conditions, are constant, and therefore they afford valuable and unmistakeable evidences of the presence of sugar in the urine.

It is not to be understood, that the whole of the changes described as occurring in diabetic urine, were fully appreciated from the observation of a single specimen, and that the first submitted to examination. It was necessary in order to arrive at all the results above recorded, to watch the changes which ensued in a variety of samples; but these changes having once been clearly ascertained, the whole of them were readily afterwards followed out in even single specimens.

I will now proceed to give the results, recorded from day to day, derived from the observation, as well as chemical and microscopical examination, of several samples of diabetic urine, in order that the precise and positive character of the facts upon which the description contained in the foregoing pages is founded, may be the more clearly comprehended.

[1] Bread and its Adulterations, 'Lancet,' April, 1850.

Results recorded from day to day, of the Examination of Samples of Diabetic Urine.

1st Sample:—This urine was passed on the morning of the *7th* of *June*, 1852, but did not come into my possession until the 11th inst., it having been kept in a corked phial; it was very acid, had a specific gravity of 1037, and examined with the microscope there were detected in it numerous octohedra of oxalate of lime; it was divided into two portions.

1st portion in open vessel.—Examined on the 11th inst. There were observed near the surface of the urine a few cloud-like gelatinous masses composed of myriads of minute sporules imbedded in a mucoid base. Sporules of *Penicilium glaucum*, some round, but the majority of an oval form, were likewise noticed resting on the urine.

Examined on the 13th inst. There were seen on the surface with the naked eye a few small circular patches of Penicilium glaucum, composed of sporules, some round, but the greater number oval, while at the bottom of the glass was an abundance of sporules, both small and large, of the saccharine torulæ, as well as a few filaments of the same, some with bearded cells.

Examined on the 19th inst. The Penicilium was still in the same state, but a thick white woolly stratum of the diabetic fungus had become developed, forming a ring round the whole margin of the glass; this consisted principally of the thallus; that is, of the root-like portion of the plant, which is made up of branched and bearded threads; intermixed with the filaments were, however, numerous large sporules, and from the upper surface of the stratum a considerable number of straight filaments shot up.

Examined *June* 23*d*. The woolly stratum now extends nearly over the whole surface of the urine; and the vertical threads are seen by the eye alone to bear on their summits the minute spherical and black heads which are characteristic of the fungus in its perfect state. (See Pl. v, fig. 2.)

Examined *July* 3*d*. The globular heads have lost the smooth outline which they at first presented, and they now consist of masses of sporules of a rounded form and deep brown colour, supported on the extremities of the vertical filaments; in some cases, the sporules have fallen off, the dilated extremities of the filaments then coming into view. The stratum breaks up readily; and on replacing it in the glass from which it had been removed for a few minutes, it sank to the bottom.

Examined *July* 19*th*. Stratum risen again, and spread over the whole surface of the glass; patches of Penicilium glaucum in perfect fructification have appeared; the diabetic torula now seen is chiefly the results of a second development, which, like the first, has passed through all the stages, even the last, that of aërial fructification.

The urine is now pale, but thick and turbid, as though mixed with flour; and there is a copious deposit, consisting principally of the sporules of the diabetic fungus: it is alkaline, contains an abundance of triple phosphate, and the potash and copper tests furnish no results, showing that the sugar has at length disappeared.

2d portion in closed vessel.—Although passed on the *7th* of *June*, this portion was not placed in the closed vessel until the 11th inst., the saccharine torula had therefore become developed to some extent previous to the exclusion of the atmosphere.

Examined on the 13*th* of *June*. Urine in the same condition, and containing the same structures as were detected in the portion exposed to the air at the same period, the only difference being that there was very much less of the saccharine torula.

Examined 19*th June*. No increase in the quantity of saccharine torula, and none present at the top of the urine, the pellicle of Penicilium on surface in the state of oval sporules.

Examined 3*d July*. Saccharine torula in the same state, no scum of Penicilium on surface.

Examined 18*th July*. Urine pale, perfectly clear, and possessing a strong acid reaction; still contains traces of sugar.

Examined 16*th September*. Urine bright, clear, and still very acid; the sugar has now disappeared entirely.

2d Sample:—*Placed in partially closed vessel.* Passed 22*d May*, but did not come into my possession until some time afterwards, it having been kept in a corked phial. When examined with the microscope, there were detected in it at the bottom a few sporules, both large and small, of the saccharine fungus, hexagonal crystals of uric acid, and octohedra of oxalate of lime, (see Pl. III, fig. 3.) It was placed in a partially closed vessel on the 14*th June*.

Examined 19*th June*. There was an abundant gelatinous frothy scum on surface, consisting of the small sporules of the diabetic torula, and of numerous bubbles of carbonic acid: there was also a considerable deposit of the small sporules, intermixed with a few of the large ones at the bottom of the vessel.

Examined 3*d July*. Gelatinous and frothy scum nearly all subsided to the bottom, the sediment consisting, as before, of the minute sporules, with a few large ones; urine still acid.

Examined 18*th July*. The thick frothy gelatinous scum had reappeared on the surface, but on shaking the urine it again fell; there is now a very considerable deposit divisible into two layers, the lower of a fawn colour, consisting of the small and large sporules of the saccharine torula, and the upper of the small sporules only: the smell of the urine is sour and acetous, but the reaction slightly alkaline; sugar gone entirely.

Examined 8*th August*. The crystals of uric acid have disappeared, and their place is supplied by numerous globules of some urate: small sporules of the diabetic fungus may still be detected. It will be observed that neither in this nor the previous specimen did the saccharine torula attain its full development.

3d Sample:—*In open vessel.* This urine did not reach

me until some time after it had been passed; it was when received, however, of highly specific gravity, acid, and contained a considerable quantity of sugar. Exposed to the air for some days, the surface became covered with the thick woolly stratum, which, on examination, was found to consist of the diabetic torula in its perfect condition.

4th Sample:—1*st portion in open vessel.* Urine passed 23*d July*, 1852; specific gravity 1033, acid.

Examined *July* 24*th*. Copious gelatinous-looking flocculi, with many bubbles of carbonic acid imbedded in and surrounding them, have appeared near the surface of the urine; these consist of vast numbers of minute circular and oval sporules, immersed in a mucus-like base. The urine has a milky or floury appearance, which is occasioned by the great numbers of sporules diffused throughout.

Examined 25*th July*. Flocculi increased in size, and many have fallen to the bottom, bubbles of carbonic acid gas are seen rising from all parts of the urine to the surface.

Examined on the 27*th July*. Nearly in the same state.

Examined 30*th July*. Surface covered, particularly at the edges, with a thin plicated scum of Penicilium, which consists of oval sporules, some extending into short threads. No large sporules of the saccharine torula have as yet appeared; the urine is still very acid, and has a specific gravity of 1024.

Examined 8*th August*. The plicated thin scum, consisting of the sporules and threads of Penicilium, is still seen at the sides; and in the centre a large mass raised above the surface, and also extending much beneath it, having the consistence and colour of yeast: this mass consists principally of the large sporules of the saccharine torula, and which are not distinguishable under the microscope from those which form the yeast plant; the urine is thick, as though flour were diffused through it, very acid, and still contains sugar, but a small quantity, judging from the action of the potash test.

Examined 8*th August*. The perfect fructification of the

Penicilium has now become developed, forming a green circle round the yeast mass. The further changes which ensued in this sample were not followed.

2d portion in partially closed vessel.—Examined on the *24th July*. This urine is in the same condition as the specimen in the open vessel at the same date.

Examined *25th July*. Same state as the previous specimen.

Examined *8th August*. A thin pellicle of Penicilium on surface, consisting of sporules intermixed with a few short threads; gelatinous masses both on the surface and at the bottom of the vessel, a very few diabetic sporules of large size being detected in the latter situation: specific gravity 1022, very acid, and contains more sugar than the urine exposed to the air.

Examined *17th September*. The masses near the surface have become whiter and more consistent, and there is a very considerable deposit of the same. With the microscope the masses were found to consist of the sporules of the saccharine fungus, both large and small, but chiefly the latter, mixed with a few broken filaments: resting on the flocculi near the surface were many fine crystals of oxalic acid. This urine has a smell like that of sour milk; is very acid, and still contains a little sugar.

3d portion placed in closed vessel.—Urine a little thick and white, as though mixed with flour; bubbles of gas rising from all parts to the surface, showing that it is on the work: bottle burst the same day with a loud explosion, the fragments being scattered here and there, and the urine effervescing like so much ginger beer.

5th Sample:—*1st portion placed in open vessel.* Passed *2d August:* the urine became milky almost as soon as voided, from suspended sporules of the saccharine torula; it also quickly threw up a large quantity of carbonic acid gas.

Examined *8th August*. Scum of torula on surface composed, in part, of the oval sporules and branched threads or thallus of Penicilium glaucum, and in part of the small sporules of the saccharine fungus: at the bottom of the

vessel there was a considerable deposit formed by the small diabetic sporules only. At this date the urine was very acid, and still contained sugar, although it only had a specific gravity of 1006: the density of the urine when first passed was not ascertained; it was most probably of low specific gravity, however.

Examined *14th August*. Diabetic torula in nearly the same condition; sugar all disappeared. The fungus in this instance did not pass through all the stages of its development, in consequence of the early and rapid transformation and disappearance of the sugar.

2d portion in partially closed vessel.—Examined *August 8th*. Very acid, specific gravity 1004: thin scum of torula on surface formed of the sporules of the saccharine fungus and of Penicilium glaucum intermixed; a considerable deposit of the same.

Examined *17th August*. Saccharine fungus in the same state; urine smells very sour, and is strongly acid.

Examined *17th September*. A thin brownish scum of torula on surface, composed chiefly of the small sporules of the saccharine fungus: urine gelatinous-looking, very acid, and of a sour smell; does not now contain sugar.

3d portion in closed vessel.—The urine was placed in the closed vessel the day on which it was voided; the next morning it was milky, and many bubbles of gas had collected on the surface: in the course of the day the vessel burst with a loud noise, the urine effervescing briskly from the large quantity of carbonic acid gas set free.

6th Sample:—*1st portion placed in open vessel.* Urine passed *7th August*, of specific gravity 1028, became somewhat milky shortly after being voided.

Examined *8th August*. Several gelatinous-looking masses had formed on the surface, where also large numbers of bubbles of carbonic acid gas had collected; the subsequent changes were the same as in the other samples freely exposed to the air; the fungus continued to grow until it reached its complete development.

The changes which occurred in the other two portions of

the same urine, the one partially exposed to the air, the other excluded from it, were so nearly similar, that it is unnecessary to describe them. Sufficient details have now been given to show the precise character of the alterations which ensue in specimens of saccharine urine placed under different conditions.

But it may be said that there are already tests sufficient of the presence of sugar in the urine; and, therefore, although the torula-test is very satisfactory, yet that it is not needed. To this objection I next reply—

There is no doubt but that in cases of confirmed diabetes, where the quantity of sugar in the urine is very considerable, the potash and copper tests afford positive indications; but do they in slight and incipient cases of that disorder?

The physician is not unfrequently consulted in supposed cases of diabetes, the symptoms being—loss of health, emaciation, but particularly an elimination of an increased quantity of urine; and yet, failing when he comes to test the urines by the ordinary reagents to discover the presence of sugar, he generally pronounces these cases not to be diabetic. Does he, in this way, always arrive at a correct conclusion?

The detection of diabetes in an early stage, where sugar is present in the urine, either occasionally only, or in small quantities, is of the highest importance; for it is then chiefly that the physician may entertain the hope of treating the disorder successfully.

In an article published in the 'Lancet,'[1] I showed that diabetic sugar might be introduced in quantities by no means inconsiderable into many different urines, and yet not be discovered afterwards by the most skilful application of the ordinary tests.

Now, this fact confirms in a remarkable manner the suspicion entertained by many that urines may contain small quantities of sugar, and yet that this shall not be detected by any of the methods ordinarily in use.

[1] On the Tests for Sugar in the Urine, 'Lancet,' 1851.

I have now ascertained that this is not unfrequently the case.

Several specimens of urine voided in a supposed case of incipient diabetes were set aside for observation, they having previously been carefully tested for sugar, but none having been discovered.

In some of these specimens, somewhat to my surprise, although such a result was not of course wholly unanticipated, the gelatinous masses previously described appeared, bubbles of carbonic acid were eliminated, and the diabetic torula or fungus was traced through all the stages of its development—even the last, that of perfect aërial fructification.

The only differences observed in the development of the fungus in these specimens contrasted with its growth in samples of urine containing large quantities of sugar, were in the size and number of the masses, which were fewer and smaller, in the thinness of the yeast-like stratum formed, and in the circumstance that this, as well as the perfect fructification which sprang from it, did not cover the whole surface of the liquid, but extended over part only, forming one or more patches.

In other specimens development entirely ceased at the end of the first stage, the urine became turbid, the gelatinous masses were formed, and carbonic acid evolved; but here the growth stopped—the masses broke up, and after a time disappeared.

Lastly, in other specimens, the diabetic torula did not make its appearance at all.

It was particularly noticed that those specimens in which the fungus went through all the stages of development were more than usually acid.

That those urines in which the development ceased quickly were but feebly acid when passed, the acidity soon being entirely lost.

Finally, that the urines in which the fungus did not make its appearance at all were frequently either alkaline when voided or very quickly became so.

It appears, then, that in the diabetic fungus we have a most valuable, and, indeed, the only certain and available, test of the presence of sugar in urine in small, but not inconsiderable quantities.

It has been remarked that it was only in the more acid samples that the fungus became fully developed. This may be readily accounted for.

When describing Penicilium glaucum, I stated that the conditions necessary for its development were free exposure to the atmosphere, albumen to act as a ferment, and an acid liquid. Now, the same conditions are requisite for the growth of the diabetic fungus, with the addition of a fourth —the presence of grape or diabetic sugar.

In the feebly acid or alkaline urines one of these conditions is not fulfilled, and, therefore, the fungus is not developed.

It may be said, however, that urines which contain sugar are always acid, and therefore, that the fungus should be developed in all cases where this is present. Where the quantity of sugar is very considerable the urine no doubt is constantly acid; but whether it is always so, where the amount is small, is less certain. With a view to determine this point, I adopted the following proceeding:

Several samples of the feebly acid or alkaline urine passed by the patient the subject of incipient diabetes were obtained; to these was added sufficient phosphoric or acetic acid to impart the decided acidity necessary for the development of the fungus should sugar be present. The specimens were watched from day to day, and as any lost their acidity, as sometimes happened, further quantities of acid were added. This proceeding furnished the following results:—In the whole of the samples the circular patches of Penicilium glaucum quickly made their appearance, ultimately passing through all the stages of their development. In one of the samples only was there any formation of the sugar fungus, and in this the growth did not proceed beyond the stage of large circular sporules. One would, therefore, be disposed to conclude as the result of this

experiment that sugar is not ordinarily contained in slightly acid, neutral, or alkaline urines.

In suspected cases of diabetes, then, should the fungus not appear in the first specimens of urine examined, it must not be concluded that sugar is not present, even although the urines possess some degree of acidity. We must ascertain whether they are sufficiently acid, and, if necessary, must increase that acidity; neither must we decide against the presence of sugar in those instances in which some of the samples of urine examined are alkaline, for, as is also shown above, sugar may be present in some and absent in other specimens. In the case of incipient diabetes, which I have made the subject of special observation, I have particularly noticed that sugar is most liable to occur in the urine voided after error and excess in diet.

In this place the observations of Dr. Basham, 'On the Cholera Sporules,'[1] may be referred to. While searching the urine of a dyspeptic patient for crystals of oxalate of lime "the appearance of some annular-formed cells attracted attention, some with minute nuclei. The field of the microscope presented these sporules amongst many crystals of the oxalate and some epithelium and mucous globules." Again, in examining, in another case, some urine which was strongly acid, abounded in stellated crystals of uric acid, and was of specific gravity 1018, Dr. Basham observed some sporules which he thus describes: "They are somewhat like the torula of diabetic urine; but they want the true confervoid character. They are oval cells, arranged by their long diameter in a bead-like form, with minute granules or cellules developing themselves from the surface and junction of the parent-cells."

Dr. Basham made pen-and-ink sketches of the appearances observed at the time. These are published in the third edition of Dr. Golding Bird's work, and from an examination of fig. 58, which represents the character of the fungus detected in the second sample of urine examined, I entertain no doubt whatever but that this drawing

[1] Medical Gazette, 1849, vol. xliv, p. 686.

exhibits a condition of the sugar fungus. The urine, therefore, although not of high specific gravity, contained a small quantity of sugar, to which the presence of the torula was doubtless due. This case affords further evidence of the value of the torula-test for sugar in the urine.

From the facts which I am now about to adduce, it becomes extremely probable that sugar frequently makes its appearance in the urine in connection with a more or less alkaline condition of that fluid. It is at all events certain that it sometimes does so.

For some years before, and up to the period of the discovery of sugar, the urine in the case of diabetes, so often referred to, was when first passed occasionally alkaline or neutral, but most frequently feebly acid. On becoming cold, and even while still acid, it usually threw up an abundant iridescent pellicle of phosphate of magnesia; and when cold, it deposited large quantities of triple phosphate. One of the consequences of this want of acidity was that Penicilium glaucum, one of the best tests of acidity, but seldom became developed in it, and, when it did appear, it still more rarely passed through all the stages of its growth.

But the most remarkable character of this urine was, and still is, that it frequently contains very large quantities of phosphate of lime in a crystallized state. Now, this earthy salt occurs but very rarely in the urine in this condition, and of it, so far as I am aware, no accurate or detailed description has yet been given. I have myself met with crystals of phosphate of lime in several different cases; and in 1850 I published in the 'Lancet' a short notice of the form and composition of certain modifications of the crystals of this phosphate.[1]

Although this salt has not yet been fully described, we yet find in works on organic chemistry one or two brief references relating to it.

Thus, in vol. ii, p. 133, of Simon's 'Animal Chemistry,'[2]

[1] On certain Important Points in the Chemistry and Pathology of the Urine, 'Lancet,' January 19, 1850.

[2] Translation by Dr. Day.

the following observation occurs: "The phosphate of lime may be recognised under the microscope as an amorphous mass. Sometimes, but rarely, it occurs in a crystalline form. Both varieties are figured in fig. 26." In this figure a granular powder, as well as certain foliaceous masses, are represented. The form of these is so irregular that it is impossible to refer them, with anything like certainty, to the crystals I am about to describe; while, appended to the explanation of the figure, a remark is added to this effect — the foliaceous bodies are most probably urates. It thus appears that Simon was himself in some doubt respecting the composition of the irregular bodies which fell under his observation.

Again, Dr. Griffith, in his little work, copies Simon's figure, and adds, "I have specimens of this."[1]

Lastly, I find crystals of phosphate of lime described and figured under the name of "*Penniform Crystals of the Neutral Salt*," by Dr. Golding Bird. The description is as follows: "This very elegant variety of the neutral magnesian phosphate has only lately fallen under my notice, and has occurred in a very few cases. It presents the appearance of striated feather-like crystals, two being generally connected, so as to cause them to resemble a pair of wings. (Fig. 35.) I cannot give any satisfactory explanation of the causes of this curious and elegant variety, or whether they differ in any way chemically from the prismatic form. The few specimens I have met with occurred in acid urine."[2]

I found my opinion that the crystals thus described by Dr. Bird are not composed of the neutral triple phosphate, but of phosphate of lime, upon an examination of one of Dr. Bird's original preparations, kindly lent me, along with others, for the purpose of having figures made from them.

Since the occurrence of these crystals is of much importance, in more respects than one, but particularly in relation to the presence of sugar in the urine, I will describe the forms which they assume, and especially the

[1] Practical Manual.

[2] Urinary Deposits, 2d ed., p. 212.

method of analysis adopted, so that no room may be left for supposing that a correct conclusion with respect to the composition of these crystals has not been arrived at.

First, I would observe the crystals have presented themselves to my notice in the urine for at least the last three or four years. Although generally present, especially when the health is more than usually affected, yet they are sometimes absent entirely,—it may be for days together,—or they may be absent from one specimen and present in the next. They vary also in number: sometimes there are but few; usually they occur in great abundance, particularly in the more acid samples, in which they are formed even while the urine retains a decided acid reaction, and long before the formation and deposition of the crystals of triple phosphate.

Viewed with a half or quarter inch object-glass, the crystals appear wedge-shaped—being broad at one extremity and narrow at the other; but when the $\frac{1}{4}$th inch glass is brought to bear upon the broad end of the crystal, which is the only completely-formed part, it is then seen that they are really six-sided prisms, with oblique, and sometimes dihedral, summits. Occasionally, but rarely, both ends of the crystal are perfect, and then the wedge-shaped appearance is lost, and both extremities are alike. Sometimes they occur singly, but the greater number usually form, by the union of several crystals by their narrow extremities, rosettes more or less perfect; in other cases, but this is very seldom, the crystals are compound, each breaking into numerous secondary crystals; when this occurs, both ends are generally of the same shape.

The crystals are formed first, and chiefly on the surface of the urine, but they are sometimes found in large quantities at the bottom of the glass, and even adhering to the sides; those on the surface are frequently imbedded in a crust of iridescent phosphate of lime.

The crystals were twice carefully analysed, being obtained for the purpose, in the following manner: after having been identified by means of the microscope, they were

skimmed off the surface of the urine, and repeatedly washed in distilled water, to free them, as far as possible, from impurity; it is rarely, however, that they can be procured in any quantity, entirely free from admixture with small quantities of either phosphate of magnesia, triple phosphate, or even both these.

In the first sample analysed, there were present a few crystals of triple phosphate, and a little phosphate of magnesia; the deposit thus contaminated exhibited the following characters: it was slowly dissolved by cold acetic acid, and very rapidly by hot; from this solution oxalic acid threw down a copious precipitate of oxalate of lime, when boiled with liquor potassæ ammonia was evolved; it was fusible with difficulty only before the blowpipe.

From the above reactions, it is evident that the crystals are composed principally, if not entirely, of phosphate of lime; the small quantities of magnesia and ammonia detected being derived from the triple phosphate and phosphate of magnesia, which were previously ascertained to be present; it is nevertheless possible, that the lime may be combined with a small quantity of ammonia.

The second sample was almost, if not entirely, free from the ammonio-magnesian phosphate, but it was admixed to a very small extent with phosphate of magnesia, animal matter in the form of vibriones, and perhaps with oxalate of lime.

On boiling a few of the crystals in a test tube with a little liquor potassæ, a small quantity of ammonia was evolved, which communicated a red stain, not permanent, to turmeric paper. After boiling for a quarter of an hour, the liquid was diluted and set aside; in a few hours, the clear supernatant liquid was poured off, then acidulated with acetic acid, and tested with lime for oxalic acid, on standing for two or three hours a faint precipitate of oxalate of lime formed. A little more of the deposit was then boiled with acetic acid, and the clear liquor tested for lime with oxalic acid, when an abundant precipitate was produced. After the precipitation of all the lime, the solution was super-

saturated with ammonia, and allowed to stand, when crystals of bibasic phosphate of magnesia and ammonia separated. Finally, heated before the blowpipe, the crystals melted with difficulty.

As the result of this analysis, it again appears that the crystals consist, for the most part, and in all probability entirely, of phosphate of lime. A trace of ammonia only was detected on this occasion, but very perceptible quantities of phosphate of magnesia and oxalate of lime, the former of these, and most probably the latter also, were present as impurities.

The question next arises, is there any connection between the crystals of phosphate of lime and sugar in the urine?

I have described these crystals as occurring most frequently and abundantly in the more acid samples of urine; now it is in precisely these that sugar most commonly makes its appearance.

Again, between sugar and lime there is a great and well-known affinity.

Lastly, lime is apt to occur in saccharine urine in another form, in combination with oxalic acid.

These considerations render it probable that there is some such connection; before, however, we shall be in a position to come to any definite conclusion on this point, further observations are required.

I will now give the results, as recorded from day to day, derived from the examination of specimens of the urine passed in the case of incipient diabetes.

Results of the Examination of Specimens of the Urine voided by the Patient the subject of Incipient Diabetes.

1st Sample:—Urine passed 5th August, slightly acid, having a specific gravity of 1015, clear when voided, and of a pale brandy colour, but becoming cloudy and thick as it cooled; flocculi separated from it, which subsiding formed a deposit three fourths of an inch in depth in a twelve-ounce

bottle; while the urine was being passed a slight smarting sensation was felt.

Examined *6th August*. The urine has now become alkaline, the deposit white and granular.

Examined *8th Aug.* A scum or pellicle has now formed over the whole surface of the urine, this consists of vibriones, a very few crystals of the ammonio-magnesian phosphate, and an immense number of crystals of phosphate of lime, mostly in stellæ, but some also single. The first analysis of the crystals given at p. 65 was made from this sample.

As at the time no suspicion was entertained that the case was one of diabetes, no search was made for the sugar fungus.

2d Sample:—Passed early in the morning, on the *5th* of *August*. Urine clear, very acid; specific gravity 1024, and of a very deep colour.

Examined *8th August*. Many small circular patches of a variety of Penicilium glaucum in all stages, some composed of sporules, others of thallus, and some fully developed, and of a dark olive-green or brown colour; interspersed amongst these were a few white woolly tufts of Penicilium of larger size.

Examined *27th Aug.* Tufts of Penicilium in much the same state, but faded somewhat, and now imbedded in a pellicle of phosphate of magnesia. While examining one of the tufts under the microscope, many large sporules, as well as some of the threads forming the thallus of the saccharine fungus, were somewhat unexpectedly discovered, and it was afterwards ascertained that a considerable quantity of this fungus in an advanced state of development was present, not only on the surface, forming the tufts in part, but also at the bottom of the vessel.

Examined *5th September*. Urine thick and turbid, alkaline, with much deposit at bottom of glass.

Examined *17th Sept.* Urine dark brown; on examination of the tufts with the microscope, numerous blue masses were seen, but there were no crystals of phosphate of lime; the deposits consisted of vibriones, a great many spherules of some urate, and a few crystals of triple phosphate.

The saccharine fungus in this specimen did not reach its complete development.

3d Sample:—Examined *5th September*. Passed about ten days since, but no record kept of its characters at that time. A thick yellow scum has spread all over the surface, with here and there imbedded in it a patch of fawn-coloured penicilium in perfect fructification, one patch somewhat green in the centre; this scum is composed of vibriones, phosphate of magnesia, and an immense number of the crystals of phosphate of lime, some separate, others in stellæ; the urine is still slightly acid, thick, and of specific gravity 1015.

Examined *17th Sept.* Urine alkaline; the scum first formed was removed, and the crystals of phosphate of lime after being well washed were submitted to analysis; a second scum similar in appearance has now collected on the surface, this is composed entirely of phosphate of magnesia, much triple phosphate, and vibriones, very small and active. At the bottom, there was present much phosphate of lime, a very small quantity of triple phosphate, and many vibriones.

There were also detected a few sporules of fungus, most probably those of the sugar torula.

4th Sample:—This sample was also passed about ten or eleven days since; it is somewhat acid, and the surface is covered with circular tufts, in perfect fructification, of an olive-green fungus, a variety of Penicilium glaucum. The tufts are small and interspersed with several white woolly tufts of larger size, and not in fructification; spreading over nearly one half the urine is another fungus in perfect fructification, the saccharine; this is recognised by the long filaments which spring up on all sides, bearing on their summits the minute spherical heads which are so characteristic of the species. On examination with the microscope, numerous large sporules and threads of the diabetic fungus, as also many stellæ of phosphate of lime, were discovered,

intermixed with the threads forming the thallus of the olive-green tufts of Penicilium glaucum; the thallus of the woolly tufts likewise contained an immense number of stellæ of phosphate of lime.

5th Sample:—Urine passed after dinner, on the *5th* of *September*, clear, of the colour of pale brandy, decidedly acid; specific gravity 1019; colour somewhat deepened by boiling with potash; no result with the copper test.

Examined *7th September*. Still clear and acid, has deposited much mucus, and some oxalate of lime.

Examined *8th Sept.* Turbid, but still acid, a few mucus-like masses near surface.

Examined *11th Sept.* Still acid; a decided scum on surface, composed of the small sporules of the saccharine fungus, vibriones, and a few crystals of phosphate of lime.

Examined *17th Sept.* Alkaline; saccharine fungus fallen to bottom, and still in the state of minute sporules; scum on surface, composed of much phosphate of lime and triple phosphate, with many vibriones. At the bottom of the glass, groups of sporules imbedded in masses of vibriones were detected, also very much oxalate of lime, phosphate of lime, and triple phosphate; the same also adhering to the sides of the glass in large quantities.

6th Sample:—Urine passed early in the morning of the *6th* of *September*, clear, of a pale brandy colour, acid; specific gravity 1022; colour more deepened than in Sample 5, by boiling with potash; the copper test does not afford any evidence of the presence of sugar.

Examined *7th September*. Very turbid, decidedly acid, contains great numbers of octohædra of oxalate of lime, and much vesical epithelium.

Examined *8th Sept.* Urine very thick; cloud-like masses of the sporules of the sugar fungus both on the surface and at the bottom, as also many bubbles of carbonic acid gas.

Examined *17th Sept.* Urine alkaline; colour of urine

not deepened by keeping; scum on the surface, composed of crystals of phosphate of lime, a pellicle of phosphate of magnesia, and many vibriones; at bottom of glass, very much phosphate of lime, numerous globules of some urate, a little triple phosphate, vibriones, and a few dark sporules of fungus, perhaps, those of the sugar plant.

7th Sample:—Urine passed after dinner, on the *6th* of *September*, decidedly acid; specific gravity 1015; clear, and of a pale colour; colour deepened by boiling with potash; no evidence of the presence of sugar afforded by the copper test.

Examined *8th September*. Very turbid, contains much vesical epithelium, but no oxalate of lime.

Examined *10th Sept*. Feebly acid, smell a little offensive, very thick, with large masses of sporules near the surface, a considerable deposit of the same, and many globules of carbonic gas.

Examined *11th Sept*. Scum on surface composed of vibriones, and phosphate of lime; no triple phosphate; urine nearly neutral.

Examined *21st Sept*. No scum; crystals of phosphate of lime floating on surface, and adhering to sides, some compound, with both extremities perfect; triple phosphate, and a very few minute octohædra of oxalate of lime. At bottom, phosphate of lime, triple phosphate, and vibriones. No diabetic sporules of any size.

8th Sample:—Passed after dinner, on the *6th September*, slightly acid; specific gravity 1019.

Examined *8th September*. Neutral, rather turbid.

Examined *10th Sept*. Alkaline, still more turbid; deposit of mucus with much triple phosphate; on surface, a scum consisting of vibriones, and much triple phosphate; no sporules of sugar fungus detected, and no phosphate of lime; the urine is now rather offensive, its colour was slightly deepened by boiling with potash; but the copper test gave no evidence of sugar.

Examined *21st Sept*. Much urate in globules at bottom of glass, with triple of phosphate, but no phosphate of lime.

9th Sample:—Passed *7th September*, at bedtime, nearly neutral; specific gravity, 1016.

Examined *10th September*. Very thick, alkaline; scum on surface composed of vibriones, and triple phosphate, deposit formed of same; no sporules of sugar fungus detected, and no phosphate of lime.

10th Sample:—Passed early on the *7th September*, decidedly acid; specific gravity 1016, clear pale straw colour; colour deepened by potash; copper test gave no evidence of sugar.

Examined *9th September*. A little turbid, contains much vesical epithelium, but no oxalate of lime.

Examined *10th Sept*. Very thick; masses of sporules near the surface, falling to the bottom when the glass is moved; a few bubbles of carbonic gas; phosphatic scum on surface; urine smells rather offensively, but is still a little acid.

Examined *11th Sept*. Scum more decided, composed chiefly of phosphate of lime, with a little triple phosphate and many vibriones; still faintly acid; bulky deposit formed of mucus; the small sporules of the sugar fungus and crystals of phosphate of lime.

Examined *16th Sept*. Urine alkaline; no further development of the saccharine fungus.

Although the colour of most of the above urines was deepened by boiling with potash, yet this increase was not greater than is commonly observed in urines which do not contain sugar. It is usually stated that non-saccharine urine is bleached by boiling with potash. This is incorrect, as shown by me in a paper published in the 'Lancet,' March, 1851.[1] It almost invariably darkens every variety

[1] On the Tests for Sugar in the Urine, 'Lancet,' 1851.

of urine. Thus, in not one of the above samples did either the potash or copper tests betray the presence of sugar.

As scarcely any data exist tending to elucidate the early, and therefore the most important stages of diabetes, it may be useful to give a somewhat detailed description of the symptoms, by which for the last three or four years the case of incipient diabetes referred to was characterised.

Case.—William F—, æt. 35, of delicate organisation and nervous temperament, but free from organic disease, has for some years suffered considerably from chronic indigestion, as evidenced by frequently recurring attacks of headache and sickness; these were brought on by very slight causes, as any little error or excess in diet; the headaches were particularly distressing, and attended by giddiness and confusion of thought; the vomitings set in some hours after the commencement of the headaches, when these were unusually severe, and occurred as often as once or twice a week; each attack consisted of several successive fits of retching, and sometimes lasted as many as 10 or 12 hours, continuing long after the stomach had been well emptied. Within the last 8 months the headaches and sickness have nearly ceased, but occur still occasionally on any departure from the very temperate and regular method of living usually pursued.

The attacks were worst in summer, milder and less frequent in winter. For the last four or five years the patient has noticed that he passed his urine more frequently and in larger quantity than ordinary, his kidneys acting quickly on the slightest cause, as almost immediately after taking liquids of any kind, especially beer. The characters of the urine have already been described above. He has long also experienced a constant feeling of debility and exhaustion, both bodily and mental; as the appetite was generally good, he was unable to account for this extreme debility, and expressed a conviction that the large quantity of urine eliminated acted as a drain upon his system, the food and drink taken, by stimulating the kidneys, appearing rather to increase the exhaustion than to afford support.

Amongst the peculiar symptoms were the following:

1st. An occasional dry hacking cough without expectoration, and unaccompanied by symptoms of cold; this used to come on about noon, and was attended by slight febrile excitement; it was always removed for the time by food. 2d. Frequent dryness of the lips without positive thirst; this symptom attracted attention long previous to the discovery of sugar in the urine, and excited the suspicion that the case might possibly be one of incipient diabetes. 3d. Very great susceptibility to changes of temperature and weather; while rain, or the least dampness of the atmosphere, produced considerable depression; the heat of the sun seemed to inflame the blood, and to induce in it a state of fermentation.

The above symptoms, prior to the detection of the sugar, were set down to indigestion and the phosphatic condition of the urine; it is now clear, however, that they were mainly attributable to the sugar, the presence of which in the urine shows that the primary assimilative functions were very greatly at fault.

The patient attributed his bad health to excessive mental labour and long-continued anxiety. For some weeks past he has relaxed somewhat from study, has taken more exercise, the diet has been regulated, meat being allowed twice a day; as the result of all which, the health has considerably amended.

We have then occurring in the urine in different and very opposite states, two distinct species of fungus, the one being characteristic, to some extent, of the presence of albumen, and the other of sugar; but since the conditions necessary for the development of Penicilium glaucum all exist in saccharine urine, the only difference being the superaddition of sugar, we have next to ascertain whether the two species do not sometimes occur together in the same urine.

As might almost have been anticipated, the result of observation on this point is, that they not unfrequently occur together.

When the amount of sugar present is but small, the two fungi go on developing themselves almost in equal ratio,

each presenting its own distinctive characters, so that when they have attained their full development, part of the surface of the urine will be occupied with patches of the true saccharine torula, and part with those of Penicilium glaucum. In some cases, even the same tufts may be formed of the two species combined. (Pl. III, fig. 4.)

When, however, the quantity of sugar is considerable, the saccharine torula is developed with such rapidity and in such quantity as to outstrip the other species; and it is only when the fermentation has nearly come to an end, that Penicilium glaucum comes into view, and proceeds in its development.

We have, in the next place, to consider very briefly the chemical changes which ensue in saccharine urine placed under the three conditions already described, viz. free exposure to the air, partial exposure, and complete exclusion.

In all the specimens of saccharine urine freely exposed to the air, the following changes have ensued: the sugar has disappeared, carbonic acid has been evolved, and alcohol formed; of the alcohol part escapes into the air, diffusing a vinous odour, and part is converted into acetic acid. As the conversion of the sugar proceeds, the specific gravity of the urine becomes greatly lessened.

In the specimens partially exposed to the atmosphere, the urine, after a time, presented a gelatinous appearance, possessed a smell like sour milk, and was strongly acid; on analysis it was ascertained that the sugar had disappeared, that a small quantity of alcohol was present, and that the acidity was due to an abundance of acetic acid. In one or two of the samples, large quantities of oxalic acid in combination with lime were detected. As the saccharine fungus was imperfectly developed only, it is probable that in this case the greater part of the sugar passed directly into acetic acid.

In the specimens from which the air was excluded, as there was only a slight development of the sugar fungus, so was there scarcely any formation of alcohol; nevertheless, the sugar disappeared, and it was found on analysis to have

become converted into lactic acid, a small quantity of butyric acid, and what appeared to be aldehyde, from its smell and property of slightly reducing the oxide of silver, and giving a brownish-yellow coloration with liquor potassæ.

These several transformations of sugar are interesting, if not important; it has usually been considered that saccharine urine, when kept for any length of time, always undergoes the vinous fermentation; the lactic, acetic, butyric, and oxalic acids sometimes formed, as well as the circumstances which determine their formation, having been in general overlooked.

From a review, then, of the whole of the facts and observations above described, relating to the development of torulæ in saccharine urine, the following conclusions may be deduced:—

1st. That there is developed in saccharine urine, freely exposed to the air, a distinct species of fungus, which occurs in no other condition of that excretion.

2d. That this fungus is identical with the yeast plant.

3d. That it passes through three stages of development, any one of which is distinctive of the species.

4th. That since it is sometimes developed in urine in cases in which the potash and copper-tests fail to detect the presence of sugar, and in which, therefore, the quantity of sugar is not very considerable, it affords a most valuable and important test, and furnishes us with the means of detecting diabetes, even in its earliest stages.

5th. That the conditions necessary for its development are—free exposure to the air, an acid liquid, nitrogenous matter to act as a ferment, grape sugar or glucose, and a moderate temperature.

6th. That it may be developed at will in any sample of urine which is sufficiently acid, by the addition of a few grains of grape sugar.

7th. That when specimens of saccharine urine are imper-

fectly exposed to the air, the development of the fungus is incomplete only.

8th. That when the atmosphere is entirely excluded, no development of the fungus occurs.

9th. That in some few cases, where the quantity of sugar is very small, the fungus will cease to grow after having passed through the first stage only of its development, in consequence of the sugar, all having become converted into alcohol and carbonic acid.

10th. That sugar may be present in some very rare cases in small quantity, and yet the torulæ fail to be fully developed in consequence of the urine not possessing the necessary degree of acidity.

11th. That in such cases it is probable the development might be ensured by the addition of small quantities of phosphoric acid, or of a solution containing carbonic acid.

12th. That the presence of this fungus indicates the vinous fermentation, its development being accompanied by the disengagement of carbonic acid and the formation of alcohol.

13th. That the power of the fungus in aiding the transformation of the sugar is limited to the period when it is in the condition of sporules or yeast, the thallus and aërial fructification exerting no influence over the change.

14th. That in those cases in which the fungus is only partially developed, in consequence of imperfect exposure to the atmosphere, the sugar is converted chiefly into acetic acid, but a portion sometimes, also, into oxalic acid.

15th. That where the fungus is not developed at all, in consequence of the exclusion of the atmosphere, the sugar is transformed into lactic, acetic, and butyric acids, and also probably aldehyde.

16th. That since, in saccharine urine, the conditions requisite for the development of Penicilium glaucum exist, that species is likewise frequently met with in such urine.

17th. That in very many of the specimens of urine obtained from the patient labouring under diabetes, in a mild form, large quantities of crystallised phosphate of lime were detected.

Postscript, *received January* 11*th*, 1853.—Since my paper on the Development of Torulæ in the Urine was read before the Royal Medical and Chirurgical Society, I have been so fortunate as to meet with another case, in which the urine threw down, on being allowed to stand for some time, an abundance of crystals of phosphate of lime, and which also contained some sugar, as shown by the development of the sugar fungus. This case affords, therefore, further and strong proof of the relation which I suggested might possibly be found to exist between crystals of phosphate of lime in the urine, and small quantities of sugar. The particulars of the case are as follows:—

Case.—Mrs. T—, aged 32, of delicate constitution and nervous susceptible temperament, subject to dyspepsia, married, and has three children, the youngest only three months old. Attention was directed to the urine in consequence of the intense pain experienced on ceasing to micturate. The only sample of urine examined, and for which I am indebted to my brother, Dr. Hassall, of Richmond, was passed on the 19th of November; it was of specific gravity 1031, very acid, contained a large quantity of some pink urate, very many crystals of uric acid, and some octohædra of oxalate of lime; there was no albumen, nor could sugar be detected by means of Trommer's test.

Examined 22*d November*.—The urine was still acid, and a cloud of vaginal epithelium had fallen to the bottom of the glass.

Examined 27*th November*.—It was still acid, and the surface was covered all over with circular patches of Penicilium glaucum in the state of sporules. Under the microscope there was discovered, mixed up with the sporules, an abundance of crystals of phosphate of lime.

Examined 7*th January*.—Urine alkaline; there was a scum of Penicilium in perfect fructification covering the whole surface of the urine, and mixed up with this were

immense numbers of globules of the urate and crystals of phosphate of lime, triple-phosphate, and oxalate of lime, together with some sporules and thallus of the sugar fungus.

Postscript, *received August 27th*, 1853.—Since the above communication was presented to the Royal Medical and Chirurgical Society, I have on several occasions met with crystals of phosphate of lime in connection with the saccharine torula. The fact, therefore, that some close relation exists between these crystals and sugar in the urine may now be considered to be fully established.

Note.—It may be well to state that the credit of establishing the real nature of yeast is due to Cogniard-Latour. In 1835 and 1836 he communicated to the *Société Philomathique* some researches on Ferments, which were afterwards published in a journal called 'L'Institut.' In 1837 he presented to the Academy of Sciences his "Memoire sur le Fermentation Vineuse," which was published in the 68th volume of the 'Annales de Chemie et de Physique,' 1838.

Fig 1.

Circular Sporules of Penicillium glaucum.

Fig 2.

Oval Sporules of Penicillium glaucum 250 diam.

Fig 3.

Sporules of Penicillium glaucum passing into filaments.

Fig 4.

Thallus of Penicillium glaucum shewing the Vesicular Enlargements 250 diam.

Fig 1.

Variety of Sporules of Sugar Fungus with many of *Penicillium glaucum*. 400 diam.

Fig 2.

Thallus and Sporules of Sugar Fungus. 220 diam.

Fig 3.

Thallus and Sporules of Sugar Fungus, with crystals of oxalate of lime also Vesicles of the Same. 220 d.

Fig 4.

Penicillium glaucum in Perfect Fructification, with Receptacle and Sporules of Sugar Fungus. 220 diam.

Read & West. Lith. 76 Shoe Lane.

Fig 1.

Incipient Thallus of Penicillium glaucum with Groups of Sporules. 220 diam.

Fig 2.

Penicillium glaucum. Perfect fructification. 220 diam.

Reed & West, Ink. 39, Norris Gardens.

Fig 2.

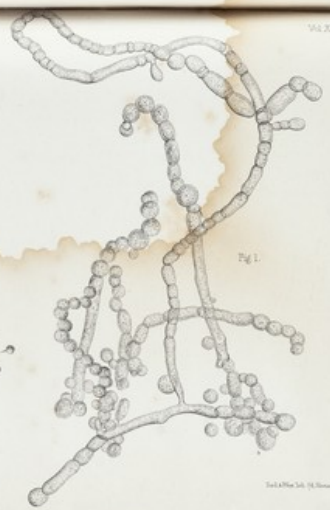

Fig 1.

Sugar Fungus in Perfect Fructification. 60 diam.

Thallus and Sporules of Sugar Fungus. 220 diam.

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On Hæmoptysis as a Cause of inflammatory Processes and Phthisis, with Remarks on Treatment.

By Hermann Weber, M.D.

THE excellent paper lately read by Dr. Bäumler before this Society on 'Cases of hæmoptysis followed by inflammatory changes in the lungs,' induces me to communicate the principal features of three cases of a similar nature, and to make some remarks on the treatment of hæmoptysis.

Case I.

Summary.—A. M. P., hereditarily predisposed to epistaxis and hæmoptysis, had himself repeatedly had slight attacks of hæmoptysis without their being followed by either pyrexia or impairment of the respiratory organs; had in 1858 again an attack, at first abating by rest, but afterwards rendered very violent by dancing; several days later, severe broncho-pneumonia, with pleuritis on both sides, terminating in gradual resolution and perfect recovery.

A. M. P., aged 20, a native of Sweden, belongs to a healthy family; his father, however, had before the age of 30 several attacks of hæmoptysis, and was considered consumptive, but has entirely recovered. Patient himself is of fair complexion, rather stout, has a healthy appearance, and well-formed chest; had as a child occasionally epistaxis, and at the age of five and fourteen slight attacks of hæmoptysis; has been in London since 1856, and enjoyed on the whole good health, but had several colds, with expectoration of small quantities of blood, which disappeared without medical advice. In December 1858, he began again to cough, and the expectoration was mixed with streaks of blood; there were no rhonchi to be heard, the percussion sound was everywhere normal, and there was no pyrexia; pulse 60 to 65; temperature 98° to 98·4° F. After a week's comparative rest, though he did not altogether stay at home, he was almost free from cough, and the scanty expectoration was scarcely tinged with blood when, against advice, he danced on several nights; and on

December 27 he expectorated several ounces of pure blood, with a sensation as if it came from the lower part of the left side. Had an irritating cough. There was some moist rhonchus at the lower part of the left side, as well in front as on the back; but there was no dullness and no fever; pulse 70; temperature 98·2° F.

Treatment.—Absolute rest. Morphiæ acetatis gr. ½, plumbi acetat. gr. j.ss., sacchari gr. v.; ft. pulvis j.; a powder to be taken every six hours.

Dec. 28.—Had two violent attacks of hæmoptysis; expectorated with each about 10 oz. of blood. Treatment: Ice internally, and iced milk as food.

29.—No hæmoptysis since yesterday; no cough. Pulse 85; temperature 99·6° F.

30, 9. A.M.—Sat up last evening against advice; had again violent hæmoptysis during the night; slight pain in the lower part of the left side; moderate dullness of percussion; scanty subcrepitant rhonchus; absence of respiratory murmur. Pulse 85 to 90; temperature 101° F.

9 P.M.—Pulse 90; temperature 101·3° F.

Treatment.—Omit morphia and lead. Pil. coloc. co. gr. x., ft. pilulæ ij. hac nocte sumendæ.

31.—Fresh attack of hæmoptysis last night. Bowels not moved; pain in both sides; dullness of percussion on both sides, with occasional crepitant rhonchus and bronchophony, from the basis to the spina scapulæ. Feels sick and much oppressed.

4 P.M.—Pulse 80; temperature 102·8° F.

Infus. sennæ co. ʒij., magnes. sulphat. ʒij., ft. haustus statim sumendus.

Jan. 1, 1859.—Brought up some dark coagulated blood after violent coughing; feels much better since; bowels moved; no change in the local symptoms. Pulse 80; temperature 100·5° F.

3.—Scarcely any expectoration on the 2nd, but much irritating cough this morning. He expectorated about two ounces of very dark coagulated blood, mixed with yellow matter, consisting entirely of pus globules (white blood globules?). The dullness in the lower part of the left side extends only to the lower angle of the scapula. There is still bronchophony at the base. There is mucous rhonchus at the lower part of the front. There is now also slight dullness over the left apex, with crepitant rhonchus, and occasional friction below the clavicle. On the right side the dullness

still extends from the base to the spina scapulæ on the back and rather less high in the front. There is distinct bronchophony, scarcely any rhonchus, and no friction, although the patient complains of pain. The general condition is improved. Pulse only 70 to 75; temperature scarcely reaches 100° F.

7.—Cough has almost ceased. Expectoration scanty, purulent. The dullness on the left side is further diminished, but there is pain in the left axilla on deep inspiration, and he is unable to lie on that side on account of it. The dullness over the apex is likewise less marked; more mucous rhonchus. Dullness over lower part of right side still well marked; bronchophony less distinct; scarcely any respiratory sound. Great emaciation. Night perspirations. Scarcely any fever.

Treatment.—Nitric acid in an infusion of cinchona; cod liver oil.

Feb. 12.—The pyrexia and the nocturnal perspiration ceased entirely after the end of January. The appetite is good, but he does not yet gain flesh. Has lost 28 lbs. between the middle of December and the end of January.

There is still a certain amount of cough and purulent expectoration, with occasional admixture of blood. The lower part of the right side is less resonant, and there are moist rhonchi from the spina scapulæ downwards. The upper part of the left side is almost normal, with the exception of a certain roughness in the respiratory sounds; but he still frequently has pain in the lower part of the left side, where, however, excepting some mucous rhonchus, nothing abnormal is to be heard. Sometimes he has also pain in different parts of the right side.

This condition lasted, with slight change, to the end of April. He also occasionally brought up small quantities of blood, which he always was inclined to attribute to the left side, where he still frequently had pain. On some days he had also slight fever. From the end of April to the beginning of June he was at Ventnor, where he began to gain flesh, but was not free from cough and expectoration, which was still occasionally mixed with blood, and the movements of the left arm, as well as deep inspirations, caused pain in the lower part of the left side.

He spent the summer of 1859 on a little island near Gothenburg, in Sweden, where he almost, but not altogether, lost his cough. When he returned to London in September, he

had mucous rhonchus in the lower part of both sides, without dullness, and also occasional rhonchus over the left apex, but his general health was good. He then spent seven months at Malaga, in Spain, and afterwards settled at Bordeaux, where he has ever since enjoyed good health, and has become very stout.

Case II.

Summary.—F. H., æt. 28, while in apparently perfect health, was seized with hæmoptysis, without any manifest disease of the respiratory organs. The hæmoptysis recurred on several days. Six days after the first attack slight pyrexia, and signs of broncho-pneumonia of the upper part of the right lung. The fever disappeared within a fortnight, and the general health was likewise soon re-established; but the effects of the inflammatory attack of the right apex were still distinct, when, several months later, pleuritis with effusion on the same side supervened. Slow but perfect recovery, with slight flattening of the upper part of the right side.

F. H., æt. 28, is the only child of a father who died young from pneumonia. The mother is living. Had several attacks of broncho-pneumonia. Mother's brother died, to use the words of the patient, 'from hæmoptysis followed by phthisis.' Has always enjoyed good health, is stout and strongly built. On Jan. 18, 1863, he suddenly began to cough, and expectorated several tablespoonfuls of pure blood. The cough and expectoration then ceased; but the same occurrence took place once more in the evening after a walk. He then slept well, and remained free from cough until the 22nd, when he felt as if he had an ordinary cough, which, however, led to expectoration of blood, mixed with only a small quantity of puriform matter. There was some slight rhonchus in the larger bronchi, but nowhere a trace of dullness or pneumonic affection to be discovered. No pyrexia. Pulse 68; temperature 98° F.

Treatment.—Perfect rest; cold fluids; gallic acid 5 grains every 2 hours.

On the evening of the 24th, after some excitement, fresh attack of hæmoptysis. He then commenced to have pyrexia, the temperature being on the evening of the 24th 100·4°, and varying in the following week between 100·2° and 102·2° F. On the 26th, dullness, with occasional subcrepitant rhonchus and slight bronchophony, was discovered on the upper part

of the right side, from the apex to the third rib, and in the supraspinal region.

Treatment.—Rest; cold milk; a pill of a grain of acetate of lead with a grain of digitalis four times a day.

Feb. 2.—The cough is much diminished. There is no more admixture of fresh blood to the scanty puriform expectoration. There is more rhonchus in the right apex, which is still dull on percussion; there is also occasionally friction sound. He has no pain there, but he sometimes has a stitch in the lower part of the left side, where no friction sound but some mucous rhonchus is heard. No dullness on that part.

The temperature is now rarely above 99° F.; the pulse under 70.

Treatment.—Continued rest in bed, but more variety in diet without ice. Pill three times a day.

6.—The phenomena of the chest are unchanged, but he is quite free from fever. Great emaciation.

Treatment.—To leave the bed for some hours. Omit the lead and digitalis. To take a mixture of phosphoric acid with infus. aurantii, and to begin with cod liver oil.

At the end of February he went to Torquay. He then had only a slight cough, with purulent expectoration in the morning. The phenomena on the left side of the chest were quite normal, but on the right side there was still dullness and absence of breathing, from the apex to the third rib in front, and over the supraspinal region on the back, and he had occasional pain in various parts of the right side.

In the middle of May, when he returned from Torquay, where he had ridden on horseback almost every day, he had gained much flesh, and had lost the cough almost entirely, but the local phenomena over the right apex were unchanged. Towards the end of the same month, while we had cold east winds, he had again a considerable increase of cough, and pleuritis with effusion developed itself on the right side, extending from the base to the middle of the scapula on the back and to the fourth rib in front. The first symptoms of the pleuritic effusion showed themselves by pain and friction in the upper part of the right side over the second and third rib. The effusion was discovered two days later. His recovery was slow, occupying from the commencement of the attack to the complete absorption almost six weeks. He had no return of hæmoptysis during this illness.

When I examined F. H. again in the spring of 1864, the dullness over the right apex was much diminished, the re-

spiration was rougher than on the corresponding part of the left side, and the supra- and infra-clavicular spaces were flattened, but there was no other sign of the former illness.

Case III.

Summary.—F. X., æt. 23, hereditarily predisposed to epistaxis, has himself likewise frequently suffered from it, but otherwise enjoyed good health. Had after over-exertion, while affected with bronchial catarrh, several attacks of severe hæmoptysis, followed by inflammatory symptoms in different portions of the lungs, which had scarcely disappeared when fresh hæmoptysis occurred, again followed by inflammatory processes. The inflammatory symptoms were abating, when another accession of hæmoptysis led to immediate death by suffocation.

Post-mortem Examination.—Caseous deposits of different ages in different parts of both lungs, the oldest and largest being situated in the lower part of the right lung and in the upper lobe of the left where the centres of several masses were occupied by newly-formed cavities, in one of which the last fatal hæmorrhage seems to have occurred; the bronchi were filled with fresh coagula, a large branch, however, was plugged by an old coagulum, resembling in every respect a venous thrombus.

F. X., æt. 23, belongs to a healthy family, but his mother frequently suffers from severe epistaxis, and a younger brother likewise; patient himself bled often from the nose as a boy, but enjoyed otherwise good health. After having had a slight cold for about a fortnight, he took, on November 29, 1863, a very long walk in the country, in order to shake it off; on his return he coughed up several ounces of pure blood. The most careful examination of the chest did not show any local change. There was no pyrexia. Pulse 70.

Treatment.—Rest; iced fluids; five grains of gallic acid every three hours.

Dec. 2.—The cough and expectoration of blood had entirely ceased already on November 30. He went out last night without permission, and had during the night a very violent fit of hæmoptysis, coughing up within a few hours almost a pint of pure blood; the cough then abated, but at 11 in the morning he again began to cough up a large quantity of blood. At 2 P.M. he was very anæmic; pulse 102 very small; skin cold; temperature in axilla only 97·8° F.

Treatment.—Rest; ice on the chest, and ice internally: a mixture of 5 grains of gallic acid, and 15 min. of diluted sulphuric acid every three hours.

4.—Cough much diminished, expectoration moderate, dark blood mixed with puriform matter in streaks (white blood globules?). Pulse 85; temperature 98·2° F.

5.—Complains of pain in the lower part of the right side; there is some fine moist rhonchus, and slight dullness, but no friction sound. Expectoration almost puriform, with very little red. Pulse 95; temperature 101° F.

6.—Pain and pyrexia much increased; there is now also friction in the right axilla. Morning: Pulse 108; temperature 103·2° F.; respiration 38. Evening: Pulse 115; temperature 104·2° F.; respiration 44.

7.—In addition to previous symptoms, pain in the left shoulder and slight dullness and moist rhonchus, as well in the left supra-clavicular as in the supra-spinal region; moist rhonchus is heard also in the lower part of the same side. Temperature 103·6° F. in the morning; 104·8° F. in the evening.

Treatment.—More nourishing food. ℞ Quinæ dis. gr. xij., acidi sulphur. dil. ʒij., aquæ ad ℥viij. An eighth part four times a day.

9.—The cough and fever are much diminished. The temperature does not exceed 100·5° F.; the pulse not 100.

13.—Is much stronger, coughs only little, the expectoration is almost confined to the morning, of greenish colour, purulent. In the lower part of the right side, the dullness much diminished, there is no bronchophony, only some mucous rhonchus; the phenomena over the left apex are unchanged, on the lower part of left side moist rhonchus without dullness. Pulse almost always under 90. Temperature in the morning normal; in the afternoon slightly increased, but under 100° F.

16.—General health very good, but the local phenomena scarcely changed. Cough and expectoration have almost ceased. Pulse and temperature are normal.

Treatment.—Is allowed to leave the room. No medicine, except cod liver oil.

Jan. 1, 1864.—Had yesterday morning a few streaks of blood with his expectoration, but was otherwise quite well, sat up till after midnight, in exciting conversation, though he drank only little; he then slept till the morning, when on waking he had a violent attack of hæmoptysis. The

examination of the chest gave a similar result as on December 13; he was quite free from pyrexia, but much blanched and exhausted.

Treatment.—Rest, ice, and the mixture of the gallic and sulphuric acids as before.

2.—No fresh blood; very little cough and expectoration of dark blood mixed with pus.

3.—Pain in the lower part of the left side, with slight dullness and diminished respiration. Urine free from albumen. In the evening much fever. Temperature above 104° F.

Treatment.—Instead of the gallic acid mixture, that of quinine and sulphuric acid as above.

5.—The pyrexia is diminished. Temperature 100° to 103° F. There is not much cough, and the expectoration scarcely exceeds three tablespoonfuls in the twenty-four hours, is thick and of greenish yellow colour, without red admixture. There is distinct friction in the lower part of the left side, and moist rhonchus with bronchial breathing on different places: the dullness is not perfect, but it extends on the back to the middle of the scapula, and in front to the nipple. Perspires much during the night.

14.—Cough much diminished, expectoration very moderate, yellow, purulent. There is still slight dullness of percussion over the left apex, as well in front as on the back, and the same over the lower part of the same side with bronchial respiration, and large rhonchi over both regions, while in the intermediate zone the phenomena of auscultation and percussion are normal. Over the lower part of the right side there has been but little change since last month. The noctural perspiration has almost entirely ceased, the pulse is mostly under 90, and the temperature has not reached 100° F. during the last three days.

On January 19, during a long conversation with friends he became much excited; towards the morning he was again seized with violent hæmoptysis, and died during the attack, evidently from suffocation.

Post-mortem Examination.—The mouth and nose are enveloped in bloody foam. The trachea is filled with semi-coagulated blood, extending into both divisions, but especially into the left, where it can be traced to the upper lobe of the left lung which contains in its upper portion several large masses, filbert to walnut size, of caseous substance, surrounded by grayish-red infiltration; between these hard masses there is still some permeable tissue; several of

the caseous masses contain in their centres newly-formed cavities, one of which is filled with a fresh coagulum. The lower part of the upper, and the upper part of the lower lobe, contain between the normal tissue several yellow caseous nodules, of the size of a small pea to a bean, which the notes, taken at the time, designate as soft yellow tubercles, but there were no true miliary tubercles either in this or in any other portion of the lungs. The smallest bronchi, and pulmonary vesicles of many parts of the normal tissue, are filled with blood. The inferior part of the lower lobe is firm and heavy, almost airless; it has somewhat the appearance of gray infiltration into which are imbedded some caseous masses. A large bronchus, entering this part, is filled with grayish-red coagulum, firmly adherent to the thickened wall, and softened in the centre, exactly like an old thrombus in a vein. The upper and middle lobe of the right lung are almost normal, but they contain several small caseous masses, surrounded by grayish-red infiltration, and, besides, the smallest bronchi and air-vesicles are filled on several places with fresh blood. The lower lobe of this lung is everywhere adherent, it is heavy, and is occupied almost entirely by hard gray infiltrated tissue, in which are contained several yellow caseous masses, two of which show central softening; there is, however, a remnant of permeable tissue between the hard masses. The heart is soft and fatty, the liver nutmeg, the kidneys somewhat congested, the spleen rather enlarged and hard.

These three cases coincide with those related by Dr. Bäumler in this important peculiarity, that the lungs did not exhibit on examination any signs of organic disease at the time that the first hæmorrhage occurred, and that it was not until several days afterwards that symptoms of inflammatory processes of the respiratory organs manifested themselves, accompanied by a corresponding elevation of temperature. These processes were principally pneumonic, but there was also a considerable addition of pleuritis and of bronchial irritation. The pneumonic affection differed from typical croupous or lobar pneumonia in the irregularity of its course, in its protracted duration, and in its being scattered over different parts of both lungs, instead of involving the whole of one lobe. In all these respects it resembled rather lobular pneumonia. The first two cases show, as two of Dr. Bäumler's, that complete absorption and recovery can take place, though the time occupied by this

process is, as just mentioned, much longer than that occupied by a common lobar pneumonia. In the second case pleuritis with effusion took place, more than four months after the hæmorrhage, at a time when all the active symptoms of the consecutive inflammatory affection had apparently long subsided; this pleuritis occurred on the same side which had been the seat of the former inflammatory process, and I cannot help bringing the two in connection with one another, the more so, as the first sign of the pleurisy consisted in pain and friction over the second and third rib, where there was still some slight dullness from the former affection, and where probably an inflammatory nodule on the surface set up the pleuritic process which at first was local and then became more general. The case shows how distant the later effects may be from the original cause.

The third case, which at last terminated fatally, and which may be regarded as an example of a form of galloping phthisis, is still more instructive, by the result of the post-mortem examination. The first attack of hæmoptysis was followed after several days by inflammatory symptoms in the lower part of the right, and the upper part of the left lung. After about three weeks the fever had ceased, and the curative process seemed to progress satisfactorily, when, owing probably to excitement, a fresh attack of hæmoptysis occurred, which again was followed, after a few days, by an inflammatory affection in the left lower lobe. He again seemed fairly to proceed towards recovery, when after a long and excited conversation a fatal hæmorrhage occurred. The post-mortem examination showed cheesy nodules, surrounded by infiltrated tissue, with the commencement of the formation of cavities in the upper lobe of the left, and in the lower of the right lung, being of the same age, and corresponding to the inflammatory processes following the first hæmorrhage about seven weeks before death; there were further the changes of a later date in the lower lobe of the left lung, with the plugged bronchial branch, corresponding to the second hæmorrhage seventeen days before death; and there was besides the fresh blood of the fatal hæmorrhage, not only in the large bronchi, but filling also some of the smallest ramifications and groups of air-vesicles, which were felt from without as hard nodules.

I confess that at the time when these cases occurred to me, I was still preoccupied by Laennec's idea that hæmoptysis, in the generality of cases, is a sign of already existing, though perhaps latent, tuberculosis; that I was quite at a loss how to interpret them on this theory; and that I owe the clue to them entirely to Niemeyer's lucid explanation in his lectures on consumption,* and to various conversations on the subject with my colleague, Dr. Bäumler. According to Niemeyer's view, pulmonary hæmorrhage, from whatever cause it may take place, can give rise to inflammatory processes, by blood aspired into, and remaining in the finest bronchial ramifications and air cells, acting there the part of an irritant. The inflammation set up in the surrounding district may undergo the usual retrogressive changes, and the products may be absorbed sooner or later, together with the metamorphosed blood, but it may also lead to the formation of cavities and to phthisis.†

In two of the cases related there was a great tendency to epistaxis, and we may regard the hæmoptysis as having arisen from the mucous membrane of the bronchi in a similar way as epistaxis from that of the nose. The same explanation may be applicable to the third case, but it certainly is not applicable to all the cases of hæmoptysis, for in a great many of them the hæmorrhage is probably due to various morbid conditions of the vessels of the lung tissue, in consequence of inflammatory processes in the latter. In such cases, owing to local and constitutional changes already existing, it is of course less easy to show whether an attack of hæmoptysis gives rise to fresh inflammatory processes or not; but in several patients it has been quite evident to me that fresh inflammation has been set up by the hæmorrhage, and this is probably not very rarely the case.

With all gratitude to Niemeyer I am, however, inclined to think that he goes too far, when he says, 'that most cases of hæmoptysis are followed by a more or less violent irritation of the lungs and pleura.'‡ Since my attention has been directed to this question, I have had the opportunity

* F. von Niemeyer, 'Klinische Vorträge über die Lungenschwindsucht, mitgetheilt von Dr. Ott,' p. 48 seq. 2nd edition. 1867.

† Before Laennec's time the best observers have held the Hippocratic view that hæmoptysis is often the cause of phthisis, and Niemeyer, to whom the merit belongs to have re-established this view, quotes a remarkable passage from F. Hoffmann on this subject: 'Verum adhuc sunt alia phthiseos initia, maximeque hæmoptysis. . . . Tum enim facile sanguis e pulmonum vasculis intra vesicolas seróas extravasatur et stasi concepta putrescit, partes vicinas corrodit ac demum sinuositates efformat, vel in nodos et tubercula coit.'—Friderici Hoffmanni 'Opera Omnia,' t. iii. p. 285. Genevæ, 1740.

‡ Niemeyer, loc. cit. p. 51.

of carefully watching nine cases of more or less severe hæmoptysis, during at least ten days after the occurrence of the hæmoptysis, and in five of them the hæmoptysis was not followed by any increase of temperature, or other sign of pleuro-pneumonia.

In conversation on this subject, I have repeatedly met with the objection that the blood remaining in the lungs after an attack of hæmoptysis could not act as a foreign irritating substance, and could therefore not give rise to inflammatory processes; but I think that this objection is entirely theoretical, and many of the post-mortem examinations performed a short time after the occurrence of severe attacks of hæmoptysis must refute them. The question can, perhaps, be decided by experiments on animals; but as yet I have not been successful. Healthy rabbits cough up the blood injected into the trachea very rapidly and completely, and exactly the same thing frequently occurs in man. Our surgical brethren may perhaps assist us in this respect by their experience on tracheotomy, during which operation blood may occasionally pass down into the bronchi, and by aspiration into the air-cells. In my limited experience lobular pneumonia has twice been the cause of death after tracheotomy, but I had no chance of a post-mortem examination.

It appears to me that not only blood but also morbid secretions of the respiratory organs themselves frequently act the part of irritants, as in various forms of bronchitis, especially those connected with whooping cough, and that the benefit derived from some remedies is due to their clearing the bronchi.

With regard to the treatment of hæmoptysis, I regard perfect rest as the most essential point, even in cases of very slight hæmoptysis, and I am convinced that in many instances, through this, more serious hæmorrhages are prevented; and, further, that even in many cases of severe hæmoptysis continued rest is alone sufficient to arrest the further effusion of blood, and that also the consecutive inflammatory changes are, to some degree, checked by it; but it ought to be continued not only till the spitting of blood has ceased, but until the thermometer has shown that the temperature has remained normal during five or six days after the cessation of the hæmoptysis. I will not enter into the value of gallic and sulphuric acids, of sedatives, of ice internally, and the restriction to iced fluids, because they

are generally used; but less frequently employed, and yet of great service in some severe cases, is continued application of ice bags to the chest, which have the additional advantage of obliging the patient to keep the same position. Another substance from which I have seen good effect in arresting severe hæmoptysis is ergot of rye in large doses, viz. from three to six drachms of the watery extract of our pharmacopœia in twenty-four hours.

The remedy, however, which I venture to mention particularly is the emetic. It is an old remedy, I do not know by whom first recommended, in hæmoptysis, but I well remember that it was highly spoken of by my excellent teacher the late Professor Nasse of Bonn. It has rather fallen into neglect, unmerited I think, not only in hæmoptysis, but also in many other pathological conditions in which it has formerly been frequently used. The fact that blood retained in the air passages can give rise to serious inflammatory conditions has induced me to employ it again in pulmonary hæmorrhage, and in four cases of obstinate hæmoptysis in which fresh accessions occurred during several days, and which were not yielding either to rest, or to the other remedies mentioned, the administration of the emetic was followed by a speedy cessation of spitting of blood; in two of these cases old coagulated blood mixed with purulent matter (cruor with altered white globules?) was coughed up between and after the acts of vomiting, and in none of these cases any marked inflammatory symptoms followed. The beneficial action of the emetic in many cases of bronchitis, especially bronchitis with whooping cough, offers some analogy; as the retention of purulent matter in the capillary bronchi, as already alluded to, likewise seems to be a source of irritation; and there is perhaps no remedy by which the smaller divisions of the bronchi are more effectually cleared than by the emetic. I do, however, not mean to say that this mechanical effect is the only action of the emetic; I believe it to be much more complex, and to depend partly also on the nature of the emetic remedies employed. This point I will not venture to discuss, but confine myself to stating that I usually combine ipecacuanha and antimony.

In cases where there is a tendency to hæmoptysis, climate is of great importance, and I am in the habit of recommending prolonged residence in alpine climates. I know that it is the general belief that elevated regions and rarefied air cause a disposition to hæmorrhage; but this idea is based partly

on theoretical reasoning, partly on the misinterpreted descriptions of the great ascents of Humboldt, Boussingault, and others who were, under circumstances totally different from those of the invalid, residing in a moderately high elevation. On the coast of Peru, where hæmoptysis is one of the most frequent affections, and the usual forerunner of consumption, the removal of the patient to the Andine valleys, especially the valley of Jauja, elevated between 10,000 and 11,000 feet above sea level, is, according to the testimony of Archibald Smith,* regarded as an almost certain cure. Among all the patients whom I have advised to stay at high elevations (in various parts of Switzerland, especially at St. Moritz, Pontresina, and Samaden in the Engadine, and at Davos am Platz, as also on the Cordilleras of South America) there is, to my knowledge, only one who had an attack of hæmoptysis while on high ground, although there are amongst them ten who had previously suffered from severe, and mostly from repeated attacks of hæmoptysis. I will not enter on the complicated modus operandi of high climates, but I may mention that the nutrition in general is improved by them, and that they seem besides to counteract, as I shall endeavour to show at another place, the tendency to catarrhal or lobular pneumonia and its consequences; infiltration, caseous transformation, rapid breaking down of tissue, and formation of cavities, processes by which the corrosion of blood-vessels and the development of aneurismatic conditions of the minute arteries are favoured.

I recommend alpine climates, however, not only as a prophylactic measure, against hæmoptysis, but also as a means to promote the cure of the effects of the inflammatory processes resulting from pulmonary hæmorrhage.

To facilitate the discussion, I will sum up the main points to which I wish to direct attention:—

1. That more or less violent hæmoptysis can occur without the existence of any disease of the lung tissue, from congestion of the mucous membrane of the bronchi.

2. That in many cases the hæmoptysis passes off without leading to any inflammatory changes in the lungs, or to any constitutional disturbance.

* Practical Observations on the Diseases of Peru, 'Edinburgh Med. and Surg. Journal,' No. 144; and Climate of the Swiss Alps and of the Peruvian Andes Compared, by Archibald Smith, M.D. ('Dublin Quarterly Journal of Medical Sciences,' May 1866.)

3. That in other cases, however, the retention of effused blood within the lungs gives rise to inflammatory symptoms, especially broncho-pneumonia, mostly lobular, from irritation.

4. That the products of this inflammation may be readily absorbed under favourable circumstances, while in other cases they may form the origin of a consumptive process, i.e. subacute or chronic phthisis.

5. That pulmonary hæmorrhages, occurring in already diseased lungs, may likewise, but do likewise not always, give rise to fresh inflammatory processes.

6. That with regard to treatment, perfect rest is the most important element, and in many cases sufficient.

7. That, however, in others especially, if the hæmoptysis does not soon cease, and remedies like gallic acid and ergotin do not succeed, and fresh attacks follow one another, the emetic is a remedy of great value, as well in arresting the hæmorrhage, as also in clearing the bronchi from effused blood, and thus preventing inflammatory processes.

8. That in the treatment as well of the tendency to hæmoptysis, as also of the effects of the latter, the alpine climates deserve the more general attention of the profession.

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ON THE PHENOMENA

OF

DIABETES MELLITUS.

BY

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CONTENTS.

ERRATUM.

Page 30, line 24, *for* 39.39 lbs. *read* 39.39 tons.

ON

DIABETES MELLITUS,

&c., &c.

The history of this remarkable disease affords an instructive example of the slow growth of human knowledge with regard to questions of physiology. The name diabetes (διάβήτης, a syphon) was first mentioned by Aretæus, the Cappadocian, as a title of the class of diseases in which diuresis was a prominent symptom, either constant or occasional. He appears to have included dropsy, of various kinds, under the title of diabetes; there can be no doubt that the disease now called diabetes mellitus would have been placed by him under the same head. His reason for the disease having been named diabetes is thus stated:—"*τῇδέ μοι δοκέει καλέεσθαι διάβήτης ἐπίκλησιν ὁκοῖόν τι διαβήτης ἐὼν, δυνικεν ἐν τῷ σκήνεϊ τὸ ὑγρὸν ὃν μίμνει, ἀλλὰ ὅκως διαβάθρῃ τῷ ἀνθρώπῳ ἐς ἔξοδον χρέεται.*"—*Lib.* i. *chap.* 2.

Aretæus had no suspicion that sugar, or any abnormal element, was contained in the urine of diabetic sufferers; and this leading and prominent fact appears to have remained unnoticed until it attracted the attention of the learned and observant Dr. Thomas Willis, of Christ Church, Oxford, who thus states the fact*:—"Quod autem plerique authores potum aut parum aut nihil immutatum reddi afferunt, à vero longissime distat: quoniam urina in omnibus (quos unquam me novisse contigit, et credo ita in universis habere) tum a potu ingesto, tum à quovis humore in corpore nostro gigni solito, plurimum differens, quasi melle aut saccharo imbuta, mire dulcescebat."

It has been subsequently ascertained that the sugar of dia-

* *Vide* Lib. De Medicamentorum Operationibus, p. 64, published at Amsterdam, in 1682.

betic urine is invariably grape sugar ($C_{12} H_{12} O_{12} + 2 HO$), which is not a natural or normal product of the urine in health; and that some of the usual natural products of the urine are present in exaggerated proportion. This is now known to be true in particular of the urea, which was formerly thought to be complementary to the sugar, to increase as the latter diminished, and *vice versâ*. In 1832, Sir Robert Kane, then Professor of Chemistry to the Apothecaries' Hall, published the results of five cases in which he had determined the amount of urea in diabetic urine[a], and expressed the opinion that the urea and sugar in diabetes were not complementary; and that in a given time there was probably as much urea excreted as in health. The following are the results he obtained:—

Table I.—*Kane's determination of Sugar and Urea in Diabetes Mellitus.*

Case.	Sugar in 1000 parts.	Urea in 1000 parts.	Specific gravity.
1	47·0	9·0	1032·00
2	31·5	9·5	1030·25
3	60·0	6.5	1036·25
4	51·0	5.3	1033·00
5	70·0	13·5	1050·50

The quantity of urine per day passed by case 5, is stated as 10 pints, which would give **170** grains of urea per day. This quantity, although not equal to the average of health, is more than was then supposed to be excreted. It is now well known that the quantity excreted is much greater than that excreted in health. In Dr. Parkes' recent work on Urine[b], the urea passed per day in twelve cases, given by various authorities, ranges from 421 grains to 1,411 grains, and has a mean of **811** grains per day. My own observations quite confirm these results.

Much difference of opinion exists as to the quantity of phosphoric acid passed by diabetic patients, the general impression being that it is but little altered. In this opinion I cannot concur, as I have invariably found it greatly increased; this is shown by the following table:—

[a] Dublin Journal of Medical and Chemical Science, vol. i. p. 15.
[b] On the Composition of the Urine, page 341.

Table II.—*Amount of Phosphoric Acid passed in Diabetes Mellitus.*

Case.	Phosphoric acid per day.		Total.	Urea per day.
	With earths.	With alkalies.		
Keogh, . . .	76 grs.	132 grs.	208 grs.	750 grs.
M'Nee, . . .	24 „	49 „	73 „	1202 „
Murphy, . .	38 „	56 „	94 „	1559 „

If diabetes be a disease accompanied by rapid and great change of tissue, nothing can be more natural than the increased excretion of urea, phosphoric acid, chlorine, and all the other healthy constants of urine. I shall reserve, however, all speculation on the physiology of diabetes for the concluding portion of this paper, as I am anxious to keep quite distinct the facts I have observed, and the inferences I think may be drawn from them.

It is commonly supposed that the specific gravity of the urine affords a means of determining the quantity of sugar, without the trouble of chemical experiments. The extent to which this is true may be inferred from the following Table, in which I have collected together the specific gravities of the various diabetic urines, determined by myself with the specific gravity bottle, and also the quantity of sugar per fluid ounce, found by direct experiment from the same specimens of urine:—

Table III.—*Comparison of Specific Gravity of Diabetic Urine with the quantity of sugar per ounce*

Specific gravity.	Sugar per ounce.	Name of patient.
1007·7	1·2 grs.	M'Cabe.
1031·8	33·6 „	Murphy.
1033·1	27·3 „	M'Nee.
1033·8	33·6 „	Murphy.
1033·8	31·2 „	„
1034·0	31·2 „	M'Nee.
1035·0	40·9 „	Murphy.
1035·4	36·4 „	M'Nee.
1035·7	33.6 „	Murphy.
1035·9	36·4 „	M'Nee.
1038·1	32·0 „	Keogh.
1038·3	39·8 „	Murphy.
1040·1	39·8 „	„
1040·2	39·7 „	„
1040·6	39·7 „	„

From this Table it appears that if only an approximation be required, for specific gravities between 1030 and 1040, there is no great error in assuming the excess above 1000, as the number of grains of sugar in each ounce of diabetic urine.

In the following cases of diabetes, I endeavoured to ascertain carefully the composition of the food consumed, with regard to its power of producing urea and glucose, so as to be able to compare the food ingested with the excretions. In order to ascertain the composition of the food, I made the following experiments, in addition to those detailed in my paper on the "Natural Constants of the Healthy Urine of Man"*.

Additional Experiments on Food.

1. *Brown Bread*, used in the Meath Hospital.
   200 grs., dried at 212° F., gave 155·00 grs.
   26·4 grs. of these gave 4·26 grs. of platinum.
   Solids = 77·50 per cent.
   Nitrogen = 2·30 ,,

From these data, I find the following chain, to determine the quantity of urea due to 1 lb. of this bread:—

1 lb. brown bread.
1 — 7000 grs.
1000 — 775 grs. at 212° F.
1000 — 23 grs. nitrogen.
28 — 60 grs. urea.

267 grs. urea.

This is a much larger proportion of urea than I found producible from white bread, even of the best quality,—1 lb. of which produces only 196 grs. of urea.

2. *Rice*, used in the Meath Hospital:—
   100 grs., dried at 212° F., gave 85·3 grs. solids.
   23·0 grs. of these gave 3·10 grs. of platinum.
   From which I deduce:—
   Solids = 85·30 per cent.
   Nitrogen = 1·92 ,,

The chain to determine the urea producible from 1 lb. of this rice is the following:—

1 lb. rice.
1 — 7000 grs.
1000 — 853 grs. at 212° F.
10,000 — 192 grs nitrogen.
28 — 60 grs. urea.

245 grs. urea.

* Dublin Quarterly Journal of Medical Science, vol. xxx., pp. 2, 3.

3. *Porter.* For the following analysis of two kinds of Dublin porter, I am indebted to Dr. Apjohn:—
   A. 1000 grs., dried at 212° F., gave 57.9 grs. of solids. 35·6 grs. of these, burned with soda lime, gave 3·40 grs. of sal ammoniac.
   B. 1000 grs., dried at 212° F., gave 84·8 grs. of solids. 35·4 grs. of these gave 2·30 grs. of sal ammoniac.
   From these experiments, I find:—

A.
1 quart porter.
4 — 70000 grs. ,,
10,000 — 579 grs. at 212° F.
356 — 34 grs. sal ammon.
54 — 14 grs. nitrogen.
28 — 60 grs. urea.

53·76 grs. urea.

B.
1 quart porter.
4 — 70000 grs.
10,000 — 848 grs. at 212° F.
354 — 23 grs. sal ammon.
54 — 14 grs. nitrogen.
28 — 60 grs. urea.

53·57 grs. urea.

The agreement between these two results is remarkable, and proves that in good Dublin porter the quantity of nitrogen is independent of the solids, which may vary considerably according to the proportion of the other constituents present.

4. *Tea*, used in the Meath Hospital. The tea given to the patients in this hospital is made in the proportion of one drachm to the pint, or one ounce to the gallon. On analyzing this tea leaf in the usual manner,—
   70·6 grs., dried at 212° F., gave 60 grs. of solids.
   26·3 grs. of these gave 8·70 grs. of platinum.
   Solids = 85·00 per cent.
   Nitrogen = 4·73 ,,
   From these data, I deduce the following chain:—

1 lb. tea.
1 — 7000 grs.
100 — 85 grs. at 212° F.
10,000 — 473 grs. nitrogen.
28 — 60 grs. urea.

603 grs. urea.

5. *Boiled Cabbage*, used in Meath Hospital.
   965 grs., dried at 212° F., gave 86·6 grs. of solids.
   28·2 grs. of these gave 8·35 grs. of platinum.
   Solids = 8·97 per cent.
   Nitrogen = 4·23 ,,

From these data, the following chain is deducible :—

1 lb. cabbage (boiled).
1 — 7000 grs. "
10,000 — 897 grs. at 212° F.
10,000 — 423 grs. nitrogen.
28 — 60 grs. urea.

57 grs. urea.

The quantity of glucose sugar producible from the various kinds of food used, may be thus estimated :—

1. *Brown Wheaten Bread.* The quantity of urea due to a pound of this bread has been already determined by direct experiment, p. 4; and the sugar producible from it may be found from the following considerations :—

a. According to Peligot's researches, it appears that in whole wheaten meal, on the average, the proportion of proteinic to starch compounds is as 14 per cent. to 68 per cent.

b. The proteinic compounds are to urea as 3 to 1.

c. Starch will produce glucose, in the proportion of 81 to 99.

From these data the subjoined chain follows :—

1 lb. brown bread.
1 — 267 grs. urea.
1 — 3 grs. proteinic compounds.
14 — 68 grs. starch.
81 — 99 grs. glucose.

4755 grs. glucose.

Hence 2 lbs. of this bread are equivalent to 9510 grains of glucose.

2. *Rice.* According to Boussingault, rice contains 83 portions of starch to 7·5 of azotised matter; combining this with the result obtained by myself, I find :—

1 lb. rice.
1 — 245 grs. urea.
1 — 3 grs. azotised matter.
75 — 830 grs. starch.
81 — 99 grs. glucose.

9942 grs. glucose.

Hence 2 ounces of rice are equivalent to 1243 grains of glucose.

3. *Milk.* I have found that the Dublin milk contains lactose, equivalent to glucose, in the proportion of 177 grains to the pint. Therefore two quarts of milk are equal to 708 grains of glucose.

4. *Porter.* It has been found that 1000 grains of Dublin porter contain 1·72 grains of glucose sugar.* Hence the sugar in one quart of porter is 30 grains.

Combining together the results of all my experiments, I have constructed the following table :—

TABLE IV.—*The Urea and Sugar Equivalents of several kinds of human Food.*

No.	Food.	Quantity.	Urea Equivalent.	Sugar Equivalent.
1	*Lean roasted mutton*; leg, near shank end; contains fat and fascia	1 lb.	480 grs.	
2	*Lean roasted mutton*; leg, near the loin; very little fat or fascia . .	1 lb.	957 „	
3	*Lean raw mutton*, loin	1 lb.	544 „	
4	*Lean roasted beef*, sirloin . . .	1 lb.	724 „	
5	*Lean raw beef*, sirloin	1 lb.	979 „	
6	White bread, first quality . . .	1 lb.	196 „	
7	White bread, second quality .	1 lb.	203 „	
8	Brown bread, wheaten . . .	1 lb.	267 „	4,755 grs.
9	Oatmeal	1 lb.	421 „	
10	Indian meal . . .	1 lb.	150 „	
11	Rice	1 lb.	245 „	9,942 grs.
12	Cauliflower, boiled . . .	1 lb.	58 „	
13	Cabbage, boiled .	1 lb.	57 „	
14	Tea	1 lb.	603 „	
15	Porter	1 qt.	54 „	30 grs.
16	Milk, sp. gr.=1025	1 qt.	116 „	354 grs.
17	Milk, sp. gr.=1027	1 qt.	126 „	
18	Milk, sp. gr.=1035	1 qt.	174 „	

From this table it appears that one pound weight of lean beef or mutton is capable of producing from 500 to 1000 grains

* Dublin Quarterly Journal of Science, Vol. I., page 71.

of urea, according as its muscular fibre is more or less mixed with cellular fat. The highly nutritious qualities of oatmeal, wheaten bread, and rice, as compared with Indian meal, are also apparent; and the agreement between the cabbage and cauliflower is natural.

The first case of diabetes mellitus that I shall describe is that of Owen Murphy; for the opportunity of observing this case I am indebted to the kindness of Dr. Stokes, under whose care he was in the Meath Hospital. The history of his case was taken by Mr. A. W. Foot, one of Dr. Stokes' pupils, whose zeal and intelligence are highly to be commended. I have added to my own remarks the statement of Mr. Foot, which renders any reference to details useless on my part.

Owen Murphy came under my observation in the beginning of November, 1860, and died on the 14th January, 1861. Tubercle was first detected in his right lung on the 27th November, 1860.

The following Table contains an account of his weight (naked), urine, its specific gravity, and the quantity of urea and sugar it contained; the specific gravity of the urine, its sugar, and urea, were observed on a mixture of all the urine passed in the 24 hours:—

Table V.—*Constants of Body and Urine of Owen Murphy*, 1860–61.

Date.	Weight.	Urine.	Sugar per day.	Urea per day.	Specific gravity.
1860, 8th Nov.	98 lbs.	310 ℥ fl.	12,329 grs.	1559 grs.	1040·2
„ 15th „	92·5 „	363[a] „	12,216 „	1429 „	1033·8
„ 22nd „	93·5 „	360 „	11,250 „	1420 „	1033·8
„ 29th „	95·5 „	300 „	12,290 „	1181 „	1035·0
„ 6th Dec.	96·5 „	275 „	9255 „	1203 „	1035·7
„ 13th „	—	240 „	9545 „	1181 „	1040·6
„ 20th „	93·5 „	175 „	6960 „	976 „	1038·3
1861, 3rd Jan.	91·5 „	194 „	7716 „	849 „	1040·1
„ 10th „	87·5 „	190 „	6394 „	840 „	1031·8[b]
Mean, . . .	**93·56**	**267·4**			

[a] Gives off a vinous smell, and carbonic acid gas.

[b] This sp. gr. is not to be depended on, as carbonic acid gas was being rapidly evolved from the fermenting urine during the weighing.

The quantities of urea and sugar ingested are found from the following calculations, based on the quantities of food and its composition already determined:—

UREA EQUIVALENT OF FOOD.

1.—*Food per day previous to 8th November*, 1860.

1. Brown bread, 2 lbs., equivalent to		534	grs. urea.
2. Beef, ¾ths of lb.	„	207	„
3. Rice, 2 oz.,	„	31	„
4. Milk, 2 quarts,	„	232	„
5. Porter, 1 quart,	„	54	„
6. Tea, 1 pint,	„	5	„
7. Eggs, 2,	„	90	„
		1153	grs.

2.—*Food per day previous to 15th November*, 1860.

Same as No. 1. Food changed to following on 16th November.

3.—*Food per day previous to 22nd November*, 1860.

1. Brown bread (toasted), 2 lbs.,	534	grs. urea.
2. Beef, 1 lb. (boiled),	724	„
3. Rice, 2 oz.,	31	„
4. Milk 2 quarts,	232	„
5. Porter, 1 quart,	54	„
6. Tea, 1 pint,	5	„
7. Eggs, 2,	90	„
	1670	grs. urea.

4.—*Food per day previous to 29th November*, 1860.

1—7. Same as before, . . .	1670	grs. urea.
8. Boiled cabbage, 2 lbs. .	114	„
	1784	grs.

5. *Food previous to 6th December*, 1860.

Same as last, with a diminution of the cabbage to 1 lb. daily. This gives for the daily equivalent of urea—

1727 grs. urea.

6. *Food previous to 13th December*, 1860.

Same as last, with reduction of bread to 1 lb. daily. This gives for daily equivalent of urea— **1460** grs. urea.

7. *Food previous to 20th December*, 1860.

Same as last; but on 18th December he complained that he had no appetite nor thirst.

8. *Food previous to 3rd January*, 1861.

Meat reduced to ½ lb. daily; milk reduced to 1 quart; and cabbage altogether omitted. This gives for equivalent of urea—

1. Bread, 1 lb.,	267	grs. urea.
2. Beef, ½ lb.,	362	,, ,,
3. Rice, 2 oz.,	31	,, ,,
4. Milk, 1 quart,	116	,, ,,
5. Porter, 1 quart,	54	,, ,,
6. Tea, 1 pint,	5	,, ,,
7. Eggs, 2,	90	,, ,,
	925	grs. urea.

9. *Food previous to 10th January*, 1861.

Same as last, with omission of quart of milk.
This is equivalent to **809** grs. urea.

Sugar Equivalent of Food.

1. *Food previous to 8th November*, 1860.

1. Brown Bread, 2 lbs.,	9510	grs. sugar.
2. Rice, 2 oz.,	1243	,, ,,
3. Milk, 2 quarts,	708	,, ,,
4. Porter, 1 quart,	30	,, ,,
	11,491	grs. sugar.

2. *Food previous to 13th December*, 1860.

The sugar-forming elements of the food remained unaltered up to the 6th December, when the bread was reduced to 1 lb. daily. Hence—

1. Brown bread, 1 lb.,	4,755	grs. sugar.
2. Rice, 2 oz.,	1,243	,, ,,
3. Milk, 2 quarts,	708	,, ,,
4. Porter, 1 quart,	30	,, ,,
	6736	grs. sugar.

3. *Food previous to 3rd January*, 1861.

1. Brown bread, 1 lb.	4755	grs. sugar.
2. Rice, 2 oz.,	1243	,,
3. Milk, 1 quart,	354	,,
4. Porter, 1 quart,	30	,,
	6382	grs. sugar.

The following Table gives a summary of the preceding calculations, and a comparison of their results, with the observations on the urine.

Table VI.—*Showing the Quantities of Urea and of Sugar ingested and excreted per Day by Owen Murphy*, 1860–61.

Date.	Urea ingested.	Urea excreted.	Sugar ingested.	Sugar excreted.
1860, 8th Nov.	1153 grs.	1559 grs.	11,491 grs.	12,329 grs.
,, 15th ,,	1153 ,,	1429 ,,	11,491 ,,	12,216 ,,
,, 22nd ,,	1670 ,,	1420 ,,	11,491 ,,	11,250 ,,
,, 29th ,,	1784 ,,	1181 ,,	11,491 ,,	12,290 ,,
,, 6th Dec.	1727 ,,	1203 ,,	11,491 ,,	9255 ,,
,, 13th ,,	1460 ,,	1181 ,,	6736 ,,	9545 ,,
,, 20th ,,	1460 ,,	976 ,,	6736 ,,	6960 ,,
1861, 3rd Jan.	925 ,,	849 ,,	6382 ,,	7716 ,,
,, 10th ,,	809 ,,	840 ,,	6382 ,,	6394 ,,

Reducing the results of the preceding Table to grs. per pound of body-weight, I obtain the two following Tables:—

Table VII.—*Showing the Relation of the Sugar ingested to the Sugar excreted, per Day, per Pound of Body-weight.*

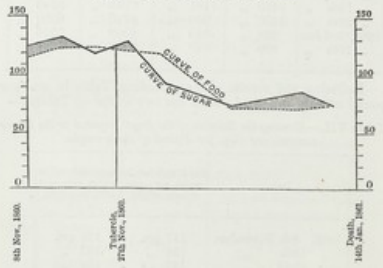
Date.	Sugar ingested, in grains, per pound of body-weight.	Sugar excreted, in grains, per pound of body-weight.
1860, 8th November,	117 grs.	126 grs.
,, 15th ,,	124 ,,	132 ,,
,, 22nd ,,	123 ,,	120 ,,
,, 29th ,,	120 ,,	129 ,,
,, 6th December,	119 ,,	96 ,,
,, 20th ,,	72 ,,	74 ,,
1861, 3rd January,	70 ,,	84 ,,
,, 10th ,,	73 ,,	73 ,,

TABLE VIII.—*Showing the Relation of the Urea ingested to the Urea excreted, per Day, per Pound of Body-weight.*

Date.	Urea ingested in grains per pound of body-weight.	Urea passed, per vesicam, in grains per pound of body weight.
1860, 8th November,	11·8 grs.	15·9 grs.
,, 15th ,,	12·5 ,,	15·4 ,,
,, 22nd ,,	17·8 ,,	15·2 ,,
,, 29th ,,	18·7 ,,	12·3 ,,
,, 6th December,	17·9 ,,	12·4 ,,
,, 20th ,,	15·6 ,,	10·4 ,,
1861, 3rd January,	10·1 ,,	9·3 ,,
,, 10th ,,	9·2 ,,	9·6 ,,

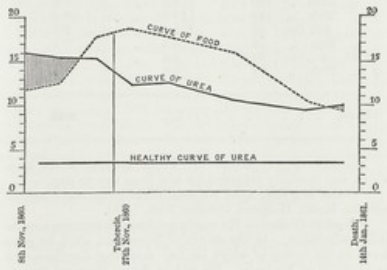
The two preceding Tables are graphically exhibited in the following diagrams:—

No. 1.—*Sugar excreted and ingested.*



In this diagram the horizontal line represents the time from 8th November, 1860, to Murphy's death, 14th January, 1861. The vertical ordinates are drawn to scale to represent grains of sugar per pound weight of body. The full line, called "curve of sugar," represents the sugar excreted in the urine; and the dotted line, called "curve of food," represents the equivalent of sugar ingested, calculated by converting the starch, &c., into glucose. I have shaded the intervals between the curves, when the sugar excreted exceeded the sugar ingested; during this portion of time the disease must have converted the body-tissues into glucose.

No. 2.—*Urea excreted and ingested.*



In this diagram the horizontal line is the same as before, and the vertical ordinates, drawn to scale, represent grains of urea per pound weight of body. The full and dotted lines represent the *excreta* and *ingesta;* and I have shaded their intervals, when the urea excreted exceeded the urea ingested; where this shaded space occurs the urea excreted must have been produced partly by the destruction of the proteinic tissues of the body. I have placed on the same diagram the horizontal line of 3·5 grs. urea per lb. of body-weight, in order to show how excessive the excretion of urea is in diabetes mellitus.

The following Table shows the relation of the discharge of sugar and urea to the body-weight, and to each other:—

Table IX.—*Ratio of Excretion of Sugar to Excretion of Urea.*

Date.	Grains of Sugar per day, per pound, of body-weight.	Grains of urea per day, per pound, of body-weight.	Ratio of Sugar to urea.
1860, 8th Nov.	126 grs. per lb.	15·9 grs. per lb.	7·9
,, 15th ,,	132 ,,	15·4 ,,	8·5
,, 22nd ,,	120 ,,	15·2 ,,	7·8
,, 29th ,,	129 ,,	12·3 ,,	10·4
,, 6th Dec.	96 ,,	12·4 ,,	7·7
,, 20th ,,	74 ,,	10·4 ,,	7·1
1861, 3rd Jan.	84 ,,	9·3 ,,	9·0
,, 10th ,,	73 ,,	9·6 ,,	7·6
Mean, ...			8·25

The following is Mr. A. W. Foot's account of the case, which was carefully observed by him from day to day:—

"Owen Murphy, aged 20, from Balbriggan, was admitted into the Meath Hospital, October 10th, 1860.

"*Previous History.*—He was in good health fourteen months before admission. In the month of November, 1859, he got a fever, in the course of which he had vomiting, diarrhœa, and an eruption on his body. He was in Ardee Hospital for two weeks; he left this hospital on his convalescence, because he he did not get enough to eat. A month after doing so, he began to suffer from excessive thirst; and in two or three weeks more, from great appetite; at the same time he commenced to make water in large quantity, of a "sea-green colour, and having the smell of apples." He had got his livelihood by making bricks in summer, and by out-door farm-work in winter.

"*Condition when admitted.*—Thirst and appetite excessive, passing daily large quantities of pale urine, full of sugar, and of a high specific gravity. Skin dry; never moist. Bowels habitually confined. Muscles thin and weak. Face clay-coloured; and countenance dejected and cold-looking. Sight defective; has been so since commencement of present illness; was good before; the pupils are dilated, and contract sluggishly to light; he sees best at noon; sometimes has double vision; sees sparks of light when the eyes are long directed upon one object. Has a constant heat in his body; so that he throws off his bed-clothes, even on cold nights, to get cool. Cold water relieves this feeling of warmth best. Prepuce long, and cannot be retracted. Pulse rapid (100). Tongue red at the tip, covered towards its back part with soft brown paste. Suffers often from giddiness.

"*Treatment and Progress.* October 14th. Recipe:—Of compound rhubarb pill, a drachm and half; of creasote, ten drops, made into eight pills, one three times daily; and an ounce of lime water in an ounce of milk every third hour.

"Ordered brown bread, and to have it toasted.

"For the first four or five days which he was in hospital he was on milk diet, and consequently said he could not remain, his hunger was so great. He had previously left two other hospitals in Dublin, because he did not get enough to eat. He used to support himself at home by begging among the farmers' houses; and stated that he generally ate 4 or 5 lbs. of meat and as much bread, daily. He expressed a liking for fat meat, and an especial preference for roasted fat. He found his thirst assuaged best by porter; buttermilk, which he sometimes drank to distension, increased his thirst. He was soon ordered full diet: a pint of porter daily, two eggs, an additional quart of milk, and rice for supper instead of stirabout, the usual food.

"October 26th. Ordered a teaspoonful of rennet in water three times a day. This he took till November 22nd.

"Thursday, Nov. 8th. Weighed him; bladder empty. Deducting the weight of his clothes, he weighed seven stone.

"The diet he was taking at this time was the following:—

"*Breakfast.*—Brown bread, 1 lb.; milk, 1 quart; eggs, 2.

"*Dinner.*—Beef, boiled, ½ lb. four days in week; brown bread, 1 lb.; porter, 1 quart.

"*Supper.*—Rice, 2 oz.; milk, 1 quart; tea, 1 pint.

"The quantity of urine excreted from 9 A. M. on the 9th, to the same hour on the 10th of November, was 15½ pints; colour, light golden; specific gravity, 1040·2; containing sugar, 12329 grs.; urea, 1559 grs.; the grains of urea per lb. weight being 15·9.

"Thursday, November 15th. His naked weight was 6 st. 8½ lb., showing a loss of 5½ lbs. in the preceding week. Professor Haughton accounted for this loss by the fact which he ascertained, that he was excreting more proteinic and farinaceous compounds per urinam than he was supplied with in the ingesta. The boy himself, at this time, said he had a particular craving for meat; his allowance was at once

doubled, and given every day in the week instead of but four times.

"The quantity of urine passed in twenty-four hours, on the 14th and 15th of November, was 18 pints 3 oz., muddy, and fermented vigorously; specific gravity, 1033·8; containing sugar, 12215 grs.; urea, 1429 grs; the grains of urea per lb. weight being 15·4.

"Thursday, Nov. 22nd. The creasote pills omitted. Recipe:—Of extract of aloes and extract of rhubarb, each one drachm; of sulphate of quinine, gum mastich, and pepper, each two grains; make twelve pills; one to be taken daily.

"His naked weight was 6 st. 9½ lbs. The quantity of urine passed in the previous 24 hours was 18 pints; of specific gravity, 1033·8; containing sugar, 11250 grs.; urea, 1420 grs.; the grains of urea per lb. being 15·1. An addition was made to his diet on this day; he was ordered 2 lbs. of fresh cabbage, and the juice of three lemons, daily. His appearance has improved; the clay-colour of his complexion has disappeared.

"Tuesday, Nov. 27th. A bubble was heard in the right infra-clavicular region; the right clavicle is dull on percussion; *bruit de pot felée* very distinct over second rib.

"Thursday, Nov. 29th. His naked weight, 6 st. 11½ lb.; the quantity of urine passed in the previous 24 hours was 15 pints, spec. grav. 1035·0, containing sugar 12,290 grs., urea 1181 grs., the grains per pound being 12·3.

"The diet of the preceding week was—

"*Breakfast.*—Brown bread, 1 lb.; milk, 1 quart; juice of one lemon.

"*Dinner.*—Beef, boiled, 1 lb., every day in week; brown bread, 1 lb.; porter, 1 quart; juice of one lemon.

"*Supper.*—Rice, 2 oz.; 1 quart of milk; juice of one lemon.

"Saturday, December 1st. The infra-clavicular bubble increasing in distinctness; *bruit de pot felée* well marked; is not able to eat more than half his allowance of cabbage; reduced it to 1 lb. per diem; respiration more feeble in right lung posteriorly than in left; both clavicles becoming prominent; has a dry cough, which gives him pain in the right side; heart's action and sounds normal; pulse, in sitting posture, 112.

"Thursday, December 6th. Naked weight, 6st. 12½lb.; quantity of urine in previous twenty-four hours, 13 pints 15 oz.; specific gravity, 1035.7, containing sugar, 9255 grs.; urea, 1203 grs.; the grains of urea per lb. weight being 12.4.

"Expectoration scanty, thick, yellowish; sputa described as 'sweet, like honey;' does not sleep well; a weakness comes over him at night.

"December 8th. Ordered wine 4 oz; increased next day to 6 oz.

"December 10th. Expectoration profuse, viscid, brownish; pain on coughing; gets no sleep from the perpetual coughing at night; *râles* becoming developed downwards over right side of chest.

"December 13th. Could not be weighed, as he was not able to leave his bed; the urine of 24 hours was 12 pints, spec. grav.1040·6, containing sugar 9545 grs., urea, 1181 grs.; he can only lie on the right side; has not rested the last two nights from constant coughing; *gargouillement* very decided in right infra-clavicular region; is not able for his full allowance of diet; 1 lb of bread taken off, and the second pound of cabbage; but this latter he took again in a few days, when he was given some butter with it. Recipe:—Of prussic acid, one drop; of solution of muriate of morphia, eight drops; draught to be taken three times daily.

"December 15th. Coughs less, sleeps better, diet now is—

"*Breakfast.*—Brown bread, ½ lb.; milk, 1 quart; 2 eggs; juice of one lemon.

"*Dinner.*—Boiled beef, 1 lb.; cabbage, 1 lb.; bread, ½ lb.; porter, 1 quart; wine, 6 oz.; juice of one lemon.

"*Supper.*—Rice, 2 oz.; milk, 1 quart; juice of one lemon.

"December 18th. No appetite or thirst; he drank nothing all last night; made very little water; cough incessant; difficult to expectorate; tongue dry and brown; pulse 106; loud *râles* over right lung anteriorly; respiration feeble posteriorly; ordered flannel vest, jacket, and drawers.

"December 20th. Weighed, naked, 6 st. 8½ lb.; quantity of urine in 24 hours, 8 pints 15 oz., spec. grav. 1038·3, containing sugar 6960, urea 976; he cannot lie now off the right side; small streak of florid blood in expectoration last night.

"December 21st. Prepuce red, swelled, fissured; no appetite at all; thirst much less.

"December 31st. Asked for roast meat; allowed ½ lb. roast mutton daily; vegetables omitted, he could not eat them; a pint of tea instead of the morning milk.

"January 3rd. Weight, naked, 6 st. 7½ lb; urine of 24 hours, 9 pints 14 oz., spec. grav. 1040·1, containing sugar, 7716 grs.; urea, 849 grs.

"January 8th. Thirst greater, appetite less; gums soft; bowels free; distinct crepitus along front of right lung; sometimes perspires about the head at night; decubitus on the right side.

"January 10th. Weighed 6 st. 3½ lb.; urine of 24 hours,

9 pints 10 oz.; specific gravity, 1031·8 containing sugar, 6394 grs.; urea, 840 grs.; in very low state—depressed; no appetite at all; found sugar on a qualitative examination of the expectoration; thirst excessive.

"Saturday, Jan. 12th. Began to vomit; rejected all his food through the day; continued to do so next day and Monday. On Monday, Jan. 14th, tongue dry and brown; pulse, 120, steady; headache, pain in back, depressed, and moaning; decubitus on right side; no food remained on his stomach since Saturday; his prepuce sore; had been several times syringed during the last fortnight; drank quantities of cold water all this day; mind wandered before death; his ravings were about eating; and he spoke of the quantities of fat, "roasted fat," he would eat to-morrow. Died at midnight, Monday night, quietly, without convulsions.

"*Post-mortem nine hours after death.*

"Body warm[a], soft, very white, shrunken.

"Brain, weight, 49 oz., healthy appearance.

"Pleuræ, no fluid. Right lung adherent to ribs, softened; tubercles thickly disseminated through it. Cavity in upper lobe, size of a walnut. Left lung, no adhesions. Cavity, 3 inches long, 1 inch wide, in upper-third; tubercles through it, more abundant towards apex.

"Heart small.

"Liver large; weight, 61½ oz.; natural colour.

"Right Kidney much larger than left; weight, 7½ oz.

"Left kidney, weight, 6 oz.

"Supra-renal glands well marked.

"Bladder thickened, large; contained about 5 oz. urine; kept for examination. The stomach was empty, containing only a little dark-coloured fluid. The mucous membrane was thick, soft, and greyish in colour. The seminal vesicles contained abundance of dead spermatozoa."—(*A. W. Foot.*)

I examined the urine found in the bladder after death, and found it to contain mucus, and a small quantity of albumen; separating these, I examined for sugar, and found it to contain 13·29 grs. per thousand. This would only give 1519 grs. in 9 pints; which would indicate a reduction of the sugar-forming faculty to one-fourth of what it had been four days previously.

I treated 245·4 grs. of blood from the heart's right ventricle, liver, and general system, by drying and percolation with alcohol (sp. gr. 0·828), and failed to detect the slightest trace of sugar.

[a] The long-continued warmth of the body after death attracted the notice of all.

The liver weighed 61½ oz. I treated 451 grs. of this liver with alcohol as before, and failed to find any trace of sugar in it.

In 348·2 grs. of the fatty liver of a phthisical patient, who had died shortly before in the Meath Hospital, I had found, without any difficulty, by percolation with ether and alcohol, sugar enough to saturate 29 measures of the standard copper solution (100 measures = 5 grs. glucose), which corresponds with 4·17 grs. per thousand in the raw liver.

In Cl. Bernard's accounts of his examination of human livers for sugar, I can only find three quantitative results, all of which are considerably greater than the preceding. His results are as follows:—

TABLE X.—*Determination of Sugar in Human Livers, by Claude Bernard.*

Case.	Death.	Name and age.	Weight of liver.	Sugar per thousand.
1	Beheaded.	Ayme, 42.	1·300 kilogr.	17·90.
2	,,	Bixner, 47.	1·300 ,,	Much.
3	,,	Lafourcade.	1·175 ,,	Sugar.
4	,,	Viou, 22.	1·200 ,,	21·42.
5	,,	Courtin.	1·175 ,,	Sugar.
6	Gun-shot wound.	——, 30.	1·575 ,,	11·00.

If, as some physiologists assert, the kidney is only a filter, and its function be simply to separate the urea and sugar previously formed and circulating in the blood, there ought to be a certain proportion between the dilution of sugar in the blood and in the urine, and we should expect to find sugar in the blood in that proportion as compared with the sugar in the urine.

I have attempted to determine the proportion between the sugar in the blood and in the urine of Owen Murphy in the following manner:—

1. I assume, on the authority of Weber and Schwann that the blood in the human body is one-eighth the weight of the body.

2. That the left ventricle holds 3 ounces.

3. That Murphy's average pulse was 100 per minute; and that his weight was 96 lbs.

4. I examined, and carefully measured the diameters of the aorta and renal arteries of a subject 82 lbs. weight, and found the following results:—

Diameter of aorta, ... $1\frac{8}{10}$ of inch.
Diameter of right renal artery, . . $\frac{3}{10}$,,
Diameter of left renal artery, . . . $\frac{2}{10}$,,

I assume, for the moment, that the quantity of blood flowing through the renal artery is to the quantity flowing through the aorta in the proportion of the square of the diameter of the renal artery to the square of the diameter of the aorta. In reality much less blood than is given by this proportion flows through the renal artery, in consequence of friction; but the preceding proportion will give me a maximum result.

I find from the preceding assumptions, that in 64 beats of the heart the blood circulation of the heart was completed; that is, in 0·64 of a minute—and since the area of the aorta is to the joint areas of the renal arteries as 16·214 to 1—very nearly 12 ounces of blood passed through the kidneys in 0·64 of a minute. Increasing this to the length of the day, I obtain finally the result that **1350** pints of blood passed through Murphy's kidneys each day. This result, it must be observed, is a *maximum*; and the less it is, the stronger my argument to be founded on it becomes. The average quantity of urine passed per day by Murphy was **13·37** pints; which is almost exactly the hundredth part of the blood from which it was secreted.

In the urine found in the bladder after death, I detected 19·29 parts of sugar per thousand; this, if it were secreted previously, and pre-existed in the blood, the kidneys only acting as a filter, would correspond to 0·1929 parts of sugar per thousand in the blood. This quantity of sugar could not have escaped the tests I applied. The copper solution I used was of the following strength:—100 measures=5 grs. glucose; and a quantity of oxide of copper less than that contained in one measure may be detected as a precipitate. The following chain shows the number of measures corresponding to the quantity of blood I examined:—

1000 : 245·4 grs. of Murphy's blood.
0·1929 grs. glucose by filter-theory.
3 : 100 measures of standard copper solution.

0·946 measures.

This quantity of the standard solution, if decomposed by the sugar, would have been detected by me; and as there was

not the slightest trace of oxide of copper precipitate, I believe that the blood, if it contained any sugar at all, did not contain one hundredth part as much as I found in the urine.

But, in reality, the blood should have contained, if the filter-theory be true, more than double the quantity of sugar just calculated; for it is a well known principle in hydraulics, that the discharge of liquids flowing through circular pipes of different bores, varies as the *square root of the fifth power of the diameter*, and not as the *square of the diameter*, which I have assumed in the preceding calculation. If this law be used, the amount of blood passing through the aorta in a given time will be 77·384 times the amount passing through one renal artery; or 38·692 times that passing through the renal arteries conjointly, instead of 16.214 times. From this it follows that only 566 pints of blood passed through Murphy's kidneys per day, instead of 1350 pints. This would give a dilution of only $\frac{1}{4}$ and instead of $\frac{1}{100}$th in estimating the sugar in the blood as compared with that in the urine—this would correspond to two and a quarter measures of the standard copper solution, an amount, which, if reduced by the presence of sugar, would attract the notice of even an inattentive observer.

The quantity of sugar in the urine during life was much greater than that found after death; for example,—on the 29th November, in 24 hours, in 300 oz. of urine there were 12290 grs. sugar, which correspond to 93·6 grs. to 1000 grs. The corresponding quantity of sugar in the blood would be 2·28 grs. to 1000 grs. of blood. I had no opportunity of examining the blood for sugar during life, and cannot, therefore, state what quantity existed in it.

Kane failed to detect sugar in the blood of his case No. 5, although he used a process capable of discovering 5 grs. in 1 lb. of blood; i. e., 0·7143 grs. in 1000. In this case the urine contained 70 parts of sugar in 1000; which, assuming $\frac{1}{15}$th as the dilution, would give 1·4 grs. of sugar to 1000 grs. of blood, or double that which he could have easily detected. This experiment of Sir Robert Kane, made without any theoretical view, confirms the fact I have found true in the case of Owen Murphy, in whose blood I should have found sugar, had the filter-theory been true.

The only case in which I can find a quantitative comparison between the sugar in the blood and in the urine, is one recorded by Simon (Animal Chemistry, &c., Sydenham Society Publications, vol. i. p. 327, and vol. ii. p. 295). In this case he found 86·3 parts of sugar in 1000 parts of urine, and 2·5 parts of sugar in 1000 parts of blood [the 2·5 parts not being altogether pure, but containing extractive matter, and some

salts]. This result would certainly fall in with the filter-theory, as it would seem to give a dilution of sugar in the blood not very far from $\frac{1}{3}$rd, which I have found to be very near the theoretical dilution in the case of Murphy. Many circumstances, however, might combine to render the fraction of dilution greater than $\frac{1}{3}$rd, such as the passing of a larger quantity of urine; while, on the other hand, a greater weight of body, and therefore of blood, might tend to diminish this fraction. Without a knowledge of all these circumstances in Simon's and Kane's cases, no exact inference can be deduced from them; but I believe that my own post-mortem experiment on Owen Murphy is sufficient to make out a *primâ facie* case against the filter-theory, which ought to be tested by further experiments before it is admitted.

In concluding my account of Owen Murphy's case, I should add, that on the 8th of December, 1860, the temperature of his left axilla, uncovered by bedclothes was 98° F.; while that of a healthy boy, in the same room, and under similar circumstances, was 96° F.

The next case to which I shall direct attention is that of Henry M'Nee, which I had an opportunity of studying, while he was under the care of Dr. Law, and of Dr. Osborne, in Sir Patrick Dun's Hospital. He was 30 years of age when he first suffered from the disease, and had been two years under its influence when admitted into hospital. He attributed the first access of the disorder to over-drinking of beer in Staffordshire, during harvest.

The following Table contains the results of my examinations of his urine:—

Table XI.—*Constants of Body and Urine of Henry M'Nee*, 1860.

Date.	Weight.	Urine per day.	Sugar per day.	Urea per day.	Specific gravity.
10 Feb. 1860.	154 lbs.	240 ℥ fl.	8750 grs.	1202 grs.	1035·9
6 Mar. „	147 „	240* „	7500 „	993 „	1034·0
20 Mar. „	158 „	240 „	6562 „	941 „	1033·1
9 May, „	151 „	200 „	7291 „	828 „	1035·4
Mean, . . .	**152·5** lbs.	**230** ℥ fl.	**7526** grs.	**991** grs.	

* After standing twenty-four hours this urine acquired a disgusting cheesy smell, with an odour of whey and sour buttermilk. This was, probably, due to the presence of lactic acid.

He died on the 14th November, 1860; and the specific gravity of the urine, some days before death, was found to be 1015, and it contained some sugar, but the quantity was not ascertained. The *post-mortem* examination, made by Dr. Law, showed hypertrophied vascular kidneys, weighing 12 oz. and 11½ oz. respectively, but free from organic disease; tubercles in the substance of both lungs; and incipient pleurisy in the base of the left lung; the liver weighed 5 lb. 6 oz., and appeared perfectly healthy.

I examined 751·7 grs. of the liver, and found it became, by drying at 212° F. 238·0 grains., or 31·66 p. c. residuum—and 194·1 grs. of this residuum treated by percolation with alcohol (sp. gr. 0·828) did not afford the slightest evidence of the presence of sugar.

M'Nee's food was carefully regulated previous to the experiments of 10th of February, and 6th of March, a change of food being made on the 21st of February:—

Food previous to the 10th of February, 1860.

	Urea-equivalent.	Sugar-equivalent.
1. Brown Loaf, 2 lbs. . .	534 grs. . .	9510 grs.
2. Broiled Mutton, 1 lb. . .	660 „	
3. Beef in broth, 3 oz. . .	160 „	
4. Butter, 1 oz.		
5. Porter, 1 quart, ...	54 „ . .	52 „
6. Tea, ½ oz.	19 „	
	1427 grs.	**9562** grs.

Food previous to the 6th of March, 1860.

	Urea-equivalent.	Sugar-equivalent.
1. Brown Loaf, 1 lb. . . .	267 grs. . .	4755 grs.
2. Eggs, 2, ...	64 „	
3. Broiled Mutton, 1 lb. . .	660 „	
4. Beef in broth, 3 oz. . .	160 „	
5. Butter, 1 oz.		
6. Porter, 1 quart, ...	54 „ . .	52 „
7. Tea, ½ oz.	19 „	
8. Whiskey, 6 oz.		
	1224 grs.	**4807** grs.

M'Nee's food remained unaltered from the 21st of February, to the 9th of May; but about the 1st of May, his appetite decreased, and his general health became worse.

The urea discharged never exceeded the urea due to the food ingested, and apparently assimilated.

The sugar discharged, on the average, reached **7526** grs. per day, during the period in which the sugar due to the farinaceous food ingested only amounted to 4807 grs.

I cannot assert positively that M'Nee had only the food of 6th March during the months of March, April, and May, as he was not watched, to prevent his eating the food left by other patients, but I was repeatedly assured by himself and his nurse, that he was quite satisfied with the food he got. In the case of Murphy, the strictest care was taken to insure accuracy, and I am certain that he obtained access to no other food than that mentioned in my account of his case.

The last case of diabetes mellitus which I shall give is that of — Keogh, aged 48; attack first noticed by patient in December, 1857; in Sir Patrick Dun's Hospital, November, 1859; had been in several hospitals during the previous seven months; attributed illness to exposure to wet and cold; had previously weighed 11st. 7lb.

On the 2nd November, 1859, I examined this case, and found the following results:—

Weight—9st. 3lbs., ... 129lbs.

During 24 hours he passed—

Urine, ... 1473fl.,
Sp. gr., ... 1038·12;

which contained—

1.	Urea, ...	750·31 grs.
2.	Uric acid, ...	4·25 ,,
3.	Alkaline and earthy salts, .	396·90 ,,
4.	Sugar, ...	4708·40 ,,
5	Extractives, ...	284·80 ,,
	Total	**6144·66** grs. per day.

On examining the salts, I found—

1.	Sulphuric acid, ...	66·5 grs.
2.	Phosphoric acid—	
	[With lime], ...	75·8 ,,
	[With alkalies and magnesia], ...	132·3 ,,
3.	Chlorine, ...	155·2 ,,
4.	Fixed salts per ℥fl., . . .	2·7 ,,

The large amount of sulphuric acid is explained by the fact that sulphuric acid and cod liver oil constituted the medicines he took at the time of my experiment:—

PHYSIOLOGY OF DIABETES MELLITUS.

The facts which have been stated in the preceding pages suggest many inferences bearing on the physiology of this mysterious disease. In order to discuss them, I append the following table:—

Table XII.—*Constants of Diabetes Mellitus.*

Case.	Weight.	Urea excreted per Day.	Sugar excreted per Day.	Urea ingested per Day.	Sugar ingested per Day.
	LBS.	GRS.	GRS.	GRS.	GRS.
1. Owen Murphy. (Mean of nine observations.)	93·56[a]	1182[b]	9773[b]	1349[b]	9321[b]
2. Henry M'Nee. (Mean of four observations.)	152·5[c]	991[c]	7526[c]	1224	4807
3. — Keogh. (Single observation.)	129	750	4708	...	...

The first point to which I would direct attention is the excessive excretion of urea, which I believe will give us the key, sooner or later, to this mysterious disease. In diabetes mellitus, there is a canine appetite, a relish for food, and an apparent assimilation of an amount of food from twice to thrice that

[a] *Vide* Table V. [b] *Vide* Table VI. [c] *Vide* Table XI.

which satisfies ordinary appetites; at the same time, there is, notoriously, no *work done* by this food; the mind is sluggish and inactive, and the body is incapable of exertion. This physiological paradox admits, I think, of an explanation, which I shall give further on; at present, I make the following calculation:—

Assuming the following compositions for proteine, glucose, and urea;

Proteine, .	$C_{36}\ H_{57}\ N_4\ O_{12}$.	393	atomic weight.
Glucose, .	$C_{12}\ H_{14}\ O_{14}$ . .	198	,, ,,
Urea, . .	$C_2\ H_4\ N_2\ O_2$ . .	60	,, ,,

The following relation is evident:—

(1) Proteine + (23) Water + (3) Oxygen + (4) Carbonic acid = (3) Glucose + (2) Urea (1)

The preceding relation shows the possibility, at least, of proteinic compounds, by the addition of small quantities of water, oxygen, and carbonic acid (which all exist in abundance in the blood), becoming converted into Glucose and Urea; and by examining the atomic weights, it will be seen that such a reaction would produce very nearly 5 grains of glucose for every grain of urea.

Let us suppose that this reaction takes place, and that no mental or mechanical work is done by the diabetic patient. In this case, his natural excretion of urea would be only 2 grs. per lb. of body weight[a].

Combining the preceding results, I find the following distribution of the Urea and Sugar excreted in diabetes mellitus:—

Table XIII.—*Distribution of Urea and Glucose excreted in Diabetes Mellitus.*

Case.	Urea due to *opus vitale*.	Urea due to decomposition of proteinic compounds.	Sugar due to decomposition of proteinic compounds.	Sugar due to starch-food.
1. Murphy,	188 grs.	994 grs.	4970 grs.	4803 grs.
2. M'Nee,	305 ,,	686 ,,	3430 ,,	4096 ,,
3. Keogh,	258 ,,	492 ,,	2460 ,,	2248 ,,

[a] Dublin Quarterly Journal of Medical Science, vol. xxx., p. 12.

The sugar excreted, given in the last column, and not accounted for by the decomposition of proteinic compounds, was undoubtedly formed directly from the starch contained in the food, by the following well-known reaction:—

(1) Starch + (4) Water = (1) Glucose. (2)

The sugar discharged, appears from Table XIII., in the three cases, to be divisible into two nearly equal portions; one of which is probably formed directly from the starch of the food, and the other probably from the decomposition of proteinic tissues into Glucose and Urea—a destructive process, which requires the system to be renovated by large quantities of nitrogenous food.

In the case of Murphy, I know that no other food was taken than that already specified, and I therefore have no hesitation in giving the following calculation, based, in his case, on the sugar ingested and sugar excreted:—

On the average, the food ingested was capable of producing 9321[a] grs. of glucose per day; and did actually produce 9773 grs. For my present purpose, I shall consider these quantities as practically equal; but they are not to each other in the relation of cause and effect, for the sugar excreted is divisible into two portions:—

1. Sugar resulting directly from starch-food, . 4803 grs.
2. Sugar resulting from decomposition of proteinic compounds, ... 4970 ,,

Total, ... **9773** grs.

The difference between 4803 grs. and the total sugar-equivalent ingested, 9321 grs. was not employed in the manufacture of Urea or of Glucose; therefore, theoretically it must have gone to produce carbonic acid and water; for, since the fæcal excretions in Murphy's case were reduced to a minimum, and his skin did not act at all, the whole excretions of the body, viz., urea, glucose, carbonic acid, and water, consisted of the four substances just named. If the theory, therefore, of no work being done in Diabetes Mellitus, and of the decomposition of proteine, be correct, we should expect to find the starch, or sugar, represented by the difference between the ingested and excreted sugar formed directly, sufficient to produce the amount of Carbonic Acid, that should be excreted as a minimum.

[a] *Vide* Table VI.

In the Philosophical Transactions for 1859, pp. 686 and 693, Dr. Edward Smith gives as the result of his accurate and original observations on four persons, whose average weight was 160 lbs., in a state of quietude, the quantity of Carbonic Acid excreted by the lungs per day as 26·193 oz. av.: this result, which I believe to be the most accurate hitherto determined, would give 71·622 grs. of carbonic acid, per pound of body-weight, per day.

Applying the preceding to Murphy's case, since his weight was 93·56 lbs., we find the carbonic acid to be excreted in a state of quietude to be 6701 grs. To compare this with the result due to the oxidation of the glucose, we have—

Sugar-equivalent ingested not excreted as such =
Difference between total sugar ingested, . . 9321 grs.
and sugar directly formed from starch-food, 4803 ,,

= **4518** grs.

This glucose would be converted into water and carbonic acid, by the addition of oxygen, as in the state of health, by the following reaction:—

(1) Glucose + (24) Oxygen = (12) Water + (12) Carbonic Acid (3)

By referring to the atomic weights of these compounds, it will be seen that glucose produces carbonic acid in the proportion of 198 to 264, which is exactly 3 : 4. Hence, the 4518 grs. of glucose (or of starch-food equivalent to glucose) remaining in the blood, will be converted into 6024 grs. of carbonic acid, and discharged by the lungs.

This result is too close to that already found from Dr. Smith's experiments to be attributed to any chance, and leads to the following view of Murphy's case, which explains all the facts observed:—

1. There was an excretion of Urea, due to the minimum condition of quietude of body and mind.
2. There was an additional excretion of Urea, caused by disease, and having its origin in a perverted decomposition of nitrogenous tissues.
3. This additional excretion of Urea was necessarily accompanied by an excretion of Glucose, amounting to about half the total excretion of that substance.

4. The remaining half of the sugar excreted owed its origin to the direct change of the Starch-food into Glucose, which was excreted as such.
5. Of the Starch-food ingested, about half was consumed, as just stated, in the diseased production of glucose; the remaining half was excreted as carbonic acid and water, as in health.
6. The carbonic acid thus formed was somewhat less in amount than that usual in health, in a state of quietude of mind and body.

It now remains for me to explain the physiological paradox involved in the phenomena of diabetes mellitus, to which I have already directed attention, viz. that while the food ingested, and apparently assimilated, is from two to four times the usual amount, it produces no work in the system, such as might be expected.

Before explaining this remarkable phenomenon, I shall show that the common theory of diabetes completely fails to afford any clue to its solution.

If Murphy had been in health, and consuming the minimum amount of food compatible with mere existence, he would have produced the following results in work done:—

1. Minimum excretion of urea, ... 188 grs.
   [94 lbs. body-weight, at 2 grs.[a] of urea for each pound, *Opus citatc.*]
2. Minimum excretion of carbonic acid, . 6768 grs.
   [94 lbs. body-weight, at 72 grs. of carbonic acid per lb.[b]]

The urea excreted may be converted into tons lifted one foot, by the rule I have elsewhere given,[c] viz. 39 grs. of urea are equivalent to 100 tons, lifted one foot.

In the healthy production of urea from proteinic compounds, carbonic acid and water are also produced, as appears from the following equation, which is easily verified—

(1) Proteine + (75) Oxygen = (2) Urea + (32) Carbonic Acid + (19) Water. (4)

[a] *Vide* Dublin Quarterly Journal of Medical Science, vol. xxx. p. 12.
[b] *Vide* preceding page.
[c] *Vide* Dublin Quarterly Journal of Medical Science, vol. xxx. p. 12.

The carbonic acid and water of this equation are both formed by the combustion of the carbon and hydrogen contained in the proteine, and the work due to this combustion [amounting to 24·33 p. c., and 10·50 p. c. of the total work ascribed to the urea, by the combustion of the carbon and hydrogen respectively] is tacitly involved in the work ascribed to the urea. We must therefore subtract the carbonic acid due to the production of 188 grs. of urea from the total carbonic acid exhaled from the lungs, to obtain the effective work due to the carbonic acid. In equation (4), the urea is to the carbonic acid as 120 : 704; from which it follows that 188 grs. of urea correspond to 1103 grs. of carbonic acid. Subtracting this from the minimum already given, 6768 grs., we find 5665 grs. of carbonic acid to be converted into tons, lifted through one foot.

To convert carbonic acid into work done, I assume, from Favre and Silbermann's experiments, that one grain of carbon will, by its combustion into carbonic acid, raise 8000 grs. of water from 32° F. to 33° F.; and also, from Joule's experiments, I assume that the heat requisite to raise one pound av. of water from 32° F. to 33° F. would lift 772 lbs. through one foot.

From these data it follows, that the combustion of 100 grs. of carbon is equivalent to 39·39 lbs. lifted through one foot.

Without giving the details of these calculations, I infer that—

I.—*Murphy in Health* (94 lb. wt.)

1. Excreted 188 grs. of urea, equivalent to	482 tons,	lifted one foot,
2. Excreted 5665 grs. of available carbonic acid equivalent to	618 „	„ „
Total work done,	**1100 Tons** „	„

This is the minimum result, consistent with bare existence in health, in a state of quietude of mind and body. I shall now compare with this result that theory of diabetes, which supposes the sugar to be formed from the starch-food alone. In the case of Murphy, the starch-food ingested, as I have already shown, was about equivalent to the Glucose excreted, a circumstance which would, at first sight, appear to

confirm the theory under consideration. This starch is converted into glucose by simple hydration, as appears from equation (2); and although this process must be attended with the giving out of some work, it is probably not much in amount.

But, on the common theory, the urea is supposed to be produced as usual, that is, by equation (4), and therefore to be accompanied by its usual and healthy equivalent of work done; viz., 100 tons per 39 grs. urea. Hence—

II.—*Murphy in Diabetes* (Sugar produced by Starch-food).

1. Excreted 1,182 grs. urea equivalent to	3031 tons	lifted one foot.
2. Excreted 9773 grs. of sugar, due to starch-food ingested, ...	— „	„
	3031 Tons „	„

This result is nearly three times the minimum work necessary to have kept the patient alive in health. No account is given by this view of diabetes of what becomes of the surplus work, which is inevitably produced, if the common theory be true; and the unhappy patient himself, by his vacillating and feeble mind, and helpless body, contradicts it. It is, further, disproved by the well-established fact, that sugar continues to be produced, though in diminished quantity, when all starch-food is carefully withheld.

This latter fact corroborates, I think, the theory here advocated, which assigns a double origin to the glucose excreted, part being due to starch-food, and part to the decomposition of proteine suggested by equation (1). Comparing this equation with the healthy action indicated by equation (4), we see that the former is a decomposition, the latter a true combustion, and that it is probable that in the diseased condition the proteinic compounds resolve themselves, without giving out Work, into Glucose and Urea; whereas, in the healthy action 75 : 3 compares the relative oxidation in health and disease; and the process, instead of being accompanied by the *retention* of carbonic acid, is attended by a large excretion of that product.

I now calculate the work done, according to my own theory—

III.—*Murphy* (*Diabetes*), (Double origin of Sugar, from Starch-food and Proteine).

1. Urea of *min. Op. vitale*, 188 grs., ...	482	tons.
2. Carbonic acid excreted, due to the combustion of 4518 grs. of glucose, as per p. 28; = 6024 grs. .	657	,,
	1139	,,
Deduct 79·5 tons, equivalent to 729 grs. of carbonic acid, *retained* by the diseased production of 994 grs. of urea, ...	79	,,
Total work done,	**1060**	tons lifted one foot.

This result is very close to **1100** tons, which has been already shown to be the minimum consistent with life, or continued existence; and shows that the physiological paradox of diabetes disappears by the application of this theory. The unequal struggle between food and excretion exhausts its victim; and though it can be maintained for a considerable time in the case of the wealthy and well-advised patient; to the poor man it brings total loss of his power of work, of mind and body, which to him means death.

The uncertainty that exists as to the actual amount of food used by M'Nee renders it difficult to make a similar calculation for his case; but it could be easily shown, that in this case, also, the supposition of a double origin for the sugar would account for the amount of sugar, and for the absence of work-done; the carbonic acid being accounted for by the fat of the food used.

The two theories of diabetes may be thus briefly compared:—One theory assumes the sugar to be formed exclusively from Starch-food; the other assumes it to have a double origin, partly from Starch-food, and partly from Proteinic compounds—these two origins giving about equal quantities of sugar.

The first theory fails in two ways: it does not account for the presence of excreted sugar, when all Starch-food is carefully excluded; and it fails completely to explain the large excretion of urea, which, on this theory, ought to be accompanied by an amount of Work done that is nowhere discoverable.

The second theory explains the presence of sugar in the excretions on almost any description of food; and also gives a rational explanation of the large excretion of urea, by attributing it to a decomposition, not attended by the development of Work done.

On both theories, a large proportion of the food consumed is wasted in the production of sugar. In the first theory, this waste of food occurs in the conversion of starch into glucose, which is excreted as such, without giving out Work; in the second theory, a similar waste occurs in the spontaneous decomposition of Proteine into Glucose and Urea, which is supposed not to be attended with the giving out of Work; but the essential difference between the two theories is, that, while they both offer an explanation of the excretion of Glucose, the first theory fails to explain the corresponding and equally remarkable excretion of Urea, a phenomenon which is satisfactorily accounted for by the second theory.

The account given by Prout of the physiology of diabetes is, although very vague, in accordance with the theory I have here laid down. Thus, he admits that some of the Starch-food is excreted as sugar, and some assimilated, and that a similar statement applies to the gelatinous, albuminous, and even the oleaginous aliments—a statement so large as to embrace almost any theory of the origin of the excreted sugar. He makes also a similar statement with regard to the tissues, and also attributes to the kidneys the function of completing the formation of the sugar:—

"When *organized* saccharine principles, as farinaceous matters, &c., are taken into the diabetic stomach, they are, in the first place, reduced to the form of *lose* sugar; part of which low sugar is assimilated as in the healthy stomach; while another part is modified, or remains unassimilated. The portion that is assimilated is applied to the purposes of the economy; the portions modified and unassimilated pass together through the system to the kidneys, by which glands the portion modified is disorganized, and finally appears in the urine as crystallisable sugar, along with the portion originally remaining unassimilated in the stomach. The same remarks are applicable to gelatinous, and, in extreme cases, perhaps, to albuminous and oleaginous aliments. The *secondary* assimilating processes in diabetic individuals participate in the derangements of the primary processes just detailed: that is to say, the gelatinous tissues are either reduced to sugar, and thus not assimilated at all, or they are imperfectly assimilated, or they are mal-assimilated; in all which conditions, the saccharine principle de-

rived from the gelatinous and other tissues may be supposed to pass through the system to the kidneys; by which organs, like similar matters brought from the stomach, the various modifications of the saccharine principle are further disorganized, and converted into crystallisable sugar."[a]

In another passage, Dr. Prout endeavours to account for the occurrence of lactic acid, at least occasionally, in diabetic urine: a fact which he seems to have himself noticed:—

"When, in diabetic individuals, the disorganizing function of the kidneys is suspended, or when these glands are partially diseased, the urine, besides albuminous matters and more or less of crystallisable sugar, often contains the saccharine principle *in imperfectly developed forms*. Hence such urine, almost without perceptibly becoming vinous, passes at once into the lactic or acetous fermentation, and acquires, from the quantity of lactic and acetic acids developed, the strong acid smell of sour milk."[b]

In conclusion, I would observe, that the well-known fact, that pulmonary tubercular disease generally accompanies the closing stage of diabetes, is well worthy of more attention than has been hitherto bestowed upon it. It is strange that some theorists should attribute phthisis to excessive oxidation, and others to deficient oxidation. Now, there can be no doubt, whatever theory of diabetes be adopted, that the excretion of Glucose in large quantities, a highly valuable and unoxidised compound, indicates a deficient oxidation of the tissues; this deficient oxidation coexists in diabetes with the early stages of tubercular disease, which latter must therefore be regarded rather as a disease accompanying defective oxidation of the blood, than as one resulting from excessive action of oxygen.

[a] Prout's Stomach and Urinary Diseases, p. 37. Third Edition.
[b] Ibid., p. 38.

Zur Frage über die Ausscheidung des Stickstoffes der im Körper zersetzten Albuminate.

Von Professor Dr. **J. Seegen.**

(Vorgelegt in der Sitzung am 15. December 1870.)

Aus dem LXIII. Bande der Sitzb. der k. Akad. der Wissensch. II. Abth. Jänner-Heft. Jahrg. 1871.

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Von Professor Dr. **J. Seegen.**

(Vorgelegt in der Sitzung am 15. December 1870.)

Es sind nahezu zwei Jahre verflossen, seitdem Herr Prof. Voit über unsere gemeinschaftlich ausgeführten Versuche berichtet hat. Prof. Voit hielt die zwischen uns bestehende Controverse für erledigt. Ich habe ihm schon damals mitgetheilt, dass ich zu meinem Bedauern mich nicht für überzeugt halten kann, dass die gesammte Stickstoffausscheidung durch die Nieren stattfinde, und dass die Ergebnisse der gemeinsamen Untersuchung für die Frage nicht entscheidend seien. Wenn ich erst heute, nach so langer Zeit zur Erwiederung gelange, geschieht es darum, weil ich gehofft hatte, die so wichtige Angelegenheit werde von anderen Forschern in den Kreis ihrer Untersuchungen gezogen werden, weil ich speciell die Veröffentlichung der von Toldt in Hering's Laboratorium ausgeführten Arbeit, auf welche ich weiter unten zurückkomme, abwarten wollte. Die Veröffentlichung erfolgte aus dort angeführten Gründen nicht; ich musste zu meinem Bedauern erfahren, dass man sich ganz einfach an Voit's Ausspruch halte, er habe während seiner kurzen Anwesenheit in Wien den Beobachtungsfehler entdeckt, auf den mein gefundenes Deficit zurückzuführen sei. An eine Kritik dieser gemeinsamen Arbeit ging Niemand; und so will ich es versuchen, heute über diese gemeinsamen Versuche zu berichten, und die Gründe darlegen, warum ich die Frage noch nicht für erledigt halte.

Es handelt sich hier nicht um Rechthaberei; die Bereitwilligkeit, mit welcher ich auf Voit's Antrag zu einem gemeinschaftlichen Versuche einging, ist Bürge dafür, dass es mir um Richtigstellung der Thatsachen zu thun war, und ich hätte nicht einen Moment geschwankt, öffentlich zu erklären, dass meine Anschauung, dass Stickstoff auch auf anderem Wege aus dem Körper treten könne, eine irrige sei, wenn mir nachgewiesen worden wäre,

dass das von mir zeitweilig gefundene Deficit auf einen Beobachtungsfehler zurückzuführen sei. Dieser Beweis ist nicht geliefert worden. Das Gesetz, wie es Voit aufstellt, ist aber von so hoher Wichtigkeit, es bildet gleichsam die Basis für alle Forschungen auf dem Gebiete der Ernährungsphysiologie, dass es nur dann als Solche gelten darf, wenn jede widersprechende Erfahrung in unwiderleglicher Weise auf eine unrichtige Beobachtung zurückzuführen ist.

Wir hatten für unsere Versuche zwei Versuchsthiere. Das eine derselben war der Hund, welchen ich seit langer Zeit für meine Ernährungsversuche benützte. Das zweite kleinere Thier hatte ich auf den Wunsch von Prof. Voit anfangs März angeschafft, und um das Stickstoffgleichgewicht herzustellen durch drei Wochen, bevor die Untersuchung begann, mit gleicher Fleischmenge gefüttert. Das Thier wog am 12. März 14040 Grm., es erhielt täglich 840 Grm. Fleisch ($1^1/_2$ Pfd.) und 900 Grm. Wasser. Das Körpergewicht sank rasch auf 12600 Grm. und blieb dann ziemlich stationär.

Die Dauer der Versuche war 10 Tage. In Bezug auf Bereitung der Nahrung, wie in Bezug auf Stickstoffbestimmung wurde gegen mein sonstiges Verfahren nichts geändert, und Voit anerkennt in offener Weise die Präcision, mit welcher das Fleisch von Fett und Sehnen gereinigt wurde, und die Zweckmässigkeit, der von mir zuerst für längere Versuchsreihen verwertheten directen Stickstoffbestimmungsmethode.

In einem wesentlichen Punkte differirte unsere Weise des Arbeitens; während ich das Versuchsthier etwa 2—3mal in 24 Stunden aus dem Stalle führen liess und es veranlasste, den Harn in ein untergehaltenes Glas zu entleeren, wurde auf Voit's Veranlassung dieser Vorgang alle 2 Stunden im Tage, an einzelnen Tagen auch noch öfter ausgeführt. Während ich ferner unmittelbar vor der Wägung, also vor dem Beginne des neuen Versuchstages das Thier einmal den Harn in ein untergehaltenes Glas entleeren liess, begnügte sich Voit mit dieser einmaligen Entleerung der Blase nicht. Das Thier wurde vielmehr im Hofe herumgeführt und demselben innerhalb 10—15 Minuten das Glas noch mehreremale untergehalten und wiederholte Harnausscheidung veranlasst. Da Voit diese Art des Vorgehens für sehr wichtig erklärte, wurde sie bei dem grossen Hunde unter seiner speciellen Leitung aufs Sorgfältigste ausgeführt. Der kleine Hund entleerte den Harn 1—2mal täglich in ein untergehaltenes Glas, fast immer entleerte er einen grossen Theil des Harns in dem Käfig, und wurde derselbe durch das Abflussrohr in einem unter dem Käfig befindlichen Gefässe gesammelt. Ich theile im Nachstehenden die Resultate der 10tägigen Untersuchungsreihe mit. Ich gebe die Resultate der directen Stickstoffbestimmung, da ich nur diese selbst ausführte, während Herr Prof. Voit die Harnstoffbestimmung nach Liebig's Methode machte.

A.

Nahrung 1200 Grm. Fleisch, Wasser 1500 CC.

Datum	Körpergewicht	Harnmenge	Stickstoff des Harns		Anmerkungen.
			p. c.	p. d.	
30/3	27600	2100	1·88	39·5	Die Hälfte des Harnes im Käfig gelassen.
31	27610	2050	1·87	38·3	1050 CC. wurden ausser dem Käfig in ein untergehaltenes Gefäss gesammelt.
1/4	27470	2073	1·84	38·1	Aller Harn ins Glas gelassen.
2	27460	2115	1·95	41·2	Aller Harn aufgefangen.
3	27420	2008	2·03	40·7	Aller Harn aufgefangen. N-Bestimmung von Voit ausgeführt.
4	27390	2053	1·9	38·9	Circa 200 CC. Harn im Käfig gelassen.
5	27420	2070	1·96	40·6	Aller Harn aufgefangen.
6	27490	1870	1·96	36·6	Harn nur 2mal ins Glas aufgefangen.
7	27520	1860	2·03	37·8	Harn nur 1mal aufgefangen.
8	27790	2160	1·93	41·7	Aller Harn stündlich ins Glas aufgefangen.
				393·4	

Die Ergebnisse dieser Untersuchungsreihe waren folgende:

1. Die Stickstoffausscheidung durch den Harn betrug 393·4 Grm. Wenn man dazu die Stickstoffausscheidung in dem Koth zu 0·5 Grm. per Tag mit 5 Grm. berechnet, beträgt die Ausscheidung

398·4 Grm. Dieser Ausscheidung steht die Einnahme von 408 Grm. gegenüber. Der Unterschied zwischen Einnahme und Ausgabe beträgt 9·6 Grm. das Deficit ist gleich 2·5%. Wenn nur jene 8 Tage in Rechnung gezogen werden, in welchen nach Voit's Methode der Harn gesammelt wurde, sinkt das Deficit auf 1%. Wird aber die Gewichtszunahme des Thieres um 190 Grm. als Fleischansatz berechnet, also 6·4 *N* von der Einnahme in Abzug gebracht, dann würden die Ausgaben die Einnahmen um 4 Grm. übersteigen. Dieses Plus steigt aber auf nahezu 4%, wenn für die Stickstoffausscheidung jene Ziffer zu Grunde gelegt wird, die Voit aus der Harnstoffbestimmung erhalten hat. Diese betrug für 8 Tage 329·2 Grm.

2. Die reiche Harnausscheidung und die Gleichmässigkeit der Harnausscheidung. In den 8 Tagen, innerhalb welcher der Harn nach Voit's Vorgang aufgefangen ward, schwankte die Harnausscheidung meist innerhalb der Grenze von 100 Cc.; nur am letzten Tage war die Ausscheidung um 160 Cc. grösser als die geringste Ausscheidung.

3. Die entschieden verringerte Harnausscheidung und damit auch die verringerte Stickstoffausscheidung in den beiden Tagen, in welchen der Harn fast ganz im Stalle entleert wurde (6. und 7. April), und die auffallende Steigerung von 1860 auf 2160 Cc. an dem darauf folgenden Tage, an welchem aller Harn in sehr häufigen Ausscheidungen ins Glas entleert wurde.

Das erste dieser drei Ergebnisse, ein minimales Deficit, oder ein mässiges plus stimmte mit den auch in früheren Untersuchungsperioden von mir wiederholt gefundenen Ergebnissen. Die Frage konnte durch dieses Resultat nicht gelöst werden. Es war nicht, wie Voit sagt, meine Aufgabe, ein Deficit zu zeigen, es war der ausgesprochene Zweck unserer gemeinschaftlichen Arbeit nachzuweisen, ob das von mir sehr oft gefundene Deficit auf einen Fehler in der Methode zurückzuführen sei.

Das zweite und dritte Resultat war nun von meinen Ergebnissen wesentlich dadurch verschieden, dass 1. die Harnausscheidung stetig eine bedeutend grössere war, als ich sie gefunden hatte, dass 2. die Schwankungen in den Harnquantitäten, die in aufeinander folgenden Tagen entleert wurden, geringer waren, und dass 3. die Art der Harnsammlung auf die Menge von entschiedenem

Einflusse war, dass die Harnmenge eine geringere war wenn der Harn nach meiner Methode gesammelt war, und dass die Quantität eine vermehrte war, wenn nach Voit's Methode die Harnausscheidung in das untergehaltene Glas häufig statt hatte.

Prof. Voit deutet nun dieses Resultat ganz einfach dahin, dass bei meinen früheren Untersuchungen ein Theil des Harnes im Stalle verloren gegangen sei, dass ich nur dann kein Deficit gefunden habe, wenn ich den Harn ausser dem Stalle sammelte, dass also das Stickstoffdeficit nicht auf unsichtbare Ausscheidung zurückzuführen sei, sondern dass es auf sehr sichtbarem Wege, im Stalle selbst, verloren gegangen sei, dass es an den Wänden des Stalles, an den Haaren, an den Füssen des Thieres haftete und einfach nicht zur Untersuchung kam.

Nun das wäre die einfache Lösung des vermeintlichen Räthsels vom Deficit.

Schon eine etwas eingehendere Prüfung jener Tabellen, welche die Resultate meiner frühern Untersuchungen[1] enthalten, beweist, dass diese Lösung eine unrichtige ist. Wenn das vermeintliche Deficit durch Harnverlust verursacht wäre, hätte in den einzelnen Versuchsperioden dieses Deficit in umgekehrtem Verhältnisse zu den gefundenen Harnquantitäten stehen müssen. Es hätte z. B. in zwei Perioden mit gleicher Nahrungs- und Wasserzufuhr, jener Periode, in welcher das Stickstoffdeficit ein grosses war, auch ein verhältnissmässig kleineres Harnquantum entsprechen müssen. Die Beobachtungsresultate sind mit dieser Annahme im Widerspruche. Einige Beispiele werden dieses bestätigen. In der ersten Versuchsreihe (Tab. *A*) wurde in der zweiten 10tägigen Periode ein Stickstoffdeficit von 7% gefunden, und in der vierten Versuchsreihe ein solches von 22·5%. Die tägliche Harnausfuhr war im Durchschnitte in der einen Periode 851 Cc., in der anderen Periode 814 Cc., in den fehlenden oder nach Voit's Annahme verlorenen 37 Cc. Harn konnte doch nicht eine 14% des Gesammtstickstoffbefundes entsprechende Menge Stickstoff vorhanden gewesen sein. In beiden Perioden war Wasser und Nahrungszufuhr vollkommen gleich.

[1] Seegen, Über die Ausscheidung des Stickstoffes der im Körper umgesetzten Albuminate. LV. Bd. d. Sitzb. d. kais. Akad. d. Wissensch. Jg. 1867.

In der zweiten Versuchsreihe (Tab. *B*) war in der Periode V ein Stickstoffdeficit von 10%. In der Periode VIII war ein Stickstoffplus von 4·3% gefunden. In jener Periode war die tägliche Harnausfuhr 1767 Cc. und in der Periode VIII war die tägliche Wasserausfuhr durch den Harn 1761 Cc. Die directe Wassereinfuhr war in beiden Perioden gleich. Die Wassereinfuhr im Fleische war in der ersten Periode um 60 Grm. grösser. Selbst für den Fall, dass diese ganze Wassermenge zur Ausscheidung gekommen und verloren gegangen wäre, hätte sie doch nicht 14·3% Stickstoff enthalten können. Denn da 1767 Cc. Harn durchschnittlich 30 Grm. Stickstoff enthalten, würden die fehlenden 54 Cc. Harn 0·9 Grm. Stickstoff enthalten, die Differenz würde um circa 3% herabgemindert; es bliebe noch immer ein Deficit von 7·2% und im Vergleiche zu der Periode VIII ein Unterschied von 11·5% in der Stickstoffausscheidung.

Wie ist es aber zu erklären, dass in unserem gemeinsamen Versuche die Harnausscheidung eine grössere war, wenn das Thier den Harn ins Glas entleerte, dass sich dieselbe verringerte, sowie das Thier den grössten Theil des Harnes in dem Stalle entleerte, und abermals stieg, sowie die Entleerung ins Glas erfolgte? Voit nennt diese letzten Versuche das *experimentum crucis*, welches unwiderleglich den Harnverlust im Stalle beweist. Mir scheint dieses Experiment in einem ganz anderen Sinne richtiger gedeutet werden zu können. Ich glaube nämlich, dass die Harnquantität, welche erhalten wird, wenn das Thier nach seinem Harnbedürfnisse den Harn im Stalle entleert, der normalen Harnausscheidung entspricht, während jenes Harnplus, welches man erhält, wenn der Harn direct ins Glas gelassen, durch gesteigerte Harnsecretion in Folge übermässig häufiger Entleerung der Blase hervorgebracht ist.

Diese Ansicht drängte sich mir zuerst aus der Analogie mit der Speichelsecretion auf. Wir können diese Secretion durch häufiges Ausspeien, also durch häufige Excretion bedeutend steigern. Directe Bestätigung für diese Anschauung fand ich in den von Kaupp angestellten Versuchen. Kaupp[1] hat in zwei langen

[1] Kaupp. Beiträge zur Physiologie des Harns. Archiv für physiol. Heilkunde 1856.

Zeiträumen von 59 und 60 Tagen an sich selbst Versuche angestellt über den Einfluss der Häufigkeit der Harnausscheidung auf die Menge des ausgeschiedenen Harnwassers und der festen Harnbestandtheile. Er hat an je einem Tage den Harn durch 12 Stunden in der Blase zurückgehalten und dann entleert, und in dem nächst folgenden Tage den Harn in Zwischenräumen von 2 Stunden und in einzelnen Versuchen noch häufiger entleert und das Ergebniss seiner Versuche war: „dass die Häufigkeit der Blasenentleerung von sehr deutlichem Einflusse war auf die Menge des Harnes überhaupt, sowie auf die Mengenverhältnisse einzelner Bestandtheile desselben. Die Mittelzahl der täglichen Harnausscheidung bei einmaliger Entleerung innerhalb 12 Stunden betrug 808 Cc., während sie bei stündlicher Ausscheidung 895 Cc. betrug. Die Harnstoffausscheidung war bei einmaliger Entleerung innerhalb 12 Stunden, im Mittel 17·9 Grm., bei 12maliger Entleerung 18·8 Cc. In einzelnen Versuchsreihen war die Differenz noch grösser; sie betrug für die Harnwasserausscheidung 13—14% und für die Harnstoffausscheidung 6%.

Ludwig[1] glaubt die verminderte Harnsecretion bei seltener Excretion auf den Widerstand beziehen zu müssen, den der in die Harnkanälchen ergossene Harn beim Abfliessen findet. Kaupp glaubt, dass in der stark gefüllten Blase eine Resorption des Harnes durch die Blasenwandung stattfinden könnte. Die Deutung ist, wie er selbst hinzufügt, noch eine problematische, während die Thatsache „aufs schlagendste“ bewiesen ist.

Voit hat den Hund im Verlaufe des Tages sehr häufig aus dem Stalle geführt, und die Blase ins untergehaltene Glas entleert. Während in meinem Versuche auch da, wo das Thier angehalten wurde, allen Harn in ein untergehaltenes Glas zu entleeren, diese Entleerung 3—4mal täglich stattfand, hatte Voit die Entleerung 6—8mal veranlasst und am letzten Versuchstage, an welchem die Harnausscheidung am reichsten war, war auch die Häufigkeit der Entleerung am grössten. Voit hat vom frühen Morgen bis zum späten Abend die Entleerung stündlich veranlasst, nebenbei noch unmittelbar vor der Fütterung innerhalb ¼ Stunde die Blase mehreremal entleert.

[1] Ludwig. Lehrbuch der Physiologie des Menschen. 1861.

Es ist also begreiflich, dass er dadurch ein reicheres Harnquantum erzielte, und dass diesem entsprechend die Summe des ausgeschiedenen Harnstoffes eine grössere war.

Dass die dem letzten Versuchstage entsprechende Harnentleerung, die das eigentliche *„experimentum crucis"* bilden und den Verlust von circa 300 Cc. Harn im Stalle nachweisen soll, nicht der normalen Harnausscheidung des Thieres entsprechen kann, geht noch aus einer anderen Betrachtung hervor.

Das Thier erhielt als Getränk 1300 Cc. Wasser. Mit der Nahrung führte dasselbe ein, circa 900 Cc. Wasser, wenn wir den Wassergehalt des Fleisches zu 75% annehmen. Die Summe der Wassereinfuhr beträgt 2200 Cc. Wäre die Ausscheidung von 2160 Cc. die normale, dann bliebe für die Wasserausscheidung durch Haut und Lunge nur 40 Cc., eine Ziffer, die doch für die Dauer sicher nicht der normalen Ausscheidung entspricht.

Ich suchte unmittelbar nach Voit's Abreise nach einem Wege, um mit unantastbarer Sicherheit die Menge der täglichen Harnausscheidung festzustellen. Da die Entleerung im Stalle nach Voit's Annahme einen Verlust im Gefolge hatte, die häufige Entleerung ins Glas nach meiner Ansicht nur anomale Steigerung der Harnausscheidung veranlasst, konnte diese Frage nur gelöst werden, wenn das Thier einen Apparat mit sich trug in welchen es den Harn entleert, das Thier also nach seinem Bedürfnisse den Harn entleerte, ohne dass ein Verlust zu besorgen sei. Ich liess einen solchen Apparat anfertigen. Es war eine ziemlich tiefe Blechschiene, welche mittelst Riemen am Bauche befestigt, den Penis beherbergte. In der Mitte der Schiene befand sich ein Ansatzrohr, und an diesem wurde ein Blechgefäss angeschraubt, in welchem der Harn gesammelt werden konnte. Das Thier trug diese Bandage nur unwillig. Beim Niederlegen sickerte überdies an den Schienenseiten Harn hervor. Um dies zu verhüten, musste der Hund am Niederlegen gehindert werden, was aber mit Hilfe einer zweckmässigen Bandage erreicht wurde. Der Hund stand auf einem Barren und konnte sich auf die Hinterbeine niederlassen, während ein Apparat von Gurten, durch welchen er an den Seitenstangen befestigt war, das Niederlegen hinderte. Der Zustand des Thieres war kein sehr erquicklicher und nach 4 Tagen musste er aus dieser unangenehmen Lage befreit werden. Innerhalb dieser

Zeit war der Harn stets in das Blechgefäss entleert worden, welches 4—5mal täglich gewechselt wurde, es ging auch nicht ein Tropfen Harn in Verlust. Die Harnmengen waren:

16/4 1780 Cc., 17/4 1840, 19/4 1750, 20/4 1710, 21/4 1720.

Ich gestehe, diese Ziffern sind das Resultat einer zu kurzen Beobachtungszeit; der Hund war überdies in unbehaglicher Lage und mögen dadurch die normalen Functionen beeinträchtigt gewesen sein; bedeutend kann diese Störung nicht gewesen sein, da das Thier seine Nahrung ganz in normaler Weise verzehrte. Die Ziffern sind doch in jedem Falle der Harnmenge näher, die das Thier im Stalle gelassen hat als jener, die es bei häufiger Blasenentleerung ausgeschieden hat.

Ein weiterer Beweis dafür, dass der Harnverlust im Stalle durchaus nicht von der Bedeutung sein kann, die Voit annimmt, liegt endlich in den Resultaten unserer gemeinsamen Untersuchungen an dem kleineren Hunde. Dieses Thier entleerte nahezu immer den Harn im Stalle und wurde nur 1—2mal täglich, meist nur unmittelbar vor der Fütterung, aus dem Stalle geführt, um den Harn ins untergehaltene Glas zu entleeren. Die Resultate der 8tägigen Untersuchung waren folgende:

Datum	Körpergewicht	Harnmenge	N aus der Harnstoffbestimmung
31	12560	1400	28·7
1	12620	1300	24·7
2	12620	1220	24·4
3	12540	1280	30·7
4	12470	1220	27·8
5	12490	1250	27·7
6	12540	1240	25·4
7	—	unbestimmt	26·4

Die Summe der Stickstoffausscheidung durch den Harn betrug 215·8 Grm., dazu, bei durchschnittlich täglicher Ausscheidung von 0·5 Grm. N mit dem Koth, 4 Grm. in 8 Tagen; macht also zusammen eine N-Ausscheidung von 219·8. Die Einnahme betrug, den N des Fleisches zu 3·4 Grm. gerechnet, 228·8. Die Differenz ist 9 Grm. für 8 Tage, das Deficit beträgt also 3·9%. Dieses Dficit ist ein sehr mässiges. Wenn man noch in Rechnung bringt, dass es

sich um ein Thier handelte, welches erst seit einem Monate in Verwendung war, welches sich an den Aufenthalt im Stalle nicht gewöhnt hatte, welches in demselben so tobte und herumarbeitete, dass es die Matratze und Holzthüre zerbiss, die Metallbekleidung aufriss, so dass unmittelbar vor dem Beginne des gemeinschaftlichen Versuches an derselben eine Reparatur nöthig wurde, wenn trotz alledem der etwa mögliche Harnverlust nur ein Deficit von nicht ganz 4% bewirkt haben konnte, gibt gerade dieses Resultat „ein schönes Beispiel dafür ab", dass die grösseren Deficite, die ich bei dem ruhigen, seit Jahren für unsere Versuche abgerichteten und an seine Gefangenschaft gewöhnten Thiere gefunden habe, nicht auf Harnverlust im Stalle zu beziehen sind.

Die Ergebnisse unserer gemeinschaftlichen Untersuchung hatten darum auch nicht die Überzeugung in mir hervorbringen können, dass das in früheren Untersuchungsepochen von mir gefundene Deficit auf einen Fehler in der Methode zu beziehen sei. Ich hatte im Gegentheile durch die Versuchsergebnisse an dem kleineren Hunde die Bestätigung erhalten, dass die Art der Harnansammlung, vorausgesetzt, dass der Stall zweckmässig eingerichtet ist, keinen irgendwie erheblichen Fehler veranlassen könne. Dass minimale Verluste stattfinden können, ist gewiss nicht ausgeschlossen; aber diese sind auch beim Einsammeln ausser dem Stalle nicht zu vermeiden, da das Thier oft, wenn das Glas weggezogen wird, noch einige Tropfen Harn entleert, oder den Harn zu entleeren beginnt, ehe man ihm mit dem Glase folgen kann. Das Einsammeln ins Glas hat dagegen den schwer wiegenden Nachtheil, dass das Thier, aus Besorgniss, es könnte den Harn in dem Stalle entleeren, oft herausgeführt werden muss, dass die Blasenentleerung häufiger vorgenommen werden muss, als dem Bedürfnisse des Thieres entspricht und dass dadurch eine vermehrte Harnausscheidung statt hat. Ein nüchterner Referent über unsere gemeinschaftlichen Untersuchungen hätte berichten müssen, dass nach Voit's Methode der häufigen Harneinsammlung eine grössere Quantität Harn gewonnen wird, als nach meiner Methode der theilweisen Harnansammlung im Stalle. Dieses Referat wäre den Thatsachen entsprechend gewesen. Ganz ungerechtfertigt ist es, wenn Voit behauptet, „es sei constatirt, dass bis zu 300 Cc. im Käfig von Seegen verloren gehen können, wenn man auch früh den Harn im Glase sammelt". Voit

hat sich nicht darauf beschränkt Thatsachen zu berichten, er hat sie gedeutet und die Deutung für das unzweifelhafte Ergebniss der Untersuchung ausgegeben.

Für sehr zweckmässig halte ich es, und nach dieser Richtung habe ich durch die gemeinsame Untersuchung eine wichtige Erfahrung gewonnen, dass das Thier unmittelbar vor dem Beginne jedes Versuchstages veranlasst werde, mehreremale Harn zu lassen, da nur in dieser Weise eine möglichst vollständige Entleerung der Blase erzielt werden kann. Dadurch erklärt es sich, dass Voit gleichmässigere Tagesausscheidungen erhielt, als ich erhalten habe. Es ist dies zwar für längere Versuchsreihen ganz bedeutungslos, da man eben die Ausscheidungen der ganzen Epoche im Auge hat, und eine ausreichende Entleerung der Blase beim Schlusse des Versuches genügend ist, um Fehler, die durch zurückgehaltenen Harn in Rechnung kommen können, zu beseitigen. Aber für kleine Versuchsepochen, zumal bei Vergleichung einzelner Tage, ist diese Vorsicht unerlässlich.

Ich hatte Voit gegenüber nicht verhehlt, dass die Resultate der Untersuchung meine Überzeugung an ein mögliches Stickstoffdeficit nicht erschüttert haben; es müsse in entscheidender Weise ein Fehler in meiner Untersuchungsmethode nachgewiesen werden, und da nun Voit diesen Fehler in der Harneinsammlung gefunden zu haben glaubte, verlangte ich, dass durch Controlversuche dieser Verlust im Stalle nachgewiesen werde.

Zur Nachweisung dieses Verlustes wurden Ausgussversuche veranlasst. Prof. Voit hatte zu dem Versuche eine Zuckerlösung vorgeschlagen. Es wurde eine Menge käuflichen Traubenzuckers in 1000 Cc. Wasser gelöst und mittelst der Fehling'schen Kupferlösung der Zuckergehalt der Flüssigkeit bestimmt. Der Titre der Cu-Lösung war so gestellt, dass 5 Cc. Cu-Lösung 50 Mg. Zucker anzeigten. Zur Reduction von 5 Cc. Cu-Lösung waren 18·6 Cc. der 10fach verdünnten Zuckerlösung verbraucht worden. Von dieser Lösung wurden in dem Stalle, in welchem der Hund sich befand, 960 Cc. aufgespritzt. Diese Lösung enthielt nach der vorangegangenen Bestimmung 25·8 Grm. Zucker. Die Aufspritzung führte Voit selbst nach eigenem Gutdünken aus. Die Flüssigkeit wurde in eine 100 Cc. fassende Pipette gegeben, an den Wänden

des Stalles alle Stellen aufgesucht, welche durch ihre mattere Farbe die Bahnen bezeichneten, an welchen der Hund seinen Harn entleerte und in dieser Richtung die Lösung von Voit selbst aufgespritzt. Die Aufspritzung geschah in 8—10 verschiedenen Absätzen in Zwischenräumen von einigen Stunden, und zwar wurden stets circa 100 Cc. Harn aufgespritzt. Der kleine Hund befand sich während des Ausgussversuches im Stalle, um so den Versuch den normalen Verhältnissen möglichst entsprechend zu halten. Das abgeflossene Quantum, in welchem Zuckerlösung und Harn gemischt waren, betrug 2075 Cc.; davon reducirten 20·8 Cc. der 5fach verdünnten Flüssigkeit 5 Mg Cu-Lösung. Die Flüssigkeit enthielt also in Summe 24·9 Grm. Zucker, der Verlust an Zucker betrug also 3·6%.

Die Untersuchung mit dem Polarisationsapparat hatte in der ursprünglichen Zuckerlösung einen höheren Zuckergehalt nachgewiesen, nämlich statt 25·8 wurde 32 Grm. gefunden. Es wurde angenommen, dass vielleicht noch eine Substanz mit vorhanden sei, welche gleichfalls Rechtsdrehung der Polarisationsebene veranlasse, ohne Cuoxyd zu reduciren. Schneider dachte an Dextrin. Voit hielt diese Differenz in den Ergebnissen der chemischen und optischen Analyse nicht für massgebend und der Versuch wurde fortgesetzt. Erst als das Resultat der Aufspritzung durch die Analyse ermittelt war, hielt Voit diesen Aufspritzungsversuch nicht für beweisend, indem er behauptete, dass im Stalle ein Theil des vermeintlichen Dextrins sich durch die Mischung mit Harn in Zucker umgewandelt habe. Ich verlangte zum Beweise dieser Behauptung einen directen Versuch. Ich löste Dextrin in Wasser, 10 Cc. der Lösung wurden mit 40 Cc. Wasser und 10 Cc. mit 40 Cc. Harn gemischt und je in einem Becherglase durch 24 Stunden stehen gelassen. Nach dieser Zeit wurden die beiden Lösungen mit Cu geprüft, es trat nicht die Spur einer Reduction auf. Voit's Annahme war also ganz unbegründet. Dieses ist der einzige Ausgussversuch, den wir gemeinschaftlich angestellt, und wenn es einer Bestätigung für mich bedurft hätte, würde dieser Versuch mir bewiesen haben, dass der Verlust im Stalle ein Minimum betrage. Voit vermuthete, dass der angewandte Zucker verunreinigt sei; er schickte Zucker aus seinem Laboratorium, der aber dieselbe Verschiedenheit in den Ergebnissen der optischen und chemischen

Bestimmung nachwies. Man muss annehmen, dass mit dem Traubenzucker noch ein oder mehrere Kohlenhydrate vorhanden seien, welche gleichfalls Ablenkung des polarisirten Lichtstrahls bewirken, ohne dass sie Kupferoxyd reduciren, oder dass, wenn eine Reduction stattfindet, diese nicht in dem Äquivalent-Verhältnisse erfolgt, wie beim Traubenzucker. Sei dem, wie ihm wolle. Selbst für den Fall, dass Verunreinigung mit vorhanden gewesen wäre, müsste doch, wenn von einem und demselben Körper in zwei aufeinanderfolgenden Tagen nach derselben Methode nahezu die gleiche Menge gefunden wird, angenommen werden, dass der Verlust nur ein der Differenz der an beiden Tagen durch die Analyse nachgewiesenen Quantitäten entsprechender gewesen ist; die Differenz zwischen dem durch Cuoxyd nachgewiesenen Zuckergehalt der Ausgussflüssigkeit, und dem gleichfalls durch Cuoxyd nachgewiesenen Zuckergehalt der Abflussflüssigkeit betrug 3·5%, der durch Aufspritzen entstandene Verlust kann also nicht mehr als 3·5% betragen haben.

Ich habe später im Vereine mit Prof. Hering, welchen Voit mit der Controle betraut hatte, einen Ausgussversuch mit 1000 Cc. Harn gemacht. Der ausgeflossene Harn betrug 895 Cc. Bei diesem Versuche stellte es sich heraus, dass der Verlust sehr minimal ist, wenn man den Harn in der vorderen Hälfte des Stalles der Ausflussöffnung nahe aufspritzt und dass der Verlust bedeutend grösser wird, wenn die Ausspritzung im hinteren Theile des Stalles zumal an der Rückwand statt hat. Dabei zeigte es sich auch, dass der Wasserverlust grösser ausfällt als der Verlust an den im Wasser gelösten Stoffen, wahrscheinlich weil das Wasser durch das längere Stagniren, wenn es von der Ausflussöffnung entfernt aufgespritzt wird, theilweise verdunstet, während die festen Bestandtheile von der abfliessenden Flüssigkeit mitgespült werden. Die zur Aufspritzung benützte Flüssigkeit enthielt 37·5 Grm. Harnstoff, die abgeflossene Flüssigkeit 36·8. Der Verlust an Harnwasser betrug 10·5% der an Harnstoff nicht ganz 2%.

Voit führt noch Ausgussversuche an, die Prof. Schneider auf seinen Wunsch mit Zuckerlösung angestellt hat. Schneiders löste 170 Grm. des ihm von Voit geschickten Traubenzuckers in 2050 Cc. Wasser, wovon an zwei aufeinanderfolgenden Tagen je

1000 Cc. aufgespritzt wurden. Nach Voit's Mittheilung enthielt die am ersten Tage aufgespritzte Lösung 52·1 Grm. und am zweiten Tage 48·5 Grm. Zucker. In der ausgeflossenen Flüssigkeit erhielt man am ersten Tage 46·6 Grm. Zucker und am 2. Tage 48·9 Grm. Voit resumirt nun diesen Augussversuch dahin: „am zweiten Tage wäre der Verlust Null gewesen, es wäre sogar etwas mehr erhalten worden, als ausgegossen wurde, was natürlich unmöglich ist; am ersten Tage betrug der Verlust 10%“. Eine richtige Auffassung des Versuches hätte anders gelautet; an zwei aufeinanderfolgenden Tagen — was in Voit's Arbeit nicht erwähnt ist — wurden 100·6 Grm. Zucker aufgespritzt und 95·5 Grm. Zucker wieder erhalten. Der Verlust reducirt sich auf 5% und das Wunder ist zugleich auch erklärt, wie es komme, dass am zweiten Tage mehr ausfloss als ausgegossen wurde. Die nachströmende Flüssigkeit des zweiten Tages hatte die Residuen des ersten Tages abgespült, und wenn der Versuch längere Zeit fortgesetzt worden wäre, und der Verlust aus den Residuen sich auf viele Tage vertheilt hätte, wäre derselbe percentisch noch viel geringer gewesen.

Schliesslich führt Voit auch die auf seinen Wunsch von Prof. Schneider ausgeführten Ausgussversuche mit Kochsalzlösung an. Von 1000 Cc. einer Kochsalzlösung mit 52·4 Grm. Kochsalz erhielt Schneider aus der Abflussöffnung 815 Cc. mit 44·8 Grm. Kochsalz wieder. In einem zweiten Falle von 1000 Cc. mit 52·4 Grm. Salz 825 Cc. mit 45 Grm. Salz. Der Verlust betrug also 14%. Aber Prof. Voit erwähnt nicht, dass, wie ihm Schneider mittheilte, das Kochsalz, wie vorauszusehen war, durch das Zink des Stalles eine Zersetzung erlitten habe, dass der Boden und die Wände des Stalles von Chlorzinkverbindungen schwarz angelaufen waren, dass also eine genaue Verlustbestimmung unmöglich war.

Eine nüchterne Kritik möge beurtheilen, ob diese Ausgussversuche, zumal die letztgenannten, zu dem Ausspruche berechtigen, die Verluste an Chlor seien völlig in Übereinstimmung mit dem Verluste an Harnstoff, wenn der Hund den Harn nicht ins Gefäss lässt. Die Ausgussversuche beweisen im Gegentheile, dass wenn die Flüssigkeit unter den ungünstigsten Verhältnissen aufgespritzt wird, das heisst an Stellen, welche wie die Hinterwand des Stalles sehr entfernt von dem Abflussrohre sind, und an

welcher, wie Voit sich zu überzeugen Gelegenheit hatte, nie die Spuren einer Harnbahn vorkommen, durch langsames Abfliessen des Harnes und durch Verdunsten desselben ein Theil des Harnwassers verloren gehen kann, dass aber der Verlust an festen Bestandtheilen, wenn auch nur zwei aufeinander folgende Beobachtungstage berücksichtigt werden, nicht über 4—5% beträgt.

Ich gelange zu dem Schlusse, dass die gemeinschaftlichen Untersuchungen an den 2 Hunden und die Ausgussversuche es bis zur Evidenz festgestellt haben, dass das von mir gefundene Defizit nicht auf einen Harnverlust im Stalle zu beziehen ist.

Ich habe in dem auf unsere gemeinschaftlichen Versuche folgenden Winter die Untersuchungen über den Stickstoffumsatz nochmals aufgenommen, und zwar indem ich, in der Weise, wie ich es in meinen früheren Versuchen gethan, den Hund 2—3mal täglich den Harn in ein ihm untergehaltenes Glas entleeren liess. Mit wenigen Ausnahmen wurde aller Harn in dieser Weise gesammelt. An einzelnen Tagen war ein Theil des Harnes im Stalle gelassen und in das unter demselben befindliche Glas abgeflossen. Die Nahrung war während der ganzen Versuchsdauer dieselbe, 1200 Grm. fettfreies Fleisch. Die Wassermenge variirte in den verschiedenen Abschnitten der Versuchsepochen. Ich wollte nämlich sehen, ob durch die verschiedene Wasserzufuhr sich das Verhältniss zwischen Wasserausfuhr durch Nieren und Lungen ändere, und ob etwa damit auch eine Verschiedenheit in der Stickstoffausscheidung im Zusammenhange sei. Die Wassermenge variirte von 500 Cc. bis 1800 Cc. p. d. Die Ergebnisse der über 56 Tage sich erstreckenden Versuchszeit waren folgende:

1. Die Stickstoffzufuhr betrug, den Stickstoffgehalt des Fleisches zu 3·4 Grm. per 100 berechnet, 2284·8 Grm. Die Ausfuhr durch den Harn beträgt 2332·2. Die Ausfuhr durch die Fäcalmassen, wenn diese für den Tag mit 0·5 Grm. angenommen wird, gibt in 56 Tagen 28 Grm. Die Summe der Ausscheidung durch Harn und Koth war also 2360·2. Es waren also durch die sensiblen Ausscheidungen 75·4 Grm. mehr ausgeführt, als durch die Nahrung eingenommen wurde; es ist dies gleich einem Plus von 3·3%.

2. Dieses Plus der Ausfuhr gegen die Einfuhr vertheilt sich aber nicht gleichmässig auf die einzelnen Tage. An einzelnen Versuchstagen beträgt die Ausfuhr weniger als die Einfuhr; sie sinkt zweimal bis auf 36·6 und 36·4, in den meisten Tagen schwankt die Ausfuhr zwischen 39 und 41 Grm. während sie in anderen Tagen bis auf 43 Grm. und darüber steigt. In hohem Grade beachtenswerth ist die Periode vom 2. bis 7. Februar. Innerhalb dieser 5 Tage steigt die tägliche Stickstoffausfuhr bis über 50 Grm. per Tag, und beträgt in Summe innerhalb dieser 5 Tage 249·1 Grm., während die Einfuhr, zu 40·8 Grm. berechnet, 204·0 betragen würde, was, selbst von der Ausscheidung mit dem Kothe abgesehen, ein Plus der Ausscheidung von 45 Grm. betragen würde. Die Ausfuhr wäre in diesen 5 Tagen um 22% grösser als die Einfuhr. Das Körpergewicht ist innerhalb dieser Zeit nahezu gleich geblieben; an eine Stickstoffausgabe auf Kosten des Körpers ist also nicht zu denken. Die Stickstoffausscheidung ist auch nicht in der Vorperiode auffallend gering gewesen, es ist also dieses Plus nicht so zu deuten, als sei im Körper aufgespeichertes Umsatzmaterial plötzlich ausgeschieden worden. Ebensowenig ist an einen Fehler zu denken, der als Erklärung eintreten könnte. Das Fleisch habe ich selbst täglich gewogen, zubereitet und dem Hunde gegeben, und ein etwaiger Fehler in der Stickstoffbestimmung in Harn, der bei der grossen Übung, die ich in dieser Arbeit habe, kaum anzunehmen ist, würde sich nicht plötzlich auf 5 Tage erstrecken und eine solche Höhe erreichen. Die einzig mögliche Deutung ist also die, **dass mit dem Fleische eine grössere Stickstoffmenge eingeführt wurde, als dies der von uns zu Grunde gelegten Ziffer des Stickstoffgehaltes des Fleisches entspricht.**

3. Die Wasserausfuhr durch die Nieren scheint auf die Stickstoffausscheidung keinen sehr bemerkenswerthen Einfluss zu üben. Die Wasserausfuhr in unseren Versuchen differirte entsprechend der Wassereinfuhr von 1200—2500 Cc. per Tag, die durchschnittliche Stickstoffausfuhr beträgt 41 Grm. per Tag und diese Grösse der Ausfuhr findet sich in den Perioden mit grösster wie mit kleinster Wasserausfuhr. Die früher erwähnten, ungewöhnlich grossen Stickstoffausscheidungen von 47—50 Grm. fallen gerade in die Periode der kleinsten Wasserausfuhr.

Diese Thatsache ist bemerkenswerth, da man bis jetzt auf Versuche von **Böcker, Genth** und **Mosler** gestützt angenommen hatte, dass mit der vermehrten Harnausscheidung auch die Harnstoffausscheidung eine grössere sei. Die erwähnten Versuche wurden an Menschen angestellt.

So vortrefflich auch solche Versuche angestellt sein mögen, sind doch ihre Resultate weniger verlässlich als die an Thieren angestellten. Während dort das Nahrungsmaterial ein sehr complicirtes ist, und jede Analyse desselben mit grossen Fehlern behaftet ist, hat man es hier mit einem einzigen Nahrungsmittel zu thun. Während es ferner kaum möglich ist, den Menschen durch längere Zeit unter ganz gleichen Verhältnissen zu erhalten, ist dies bei einem Thiere, dessen Lebensbedingungen viel einfacher sind, leicht möglich, und darum kann auch die Dauer eines Versuches eine viel längere sein. Die bei Versuchen an Thieren gewonnenen Resultate dürften darum massgebender sein, und mindestens zur Revision dieser Frage anregen.

4. Gesteigerte Wasserzufuhr vermehrt nicht bloss die Harnausscheidung, sondern es wird das ganze Plus des eingeführten Wassers nahezu ganz durch die Blase entleert. Wenn wir in unseren Versuchen von der geringsten Wasserzufuhr zu der grössten aufsteigen, und das Mittel der täglichen Harnausscheidung ziehen, stellt sich das Verhältniss der Harnausfuhr zu Wasserausfuhr folgendermassen in den verschiedenen Versuchsperioden dar:

Nr.	Wasserzufuhr	Mehrbetrag gegen die Vorperiode	tägliche Harnausscheidung	Mehrbetrag gegen die Vorperiode
I.	500		1260	
II.	800	+300	1506	+256
III.	1200	+400	1892	+386
IV.	1500	+300	2216	+324
V.	1800	+300	2493	+274.

5. Die Wasserausfuhr durch Haut und Lungen ist von der Wassereinfuhr unabhängig. Wir berechnen, da uns die Mittel zur directen Untersuchung fehlen, die Perspirationsgrösse aus der Differenz zwischen Wassereinfuhr und sensibler Ausfuhr. Diese Differenz schwankt meist zwischen 110—200 CC., einigemale

steigt sie auf 300 Cc. und darüber und an manchen Tagen sinkt sie unter 100 Cc.; aber diese Ziffern sind von der Grösse der Wasserzufuhr unabhängig. Wir finden die höchste Perspirationsgrösse von 380 Cc. bei der geringsten Wasserzufuhr. Die durchschnittliche Perspirationsgrösse bei 1200 Cc. Wasserzufuhr beträgt 207 Cc, bei Zufuhr von 1800 Cc. ist dieselbe 203 Cc, bei Zufuhr von 1500 Cc. beträgt sie 184 Cc. und bei Zufuhr von 800 Cc. ist sie 178 Cc. An einzelnen Tagen sinkt die Perspirationsgrösse auf ein Minimum, nämlich 70—50 und 20 Cc., an einem Tage ist sie = 0, und an 3 Tagen, am 4., 5. und 6. Februar, ist die Ausfuhr durch den Harn um 20—50 Grm. grösser als die Wassereinfuhr in der Nahrung und im Getränke. Die Luft war in diesen drei zuletzt genannten Tagen mit Wasserdunst übersättigt und dieser in Form eines dichten Nebels in der Atmosphäre vorhanden. Das Körpergewicht hatte nicht abgenommen, es war im Gegentheile von 29190 auf 29400 Grm. gestiegen, an eine Wasserabgabe vom Körper ist also nicht zu denken, ein beträchtlicher Fehler ist gleichfalls auszuschliessen, da die Factoren für die Berechnung, nämlich das Messen des zugeführten Wassers und des gelassenen Harnes zu einfach sind. Der Wassergehalt des Fleisches ist freilich keine absolute Grösse, aber derselbe schwankt doch nur innerhalb enger Grenzen, zwischen 73—76%. Wir legen bei unseren Berechnungen den Gehalt von 75% zu Grunde. Würde derselbe aber auch in diesen Versuchstagen 76% betragen haben, würde dieses nur einer vermehrten Zufuhr von 12 Grm. aq. gleichkommen, es wäre noch immer die Ausfuhr durch den Harn grösser als die Einfuhr. Diese merkwürdige Thatsache ist also nur dahin zu deuten, dass bei grossem Wassergehalte der Luft nicht nur keine Wassergasausscheidung stattfindet, sondern dass auch Wasserdunst von Aussen durch Haut und Lungen in den Organismus treten kann. Bidder und Schmidt[1] haben auf Grundlage ihrer Ernährungsversuche ausgesprochen, dass der Betrag der Wasserdampf-Exhalation nur innerhalb enger Grenzen schwanke, dass sie von der Wasseraufnahme unabhängig sei und nur „als alleinige Function der Temperatur und des Sättigungsgrades der den Körper umgebenden Luftschichten mit Wasserdampf zu betrachten sei".

[1] Bidder und Schmidt. Die Verdauungssäfte und der Stoffwechsel. 1852.

Unsere Versuche bestätigen diesen Zusammenhang aufs vollständigste. Während aber Bidder und Schmidt den Betrag der Wasserdampf-Exhalation auf 15—17 p. m. des Körpergewichtes annehmen, ergibt sich aus unseren Versuchen, dass diese Exhalation mindestens beim Hunde viel geringer sei. Nach Bidder und Schmidt würde für das 30 Kilo schwere Thier die Wasserdampf-Exhalation circa 900 Grm. p. d. betragen, während dieselbe im Durchschnitte nur 200 Grm. betrug.

Von Interesse ist es, dass die höchsten Stickstoffausscheidungen durch den Harn auf jene Tage fallen, an welchen die Wassergas-Exhalation verschwunden war. Sollte dies dahin gedeutet werden können, dass der Wasserdampf der Träger des exspirirten Stickstoffes sei, und dass mit dem geänderten Respirationsmechanismus auch die Umsetzung der Albuminate und die Ausscheidung dieser Umsetzungsproducte modificirt werde?

Es ist dies natürlich nur eine Hypothese, die zu ihrer Stichhaltigkeit weiterer Bestätigung bedarf. Dass die Wasserexhalation allein nicht für die Art der Stickstoffausfuhr massgebend ist, geht daraus hervor, dass auch bei reichlicher Wasser-Exhalation, wie beispielsweise am 2. Februar, doch eine grosse Stickstoffausscheidung durch die Nieren, also eine verminderte Stickstoffausfuhr durch die Lungen statt hatte. Welcher Art die Bedingungen sind, unter welchen die Umsetzung der Albuminate derart von Statten geht, dass aller N durch die Nieren ausgeschieden wird, ist noch nicht festzustellen. Gerade der Umstand, dass in der langen, 60tägigen Versuchsreihe nur an 5—6 Tagen der muthmassliche Gesammtstickstoff des umgesetzten Fleisches im Harne erscheint, beweist, dass eine partielle Ausscheidung des Stickstoffes durch die Lungen die Regel sei. Dieses Ergebniss unserer Untersuchung stimmt auch vollkommen überein mit den Ergebnissen der bekannten von Regnault und Reiset angestellten Untersuchungen über den Stickstoffgehalt der Respirationsluft. In 12 an Hunden angestellten Untersuchungen war nur einmal im Athemapparate kein Stickstoff vorhanden, während 10mal eine mehr oder weniger grosse Stickstoff-Exhalation nachzuweisen war.

Das wichtigste Ergebniss unserer Untersuchungsreihe ist, dass auf indirectem Wege, nämlich aus der Menge des durch den Harn ausgeschiedenen Stickstoffes nachgewiesen wurde, dass der Stickstoffgehalt des Fleisches, an einzelnen Tagen wenigstens, entschieden grösser war, als der von Voit allen seinen Rechnungen zu Grunde gelegten Ziffer entspricht, dass dieser Stickstoffgehalt selbst über 4% betragen kann, da eben an einzelnen Tagen mehr als 50 Grm. mit dem Harn entleert wurde.

Diese Thatsache wurde auf directem Wege bestätigt durch zahlreiche Fleischanalysen, welche die Herrn Toldt und Novak im Laboratorium des Prof. Schneider ausführten.

Dr. Toldt hat an meinem Hunde eine längere Untersuchungsreihe über den Stickstoffumsatz der eingeführten Nahrung ausgeführt, er hat mir auf mein Ersuchen die Ergebnisse seiner Untersuchung gefälligst mitgetheilt und die Veröffentlichung gestattet. Ich lasse dieselben nachstehend folgen:

„Die Untersuchung erstreckte sich auf 40 Tage, nachdem der Hund durch 16 Tage als tägliche Nahrung 1200 Grm. Pferdefleisch erhalten, und im Körpergewicht sich nicht wesentlich geändert hatte. Die Versuchsreihe wurde mit allen, von Voit urgirten Vorsichtsmassregeln durchgeführt, namentlich wurde der gesammte Harn stets entweder von mir selbst oder in meiner Gegenwart in einem untergehaltenen Glase aufgefangen. Als Nahrung wurde täglich verabfolgt: 1200 Grm. möglichst sorgfältig ausgewähltes Pferdefleisch und 1000 CC. Wasser. Die Menge des N im Harne wurde sowohl nach der Liebig'schen Titrirmethode, als nach der Schneider-Seegen'schen Bestimmungsmethode ermittelt, wobei zu bemerken ist, dass ich für letztere stets 10 CC. Harn zur Untersuchung verwendete, — nicht, wie üblich 5 CC. — wodurch die Fehlergrenzen um die Hälfte vermindert wurden. Die Titerflüssigkeiten wurden zu Beginn und zu Ende der Versuchsreihe auf ihre Richtigkeit geprüft, die verwendeten Massgefässe Büretten, u. s. w. ebenfalls bezüglich ihrer Übereinstimmung und Genauigkeit controlirt.

Zu Ende der Versuchsreihe, während welcher das Körpergewicht des Hundes von 28·360 auf 26·980 Kilo herabgesunken war, hatte das Thier im Ganzen 1564·57 Grm. N durch den Harn entleert; rechnet man hiezu noch ungefähr 20 Grm. N aus dem

Kothe, so ergibt sich eine Gesammtausscheidung von 1584·57 Grm. in 40 Tagen. — Würde man nun den N-Gehalt des zugeführten Fleisches, wie üblich, zu 3·4% berechnen, so stünde eine Gesammteinfuhr von 1632 Grm. N entgegen, woraus sich ein Deficit von 47·43 Grm. oder 2·9% N berechnet [1].

Es lag jedoch in meinem Versuchsplan, für die Berechnung der Stickstoffzufuhr nicht eine ungefähre Mittelzahl, sondern den wirklich gefundenen N-Gehalt des verfütterten Fleisches zu Grunde zu legen, und so habe ich von jeder der für je 3 Tage bestimmten Fleischrationen eine gewogene Menge entnommen, in ein Glasröhrchen gebracht, zuerst bei 100° C. im trockenen Luftstrom (Aspirator mit vorgespanntem Chlorcalciumsrohr) entwässert und dann unter der Luftpumpe über SO_3 getrocknet, bis keine Gewichtsabnahme mehr constatirt werden konnte. Die sogenannte trockene Fleischmasse wurde in den signirten Glasröhrchen im Exsiccator für die Analyse aufbewahrt. — Ich wurde leider durch Krankheit verhindert, die Fleisch-Analysen für die ganze Versuchsreihe auszuführen, und darin liegt der Grund, warum ich die Untersuchung nicht als abgeschlossen betrachten kann. Wie weit ich mit meiner Arbeit gekommen bin, will ich in Folgendem berichten:

Der N-Gehalt des Fleisches wurde nach zwei Methoden bestimmt; einmal durch Glühen mit Natronkalk in dazu vorbereiteten starken, etwa ½ Meter langen Verbrennungsröhren, wobei das in die SO_3-Vorlage übergegangene NH_3 durch Rücktitriren der freigebliebenen SO_3 mit NaO ermittelt wurde; und andererseits vermittelst der Elementaranalyse durch Verbrennung mit CuO. — Die nach beiden Methoden gewonnenen Resultate waren nun nicht hinreichend übereinstimmend, um für die obige Berechnung verwendet werden zu können. Es zeigte sich, dass bei der Bestimmung mit Natronkalk Proben eines und desselben Fleisches

[1] Das Thier hat während der Versuchsdauer um 1380 Grm. an Körpergewicht abgenommen. Wird diese Gewichtsabnahme als Fleischverlust berechnet, entspricht derselben eine Stickstoffmenge von 46·9 Grm. Diese zur Stickstoffeinfuhr addirt, erhöht dieselbe auf 1678·9 Grm. Die Differenz zwischen Ein- und Ausfuhr würde 94·4 Grm. betragen, was einem Deficit von 5·6% entspräche.

stets weit geringere Mengen von N ergaben als durch die Elementaranalyse erhalten wurden. Ausserdem differirten die erhaltenen Zahlen aus verschiedenen Fleischproben nicht unerheblich. Stets waren jedoch die niedrigsten Ziffern aus der Elementaranalyse gewonnen höher, als die höchsten Zahlen der Natronkalk-Methode. Der hiedurch begründete Verdacht, es möchte nicht aller N des Fleisches durch den Natronkalk in NH_3 überführt werden können, wurde bestätigt, als ich den Glührückstand mit Wasser verrieb, und das Ganze neuerdings der Glühhitze unterzog; es wurden beim zweiten Glühen stets noch grössere oder geringere Mengen von NH_3 in der Will'schen Vorlage nachgewiesen (wobei mit den 10fach verdünnten Normallösungen gearbeitet wurde) und ausserdem zeigte der zweite Glührückstand einen ganz exquisiten Geruch nach Methylamin.

Das Mittel aus acht nach dieser Methode ausgeführten Fleischanalysen ergab 3·27% N, wobei als mindeste Zahl 3·13, als höchste 3·37% N erhalten wurde; für die Analyse waren je 300 bis 450 Milligrm. trockener Substanz verwendet worden. Bezüglich des luftdichten Verschlusses des Apparates, der vollständigen Überführung des entwickelten NH_3, ferner was die Dauer und Intensität der Glühhitze, endlich die Correctheit der Titrirung anbelangt, wurde die gebotene Sorgfalt nicht verabsäumt.

Die Elementaranalyse mit CuO ergab ganz differente Resultate, und ich stelle die gewonnenen Zahlen denen der Natronkalk-Analyse gegenüber:

Fleisch am 1., 2., 3. December verfüttert (enthielt 25·376% trock. Substanz).

1.) 2.)	Analyse mit Natronkalk:	3·27% N 3·16%
	Elementaranalyse:	3·74% N

Fleisch am 4., 5., 6. December verfüttert (enthielt 24·584% trock. Substanz).

1.) 2.)	Analyse mit Natronkalk:	3·34% N 3·27%
	Elementaranalyse:	4·02% N

Fleisch ausserhalb der Versuchsreihe (24·63% trockene Substanz).

1.) 2.)	Analyse mit Natronkalk:	3·34% N 3·37%
	Elementaranalyse	3·93% N.

Auffallend ist, dass das Fleisch, welches geringeren N-Gehalt ergab, auch weniger Wasser enthielt. Die Elementaranalyse wurde unter der Anleitung und unmittelbaren Aufsicht von Herrn Prof. Schneider in folgender Weise vorgenommen. (Es wurden für die erste Analyse 458·2 Mgr., für die zweite 378·0 Mgr. und für die dritte 324·8 Mgr. trockenes Fleisch verwendet.)

Die auf einer Seite ausgezogene Verbrennungsröhre wurde gut gereinigt und derart gefüllt, dass zuerst ein Propf von frisch geglühtem Asbest eingeführt, dann eine Lage von doppelt-kohlensaurem Natron wieder mit einem ausgeglühten Asbestpfropf bedeckt wurde. Es folgten nun der Reihe nach: Ein Propf aus dünnem Kupferdrath, dann Kupferoxyd, und dann das Gemenge der trockenen Fleischsubstanz mit Kupferoxyd; auf diese Schichte folgte eine Lage von Kupferoxyd, dann metallisches Kupfer, wieder Kupferoxyd, endlich ein ausgeglühter Asbestpfropf. Die so gefüllte Röhre wurde auf den Verbrennungsofen gelegt und mittelst eines Kupferstöpsels luftdicht ein Gasentwicklungsrohr eingefügt, welches in einer Wanne unter Quecksilber tauchte. An das ausgezogene Ende der Verbrennungsröhre wurde ein Kohlensäureapparat gespannt und durch 3 Stunden fortwährend gereinigte Kohlensäure durch die Röhre getrieben. Nachdem dies im Verlaufe des Nachmittags geschehen war, blieb der Apparat die Nacht über so stehen und nächsten Tages Früh wurde neuerdings CO_2 durchgeleitet; es wurde nun alles durch die Gasentbindungsröhre ausströmende Gas von Kalilauge absorbirt. Zum Sammeln der entwickelten Gase wurde eine Eudiometerröhre (in Millimeter getheilt), zur Hälfte mit Kalilauge, zur Hälfte mit Quecksilber gefüllt, über die Mündung des Gasentwicklungsrohres gestellt. Nachdem das ausgezogene Ende der Verbrennungsröhre zugeschmolzen war, wurde ein Theil des im rückwärtigen Ende derselben befindlichen doppelt-kohlensauren Natrons gelinde erhitzt, und nachdem die so entwickelte Kohlensäure eine Zeit lang durch die Röhre gestrichen war und alles entweichende Gas von der

vorgelegten Kalilauge absorbirt wurde, nach und nach die übrigen Partien der Röhre der Glühhitze ausgesetzt. Nachdem der ganze Inhalt der Röhre durchgeglüht war und das in der Eudiometerröhre gesammelte Gasvolum keine Zunahme mehr zeigte, wurde die Hitze allmälig gemässigt und schliesslich durch Erwärmen des noch unverschrten Theiles des doppelt-kohlensauren Natrons ein Kohlensäurestrom durch die Röhre getrieben. Die Eudiometerröhre wurde nun nach einiger Zeit vorsichtig aus der Quecksilberwanne genommen, sammt Quecksilber und Kalilauge in einen mit Wasser gefüllten Glascylinder gesetzt und über Nacht stehen gelassen. Die Flüssigkeit wurde öfters erneuert und durch vorsichtiges Schütteln der Eudiometerröhre mit dem Gase in innigere Berührung gebracht.

Die Volumbestimmung des Gases in der Eudiometerröhre geschah durch Abmessung des vom Gase eingenommenen Raumes der Röhre mit Wasser. Das Ablesen der Theilstriche wurde immer mit Hilfe des Fernrohres unter mehrfacher Controle vorgenommen; die Gewichtsberechnung des Stickstoffes geschah in der üblichen Weise, mit Zugrundelegen der in den Bunsen'schen Tabellen enthaltenen Zahlen.

Ich bemerke noch, dass das zur Analyse verwendete Kupferoxyd früher schon wiederholt durchgeglüht war, dass der luftdichte Verschluss der Verbrennungsröhre vollkommen sichergestellt war und dass bei Abwägung des der Analyse unterzogenen Fleisches, wie überhaupt bei der ganzen Operation mit der nöthigen Sorgfalt vorgegangen wurde. Die Verbrennungsröhre war etwas über 1 Meter lang; ich überzeugte mich auch, dass dem Stickstoff kein Stickstoffoxyd beigemengt war.

Ich wage es nun nicht, aus der geringen Zahl von drei Elementaranalysen bestimmte Schlüsse zu ziehen, möchte jedoch noch dieser Mittheilung hinzufügen, wie die aus der Analyse gewonnenen Zahlen für den Stickstoffgehalt des Fleisches zu den an den Fütterungstagen ausgeschiedenen Stickstoffmengen sich verhalten:

Am 1., 2. und 3. December betrug die Stickstoffausscheidung durch Harn und Koth 118·837 Grm. Berechnet man den Stickstoffgehalt der Nahrung nach dem Mittel der beiden Natronkalk-Analysen, so würden in den drei Tagen 115·56 Grm. N eingeführt

worden sein, in den Ausscheidungen also ein Plus von 3·27 Grm. oder 2·8% Stickstoff enthalten gewesen sein. Legt man aber die Zahl der betreffenden Elementaranalyse der Berechnung zu Grunde, so hätte der Hund 134·64 Grm. Stickstoff genossen, somit wäre in den Excreten ein Deficit von 15·803 Grm. oder 11·7% Stickstoff.

Ähnlich verhält es sich mit dem Fleisch, welches am 4., 5. und 6. December verfüttert wurde. Die Stickstoffausscheidung betrug an diesen drei Tagen 122·257 Grm. Berechnet man den Stickstoffgehalt des Futters nach dem Mittel der beiden Natronkalk-Analysen, so beträgt die Stickstoffeinfuhr 118·80 Grm.; es erscheint dann im Harn und Koth ein Plus von 3·457 Grm. oder 2·9% Stickstoff. Rechnet man aber mit dem Ergebnisse der Elementaranalyse, so wurden 144·72 Grm. Stickstoff eingeführt, und es bleibt in den Ausscheidungen durch Harn und Koth ein Deficit von 22·463 Grm. oder 15·5% Stickstoff. (Der Hund hatte in den ersten drei Tagen 5880 CC. Harn, in den zweiten drei Tagen 5430 CC. Harn entleert.) Das Körpergewicht des Hundes betrug am 1. December 27·380 Kilo, am 4. December 27·030 Kilo und am 7. December 27·000 Kilo. Der Hund ward täglich Früh nach Entleerung der Blase und des Kothes und vor dem Füttern gewogen [1]."

Herr Dr. Novak, Assistent des Prof. Schneider, hat eine grosse Reihe von Fleischanalysen ausgeführt, die demnächst veröffentlicht werden, und aus denen ich vorläufig die wichtigsten Ergebnisse mittheile. Die Arbeit ist mit grösster Sorgfalt, mit Beobachtung aller Cautelen und mit Berücksichtigung jeder Fehlerquelle ausgeführt. Dr. Novak hat zuerst durch Vorversuche constatirt, dass von den stickstoffhaltigen Verbindungen, die in genetischer Beziehung zur Fleischsubstanz stehen, manche, wie z. B. Harnsäure, sowohl durch Verbrennung mit Natronkalk, wie durch die Elementaranalyse gleiche Stickstoffmengen er-

[1] In den Tagen vom 1.—4. December beträgt die Gewichtsabnahme 350 Grm. Wird diese als Fleisch berechnet, entspricht derselben eine Stickstoffmenge von 13 Grm. Diese zur Zufuhr addirt ergibt eine Stickstoffeinnahme von 147·6 Grm. gegenüber einer Ausfuhr von 118·8 Grm., also ein Stickstoffdeficit von 19·5%.

gaben, dass dagegen bei anderen, wie z. B. bei der Kynurensäure, die durch Verbrennung mit Natronkalk gefundene N-Zahl weit hinter der durch die Elementaranalyse gefundenen Ziffer zurückbleibt.

Novak hat zunächst mit derselben Fleischpartie desselben Thierindividuums vergleichende Analysen nach beiden Methoden angestellt, und nachfolgende Resultate erhalten:

Muskelpartie	Analyse	Analyse mit Natronkalk	Verbrennung mit Cuv.
A.	I.	3·33%	3·755
	II.	3·23—	3·760
	III.	—	3·752
B.	I.	2·925	3·637
	II.	3·09—	3·631
	III.	—	3·635.

Es wurde dadurch sicher gestellt, dass die Natronkalkverbrennung nicht ausreiche, um allen N-Gehalt des Fleisches in Form von Ammoniak zu erhalten.

Novak hat in Summe 12 Pferdefleisch-Elementaranalysen an dem Fleische von drei Thieren ausgeführt und kam in der Hauptsache zu folgendem Resultate:

1. Der Stickstoffgehalt variirt nach den Thierindivien. Die Analysen ergaben bei einem Thiere einen Gehalt von 3·5 und bei einem anderen Thiere 3·9%.

2. Die verschiedenen Muskelpartien desselben Thieres haben einen verschiedenen N-Gehalt. Derselbe schwankt bei einem Thiere zwischen 3·78 und 3·97%.

Novak bestimmte auch den N des Hundefleisches durch die Elementaranalyse und da zeigten die verschiedenen Muskelpartien eine noch grössere Differenz in Bezug auf den percentischen Stickstoffgehalt; derselbe variirte nach den verschiedenen Muskelpartien von 3·52 bis 4·31, während die Analysen derselben Partien bis auf die zweite Decimalstelle übereinstimmende Resultate ergab.

Die directen Fleischanalysen beweisen also aufs unwiderglichste, dass das Fleisch in Bezug auf den Stickstoffgehalt wesentlichen Schwankungen unterliegt, es ist ferner auf directem,

wie auf indirectem Wege erwiesen, dass der Stickstoffgehalt des Fleisches häufig grösser ist, als derselbe von Voit und auch von mir angenommen wurde.

Allen bisherigen Untersuchungen lag also ein wesentlicher Irrthum zu Grunde, das Einnahmsbudget wurde als feststehend angesehen, und die ganze Sorgfalt der Feststellung des Ausgabenbudgets zugewendet.

Voit hat auf dieser Grundlage sein Gesetz aufgestellt, dass der Gesammtstickstoff der Einnahme im Harn und Koth wieder erscheine, und hat jede widersprechende Erfahrung als mit Beobachtungsfehlern behaftet zurückgewiesen. Alle diese Beobachtungsfehler wurden auf mangelhafte Harnansammlung zurückgeführt, es wurden um mit Voit's Worten zu reden „Mücken geseiht und Elefanten durchgelassen". Während die Verluste in einem gut eingerichteteten Stalle nach unseren Ausgussversuchen 4—5% betragen können, beträgt die Differenz in den Einnahmsposten, je nachdem man den Stickstoffgehalt des Fleisches zu 3·4% oder zu 4% annimmt über 17%.

Der schwankende Stickstoffgehalt des Fleisches erklärt zum grossen Theile die Differenzen in den Ausscheidungsziffern, er erklärt vorzüglich was bis dahin unerklärlich war, das zeitweilig auftretende anscheinende Plus in der Stickstoffausfuhr.

Es ist nicht bloss denkbar, sondern im hohen Grade wahrscheinlich, dass auch dann ein Deficit vorhanden war, wenn auf der unrichtigen Basis des constanten Stickstoffgehaltes von 3·4% ein vermeintliches Gleichgewicht zwischen Stickstoffeinfuhr und Ausfuhr durch Harn und Koth nachgewiesen werde.

Ich habe in meinen früher mitgetheilten Untersuchungen wiederholt kein Deficit, zuweilen ein Plus in der Stickstoffausfuhr gefunden. In der zehntägigen, mit Voit gemeinschaftlich ausgeführten Untersuchung war, wenn die Körpergewichtszunahme als Fleischansatz berechnet wird, ein Plus in der Ausfuhr vorhanden. Schneider hat einen Monat später den Harn einen Tag gesammelt, und den Stickstoffgehalt bestimmt, dieser betrug 41·2 Grm. Voit theilt dieses Resultat mit als Bestätigung, dass das früher von mir gefundene Deficit nur durch Fehler in der Einsammlung veranlasst sein konnte. Voit hätte eine glänzen-

dere Bestätigung in den einige Monate später von mir und von Toldt ausgeführten Untersuchungsreihen. In letzterer ist nur ein mässiges Deficit vorhanden, und doch zeigt gerade diese Reihe bei Zugrundelegung der Ziffern des wirklich eingeführten Stickstoffgehaltes im verfütterten Fleische ein Deficit von 11 bis 19%.

In meiner 56tägigen Untersuchungsreihe ist die Ausfuhr grösser als die Einfuhr. Dieses Verhältniss würde gewiss ein anderes sein, wenn das Einnahmenbudget auf Grundlage der Fleischuntersuchung festgestellt worden wäre.

Voit resumirt an einer Stelle seiner gegen meine Versuche gerichteten Abhandlung seine Ansichten mit folgenden Worten: „Die Aufgabe besteht, einfach darin zu sehen, ob durch Harn und Koth eben so viel Stickstoff abfliesst als zufliesst, oder ob noch durch einen andern Weg der Abfluss geschieht, und das Princip der Lösung der Aufgabe ist, es so einzurichten, dass eben so viel abfliesst als zugeflossen ist, und dann genau das Eingeführte und das Weggeführte zu messen. Wenn jemand auf den beiden ersten Wegen Alles findet, und zugleich nachweisen kann, dass von anderen, die, weil sie daraus nicht Alles erhalten, eine unbekannte Ausflussöffnung annehmen, bei der Messung des Zu- und Abganges Verluste stattgefunden haben, so kann man unmöglich im Zweifel sein, welche Ansicht die richtige ist.“ Der Kernpunkt dieser etwas unklaren Sätze ist der „das das Eingeführte und das Weggeführte genau gemessen werden muss“. Insolange als diesem Erfordernisse nicht entsprochen wurde, ist eine Bilanz unmöglich, und das auf unrichtiger Grundlage statuirte Gesetz ist haltlos.

Ich habe in meiner ersten Abhandlung die Arbeiten aller jener Forscher mitgetheilt, welche wie ich ein Deficit zwischen der Stickstoffeinfuhr- und Ausfuhr nachgewiesen haben. Voit sucht fast überall das Deficit auf dieselbe Fehlerquelle in der Harneinsammlung zurückzuführen, er verlangt von allen, die seinen Angaben widersprechen, das völlige directe Auffangen des Harns. Ich brauche nach dem Vorhergehenden auf die Bedeutung dieser Forderung und auf die Berechtigung, jedes Deficit auf die Nichterfüllung dieser Bedingung zurückzuführen, nicht weiter zurückzukommen.

Voit behauptet aber ferner, seine Gegner „welche eine Stickstoffausscheidung durch Haut und Lungen annehmen, haben nicht den Schatten eines Beweises dafür gebracht, in welcher Form und wie dieser Stickstoff den Körper verlassen hat“. Diese Behauptung ist unrichtig, ich habe die einzigen directen Beweise die für Stickstoff-Exhalation vorhanden sind, die berühmten Versuche von Régnault und Reiset beigebracht. Voit hatte diese Versuchsresultate nicht als beweisend angesehen, weil die von Régnault gefundene Stickstoffmenge zu gering sei, um das in Ernährungsversuchen gefundene Deficit zu decken, und weil diese Forscher selbst nicht ein Wort darüber äusserten, wodurch die Alteration im Stickstoffgehalt bedingt sein könnte. Ich habe mich bemüht nachzuweisen, dass das von Régnault und Reiset gefundene Stickstoffquantum mehr als genügend sei, um selbst ein sehr bedeutendes Deficit zu decken. Ich habe nach dieser Richtung auch Reiset's neuere Versuche an Hammeln citirt, bei welchen dieser Forscher die Übereinstimmung in den Ziffern des exhalirten Stickstoffes und des in den Excrementen fehlenden Stickstoffs nachweist. Die Einwendungen, welche von Pettenkofer gegen die Correctheit dieser Versuche und gegen die Verlässlichkeit der gewonnenen Resultate gemacht wurden, war ich zu widerlegen nicht im Stande, da ich mit diesen Arbeiten nicht vertraut bin. Ich wollte wissen, wie Régnault sich zu diesen Einwendungen verhalte und Prof. Pfaundler, ein ehemaliger Schüler Régnault's, war so freundlich, ihn brieflich in dieser Frage zu interpelliren. Ich theile nachstehend die hieher gehörigen Stellen aus Régnault's Antwort mit:

„Je réponds à votre question — „la totalité de l'azote des substances alimentaires se trouve-t-elle dans les excréments, ou une partie s'échappe-t-elle par la respiration?“

Je sais que Mr. Voit et Pettenkofer ont contesté l'exactitude des expériences que j'ai faites avec Mr. Reiset sur la respiration, et je n'ai jamais songé à leur répondre parce que leurs critiques ne posent sur aucun fondement.

Ainsi ils pensent que mes appareils n'étaient pas hermétiques, et qu'il a du y entrer de l'air, ce qui expliquerait le gain d'azote que nous avons trouvé. Mais si ces Messieurs avaient lu attentivement notre mémoire, ils auraient vu, que pendant toute l'expérience

qui dure souvent plusieurs jours, *il y a dans notre appareil un excès de pression.* C'est la condition nécessaire pour nos expériences. Or dans ce cas, si les appareils n'étaient pas hermétiques, *il y aurait perte d'azote, et non pas gain.*

Nous nous sommes toujours assuré que l'appareil était absolument hermétique, et cette condition était bien facile à réaliser.

De plus ces Messieurs ont pu voir que dans quelques expériences, nous avons eu une *véritable diminution d'azote* dans l'atmosphère. Ce cas ne s'est présenté, que *quand l'animal était à l'inanition.* La respiration est alors beaucoup plus lente, et on prolongeait l'expérience beaucoup plus longtemps. On se trouvait donc dans les conditions où, dans l'hypothèse de ces Messieurs, on aurait dû avoir dans l'appareil *le plus grand gain* d'azote.

Je n'ai pas fait l'expérience d'une bougie brûlante dans notre cloche, parce que ce serait un contrôle très incertain. La combustion d'une bougie est toujours incomplète, et donne des produits accessoires, qui troubleraient les résultats. Ce serait un *procédé barbare.* Mais nous avons très souvent soumis l'oxygène de nos ballons à des essais pour en éprouver la pureté. Le moyen le plus sûr était de le brûler par l'hydrogène dans mon eudiomètre, on en y faisant passer successivement plusieurs mélanges (de 2 H et 1 O) approximatifs, et analysant ensuite exactement ce qui restait après plusieurs combustions. La petite quantité d'azote qui restait, était toujours *absolument négligeable,* elle ne formait pas le $^1/_{10}$ me. de la quantité d'azote exhalé. Par notre manière de préparer l'oxygène, rien n'était plus facile, que de chasser complètement l'air avant de recueillir l'oxygène, et l'on doit admettre que nous avons assez d'habitude des opérations chimiques pour savoir éviter une pareille cause d'erreur. Enfin, on trouve dans notre mémoire assez de cas particuliers qui prouvent l'inexactitude de leurs critiques.

Régnault.

Tabelle zu meinen Untersuchungen.

Datum	Körpergewicht	Harnmenge	Stickstoff		Anmerkungen
			p. c.	p. d.	
		Eingenommen 1200 Cc. Wasser, 1200 Grm. Fleisch.			
21. Dec.	29890	1890	2·17	41·0	
22.	29990	1960	2·14	41·9	
23.	30060	1930	2·11	40·8	
24.	30040	1930	2·1	40·5	
25.	30040	1840	2·2	40·5	
		1500 Cc. Wasser.			
26.	29970	2280	1·78	40·6	
27.	29990	2250	1·83	41·2	
28.	30090	2260	1·85	41·7	
29.	30120	2250	1·89	42·5	
30.	30110	2040	1·94	39·7	
		1800 Cc. Wasser.			
31. Dec.	30060	2520	1·62	40·9	
1. Jän.	30040	2510	1·73	43·5	
2.	30060	2450	1·75	42·8	
		800 Cc. Wasser.			
3.	30130	1500	2·8	42·0	
4.	30120	1420	2·95	41·9	
5.	30170	1500	2·64	39·6	
6.	30310	1515	2·62	39·6	
7.	30160	1500	2·59	38·8	
8.	30160	1540	2·38	36·6	
9.	30240	1490	2·57	38·2	
10.	30240	1550	2·37	36·4	
11.	30160	1480	—	—	Harnverlust
12.	30160	1570	2·45	39·0	
13.	30060	1600	2·52	40·3	
14.	29940	1530	2·84	38·8	
15.	29940	1490	2·74	40·8	
16.	29860	1500	2·59	38·8	
17.	29920	1570	2·60	40·8	
18.	29940	1560	2·50	39·8	
		500 Cc. Wasser.			
19.	29980	1180	3·3	38·9	
20.	29910	1340	3·3	44·0	
21.	29820	1250	3·2	46·0	
22.	29760	1270	3·2	40·6	
23.	29740	1290	3·0	38·9	
24.	29700	1400	3·1	43·9	

Datum	Körpergewicht	Harnmenge	Stickstoff		Anmerkungen
			p. c.	p. d.	
25.	29590	1380	3·1	43·0	
26.	29610	1350	3·2	43·2	Stall verunreinigt. Harnverlust.
27.	29440	—	—	—	
28.	29540	—	—	—	
29.	29600	1220	3·44	41·9	
30.	29440	1260	3·44	43·3	
31.	29040	1250	3·45	43·1	Im Stalle gekothet.
1. Feb.	—	—	—	—	
2.	29200	1240	4·0	49·6	
3.	29190	1330	3·6	47·8	
4.	29250	1420	3·58	50·8	
5.	29300	1450	3·47	50·3	
6.	29400	1450	3·47	50·6	
7.	29250	1220	3·40	40·4	
8.	29250	1300	3·15	39·6	
9.	29200	1220	3·48	42·4	Im Stalle gekothet.
10.	29180	1250	—	—	
11.	29280	1190	3·28	39·3	
12. Feb.	29380	1150	3·50	40·0	
13.	29270	1190	3·10	37·6	
14.	29310	1210	3·51	42·4	
15.	29230	1210	3·43	41·5	
16.	29240	1290	3·20	41·2	
17.	29250	1250	3·20	40·0	
18.	29400	1120	3·70	41·4	
19.	29340	1340	—	—	

Tabelle zu Dr. Toldt's Untersuchungen.

Datum	Körpergewicht in Kilo.	Harnmenge in C. C.	N (als NH_3 bestimmt) in Grm.	N in 100 Cc. Harn	Anmerkung
30. Oct.	28·360	1765	43·242	2·450	
31.	28·320	1800	34·020	1·890	
1. Nov.	28·250	1770	44·480	2·513	
2.	28 310	1650	36·630	2·220	
3.	28·240	1550	36·626	2·363	
4.	28·230	1695*	36·781	2·170	
5.	28·210	1805*	40·432	2·240	
6.	28·270	1835	37·892	2·065	
7.	28·270	1835*	35·966	1·960	
8.	28·160	1845	37·841	2·051	
9.	28·250	2000	41·860	2·093	
10.	28·210	1845	35·072	1·901	
11.	28·140	2030	44·903	2·212	
12.	28·050	1845	37·195	2·016	
13.	27·900	1895	38·734	2·044	
14.	27·880	2000*	38·640	1·932	
15.	27·870	1910	35·296	1·848	
16.	27·800	2020	39·592	1·960	
17.	27·850	1930	39·584	2·051	
18.	27·730	1905	40·671	2·135	
19.	27·720	1895*	39·795	2·100	
20.	27·600	1990	39·282	1·971	
21.	27·550	1855	37·916	2·044	
22.	27·600	1940	39·382	2·030	
23.	27·580	1945	39·755	2·044	
24.	27·540	1790	39·469	2·205	
25.	27·530	1820	39·494	2·170	
26.	27·530	1910	39·507	2·058	
27.	27·580	2015	39·817	1·976	
28.	27·500	1850*	38·332	2·072	
29.	27·480	1990	37·332	1·876	
30.	27·390	1875	37·537	2·002	
1. Dec.	27·380	2040	39·984	1·960	
2.	27·340	2010	38·411	1·906	
3.	27·060	1890	38·942	2·128	
4.	27·030	1670	38·343	2·296	Das Thier hatte flüssige Stuhlentleerung.
5.	26·840	1805	42·454	2·351	
6.	27·040	1955	39·960	2·044	
7.	27·000	1915	41·287	2·156	
8.	26·980	1950	42·315	2·170	
9.	26·940				

Das Zeichen * in der Rubrik „Harnmenge" bedeutet, dass das Thier an diesem Tage einen Theil des Harns in den Stall entleert hat.

Aus der k. k. Hof- und Staatsdruckerei in Wien.

[*From the* Proceedings of the Zoological Society of London, April 8, 1869.]

Observations on *Lepus americanus*, especially with reference to the Modifications in the Fur consequent on the rotation of the Seasons, and the Change of Colour on the advent of Winter; based on Specimens obtained in the province of New Brunswick, North America.

By Francis H. Welch, Assistant-Surgeon, 1st Battalion, 22nd Regiment*.

This species is the sole representative of the *Leporidæ* in the province of New Brunswick. In the List of Mammalia of the Portland Natural-History Society it is called the "White Hare," and in the 'New York Fauna,' by De Kay, the "Northern Hare." It is also termed the "American Varying Hare," and was for a long time confounded with the *L. variabilis* of Europe. Its geographical range appears as yet undetermined. According to Sir John Richardson it "is found as far north as 64° 30′, Fort Enterprise, forming the staple food and clothing of the Hare Indians on the banks of the Mackenzie River." Its southerly limits are given by De Kay as "the northern parts of Pennsylvania and the mountain-tops of the northern part of Virginia." Of the many species of *Leporidæ* inhabiting the North-American continent, it appears to be the only one that undergoes a complete change of colour during the winter†,—the Greenland Hare remaining white during the whole year, *L. nanus* becoming of a lighter hue, and occasionally iron grey, during the winter months, and *L. glacialis* assuming occasionally in the adult a greyish tint during the summer, limited to the points of the hair, the deeper parts remaining white permanently, the young, however, being born grey, and changing to white on the advent of winter‡. Its weight varies—in its southernmost limits reaching 6½ lbs.; in New Brunswick averaging 3 lbs.; in Hudson's Bay Territory 4 lbs.

* Communicated by Mr. G. Busk, F.R.S.

† *i. e.* provided the *L. campestris* be only a variety of *L. americanus*, as stated by Sir J. Richardson, but denied by Baird.

‡ Fauna Boreali-Americana.

This Rodent is described in the 'New York Fauna' by De Kay; but I believe, up to the present time, no detailed account of the fur-changes in sequence to the seasons has appeared. Its representative among the European species is *L. variabilis*, the process of change in which is summed up in the 'Naturalists' Library' (vol vii.) as follows:—"From the examination of individuals at different periods of the year, I have inferred that in this species the hair is almost always changing; that in April and May there is a general but gradual shedding, after which the summer colours are seen in perfection; that towards the middle of autumn many new white hairs have been substituted for coloured ones; and that by degrees all the hairs and under-fur are shed and renewed before the end of December, when the fur is in the perfection of its winter condition, being closer, fuller, and longer than in summer." In the 'Edinburgh Philosophical Journal' (vol. xi. p. 191) the conclusion arrived at is that "during the whole of this remarkable change in the fur no hair falls from the animal; hence it appears that the hair actually changes its colour, and that there is no renewal of it." Thus, in the former article the change is attributed to an autumnal shedding and new winter growth; in the latter to a change of colour only in the existent hair. I propose in the following remarks to enter fully into the details of the process, as illustrated by *Lepus americanus*.

In order to appreciate fully the cycle of changes in the coat of this Rodent in sequence to the rotation of the seasons, it seems best to take the summer dress as our starting-point, and inquire into the varieties of hair entering into the composition of the fur at this period, for the better elucidation of the part each individually plays in the subsequent phases; for in scientifically inquiring into the change of colour in the fur-bearing animals, it is essentially necessary to make a clear distinction between that resulting from alteration of colour in the already existent coat, and that consequent on a fresh undergrowth, which by gradual increase may eventually obscure the summer and autumnal hues. Each portion also of the skin must be separately examined, and individual peculiarities noted. The summer dress may be described as follows:—Back and sides of a glistening fawn-colour, interspersed with black, especially over the vertebral ridge; tail white; face and ears reddish brown, sparsely variegated by black hairs; edges of ears externally black or dark brown, increasing towards the tips; internally whitish, especially posteriorly; whiskers and eyebrows black; margin of lids dark brown or black, pupil the same, iris yellow; underparts white; anterior surface of feet light brown, the treading surface dirty white with hair very wiry. On examination, the components of this coat will be found to vary according to the portion of the animal examined; consequently it is necessary to enter somewhat into details.

In the fur are to be distinguished the external firm hairs constituting the pile and determining the colour, and the soft woolly undergrowth constituting the thickness of the coat and mainly instrumental in the retention of the animal heat. On the back the pile is made up of firm, straight, pointed hairs of diminished thickness

at their insertion into the skin, divisible into two varieties as to length and colour,—the one, in the minority, entirely black, average length $1\frac{2}{10}$ inch; the other, black at extreme tip, succeeded downwards in the shaft by a well-defined tawny band again merging into black, which fades into light brown at the attached extremity, average length $\frac{8}{10}$ inch. The delicate, wavy, flocculent undergrowth is of a slaty hue, passing into reddish brown at the free extremity, and of an average length of $\frac{1}{2}$ inch; the commingling of the hairs *in situ* produces five zones of colour in the coat, viz. (proceeding from within outwards) slaty blue, reddish brown, brownish black, tawny, black. On the underparts the components of the fur are the same, of finer texture; the pile being entirely white lightens the hue of the undergrowth, which is slaty blue. No undergrowth is present on the ears, except at the base, and is very slight on the head and feet, especially on the treading-surface; here the hairs are of the same length, wavy in outline, and wiry in character. On the head, ears, and feet the pile is made up only of the shorter coloured hairs; at the nape of the neck only the undergrowth is present.

The autumnal coat is characterized by an increase in length of the outer hairs and undergrowth, generally over the whole body, and more appreciable as winter approaches.

About the commencement of October the first indications of the hybernal change are to be detected: the nose and lips assume an iron-grey hue, from the presence of white hairs; many of the whiskers are white at the tip or some portion of the shaft; a patch of white hairs, twenty to thirty in number, of the size of a split-pea, forms on the centre of the forehead*; white hairs become apparent on the edges of the ears outside and at their junction with the neck, while on the inside a crop of downy white fluff springs up; a few of the longer hairs of the pile of the back, especially towards the tail, are observed to be blanched wholly, or only at the tips, while the greater part of the smaller kind are brown at the tip, with the tawny band of the shaft much lighter in colour or even white; the anterior surface of the feet, especially of the hind ones, is mottled with white.

Thus far the most careful examination fails to elicit any addition to the autumnal coat, the change being superficial and entirely dependent on an alteration of colour in existent hairs: the hind feet are the most advanced, then the ears and muzzle, lastly the back. During November this surface-change gradually deepens in intensity, especially around the tail, and on the feet, ears, and face (on the latter by a white streak extending from nose to eyes and upwards to the ears), and is accompanied by a deeper one of a much more potent character; for on separating the fur a thick crop of white stiff hairs (first apparent at the root of the tail) is to be detected springing up over the back and sides. These hairs, at first extremely minute and entirely of a new growth, rapidly increase in length, accompanied by an advance in the superficial changes above mentioned; soon they are

* "Fancy Rabbits have often a white star on the forehead, and so has the young of *L. americanus*, like the English Hare" (Darwin, Animals and Plants under Domestication, vol. i. p. 140).

on an equality with the pile of the autumnal coat on the sides, forming a mottled whity-brown band from ears to tail, contrasting strongly with the centre of the back, at present comparatively unchanged; anon they outstrip this, reducing the mottling on the sides to a pure white, and, gradually implicating the centre of the back in the same process (through the varying hue-phases, according as the rapidly advancing white growth appears through and finally overwhelms the variegated changing autumnal coat), they clothe the animal in a thick white outer garment, generally assumed about the first week of December. As soon as the new growth renders itself superficially evident, the change of colour in the old hair, which on the back up to this time has been slow in progress, advances with great rapidity, so that in a few days only a few coloured hairs, generally remaining unchanged throughout the whole winter, are to be detected. The feet and ears, the first to show indications of change, are the last in completing the winter hue: generally the head and ears have no hybernal fresh growth; but occasionally it is to be met with. During this period, and especially when the new hybernal growth of white hair renders itself conspicuous on the surface of the autumnal coat, an extremely handsome fur is produced; every degree of variation may be met with, and each step of the process can be traced with accuracy and clearness. Modifications of the progressive changes enumerated above often occur in individuals, from an anticipation or retardation of change in one part relatively to the whole; these, however, are of a temporary nature—mere individual peculiarities, and finally merge into the all but universal midwinter clothing, which may be described as under. A white, with a leaden tinge, from a few long black hairs undergoing no change, pervades the entire skin, with the exception of the edges of the ears, eyelids, and legs; a narrow rim of black hair, $\frac{1}{6}$ inch wide, is present at the tip of the ear externally and $1\frac{1}{6}$ inch downwards on each side of the cartilage, which is thrown into strong relief by the thick white woolly coat now existent on the inside; a narrow rim, also black, on the free edge of the eyelids; the whiskers white entirely, or interspersed with some not changed, the shaft of hair white only at tip, or with alternating white and black bands; the anterior surface of the feet mottled reddish white,—the colour of the ears and eyelids being the resultant of no change in these situations, that of the feet and whiskers from a non-completion of the process. However, although this is the general rule, yet it is not difficult to find specimens where the length of the hybernal growth on the ears and around the eyes conceals the normal black, and the absolute completion of change elsewhere obliterates these peculiarities, leaving the animal snowy white, broken only by the glistening dark-brown pupil of the eye and yellowish iris.

Contrasting the winter with the summer and autumnal coat we find a colour-change with a great increase in the length and thickness of the fur; let us inquire minutely into the process and its local modifications. On the back is to be distinguished the pile and undergrowth. The former is made up of straight pointed hairs, slightly varying in length, the average $1\frac{8}{10}$ inch, and white throughout the entire shaft, mingled with a few isolated black hairs and

reddish-brown ones with white tips: these latter are evidently unaltered or partially changed summer varieties; but the mass of the pile, trebly increased in number and at least half an inch in length, is the produce of the hybernal growth superadded to the elongated and blanched autumnal coat. The under-fur has increased $\frac{1}{12}$ inch in length, but is unaltered in thickness or colour. A crop of white hair has sprung up on the inside of the ear, on the outside and on the face the hairs have increased in length, and the shaft is partially or wholly whitened from the tip downwards. In most specimens no new hybernal growth is perceptible in these localities, in some there is a slight addition, in a very few it is as complete as on the back. However, where no increase in number ensues, compensation is effected by an extra augmented growth in the existent fur. On the legs the change is limited to a lengthening and bleaching of the outer hair; often this is limited to the tips of the shaft; and an occasional absence of change in spots leaves an irregular fawn-coloured mottling and streaking, especially on the front paws; the hair on the treading surface is lengthened and dirty white. On the underparts there is no addition beyond an increase of length of the fur; occasionally the whiskers and eyebrows remain black. Thus the winter hue would appear to be brought about by a change of colour in the pile of the autumnal coat combined with a new hybernal white crop, the latter undoubtedly playing no small part in the colouring process and in the thickening of the fur. There is no indication of shedding. An increase in length ensues over the whole body. On the underparts the change is limited to this, but elsewhere it is associated with a bleaching of the pile, generally commencing at the tip of the hair and involving part or the whole of the shaft. On the feet, and generally on the outside of the ears and face, no additional growth is perceptible; but on the inside of the ears, and over the whole back and sides, a thick crop of white hair springs up as the winter advances, and, blending with the changed surface, materially increases the thickness of the fur, protects the animal against the inclemency of winter, and assimilates it in colour to external nature. The process may be summed up as a combination of colour-change (except in the underparts) of the lengthened outer hairs of the autumnal coat, with an additional hybernal growth; the former universal over the body, the latter limited to certain portions.

The shaft of the hair of the new growth is invariably white, a circumstance which renders it easily distinguished from the autumnal hair in process of change. Careful examination of a great number of these latter hairs will render it evident that, although the blanching process commences, perhaps, most frequently at the tip and proceeds downwards, involving the whole or a part only of the shaft, yet it is easy to obtain specimens (especially among the shorter variety of the pile) demonstrating its commencement at the centre, and occasionally at the attached extremity. The whiskers, which apparently do not lengthen but merely alter in colour, will demonstrate each variety.

Microscopically examined, the hair of this Rodent, circular in outline, is composed of oval or irregular shaped cells placed end to

end and arranged in linear series in the long axis of the shaft, covered externally by a delicate tissue of elongated flattened epithelium (fig. 2). The shaft of the under-fur (fig. 1) averages $\frac{1}{1000}$ inch in thickness, has one series of cells in its structure; the pile, $\frac{1}{200}$ inch in diameter (fig. 3), four or more, according to the varying thickness of the shaft,

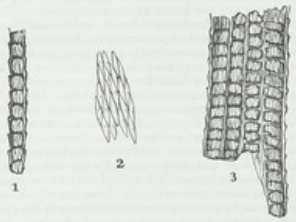

Fig. 1. Microscopic aspect of shaft of under-fur.
2. Epithelial covering of shaft.
3. Shaft of pile.

one series only at the tip, and the number gradually augmenting to the greatest circumference—the cells varying in colour according to the portion examined, but when white to the naked eye then colourless microscopically. The increase in the length of the autumnal hairs has been already noted; to this must be added that the blanching shaft, in the majority of cases, has also augmented in thickness, the average $\frac{1}{500}$ inch in diameter (corresponding to the new growth), the increase being consequent upon a more than usual number of series of cells entering into its composition. In some hairs where the centre of the shaft has changed, bounded on each side by an unchanged portion, it will be noted that at the altered segment the shaft bulges out, increasing in diameter from $\frac{1}{500}$ to $\frac{1}{200}$ of an inch by the addition of one or more series of colourless cells, and that at the unaltered portion, both above and below, it is contracted to the former size, contrasting strongly both in the number of series of cells and in the absence of colour in the changed parts. If also we examine one of the long black hairs bleaching at the tip, the addition of the colourless cells, as contrasted with the same portion of an unchanged hair, is very marked. Again, a comparison of changed hairs with unchanged ones of almost equivalent length, from the same vicinity, gives frequently a double thickness to the former over the latter. The increase of series to the shaft of the hair in process of change seems the rule, the absence of colour invariable; but in the whiskers, which in their structure approach rather the human hair with its fibrous cylinder and cellular centre, the former is not so apparent.

What is the *rationale* of the process in virtue of which to the naked eye the colour of the hair is changed from black or tawny to white? Is it dependent on an abstraction of pigment, an alteration, or new deposition? and must we regard it in the light of some general condition of the animal frame modifying the whole capillary pigmentary secretion, or, on the other hand, interrogate the hair itself for the solution of the problem? The gradual character of the process, the immunity of some hairs from all change whatever, the irregularity of its course in involving different hairs in the same portion of the body, the all but invariable commencement of change in any other part of the shaft than that first to be influenced by altered secretions, the temporary localization of the process to some one part of the shaft, entirely limited to this or gradually implicating the rest, and the freedom from all change in colour in the under-fur, incline the balance of evidence to the latter opinion, and, moreover, indicate a capability of action of one portion of the shaft of the hair independently of any general change affecting the whole, and derived from the organism within. It would seem that the rapid development of new hairs, varying in no appreciable respect except colour from the pile, called forth by the increasing rigours of climate for the protection of the animal frame, involves the autumnal outer fur in the same process, leading to an increased length and thickness in the shaft of the hair by the superposition of layers of the same colourless cells entering into the structure of the new growth—perhaps combined also with an arrested production of pigmentary matter.

Although, as a general rule, it may be stated that the hybernal change commences about the first week in October, and is finished the first week in December, thus occupying two months, yet departures from it are not at all uncommon, both as regards the comparison of one individual with another at the same period of time, and as regards the modifications consequent on yearly climatic variations. For example, a specimen shot in December 1866 was only beginning to turn white. On November 6th, 1867, a skin (before the first fall of snow) had a head piebald, feet white, back with a scattered white hair, no undergrowth. On November 18th (after the first fall), two Hares were shot in the same vicinity, one changing, the other not. On the 22nd, from a high ground, one was perfectly white on head and feet, and on each side and around the tail deeply patched of the same colour; the other showed only slight superficial changes, but on separating the fur the new growth was easily detected, $\frac{1}{2}$ inch in length, hidden under the autumnal coat. Again, on the 21st one was in the same state as the preceding, while another from the same vicinity presented a dark streak along the centre of the back gradually fading into the white sides; change elsewhere accomplished except on centre of forehead. On the 28th one was pure white. In the first week in December 1868 one was complete in the change; another was still very brown along the spine. On the 11th December 1868 three were examined, —one, ears not whitened at all in front, feet very reddish, body changed; another, feet changed, side of face mottled, centre of back not yet implicated; the third, complete except a patch on each side

of the face. Although the examples quoted demonstrate how individual peculiarities, apart from age, sex, or habitation, may modify a general law, there can be no doubt that the change is essentially dependent on the season, and is hastened or retarded by its severity or otherwise. On the seaboard it is postponed in comparison with inland districts in the same latitudes. Sir J. Richardson remarked the early change of *L. americanus* in the Hudson's Bay Territory, as well as the carrying of its winter coat until June. He also especially mentions "the absence of change of dress in the winter time in the southern parts of the United States"*. I am informed that one kept in confinement at St. John's, N. B., in a warm barn, retained the summer colours. Respecting the popular idea of the white fur coinciding with the first fall of snow, careful observation does not corroborate it. The change is essentially gradual, and spread over some seven weeks; but the rapidity with which the new white growth, when it first renders itself apparent externally, involves the entire surface of the back may somewhat explain the popular belief on the subject, although at least seven days must be taken up in this part of the process.

The winter's coat is generally carried in New Brunswick until the middle of May, when it is gradually shed, so that in June the animal may be said to have assumed its summer fur. Thus five months may be regarded as the period during which in this province *L. americanus* is clothed in white—from December to April; two months are occupied by the autumnal change, and one by the vernal. We have seen how in the Arctic regions the duration of the winter coat is extended, and its absence in southern latitudes. Considering the increased duration of the winter coat over the summer one in proportion to the seasons, as well as its importance to the animal in assimilating it to the natural features of the country for the greater part of the year, and as a protection against cold and its numerous enemies, it would be rational to regard the winter fur as the ordinary coat of this Hare in New Brunswick and northern climes, and the summer change its modification; the opposite would hold good in more southern latitudes, in sequence to the relative length of the seasons.

The dimensions of this Rodent, as met with in New Brunswick, are as follows:—

	ft.	in.
Length from nose to end of tail	1	6
——— from ear to end of hind leg stretched	2	5
——— of ears	0	3
——— of head	0	3·75
Fore leg, from middle toe to ulna extremity	0	6
—— —, from wrist-joint to middle claw	0	2·9
Hind leg, from middle claw to hip-articulation	0	12
—— foot, from middle toe to calcis	0	6
—— ——, breadth posteriorly	0	0¾
—— ——, breadth anteriorly	0	1¾
—— ——, „ „ when expanded	0	4

Average weight, 3 lb.

* Appendix to Parry's Arctic Expedition. *L. americanus.*

Thus the peculiarity of *L. americanus* consists in the development of the feet relatively to the body generally, as contrasted with other species. Although only weighing 3 lb. in New Brunswick, against 6½ lb. in southern districts, with a corresponding diminution in the dimensions of the body, the feet yet retain fully as great development in one as the other. *L. timidus*, with an average weight of 8 lb., and length 26 inches, has a hind foot only 5¼ inches long; whilst *L. variabilis*, with an average length of body of 23 inches, has also 5¼ inches. *L. glacialis*, found in common with the American, 7 lb. weight, and 22·6 inches long, has dimensions as follows:—from wrist-joint to end of claw 2 inches 9 lines, heel to point of middle claw 5 inches 9 lines. Not only is the foot of *L. americanus* proportionately lengthened, but a remarkable degree of lateral extension is allowed between the metacarpal and metatarsal bones, with great laxity of the web membrane. Inhabiting the woody districts, where the snow remains deep and soft during the greater part of the winter, the advantage of such a modification in the feet, especially when combined with the lengthened stiff winter hair on the treading-surface, is apparent, allowing it to pass over the softest snow with the slightest impress, and thus giving it the power of eluding by swiftness its numerous enemies. A recent impress of these natural snow-shoes gave the following shape and dimensions:—Fore feet oval, each 3½ inches long by 2 inches broad. Hind feet egg-shaped (large end anteriorly), each 6 inches long by 3 inches in front and 1½ inch behind.

The average snow-shoes adapted to an ordinary-sized man have a superficial area 5½ inches for each pound in weight, which is extended in this Rodent to 11·4 inches. In the Hudson's Bay Territory *L. glacialis* and *L. americanus* exist in the same district, the one inhabiting the open barrens, the other the soft snowy woodlands.

It appears much to be desired that the modifications in the feet and winter coat of this Rodent, under different latitudes and variations of natural conditions, should be accurately traced out, inasmuch as the indications are that, both in the one and the other, they fully illustrate the capability of external circumstances to call forth structural changes, placing the animal frame in harmony with the surrounding natural features, and allowing it to compete advantageously with its numerous and powerful enemies in the great struggle for existence.

REVUE
DES MÉDECINS DES ARMÉES

DU SERVICE MÉDICAL DANS LES ARMÉES DE L'ANTIQUITÉ.

De tout temps, l'art de tuer les hommes a été en progrès sur l'art de les guérir. Ne parlons aujourd'hui que des anciens ; qui ne sait combien ils ont déployé de sagacité inventive et d'application persévérante à multiplier les moyens de s'entre-détruire et à raffiner la barbarie guerrière? Leurs lois faisaient de la vie humaine une leçon d'escrime indéfinie, et couronnaient la destinée de tout être moral et intelligent par cette fin suprême : découvrir le plus sûr chemin qui mène une pointe d'épée ou de javelot au cœur d'un adversaire. Ce grand souci prenait l'homme à quinze ans et ne le quittait plus ; on voit, chez les plus civilisés d'entre eux, d'illustres personnages, déjà grisonnants et sur le retour, s'évertuer au Champ de Mars avec les adolescents et les novices, pour se maintenir en crédit dans la cité. En lisant leurs histoires, où naturellement tant de vaillance est mise en fort beau relief, en parcourant cette série de batailles qui, pendant mille ans et plus, s'étend du Gange à l'Elbe et finit par livrer le monde à la meilleure école de gladiateurs, je me suis quelquefois étonné que ceux qui nous racontent ces passes d'armes d'un ton si charmé n'aient jamais eu l'idée d'introduire dans le relevé un peu monotone des coups donnés et reçus certains détails, ingrats mais instructifs, et de nous dire, par exemple, comment ces florissantes armées se conservaient et réparaient leurs pertes,

ce qu'il advenait des soldats qui tombent journellement dans le rang sous le fer ou la fatigue, et quelle sollicitude provoquait en haut lieu cette masse flottante de blessés et de malades, inévitable arrière-garde des mouvements les plus triomphants. Il y a là un de ces oublis et de ces sous-entendus comme l'histoire ancienne s'en permet trop, et qui déroutent à chaque pas la curiosité éveillée du lecteur moderne. Nos historiens contemporains se gardent bien de négliger ces prétendues inutilités, ces rebuts du récit qui en contiennent la leçon et la moralité. Le Tite-Live du *Consulat et de l'Empire*, notre grand peintre de batailles, M. Thiers, ne manque jamais de résumer une affaire par le bulletin des ambulances, et son impitoyable mais profonde exactitude ne nous fait pas grâce d'un hôpital. Les anciens n'ont guère de ces scrupules, et leurs relations de victoire ne tiennent aucun compte des lendemains. Tout chez eux se passe en défilés et en parades ; tout y est bruit et éclat ; on ne voit se lever sur l'humanité que les jours solennels, ceux où les résultats élaborés se manifestent, où le génie se déclare, où l'héroïsme se drape, où la nature entière paraît comme sur un théâtre ; mais les transitions difficiles, les petits ressorts des grandes choses, les cruelles laideurs de la gloire, le côté bas et souffrant de l'homme et de ses œuvres, tout cela est supprimé.

Que faut-il conclure de ce silence? Accuse-t-il l'insensibilité des mœurs publiques et l'incurie des généraux ? Ou bien faut-il n'y voir qu'une délicatesse d'écrivain, et l'un de ces ombrages d'imagination si ordinaires aux anciens, dont le goût s'effarouchait des aspects lugubres et sauvait l'horreur des choses par la pudeur de l'exposition? Est-ce une lacune du récit ou un défaut de la réalité ?

Généralement, un dédain de l'histoire suppose une défaveur de l'opinion. Si aujourd'hui les tristesses de la guerre

ont pris place dans le récit à côté des parties éclatantes et dramatiques, c'est qu'à aucune époque le sentiment de ces misères n'a été plus vif, ni le soin de les atténuer plus efficace. L'émotion populaire y concourt avec la bienfaisance des gouvernements. Telle est, en effet, l'honorable contradiction de ce siècle belliqueux et philanthrope : ingénieux à faire frémir dans le perfectionnement des engins destructeurs, son humanité croît en raison de sa puissance homicide. On dirait qu'il veut s'absoudre de ses atrocités savantes et que le repentir lui donne des entrailles. Jamais il n'y a eu dans les laboratoires de mort une plus ardente conspiration contre la chair et le sang de l'homme, et jamais la chair et le sang de l'homme n'ont été plus sacrés pour le pouvoir qui en dispose. Jamais au chevet de la souffrance et dans l'agonie des victimes l'art n'a prodigué plus généreusement ses énergies salutaires, et la charité ses tendresses. La guerre a le cœur moins dur à mesure qu'elle frappe des coups plus terribles ; elle voudrait guérir d'une main les plaies qu'elle fait de l'autre. Nos belles campagnes de Crimée et d'Italie ont donné récemment le consolant spectacle d'une lutte engagée entre ces deux tendances. On a vu la science médicale rivaliser d'initiative avec le génie des combinaisons meurtrières, opposer progrès à progrès, circonscrire les ravages de cette formidable artillerie moderne, dont l'idée seule trouble dans ses fibres les plus intimes la philanthropie, réduire et presque supprimer la douleur, et par d'habiles innovations diminuer le dommage et les suites des accidents les plus irréparables (1). Puisque chez les anciens, au contraire, l'histoire reste sans pitié et

(1) V. les intéressants rapports de M. Boudens sur l'organisation du service médical en Crimée (*Revue des Deux-Mondes*, 15 février et 1er avril 1857).

sans voix sur ce douloureux sujet, puisqu'elle omet de nous dire quelles mains recueillaient les vaincus de ce sanglant labeur, faut-il inférer de là qu'ils gisaient à l'abandon? « Le peuple romain, dit quelque part Voltaire, vécut près de cinq cents ans sans médecins. Comment donc en usait-on à Rome quand on avait la fièvre ou une fluxion de poitrine? On mourait (1). » A la question posée plus haut répondrons-nous comme Voltaire, ou admettrons-nous que l'organisation militaire des anciens comprenait les éléments d'un service médical assez semblable au nôtre?

C'est nous placer là, nous le savons, sur un terrain qui confine à la Faculté; mais nous espérons que cette excursion passagère, tentée aux frontières extrêmes de la littérature et dans le voisinage d'une spécialité, ne sera pas considérée comme une irruption; car notre incompétence s'est prémunie d'excellents guides que le plus sévère aréopage médical ne saurait récuser.

Rechercher s'il y avait des médecins à la suite des armées anciennes est une curiosité qui, en France du moins, ne nous paraît jusqu'ici avoir tenté personne. Ce petit coin d'érudition n'a été abordé par aucun des hardis explorateurs qui chez nous, depuis cinquante ans surtout, ont remué en tous sens, et parfois si heureusement, le champ de l'antiquité. Lebeau, dans ses Mémoires si complets sur la légion romaine, fait à peine une brève mention du médecin légionnaire. L'auteur de *Rome au siècle d'Auguste*, qui a écrit un chapitre très-piquant sur les médecins romains, se borne, au sujet des médecins militaires, à un seul mot qu'il emprunte à Lebeau. Les thèses de Sorbonne, riches en toute sorte d'aperçus, ont omis celui-là comme trop

(1) *Dict. phil.* Article *Médecine*.

spécial, et d'autre part il nous semble que les ouvrages de littérature purement médicale l'ont négligé comme imperceptible. Mais à l'étranger l'attention a été plus excitée ou moins dédaigneuse. M. le docteur Sichel a bien voulu nous mettre entre les mains une courte dissertation anglaise, à la date de 1851, sous ce titre : « *Les armées romaines étaient-elles pourvues d'officiers de santé?* » Elle est de M. le docteur Simpson, président du collége royal de médecine d'Édimbourg. La *Gazette médicale de Paris* en a publié une excellente traduction dans ses numéros 12, 16 et 18 en 1857 (1). M. Simpson commence par constater le silence universel des érudits sur cette question. Puis il émet ses opinions personnelles, résultat de recherches qui sont loin d'être sans importance. Toutefois, le savant professeur et président d'Édimbourg avait un prédécesseur dont il ne paraît pas s'être douté : c'est l'Allemand Kühn. Du moins, en énumérant les amateurs d'antiquités, « les archéologues », qui par leur goût ou par la pente naturelle de leurs études auraient pu être portés vers ce sujet, ou qui l'ont côtoyé sans y entrer, il ne prononce pas le nom de Kühn et ne lui fait aucun emprunt. Or Kühn, professeur de pathologie et vice-chancelier de l'Université de Leipzig, a publié sous ce titre : « *De la condition des médecins militaires chez les Grecs et les Romains de l'antiquité* » une suite de dissertations latines, tout à la fois courtes et diffuses, dont chacune a été lue en séance publique, pour servir de prologue à la réception des candidats à la double licence médicale (2).

(1) Was the Roman army provided with any medical officers?—By J.-Y. Simpson, President of the Royal College of Physicians of Edimburgh; professor of midwifery in the University, etc.

(2) *De medecinæ militaris apud veteres Græcos Romanosque conditione.*—D. Carolus Gottlob Kühn, etc.

L'existence de ces opuscules, qui remonte à 1824-1827, a donc échappé à M. Simpson, et de fait ils sont introuvables. Si nous avons pu les découvrir, ce n'est ni la Bibliothèque impériale, ni la Bibliothèque de l'École-de-Médecine qui nous les ont procurés : nous les devons au savoir et à l'obligeance de M. le docteur Ch. Daremberg. Voilà sur quel fond et avec quel secours nous avons travaillé. Mais comme en matière d'érudition il n'est chercheur si modeste et si malavisé qui ne soit capable de quelques rencontres, et qui ne puisse interpréter autrement des textes déjà cités et étendre des vues déjà émises, qu'on nous permette d'ajouter qu'il ne nous a pas suffi de coordonner et de compléter l'un par l'autre les travaux des deux savants étrangers.

Le sujet se divise de lui-même. On peut y distinguer quatre périodes : chez les Grecs, la période héroïque et l'âge historique; chez les Romains, l'époque républicaine et l'époque impériale.

I

MÉDECINS MILITAIRES DE L'AGE HÉROÏQUE.

Croira-t-on, si bien porté qu'on soit pour les temps héroïques, que mille à quinze cents ans avant Jésus-Christ la médecine était constituée en un service régulier, ayant son enseignement, sa tradition, son *Credo*, sa discipline, ses spécialités, un corps de médecins militaires surveillés et payés par l'État, une vraie Faculté enfin? Disons tout de suite que cette précocité administrative a fleuri non dans la Grèce homérique, mais dans l'Égypte des Pharaons, sur ce sol qui de si bonne heure a mûri et exporté la civilisation. « Quand les Égyptiens vont à la guerre, dit un historien, ils sont soignés gratuitement; car les médecins reçoivent un salaire de l'État. La médecine est si sagement distribuée en

ce pays qu'un médecin ne se mêle que d'une seule espèce de maladies et non de plusieurs. Tout y est plein de médecins. Les uns pour les yeux, les autres pour la tête; ceux-ci pour les dents; ceux-là pour les maladies de l'intérieur (1). » Ce qui suit est d'un caractère non moins moderne. « Les médecins militaires exercent leur art d'après une loi écrite, dont les articles ont été dès longtemps combinés par une foule d'illustres praticiens. S'ils échouent en suivant les prescriptions du texte sacré, leur responsabilité est à couvert, et ils ne sont passibles d'aucun châtiment. S'ils s'écartent des règles, ils encourent la peine capitale. Car le législateur a pensé qu'un enseignement qui s'appuie sur l'expérience et sur l'autorité des maîtres sera bien difficilement surpassé en génie et en prudence (2). » Voilà qui est clair. Il y avait dès lors un enseignement traditionnel, officiel, sacré, comme dit le texte; et dès le temps de Moïse et de Sésostris, on était libre de réussir ou d'échouer, pourvu que ce fût dans les règles. Après tout, cette défense d'innover, appliquée aux opérations que nécessite la guerre, ne manque pas de sagesse. On comprend que ce n'est pas dans la précipitation et l'imprévu du champ de bataille qu'un médecin peut écouter une humeur aventureuse et fantaisiste. « Le soldat, dit M. Baudens, ne doit jamais servir à

(1) Hérodote, l. II, 84. — Diodore de Sicile, l. I, ch. 82 « In expeditione bellica Ægyptii absque mercede curantur. Medici enim annonam ex publico accipiunt. » (*Trad. latine.*)

(2) Diodore, l. I, 82 : « Medicinam ex lege scripta, per multos ab antiquo medicos illustres concinnatam, applicant. Si leges, quas sacri codicis lectio tradit, secuti ægroto sanitatem reddere nequeant, culpa vacant et indemnes abeunt; sin contra præscriptum agant, capitis judicium subeunt. Nam medendi rationem longi temporis usu observatam et ab optimis artificibus ordinatam paucos ingenio et solertia superaturos legislator censuit. »

des expérimentations, et le conseil de santé des armées a bien raison de maintenir la sage et traditionnelle prescription qui défend aux chirurgiens militaires d'employer des modes de traitement et d'opération que n'a pas sanctionnés l'expérience (1). » M. Baudens exprimait là une opinion tout égyptienne.

En Grèce, la médecine militaire n'était pas encore parvenue à ce haut point. Pourtant il y avait des chirurgiens au siége de Troie. Achille, Patrocle, et surtout Podalire et Machaon, sont vantés par Homère comme « d'excellents guérisseurs. » Ils tenaient ce secret d'Esculape et de Chiron, qui le tenaient eux-mêmes, selon Suidas, de l'Egyptien Apis. A propos du centaure Chiron, M. P. Ménière, dans ses spirituelles études sur les poëtes latins, prétend qu'il est l'emblême du médecin de campagne, à cheval nuit et jour pour soigner ses malades : voilà une interprétation allégorique qu'un pur érudit n'aurait jamais trouvée (2). MM. Simpson et Malgaigne ont remarqué que Podalire et Machaon opéraient déjà par principes : « Ils sucent la plaie, lavent la blessure avec de l'eau tiède et arrêtent le sang par l'application d'une racine amère (3). » En revanche, Kühn fait observer que, s'ils étaient habiles en chirurgie, ils savaient peu de chose en médecine, car ils ne furent d'aucun secours à l'armée en ce qui concerne l'hygiène et le traitement des maladies internes. Cette armée grecque, campée pendant dix ans sur un promontoire, sans abris et sans vivres, et décimée par la peste, était dans une situation assez sem-

(1) *Une mission médicale en Crimée* (*Revue des Deux-Mondes*, 15 avril 1857).

(2) P. 234.

(3) *Encyclopédie du dix-neuvième siècle*. t. XV.—*Histoire de la médecine*.

blable à celle de nos troupes à Gallipoli et sous Sébastopol : le temps change les costumes et les armes, mais il ne change pas la souffrance ; c'est le fonds éternel et l'invariable programme de la guerre. Voici en quels termes vifs et sentis le poëte Eschyle, qui avait été soldat, a exprimé ces maux de chaque jour endurés sous le drapeau : « Enfin, nous voilà logés maintenant dans les maisons des Troyens, et nous en avons fini avec les rosées et les gelées blanches ! Car nos lits étaient au pied des murs ennemis, à la belle étoile, et du ciel et de la terre l'humidité qui couvre les prairies nous pénétrait, imbibait nos vêtements, et nous rendait les cheveux tout hérissés. L'hiver, c'était un froid à tuer les oiseaux; les neiges de l'Ida nous glaçaient. L'été, quelle chaleur suffocante, lorsque la mer réfléchissant le soleil de midi dormait sur ses bords, et que la vague était assoupie en l'absence du vent (1). » Des critiques, trop pressés de voir dans les médecins de l'Iliade les devanciers de nos chirurgiens-majors, ont soutenu que Podalire et Machaon se tenaient sans armes sur le champ de bataille, tout entiers à leurs fonctions. Ils avaient mal lu Homère, qui les place à leur poste et à la tête de leurs troupes, comme les autres rois ; seulement, dès qu'un chef avait reçu une blessure grave, on les envoyait chercher par un héraut et on les dérobait à la mêlée. Ce qui est vrai, comme le remarque Diodore, c'est qu'ils jouissaient de certaines immunités ; on les dispensait des corvées et des grand'gardes, on les tenait à l'abri du danger. Dans un combat, Machaon est blessé ; aussitôt tous les Grecs tremblent, et Idoménée s'adressant à Nestor lui dit : « Fils de Nélée, hâte-toi de retirer Machaon du milieu des guerriers ; emporte-le sur ton char près des vaisseaux ;

(1) *Agamemnon*, v. 335 et 339.

car un médecin vaut à lui seul mille combattants (1). »

Mais ces rois-médecins n'étaient que pour les rois. « Les peuples, » comme les appelle Homère, se soignaient eux-mêmes. Un guerrier était-il blessé, il priait son voisin d'arracher le trait, comme fait Diomède en pleine bataille en invoquant Sthénélus, puis il continuait à se battre, si la blessure était légère; et lorsque ses forces l'abandonnaient, il gagnait sa tente, et, suivant le cas, guérissait ou mourait : car il ne faut jamais perdre de vue le mot de Voltaire.

Ainsi, nous avons trouvé en Égypte un service de santé militaire rétribué par l'État, et chez les Grecs des opérateurs déjà expérimentés qui reçoivent leur salaire en honneurs et en considération, suivant le mot de la Bible : « La science du médecin lui fera porter haut la tête, il sera loué en présence des grands, et il recevra les présents du roi. » Tel est le résumé de la première période.

(1) *Iliad.*, XI, 510; V, 110.—Diodore, IV, 71. Voici les deux passages où Homère décrit une opération chirurgicale :

« Ayant ainsi parlé, Machaon traversa l'armée avec le héraut, et quand ils arrivèrent à l'endroit où le blond Ménélas avait été blessé, ils trouvèrent les plus vaillants chefs rassemblés autour de lui ; lui était au milieu, pareil à un immortel. Aussitôt Machaon tire à soi la flèche enfoncée dans le baudrier; en la tirant il dégage les pointes aiguës et les fait sortir. Il détache le baudrier, la ceinture revêtue de bandes d'airain, et dès qu'il voit la plaie formée par la flèche aiguë, il suce le sang, et d'une main expérimentée y verse les baumes adoucissants que Chiron avait donnés jadis à Esculape. » (*Iliad.*, IV, 210.) — « Patrocle ayant pris sous la poitrine le roi blessé le conduisit dans sa tente. Les apercevant, le serviteur étendit des peaux de bœuf. Patrocle ayant étendu Eurypyle sur ces peaux, fit sortir de la cuisse, en élargissant la plaie avec un glaive, le trait acéré et douloureux ; il lava avec de l'eau tiède le sang noir qui coulait, y mit une racine amère broyée entre ses mains. Elle calma toute douleur. Alors, étanchant la blessure, il arrête le sang. » (XI, 841.)

II

MÉDECINS DES ARMÉES GRECQUES. — ÉPOQUE HISTORIQUE.

Les armées de Marathon, de Platée, d'Issus et d'Arbelles, les phalanges d'Agésilas et de Lysandre, les bandes mercenaires des Dix-Mille avaient-elles à leur suite des médecins ? Très-certainement. Qui choisissait ce personnel médical ? Qui le rétribuait ? Était-il en proportion avec l'élément militaire ? C'est ce que nous essayerons d'expliquer.

Prouvons d'abord qu'il y avait des médecins. Xénophon, décrivant l'ordre de bataille d'une armée lacédémonienne, dit que derrière la troupe commandée par le roi se placent divers services, « les aruspices, les médecins, les joueurs de flûte, les officiers supérieurs et les volontaires. » C'est ce que nous appellerions aujourd'hui la grande aumônerie, le corps médical, la musique, l'état-major et les curieux de toute nation qui suivent, et parfois incommodent le quartier général. Or, si les durs et incultes Spartiates étaient pourvus de médecins, il n'y a nulle témérité à supposer que les autres Grecs en avaient aussi. On en voit même chez les Perses, du temps de Cyrus le Grand, si Xénophon dit vrai. Dans une guerre contre les Assyriens, on lui amène des prisonniers blessés. « A cette vue, il ordonne de détacher leurs liens, et mande des médecins pour les soigner (1). »

Ces médecins étaient-ils nombreux dans chaque armée ? Mais avant tout, qu'est-ce qu'une armée grecque ? Une force de dix à douze mille hommes en moyenne. Démos-

(1) *République de Sparte*, ch. 13 : « Qui vero post hos collocantur, sunt hi quicunque contubernio cum paribus utuntur (ὅσοι αν συσκηνοι ὠσι των ὁμοιων), et aruspices, et medici, et tibicines, exercitus duces, et si qui sponte sua expeditioni adsunt. »—*Cyropédie*, l. III, ch. 2 § 12.

thène, dans un de ces discours où il discute le budget de la guerre avec la précision d'un ministre anglais ou français, propose d'envoyer contre Philippe II mille hommes de pied et cinq cents chevaux. Nous voilà bien loin des évaluations et des nombres ronds si aisément enflés dans la bouche des faiseurs d'annales ! Le corps expéditionnaire qui est en Syrie nous représente assez bien ce que l'antiquité appelait une armée. Or, en parlant du service médical, Xénophon dit constamment « les médecins » au pluriel ; il donne même à entendre qu'ils formaient un corps, une compagnie : d'où l'on peut conjecturer qu'ils étaient en nombre suffisant et proportionné aux troupes.

Pour mieux comprendre ce qui se passait aux armées, regardons la société civile. Là chaque médecin était en même temps chirurgien et pharmacien ; il tenait boutique : au lieu d'aller aux malades, les malades venaient à lui. Dans une comédie grecque traduite par Plaute, un médecin fait transporter dans son domicile un aliéné et lui administre de l'ellébore pendant vingt jours. C'est là plus qu'un cabinet de consultation, c'est comme une maison de santé et un petit hôpital (1). Le détail des cures et opérations nécessitait l'emploi de nombreux esclaves ; les moins adroits servaient d'infirmiers, les autres de sous-aides. « Ces derniers, dit M. Malgaigne, soignaient eux-mêmes les esclaves, et formaient un ordre secondaire de praticiens comparable aux compagnons barbiers de l'ancien régime et aux officiers de santé d'aujourd'hui. » Transportons ces usages dans les camps, et nous nous figurerons aisément le service médical des armées. Chaque médecin arrivait là avec son matériel et son personnel ; entouré de ses esclaves,

(1) *Les Menechmes.*—Voy. P. Ménière, p. 59.

infirmiers et sous-aides, il constituait à lui seul et avec ses seules ressources une ambulance. Voici d'ailleurs, sur ce point, un autre texte plus explicite. Dans la retraite des Dix-Mille, après un combat sanglant livré sur des hauteurs qui dominaient la route, les Grecs « s'arrêtèrent pendant trois jours dans les villages voisins pour soigner leurs blessés qui étaient nombreux, et ils préposèrent à ce service huit médecins (1). » C'est là un chiffre très-respectable, d'autant plus que, d'après le texte même, on est autorisé à croire que ces huit praticiens ne formaient qu'une section du corps entier des médecins attachés à l'armée. La célèbre troupe des Dix-Mille comptait dans le rang, avant la journée de Cunaxa, 12,900 hommes de toutes armes ; à la fin de la retraite, elle était réduite à 9,800 (2). Notre division expéditionnaire de Syrie était de six mille hommes ; le personnel medical comprenait : 1 médecin principal de 2e classe, 2 médecins-majors de 1re classe, 2 médecins-majors de 2e classe, 2 aides-majors de 1re classe, 1 pharmacien-major, 1 pharmacien aide-major commissionné ; en tout, 9 personnes (3).

Comment se recrutaient les médecins? Remarquons d'abord que la matière du recrutement ne manquait pas, car on peut s'assurer par les histoires spéciales combien, avant et après Hippocrate, l'art médical prospérait chez les Grecs (4). M. Malgaigne dit que le général choisissait les

(1) *Anabase*, l. III, ch. 4, § 30 : ..... ibique medicos octo constituere (ἰατρους κατεστησεν οκτω).

(2) L. I, ch. 8, et l. IV, ch. 8.

(3) *Gazette des Hôpitaux*, citée par le *Journal des Débats* du 8 août 1860.

(4) Voy. l'excellente traduction d'Hippocrate par M. Ch. Daremberg, Introd., p. 48 et 50. — M. Malgaigne, *Encyclopédie du dix-neuvième siècle*, t. XV.

médecins. Très-probablement, en effet, il en engageait le plus possible et les prenait aussi habiles que possible. Cela est bien dans les usages grecs, qui permettaient tant d'initiative aux fonctionnaires publics, et laissaient tant de soins à leur charge. Un général ne recevait pas du gouvernement qui l'avait élu une armée équipée et pourvue comme les nôtres : chez nous, l'armée attend son chef; chez eux, le chef attendait son armée ; et s'il n'avait pas à la créer absolument, du moins avait-il besoin de la renforcer, de la discipliner, d'y attirer par son crédit et ses relations personnelles des recrues, des officiers, et de vivifier la matière inerte et inorganique que le vote populaire venait de lui confier. Il montait son expédition à peu près comme le poëte dramatique montait sa pièce, en formant ses acteurs et son orchestre. Le choix, ou, plus justement, les avances et les séductions du général peuvent donc être considérées comme une des formes du recrutement médical dans les armées grecques.

Ce n'était pas la seule. Quelquefois l'assemblée elle-même nommait le médecin, qui devait être alors une sorte de médecin principal. Kühn cite à ce propos un curieux passage d'un discours de Thessalus, fils d'Hippocrate, aux Athéniens. Il y est dit « qu'à la veille de l'expédition de Sicile, l'assemblée délibérait sur le choix d'un médecin, lorsque Hippocrate se leva et proposa d'envoyer son fils Thessalus, en refusant tous honoraires et en se chargeant de l'entretenir pendant toute la campagne. »

Un passage de la *Cyropédie* fait allusion à ce double mode de recrutement : le suffrage populaire et le choix émanant des chefs d'armée. « J'ai entendu dire et j'ai vu, dit Cyrus, que les villes qui s'intéressent à la santé publique choisissent des médecins, et que les généraux en conduisent avec eux pour soigner les soldats (1). Un troisième moyen, très-propre à faciliter les deux autres, c'était l'enrôlement volontaire. Pour un médecin, il y avait double profit à suivre l'armée ; il y acquérait de l'instruction et de la popularité. « Celui qui veut devenir bon opérateur, dit Hippocrate, doit s'enrôler et s'attacher aux armées ; c'est ainsi qu'il deviendra fort exercé dans cette branche de l'art (2). » Aller à la guerre, lorsqu'elle durait si peu et se faisait si près, accompagner l'armée, lorsqu'elle se composait de gens de la même ville, ce n'était pas abandonner sa clientèle, c'était la suivre, et ceux qui n'en avaient pas trouvaient là un excellent moyen de s'en faire une. Enfin, il existait une espèce particulière d'opérateurs que leurs habitudes prédisposaient à s'engager : on les appelait *périodeutes*, ou médecins nomades. Ces *périodeutes* parcouraient les villes et fréquentaient les cours des princes, soit pour se perfectionner, soit pour exercer la médecine à prix d'argent. On comprend que les offres des généraux devaient avoir une prise facile sur cet ordre de praticiens, et c'est à eux sans doute que les chefs de *condottiere* s'adressaient de préférence.

Maintenant, quels étaient les honoraires affectés à ce service ? Ici les renseignements positifs manquent. Recevaient-ils une solde, et une solde plus élevée que celle des troupes? Trouvaient-ils l'indemnité qui leur était due dans les gratifications des officiers et les largesses du général ? Cela ne peut guère être autrement. Hérodote nous raconte

(1) L. I, ch. 6, § 15 : « Quod et audirem et viderem tum civitates eas quæ quo bene valeant, operam dint, medicos eligere (αἱρουνται), tum imperatores militum gratia medicos educere (ἐξαγωσιν), ita et ego... »

(2) *Livre du médecin*, qui est probablement d'Hippocrate (M. Daremberg).

que le médecin grec Démocède, ayant abandonné la cour de Darius, reçut de la république d'Egine un talent, soit 5,400 fr. d'appointements annuels. Athènes l'enleva à ses voisins en lui offrant 100 mines (9,000 fr.), et Polycrate de Samos l'enleva à Athènes par l'appât d'un double talent (11,800 francs environ) (1). En supposant le fait peu sûr et les chiffres exagérés, il ressort de là néanmoins que c'était un usage dès lors établi d'attirer les médecins célèbres par des honoraires considérables. et il est permis d'admettre que, dans certains cas, des traitements publics aient été assignés aux médecins militaires en rapport avec leur mérite.

Outre les médecins qui s'occupaient du soldat, il y en avait d'autres spécialement attachés à la personne du chef, surtout quand celui-ci était un roi. Ils commençaient par la domesticité, et s'élevaient presque toujours à la faveur et à l'intimité. A proprement parler, ce ne sont pas des médecins militaires, pas plus que ne l'étaient les médecins de la maison de l'Empereur qui ont fait la campagne d'Italie. Dans cette même expédition des Dix-Mille figure un médecin grec au service d'Artaxerxès ; c'est Ctésias, le même qui devint plus tard diplomate et historien. Sorti de l'école de Cnide, il avait passé en Perse pour y tenter fortune, comme faisaient les médecins d'Egypte, comme avait fait Démocède, comme fait aujourd'hui plus d'un artiste qui quitte Paris pour Saint-Pétersbourg. Il avait réussi à s'y créer une fort belle situation. De l'aveu d'Artaxerxès, son titre était : « médecin du grand roi, de sa mère, de sa femme et de ses enfants. » C'est lui qui guérit ce prince blessé par Cyrus à Cunaxa. Le roi Agésilas avait aussi ses médecins

(1) L. III, ch. 131.

particuliers. « Étant un jour à Mégare, comme il montait du temple de Vénus au palais du sénat, il sentit une veine se rompre intérieurement et tout son sang affluer à ses jambes, bien que cette partie du corps ne lui eût jamais causé aucune douleur. Elles enflèrent démesurément avec d'atroces souffrances. Un médecin de Syracuse qui l'accompagnait le saigna au-dessus de la cheville ; le sang coula nuit et jour sans pouvoir être arrêté, et l'hémorrhagie ne cessa que lorsque le malade eut perdu connaissance. A la suite de cet accident, Agésilas garda le lit pendant une année entière (1). » L'histoire du médecin d'Alexandre, Philippe d'Acarnanie est bien connue. Quinte-Curce mentionne un autre praticien, Critobule, qui fut chargé d'extraire la flèche barbelée dont le roi avait été blessé dans la ville des Oxydraques. Cette opération est décrite avec une précision toute chirurgicale par Quinte-Curce (2).

Que devenaient les blessés dans les rapides mouvements des armées? En pays ami, les plus gravement atteints étaient confiés aux citoyens ou aux alliés ; sinon, dès qu'il fallait suivre, le transport s'effectuait en litière ou sur les bras des soldats valides. C'est du moins ce qui résulte d'un passage où Xénophon dit que parmi les Dix-Mille il y en avait beaucoup d'empêchés, « les uns par suite de leurs blessures, les autres parce qu'ils portaient les blessés, d'autres enfin parce qu'ils tenaient les armes de ceux qui portaient les blessés (3). » Il faut dire que les Grecs, serrés de près, avaient brûlé, pour être plus alertes, bagages et voitures ; car il me paraît difficile d'admettre qu'en temps or-

(1) Xénophon. *Hist. grecq.*, l. v, ch. 4, § 58.
(2) L. IX, ch. 5 et 6.
(3) *Anabase*, l. III, ch. 4, § 30.

dinaire on n'ait pas utilisé pour le transport des blessés les chariots qui servaient aux bagages et qui pouvaient tenir lieu de prolonges et de cacolets. Nul doute aussi qu'on ne tirât quelques secours de ces nuées de valets et de vivandiers qui s'abattaient sur les armées en marche, pour les servir, les nourrir et les voler.

Dans nos guerres modernes, qui se font au loin et avec des masses, la guérison des blessures n'est que la moitié des services que les armées attendent de leurs médecins; car il est bien connu qu'elles perdent plus d'hommes par les maladies que par le feu de l'ennemi. Aussi, ce qu'on appelle hygiène et prophylaxie entre-t-il pour une très-forte part dans les devoirs du corps médical. Certaines opinions émises par Xénophon, — l'homme de son temps qui avait le plus d'idées sur toutes sortes de sujets, — nous montrent que, même chez les Grecs, on commençait à se préoccuper non-seulement de guérir ceux qui étaient atteints, mais de conserver en santé ceux qui se portaient bien. Le héros de la *Cyropédie*, cet Émile du philosophe d'Athènes, a une physionomie toute moderne. Ce n'est plus le général des temps héroïques, audacieux chef de bande, dont tout le mérite consiste à tomber le premier sur l'ennemi ou à le duper par d'effrontés mensonges; il est tacticien et intendant; il songe aux subsistances et aux magasins; il distingue entre les campements salubres et ceux qui ne le sont pas; il assure avec un soin tout particulier le service médical; il a pour maxime qu'il est bien de se pourvoir de médecins, mais qu'il est encore mieux de prévenir les maladies. Obtenir l'obéissance passive ne lui suffit pas, il se pique d'autorité morale; il se précautionne contre l'oisiveté des troupes et contre les mauvaises passions qui se glissent dans la torpeur des camps; il raisonne

comme M. Baudens lui-même sur la nécessité de tenir le soldat en haleine, de l'amuser et de le distraire; il va plus loin, il est humain et compatissant comme nos généraux de Crimée et d'Italie; le spectacle des malheurs de la guerre l'attendrit, il prend soin des blessés de l'ennemi; il ne goûte le repos, comme M. Thiers le rapporte de Napoléon, que lorsqu'il a fait visite aux ambulances; où il ne peut aller lui-même il envoie des inspecteurs (1). Ce sont là toutes vertus anticipées de notre temps; mais des Grecs à nous voici le progrès : ce que rêvait une belle âme transfigurée par la philosophie, le dernier de nos soldats le pratique; l'idéal romanesque du noble disciple de Socrate est devenu la réalité.

III

MÉDECINE MILITAIRE DES ROMAINS SOUS LA RÉPUBLIQUE.

Les principaux éléments du service médical existaient dans les armées grecques; chez les Romains, l'organisation est plus complète encore, mais seulement sous l'empire. En attendant, nous allons retomber en plein âge héroïque.

Durant six cents ans, Rome n'ayant pas de médecins ne put en donner à ses armées. Chaque père de famille, à l'exemple du vieux Caton, avait un manuel médico-chirurgical, à l'usage de ses enfants et de ses esclaves, et l'appliquait de sa propre main. Le climat de l'Italie faisait le

(1) Voy. *Cyrop.*, l. I, ch. 6, § 15. Il y a là un remarquable entretien de Cyrus avec son père, dont nous avons extrait, mot à mot les traits les plus saillants. — Voy. aussi l. V, ch. 4, § 17 : « Cum jam cœnandi tempus erat, Cyrus etiam tum cum ministris ac medicis neminem sua quidem sponte neglectum relinquebat, sed vel ipsemet suis oculis inspiciebat omnes, vel ipse, si hoc perficere non posset, palam mittebat qui eorum curam gererent. »

reste. Un soldat blessé se soignait lui-même, comme un héros d'Homère, ou, s'il ne le pouvait, il avait recours à ses compagnons de chambrée. Les plus pauvres et les plus gravement atteints, surtout après un engagement meurtrier, étaient répartis entre les maisons riches, et soignés d'enthousiasme par la noblesse de Rome, comme le furent nos soldats à Milan après Magenta et Solferino (1). Il est probable que, même avant l'arrivée des médecins étrangers, il vint d'Etrurie et de la Grande-Grèce, pays plus avancés, des notions et des méthodes dont l'avidité romaine fit son profit. M. Simpson est d'avis qu'il se forma spontanément dans les légions une sorte de corps médical composé de volontaires, c'est-à-dire « que le traitement des malades et des blessés était confié aux soins de quelques camarades qu'un goût particulier disposait à s'occuper de chirurgie. » Cette conjecture nous paraît très-plausible, et un fait récent la confirme. En Crimée, le typhus ayant décimé les médecins, on put craindre l'interruption du service. On para au danger par la création d'un personnel en sous-ordre, composé des plus intelligents d'entre les soldats convalescents. Habilement dirigés, la plupart montrèrent un zèle et une aptitude dignes des plus grands éloges (2). Je m'imagine sans peine qu'il existait quelque chose d'analogue dans les légions, sous la république, et que le corps médical se composait de soldats qui avaient la vocation du dévouement.

L'an 535 de Rome, un Péloponésien s'avisa de l'idée

(1) Voy. Tite-Live, l. II, ch. 47 : «C. Fabius consul..... saucios militis curandos dividit patribus.» — Cet usage est confirmé par Tacite. *Annales*, IV, 63 : «Fuitque urbs per illos dies veterum institutis similis qui, magna post prælia, saucios largitione et cura sustentabant. »

(2) M. Baudens, rapports déjà cités.

qu'une ville de 200,000 soldats toujours occupés serait un lieu bien choisi pour y fonder une école de chirurgie. Cet opérateur, nommé Archagatas, fut accueilli comme un bienfaiteur public ; on lui accorda droit de cité, on lui acheta des deniers du trésor, avec la munificence du temps, une taverne ou boutique près du théâtre de Marcellus et du marché aux légumes. Il fit sa spécialité de la guérison des blessures ; on l'appela « médecin vulnéraire, » *medicus vulnerarius ;* mais comme ses moyens étaient énergiques, on accola à ce nom celui de bourreau, *carnifex.* Évidemment, Archagatas eut des disciples et des imitateurs. L'art médical, transplanté à Rome, y prit racine et s'y propagea. Les gens riches se piquèrent d'avoir un esclave médecin aussi bien qu'un esclave poëte. Ces esclaves, une fois affranchis, travaillèrent pour le public et s'établirent près des barbiers et des tondeurs. L'affinité entre le rasoir et le couteau se déclare ; Plaute nous montre les boutiques médicales et pharmaceutiques ne formant qu'un même groupe avec les magasins des parfumeurs, des barbiers et des bouchers. Il est déjà question chez lui du prix de la visite, qui ne va pas à moins de 2 francs. Déjà aussi court dans Rome ce jeu de mot intraduisible : qui dit médecin dit mendiant, *qui medicus et mendicus* (1). Faut-il inférer de cette rapide installation de l'art médical à Rome que, vers la fin de la république, des médecins suivaient les armées? Rien ne nous y autorise. Les généraux, et quelques officiers peut-être, étaient accompagnés de médecins grecs, esclaves ou affranchis, comme le prouve l'exemple du consul Pansa, qui fut soigné et, dit-on, empoisonné par le

(1) P. Menière, p. 36 et 69. — Dézobry, *Rome au siècle d'Auguste*, t. III, l. 93.

médecin Glycon ; mais ces praticiens n'opéraient pas sur le soldat. César dit qu'après la rude bataille où il vainquit les Helvètes, le soin des blessés et des morts força l'armée de s'arrêter pendant trois jours, mais en aucun endroit il ne parle de médecins (1). L'auteur de la *Guerre d'Afrique* rapporte que « Labiénus, après le combat de Ruspina, fit transporter à Adrumète ses nombreux blessés sur des chariots (2) ; » ce qui semble indiquer une innovation. Là se bornent les renseignements que nous fournit la période républicaine.

IV

MÉDECINS MILITAIRES SOUS L'EMPIRE.

S'il faut en croire Pline, il n'y avait pas à Rome, sous les empereurs, de profession plus lucrative ni plus courue que celle de médecin. Il cite un certain Cassius qui recevait d'Auguste 250,000 sesterces d'appointements annuels (66,410 fr), un Stertinius qui, avant d'entrer au service de la famille impériale, prouva par ses livres que ses malades en ville lui rapportaient, bon an, mal an, 600,000 sesterces (159,360 fr.), et par conséquent crut se montrer de facile composition en se bornant à demander 500,000 sesterces (132,880 fr.) à ses nouveaux clients. Le médecin Charmis, appelé en province, exigea pour cette seule visite *extra muros* 200,000 sesterces (53,130 fr.). Un chirurgien, nommé Alcon, fut mis à l'amende, sous Claude, de dix millions de sesterces (1,758,749 fr.) : il refit cette somme en peu d'années. Une épigramme de Martial nous représente un certain Symmaque visitant ses malades avec une troupe de disciples qui pouvait passer pour une école

(1) L. I, ch. 26.
(2) *De bello africano*, ch. 21.

de médecine tout entière (1). Quand Rome regorgeait, rien d'étonnant que les légions se soient ressenties de cette affluence.

A quelle époque furent institués les médecins militaires? C'est une date impossible à fixer sûrement, mais le fait même de l'institution est indubitable. Sans doute ce fut dès les commencements de l'empire, lorsque l'organisation et le bien-être des légions devinrent plus que jamais affaire d'Etat. On sait la faveur témoignée par Jules César et par Auguste aux médecins ; le premier les fit citoyens, le second les exempta à tout jamais d'impôts (2). Lorsque les armées s'établirent à poste fixe dans des camps retranchés, et que des colonies d'artisans et de marchands, — villes futures, — se groupèrent aux alentours, il est probable que les médecins s'y rendirent d'abord librement; peu à peu on régularisa cette innovation, et on fit du chirurgien un officier. Nous allons le prouver par deux sortes de documents : par des textes, et surtout par des inscriptions. En tout ce qui est usage et détail intime, l'épigraphie supplée fort heureusement l'histoire.

Voici les textes. Velleius Paterculus, développant son thème favori, qui est l'éloge de Tibère, se plaît à signaler le soin qu'il prit de la santé de ses soldats pendant les guerres de Germanie et de Pannonie (760-763), à une époque où il n'était encore que général et beau-fils de l'empereur : « Au milieu de tous les soucis qui l'accablaient, on eût dit qu'il ne ressentait que celui-là. Il y avait une voiture toujours attelée pour ceux qui étaient fatigués ; la

(1) Pline, l. XXIX, ch. 1.—M. Dézobry, *Rome au siècle d'Auguste*, t. III, p. 93.—M. P. Ménière, p. 402.
(2) Suét., *J. César*, ch. 42 ; *Auguste*, ch. 42.

Mais quelle situation leur était faite? C'est ce qu'ils n'expliquent pas.

Ayons donc recours à l'épigraphie. Voici, en premier lieu, des inscriptions qui confirment ce que les textes donnent à entendre : le caractère officiel du titre de médecin légionnaire. Trois inscriptions tumulaires recueillies par Gruter et Orelli portent les noms de trois médecins de légion. Ce sont : L. Cœlius Arrianus, « médecin de la IIe légion italienne », mort à 49 ans 7 mois ;—T. Claudius Hymnus, « médecin de la XXIe légion ;—M. Besius Tertullus, « médecin de la XIe légion (1). » Dans les inscriptions romaines de l'Algérie, recueillies par M. Léon Rénier, j'ai trouvé trois monuments funéraires élevés à la mémoire de trois médecins de la même légion : M. Claudianus, T. Flavius Italus et T. Flavius Onesiphorus, qualifiés du titre de « *médecin de la 3e légion Augusta Pia Vindex* (2). » Cette légion paraît avoir séjourné à Lambæse, sous Marc-Aurèle, car beaucoup d'inscriptions qui lui appartiennent portent cette date.

Il est à noter qu'on ne rencontre nulle part le titre de « médecin de cohorte » lorsque les cohortes dépendent d'une légion ; c'est toujours « médecin légionnaire. » Ce qui ne veut pas dire qu'il n'y avait qu'un médecin par légion, mais que tous les médecins attachés aux divers corps de la légion prenaient la même qualification. Il y avait une ambulance par légion (six mille hommes), comme il y en a une aujourd'hui par division. Si, au contraire, la cohorte

(1) *Inscript. rom.* Gruter, p. 633. 1. 5 t. 1 : « L. Cœlio Arriano, medico Legionis II Italicæ. » Nous ne citerons que celle-ci ; dans les autres, la dénomination est la même. — Hugenbach et Orelli (Collect. inscrip. vol. I, n° 448).—*Ibid.*, vol. II, n° 4996.

(2) N°s 506, 637, 641.

avait une existence à part et indépendante, comme les cohortes prétoriennes, les cohortes de vétérans, les cohortes alliées, le médecin s'appelait « médecin de cohorte » *medicus cohortis*. On peut comparer ce titre à celui de « médecin de régiment », et l'établissement médical de la cohorte équivalait à ce qui s'appelle chez nous « infirmerie régimentaire. » Sept inscriptions, dont six ont été trouvées à Rome, désignent des médecins de cohorte. Cinq appartiennent à la garde prétorienne ; une à la 2e cohorte des gardiens de nuit (*cohors vigilum*), sorte de sergents de ville ; la septième, trouvée en Northumberland, à Housesteads, appartient à la 1re cohorte des Tongriens (1). Les cinq médecins de la garde sont : Sextus Titius Alexander, médecin de la 5e cohorte prétorienne, » en 83, sous Domitien ; — Sextus Titius, de la 6e cohorte ; — T. Claudius Julianus, « médecin clinique », de la 4e ; — Titus Rufinus, d'une cohorte inconnue, sous le règne de Commode ;— T. Vibius Rufus, de la 5e. Le médecin de la 2e cohorte de gardiens de nuit, sous Marc-Aurèle, est M. Julius Ingenuus, qui ajoute à son nom « médecin jouissant d'immunités spéciales, » *medicus beneficiarius* : ce qui implique l'idée, sinon d'un grade, au moins d'une distinction. Enfin, le médecin de la cohorte Tongrienne, Anicius Ingenuus, s'intitule « *medicus ordinarius.* » On appelait *ordinarius*, dit Végèce, le 1er tribun d'une légion et le 1er centurion d'une cohorte. Sur le champ de bataille, ils prennent la tête de la compagnie (*ordines ducere*) (2). C'est à peu près

(1) Cette cohorte, qui se distingua à la bataille du mont Grampien, sous Agricola (ch. XXXVII), prit ensuite garnison à Housesteads (*Borcovicus*), un des postes principaux de la grande muraille défensive élevée par Adrien de la Tyne à la Solway, et elle semble y être restée jusqu'à la fin de l'empire. (V. p. toute cette partie M. Simpson).

(2) L. II, ch. 7.

ce que nous appelons « capitaine-commandant ». Par analogie, *medicus cohortis ordinarius* devait signifier « médecin en chef de la cohorte : » en francais, chirurgien-major d'un régiment. Quant à l'épithète *clinicus*, mentionnée plus haut, elle semble indiquer qu'il y avait dans les camps tout à la fois des chirurgiens et de simples médecins ; car ce mot signifie ici médecin, non chirurgien. Parmi les cachets d'oculistes romains (on appelle ainsi des ordonnances gravées sur pierre fine), M. Sichel m'a signalé un collyre appelé *stratioticum* ou militaire, trouvé à Nimègue. On s'en servait dans les camps contre la chaleur, la poussière ou le vent. Il porte pour signature M. Ulpius Heracles (1).

Le service médical ne faisait pas plus défaut à la cavalerie qu'à l'infanterie. Une inscription parle d'un M. Vulpius Sporus « médecin des auxiliaires-indiens et de la 3e compagnie des Asturiens à cheval. » Cette cavalerie légère d'Indiens et d'Espagnols est mentionnée par l'Almanach de l'Empire (*Notitia imperii*) comme ayant résidé dans le Cumberland et le Northumberland (2). Il y avait aussi des médecins de vaisseaux. On lit sur une inscription découverte à Baïes, près de la station navale du cap Misène, le nom de M. Satrius Longinus, « médecin à double solde » (*medicus duplicarius*) du vaisseau à 3 rangs le *Cupidon*. Une autre, trouvée à Naples, a conservé le nom de Sextus Arrius Romanus, « médecin à double solde » de la flotte d'Égypte (3). Rien de plus fréquent en épigraphie que

(1) Sur tous ces détails, voy. Gruter (*Inscript. Rom.*), p. 68, [1]re 1 et 2. — P. 69, [1]re 3. — Reinesius (*Syntagma inscript.*), 611, 7. — Gruter, p. 108, 4, — P. 569, 3.—Spon. (*Rech. d'antiq.*), dissert. 27, p. 423.—J. Ern. Walch., *Antiq., medicæ solutæ* (Iena, 1772).

(2) Muratori (*Nov. Thes. vet. inscrip.*), 1046, 5. — M. Simpson.

(3) Mommsen (*Inscript. regni neap. latinæ*), 2701.—Muratori, t. II, p. 884, 7.

la rencontre de cette épithète « double solde. » La double solde permettait de récompenser les soldats et les officiers à qui l'on ne pouvait donner d'avancement. Cela répond à la haute paye des armées modernes, et, par certains côtés, à la médaille militaire. Il y avait des soldats pour qui la solde était triplée et même quadruplée. J'ai noté, dans une inscription de Lambæse, jusqu'à 110 soldats à double solde appartenant à une même légion. Cette faveur avait son prix, car elle donnait à de simples légionnaires les appointements d'un officier. En effet, la solde du centurion était le double de celle du légionnaire; la solde du tribun, le double de celle du centurion.—Pour compléter l'énumération, ajoutons qu'il y avait aussi dans les armées des médecins vétérinaires. Une inscription d'Orelli (t. II, 4229) mentionne un *medicus jumentarius*.

De ce qui précède il résulte : 1° une certitude sur l'institution du service médical dans les armées de terre et de mer ; 2° un ensemble de conjectures sur les différences que le mérite, l'âge, peut-être même le grade, pouvaient établir entre les médecins attachés à ce service.

Encore un éclaircissement. On sait combien l'organisation des légions était savante et compliquée. Lebeau a consacré plus de vingt mémoires à l'expliquer. Une légion, dit Végèce, c'est une petite nation sous les armes « *armata civitas.* » Son effectif réglementaire était de 6,100 fantassins et de 726 cavaliers. Mais ce n'est pas tout, et derrière ces sept mille combattants, qui seuls font figure dans l'histoire, il faut compter un peuple d'employés et d'ouvriers rétribués par le fisc, et constamment occupés à nourrir, équiper, loger et même enterrer cette poignée de soldats. Chaque spécialité formait une compagnie. Les inscriptions citent en mille endroits les *frumentarii* et les *pecuarii*,

chargés de la manutention et du parc de bétail ; les *librarii*, teneurs de livres, et même les *lecticarii* ou croque-morts. Ces corporations avaient leurs chefs, leurs règlements, leurs priviléges ; tous les membres étaient solidaires ; on n'y était admis qu'après examen ; chacune d'elles avait un bureau « *schola*, » lieu de rassemblement où se traitaient les affaires communes. Toutes obéissaient au « préfet des ouvriers, » *præfectus fabrûm*, qui lui-même avait pour supérieur l'intendant général ou préfet du camp. Voilà dans quel monde d'administrés vivaient les médecins militaires ; ils formaient une de ces corporations : ils avaient leur salle commune, leurs règlements, leurs examens d'admission, leur esprit de corps, leurs priviléges et immunités.

En quoi consistaient ces immunités ? Quel était le salaire assigné par le fisc aux médecins ? Je ne saurais dire si le taux de ce salaire était fort élevé ; ce qu'il y a de sûr, c'est qu'ils en recevaient un au même titre que les nombreux employés militaires ci-dessus mentionnés. Deux des inscriptions par nous produites en témoignent ; mais la plus forte preuve, c'est qu'il leur était interdit, nous l'avons vu, de se faire payer par les soldats. Or, comme les médecins étaient en même temps pharmaciens, ils avaient droit à une rémunération et à une indemnité : était-ce trop, pour cette double récompense, d'un salaire public ? Remarquons aussi que sous l'empire il y a tendance générale à transformer les professions privées en emplois salariés ou offices. L'État centralise et administre : c'est l'esprit du temps. Voyez l'enseignement ! avant Vespasien, il n'y avait dans tout l'empire que des écoles privées et libres ; à partir de ce règne jusqu'à celui de Théodose le Jeune, elles ont toutes fait place à des écoles subventionnées par le Trésor impérial ou par les villes, et les professeurs se sont constitués en colléges ou

facultés qui se recrutent par voie d'examens et d'agrégation, sauf l'agrément des décurions municipaux et l'approbation de l'empereur. Quintilien avait 100,000 sesterces (20,000 fr.) d'appointements, et il obtint sa retraite après vingt ans. Les professeurs de Lucien recevaient par an 10,000 drachmes (7,500 fr.), et se plaignaient. On voit même, sous Constantin et après lui, les médecins de certaines villes, sans doute ceux qui se consacraient à l'enseignement de leur art, recevoir, comme les professeurs de belles-lettres, des traitements de l'État (1). Puisque le progrès de l'action administrative tendait à instituer des fonctionnaires même parmi les médecins de l'ordre civil, comment les médecins des légions seraient-ils restés en dehors de ce mouvement organisateur ? C'est par eux, au contraire, qu'il a dû commencer, puisqu'il a passé des légions à la société.

Il existait dans l'antiquité un genre de faveurs très-recherché et qui, pour les gens en place, constituait un supplément d'honoraires : c'étaient les immunités, ou exemptions d'impôts et de charges publiques. On reste confondu quand on voit, dans le *Digeste* et les divers codes impériaux de combien de charges, corvées, redevances, réquisitions, un seul homme pouvait être dégrevé, et partant sous quel fardeau vivaient ceux que le fisc n'allégeait pas. Le moyen âge, si ingénieux à pressurer le pauvre peuple, n'était qu'un plagiaire. Disons, à la gloire des médecins, tant civils que militaires, qu'ils furent au nombre des privilégiés. On les traita sur le même pied que les pro-

(1) Voy., pour toute cette partie, Lebeau, *Mém. de l'Acad. des inscript.*, t. XXXVII-XL.—M. Naudet, *De l'instruction publique chez les Romains*, Acad. des inscript. (*sér.* nouvelle), t. IX.—Const. Codic., l. x, titre 52, § 5, 6, 9, 10, 11.—Aliq., aliæ Const. Justiniani, n° XXII.

fesseurs de belles-lettres. Il y avait pourtant une différence : ainsi on avait limité le nombre des professeurs et des médecins qui, dans chaque ville, avaient droit à l'immunité, tandis que cette restriction n'existait pas pour les médecins des légions (1). Un autre droit qu'ils partageaient avec les fonctionnaires en tournée ou en mission, c'était de réclamer du trésor une indemnité, quand le service public avait porté préjudice à leurs intérêts privés. C'est ce qu'on appelait droit de restitution.

Quant aux distinctions honorifiques qui, en tous pays, n'ont pas été moins désirées que les plus solides faveurs, rien ne m'indique qu'on les ait prodiguées aux médecins militaires. Ammien-Marcelin fait mention, et Kühn fait grand état d'un grade de centurion ou de capitaine donné à un ancien médecin des gardes du corps, nommé Dorus ; je vois bien aussi à Constantinople « les médecins du Sacré Palais, » ou *Archiatri*, devenir comtes du deuxième ou du premier degré après quelques années de service, et, comme tels, prendre rang dans la hiérarchie à côté des *ex-vicarii* ou gouverneurs de diocèse honoraire ; mais ce

(1) Voici en quoi consistaient ces immunités : l'exemption d'impôts accordée par Auguste ; la dispense de tout honneur coûteux et de toute corvée entraînant une perte de temps considérable, comme l'entretien des gymnases, les sacerdoces onéreux, les ambassades gratuites, les fonctions judiciaires, l'édilité, l'intendance des vivres, les tutelles et curatelles, le logement des gens de guerre et autres agents de l'autorité. — Voir les décisions d'Herennius Modestinus et les décrets de Vespasien, d'Adrien, de Commode, de Dioclétien, de Maximien, de Constantin et de Julien. Théodose et Honorius étendirent ces privilèges aux femmes et aux enfants des médecins. C'est sous Adrien et Antonin que l'on posa la restriction qui limita le nombre des médecins, privilégiés dans l'ordre civil. Ce nombre était de dix dans les métropoles, de sept dans les villes ayant un tribunal, de cinq dans toutes les autres. — *Digeste*, l. XXVII, t. I, § 6. — L. L. t. IV, § 18. — T. V, § 6. — *Const. Codic.*, l. X, t. LII, § 11. *Dig.*, l. IV, t. VI, § 33.

sont là des faits isolés et sans conséquence. On ne peut rien en conclure, par rapport à la situation hiérarchique du corps médical, pas plus qu'on ne peut inférer du décret de Théodose le Jeune, qui nommait comtes les professeurs de son lycée impérial, que les maîtres de philosophie, de rhétorique et de grammaire aient compté en tout temps parmi les citoyens les plus considérables de l'empire romain (1).

V

DES AIDES-MÉDECINS DANS LES LÉGIONS ROMAINES.

Les anciens, qui de très-bonne heure sentirent le besoin des médecins militaires, eurent assez tard l'idée de rassembler en un même lieu et de traiter en commun les soldats invalides. La raison en est que, si leurs armées avaient des blessés, on y voyait très-peu de malades. Ces petites armées, si fort au-dessous des nôtres, leur étaient cependant supérieures en un point : je veux dire la vigueur et la qualité physique des troupes. Composées d'hommes sobres, comme le sont en général les Méridionaux, d'hommes endurcis par des travaux excessifs et rompus aux fatigues, elles résistaient à toutes les pénuries et se conservaient sous toutes les latitudes. Les Romains, qui, pendant douze cents ans, ont fait la guerre un peu partout, n'ont jamais perdu beaucoup de monde par l'excès du froid ou de la chaleur. Je n'ai pas souvenir que les historiens nous parlent de légions décimées par une épidémie. Dans le sixième volume du *Consulat et de l'Empire*, M. Thiers cite, comme une exception, ce fait que le corps de Marmont, parti du camp de Boulogne en 1805, après avoir traversé en un mois la

(1) Amm. Marc. *Rer. gestar.*, l. XVI, ch. VI. — *Constit. Codic.*, l. XII, titres XIII et XV. — L. VI, t. XXI. — L. XIV, t. IX, § 3.

France et une partie de l'Allemagne, arriva à Würtzbourg, n'ayant laissé en route que neuf hommes sur quinze mille (1). Le fait est digne de remarque, et l'historien l'admire avec raison. Cette armée de 1805, trempée par dix campagnes, était comparable, pour le nerf et la solidité, aux plus robustes troupes de l'antiquité, et il n'y a guère aujourd'hui en Europe que quelques vieux régiments d'Afrique qui en rappellent la vigueur. Chez les anciens, et particulièrement chez les Romains, le succès d'une telle marche n'avait rien d'exceptionnel. Et il fallait bien qu'il en fût ainsi ; car, lorsqu'ils envoyaient deux légions, soit dix à douze mille hommes, pour occuper une vaste étendue de côtes en Afrique, ou l'Asie Mineure tout entière, ou la Grèce ou la Macédoine, ou l'Espagne, si ces troupes avaient été molles et faibles, comme les troupes européennes d'aujourd'hui ; si elles avaient eu l'habitude de s'éparpiller sur les routes en traînards et en éclopés, combien d'hommes seraient arrivés à destination ?

Ceci explique pourquoi, dans les écrivains militaires, il est si peu parlé des infirmeries ou des hôpitaux d'armée. Les Grecs ne les connurent point ; les Romains les inventèrent tard et s'en servirent peu. Tacite dit que Germanicus, visitant les blessés, faisait le tour des tentes, preuve évidente qu'ils n'étaient pas réunis. Pline rapporte la même chose de Trajan. Polybe, qui a décrit si curieusement la disposition du camp romain, et qui ne laisse pas un mètre carré de terrain sans en justifier l'emploi, n'indique aucun emplacement affecté au service médical (2). Les blessés légèrement atteints, les petits blessés, comme on dit, suivaient

(1) Page 68.
(2) Tacite, Ann. 1,71.—Pline, Panég., 13.—Polybe, l. VI, 31.

l'armée en litière ou sur des chariots ; les autres étaient confiés aux alliés et répartis chez les particuliers. L'empereur Adrien s'imposait le devoir d'inspecter « les cantonnements » des blessés. Alexandre Sévère remboursait aux particuliers les dépenses faites pour les malades (1). Dans les *Commentaires* de César, nous voyons un commencement de concentration et quelque chose qui ressemble à une infirmerie divisionnaire. Les blessés étaient nombreux, car l'armée allait à dix légions environ, effectif énorme pour le temps ; César les avait réunis dans un camp fortifié à *Aduatuca*, aujourd'hui Tongres en Limbourg. A mesure qu'ils se rétablissaient, on les renvoyait à leurs corps respectifs, au nombre de deux à trois cents, sous un guidon, ou *vexillum* (2).

Le premier et le seul auteur qui ait parlé en termes précis d'un hôpital militaire, c'est Hygin, dit l'Arpenteur, affranchi de Trajan. Les Romains, en traçant leur camp, laissaient un espace libre de deux cents pieds entre les dernières tentes et les quatre faces du retranchement. Du temps de Polybe, on y entassait le butin et on y parquait les troupeaux. C'est là qu'Hygin place l'infirmerie ou l'hôpital, *valetudinarium*. Il y établit aussi un atelier, *fabrica*, mais « à une distance convenable pour ne pas troubler les malades ; » enfin, un *veterinarium* ou lieu de traitement pour les chevaux (3). Ainsi, à la fin du premier siècle ou

(1) V. Spartien (*Adrien*, l. x) : » Ægros milites in hospitiis suis videbat. »—Lampride (*Alex. Sév.*, ch. 47) : « Ægrotantes ipse visitavit per tentoria milites, etiam ultimos, et carpentis vexit, et omnibus necessariis adjuvit. Et, si forte gravius laborassent, per civitates et agros patribus familiàs honestioribus divisit, etc. »
(2) L. VI, 36.
(3) *De castrametatione Liber*.

au commencement du second, il y avait un hôpital dans les camps romains. Le silence de Végèce, la mention qu'il fait de blessés « soignés sous la tente, » les textes ci-dessus rappelés de Lampride et de Spartien ne suffisent pas à détruire le témoignage d'Hygin : les anciens usages ont pu subsister à côté de l'institution nouvelle. N'avons-nous pas, nous aussi, dans les armées en campagne, plusieurs sortes d'établissements de santé, correspondant à divers degrés de traitement? A mesure que les légions se remplirent d'un ramassis d'hommes sans vigueur et sans discipline, à l'époque où l'infanterie, pesamment armée, avait disparu, parce que les cuirasses et les casques étaient intolérables aux soldats, il est évident que les hôpitaux et les infirmeries, avec notre attirail moderne, devinrent une nécessité. Selon toute probabilité, on les établit de préférence dans les camps à poste fixe où les légions laissaient leurs dépôts en temps de guerre : c'est là que chaque corps dressait ses recrues et recueillait ses invalides. A cette époque, l'état sanitaire des troupes préoccupait les généraux plus vivement que par le passé. Le chapitre de Végèce « Comment se gouverne la santé d'une armée » est un exposé de précautions hygiéniques qu'on peut comparer avec les prescriptions de M. Baudens.

Les tribuns légionnaires, sous la présidence des préfets du camp, formaient le conseil de santé. Ils surveillaient le service du *valetudinarium* et y passaient de fréquentes inspections (1). Le service était confié à des aides-médecins, appelés *optiones valetudinarii*. Ce terme d'*optio* signifie en général « suppléant » ou « lieutenant. » Les centurions et les tribuns avaient leurs lieutenants, et même leurs sous-

(1) *Digest.*, l. XLIX, titre XVI, § 12.—Vég., l. II, ch. X.

lieutenants, *suboptiones*. Les *optiones valetudinarii* étaient donc des médecins suppléants, des aides-médecins (1). L'ordonnance du jurisconsulte Tarruntenus Paternus où ils sont cités fait aussi mention « d'infirmiers » sous cette dénomination : « *et qui ægris præsto sunt.* » Léon le Philosophe, qui vivait au neuvième siècle, a décrit les fonctions des aides-médecins et des infirmiers sur le champ de bataille. Les détails qu'il donne s'appliquent, il est vrai, aux armées du Bas-Empire; mais, comme il a copié le *Traité militaire* en douze livres de l'empereur Maurice, qui est de la fin du sixième siècle, on peut croire que les usages qu'il rapporte étaient empruntés, en tout ou en partie, des armées romaines. « On appelait autrefois « délégués » (*deputati*) ceux que nous appelons aujourd'hui « messagers » (*scribones*). Leur fonction est de suivre l'armée en bataille pour recueillir et soigner les blessés. Le général en placera huit ou dix par légion derrière chaque ligne. Il les choisira vifs et alertes. Ils se tiendront sans armes, à cent pas en arrière, afin que les soldats atteints dans la mêlée, les cavaliers démontés et incapables de continuer le combat soient emportés par eux, et qu'on ne voie pas de braves gens foulés aux pieds par le second rang et succomber à leurs blessures, faute de soin. Pour chaque soldat sauvé, le « délé-

(1) Le jurisconsulte Tarruntenus Paternus (*Dig.* l. I, titre V, § 6), les cite à propos d'immunités avec les médecins, les employés de la fabrique (optio fabricæ), les gardes-tentes et couvertures, ou *capsarii*. Kühn (Diss., IV, 8) cite une inscription (Reinesius *Syntagma inscript.*, p. 141), où il est question d'un *optio valetudinarii*, qui avait été auparavant appariteur d'un tribun et sous-trésorier. Nous avons rencontré dans une inscription de Lambèse une énumération fort semblable à celle de l'ordonnance de Paternus. Les *optiones valetudinarii* sont mentionnés avec les *capsarii*, *incuarii*, *librarii*, à propos de l'élection d'une *schola* sous Marc-Aurèle (*descript.* 63).

gué » recevra de notre trésor impérial une pièce d'argent. Pour mieux remplir leur office, ils se muniront de deux échelles attachées à droite et à gauche de leur cheval. Ils pourront ainsi faire monter deux blessés à la fois. Ils auront soin aussi d'emporter de l'eau dans une outre, pour ranimer les blessés qui perdraient connaissance (1). » Au dixième siècle, Constantin VII Porphyrogénète, auteur d'un petit livre sur la tactique, s'exprime dans les mêmes termes. J'abandonne volontiers aux Grecs du Bas-Empire les deux échelles ; mais n'est-il pas permis de supposer que, même dans les armées romaines, sous les empereurs d'Occident, il existait un corps spécial d'employés militaires, aides-médecins ou infirmiers, chargés du même service que ces « délégués ou messagers » dont parle Léon le Philosophe ?

Là se borneront, avec nos recherches, nos conjectures. Sans doute, les résultats obtenus renferment bien des points hypothétiques ; mais il nous semble que, si le vague et l'incertitude qui restent encore obscurcissent certaines particularités, nous avons mis en pleine évidence les bases mêmes de l'organisation médicale des armées. D'ailleurs, nous ne prétendons pas clore la question ni l'avoir épuisée. Les textes, depuis longtemps étudiés, fourniront peu de renseignements nouveaux ; c'est une mine qui a donné à peu près ce qu'elle contenait ; mais il y en a une autre, plus récemment ouverte, l'épigraphie. De ce côté, de nouvelles indications peuvent surgir ; des noms inconnus, investis de titres ignorés ou mal appréciés, peuvent se révéler : c'est un supplément d'enquête indéfini, un commentaire qui n'a pas dit son dernier mot ; et le hasard, sollicité par

(1) *Traité sur la Tactique*, ch. I et IV, § 15.—Ch. XII, §§ 51, 53, 119.

d'infatigables explorateurs, n'est pas au terme de ses munificences. En attendant ce surcroît possible d'informations, notre œuvre aura consisté à recueillir, à développer ce qu'on a jusqu'ici découvert sur une question qui intéresse à la fois la critique littéraire et historique et la science médicale.

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Le travail si plein d'érudition de M. Charles Aubertin sera complété et corroboré par les passages suivants extraits d'un livre, non moins savant, sur les institutions des armées romaines (1), récemment publié par M. MASQUELEZ, bibliothécaire de l'École de Saint-Cyr :

Soins donnés aux blessés. — Les auteurs nous ont malheureusement donné peu de renseignements sur ce point important. Lampridius (*Vie d'Alexandre Sévère*, chap. 46) nous apprend que des chariots étaient affectés au transport des blessés, et que ces derniers, à leur arrivée dans une ville, étaient confiés aux soins de pères de famille ou de matrones qui recevaient alors une indemnité.

... § IV. « Toutes les fois que l'on aura cinq ou six légions, deux « *cohortes primæ* devront camper sur les côtés du *prætentorium*, et « deux autres dans la *prætentura*. Au delà de ces dernières, on placera « l'ambulance, puis les *vexillarii* ou les deuxièmes cohortes ; si c'est « nécessaire, on met une *cohors peditata quingenaria* à la place des « *vexillarii* : si l'emplacement est trop étroit, on l'attribue à une « cohorte légionnaire, mais de la même légion, de telle manière qu'il y « ait trente pieds pour l'ambulance et pour ce qu'on place au delà (*de*

(1) *Etude sur la castramétation des Romains et sur leurs institutions militaires.* 1 vol. in-8° de 495 planches. Paris, 1854, J. Dumaine, éditeur.

« *la* via prætoria), c'est-à-dire l'infirmerie des chevaux et l'atelier des « armes qui se trouve ainsi éloigné afin que le repos des malades de « l'ambulance ne soit pas troublé : on a coutume de compter, pour ces « divers emplacements et de chaque côté (*à droite et à gauche de la* « via prætoria) un espace égal à celui qu'occupent deux centuries. »

Les deux *cohortes primæ* campées dans la *prætentura* étaient placées le long de la *via sagularis*, à droite et à gauche de la porte prétorienne. L'auteur ne parle pas ici de l'emplacement attribué aux *cohortes primæ* de la cinquième et de la sixième légion, mais on voit dans le § XVII qu'elles étaient placées dans la *retentura*, le long de la *via quintana*. Dans ce même § XVII, nous avons remarqué qu'en parlant de la *via quintana*, l'auteur dit qu'elle se trouvait *super* ou *supra prætorio :* or, d'après la méthode adoptée maintenant pour l'interprétation d'un plan quelconque, nous dirions que cette voie est placée au-dessous du *prætorium*. Cette observation nous permet de comprendre le § IV qui nous occupe en ce moment : on peut conclure de l'expression employée dans le § XVII que nous venons de citer, que si l'on plaçait, comme on le fait habituellement, la porte prétorienne dans la partie supérieure du plan, toutes les fois qu'on trouverait dans le texte les mots *super* ou *supra*, on devrait les remplacer par *infra*, en descendant de la porte prétorienne à la porte décumane. Cependant il nous semble préférable de constater que l'auteur, dans sa description du camp, se place à la porte prétorienne, et que les mots *super* et *supra* doivent être pris dans le sens de *au delà :* c'est ainsi qu'on traduirait la phrase suivante : « cohors prima tertiæ legionis supra viam « sagularem tendere debet » par celle-ci : « La première cohorte de la troisième légion doit camper au delà de la *via sagularis*. »

Aucun des écrivains antérieurs à Hyginus, et pas même Josèphe qui vivait peu de temps avant lui, n'a parlé de l'ambulance ; on est donc autorisé à croire qu'elle était de création récente quand notre auteur rédigea son traité. On ne recevait à l'ambulance que les hommes grièvement blessés ou atteints de maladies graves, puisque Pline le Jeune nous apprend que Trajan visitait dans leurs tentes les soldats malades : Lampridius nous apprend qu'Alexandre Sévère agissait de même (*Vie de cet Empereur*, chap. 46). Le même auteur dit encore que l'empereur dont il parle faisait transporter les malades dans des chariots suspendus, et leur fournissait tout ce qui leur était nécessaire : si leurs maladies étaient graves, il les confiait, dans les villes ou dans les campagnes, aux soins de pères de famille ou de respectables femmes qui recevaient une indemnité, soit que les soldats mourussent, soit qu'ils revinssent à la santé. Une inscription mentionnée par Gruter prouve qu'il y avait un médecin dans chaque légion.

Lange et les autres savants qui ont eu entre les mains le manuscrit de l'ouvrage d'Hyginus, l'ont trouvé altéré à l'endroit où l'auteur indique l'une des deux dimensions du *valetudinarium :* ils ont hésité entre les nombres LX, LXX et XXX ; nous adoptons de préférence ce dernier nombre, contrairement à l'opinion générale, parce qu'il se rapporte à l'emplacement le plus convenable ; il nous semble naturel de penser qu'autant que possible on éloignait les malades du retranchement et surtout de la face qui était la plus exposée à une attaque : en outre, cette disposition permettait de placer les troupes dans l'ordre le plus naturel et le meilleur pour la défense, c'est-à-dire faisant face à la *via sagularis*, et par suite au retranchement, tandis que les commentateurs dont je viens de parler, ont placé une par-

tie des troupes parallèlement, et l'autre partie perpendiculairement à la *via sagularis*.

Les vétérinaires étaient appelés *medici veterinarii* ou *mulomedici* : on donnait le nom d'*agasones* aux esclaves qui soignaient les chevaux, et celui de *mulliones* à ceux qui soignaient et conduisaient les bêtes de somme.

.... Chacun des côtés de la *prætentura* ayant 600 pieds de largeur (§ 32), voici comment nous comprenons la disposition des troupes qui étaient placées entre la *via sagularis* et la *via vicinaria* la plus rapprochée. A gauche, en entrant par la porte prétorienne, on trouvait d'abord la *cohors prima* de la troisième légion faisant face au retranchement, et occupant un terrain de 360 pieds de longueur mesuré le long de la *via sagularis*, sur 120 pieds de profondeur. Cette cohorte étant placée, on pouvait encore disposer d'un terrain ayant 240 pieds de largeur le long de la *via sagularis*, sur 120 pieds de profondeur : on y plaçait, sur l'alignement de la première cohorte, la cohorte des *vexillarii* de la troisième légion, à qui il fallait une profondeur de 90 pieds, puisque le front en avait 240; cette profondeur ayant été mesurée, il ne restait plus, pour compléter le rectangle, qu'un terrain ayant 240 pieds de largeur sur 30 pieds de profondeur, comme le dit l'auteur; c'est ce terrain qui est attribué au *valetudinarium*. Nous croyons présenter ainsi la meilleure solution, d'autant mieux qu'Hyginus dit que ce terrain avait la même étendue que celui qu'on assignait à deux centuries. Or, chacune de celles-ci, occupant un terrain ayant 120 pieds de largeur sur 30 pieds de profondeur, on aurait pu en placer deux sur un terrain ayant, comme celui dont nous parlons, 240 pieds de largeur sur 30 pieds de profondeur.

.... Végèce. — « C'était le préfet de la légion qui donnait les ordres nécessaires pour le départ du camp et le service des sentinelles (liv. II, chap. 9). »

« Le choix de l'emplacement du camp, ainsi que la détermination des dimensions du fossé et du rempart, appartenaient au préfet du camp. C'est encore lui qui donnait les ordres relatifs aux tentes ou aux baraques des soldats et à tous les *impedimenta*. Il avait aussi à s'occuper des malades et devait leur procurer les médecins nécessaires pour les soigner. Il procurait les voitures, les bêtes de somme, les outils en fer pour scier le bois et couper le gazon, creuser les fossés, construire le rempart et les conduites d'eau (liv. II, chap. 10). »

NOUVEAUX WAGONS-AMBULANCES.

Notre correspondant des États-Unis était membre de la Commission sanitaire de l'armée fédérale, et il a donné sur cette institution tous les détails qui pouvaient intéresser nos lecteurs; nous avons donc simplement annoncé la brochure publiée en 1865 par le docteur Thomas W. Evans sur le même sujet. Cependant son travail renferme la description d'un wagon-ambulance qui doit être signalé dans la *Revue;* la reproduction de l'article suivant, dû à la plume de l'éminent publiciste de la *Presse*, fera connaître ce nouveau train hospitalier.

Cesser de *caserner* la maladie et les malades dans une succession de salles contiguës et d'y concentrer ainsi le foyer d'infection; remplacer les hôpitaux auxquels l'espace, l'air et le soleil sont parcimonieusement mesurés dans les villes par des *villas de santé* semées dans un vaste parc, assez rapprochées les unes des autres, mais séparées par des massifs d'arbres : telle est l'idée sur l'adoption de laquelle nous avons insisté à plusieurs reprises et notamment le 23 janvier 1863, à l'occasion du projet de reconstruction de l'Hôtel-Dieu de Paris. L'objection faite

à l'adoption de cette idée était la difficulté de transporter les malades hors de Paris. Cette objection n'existe plus, ainsi qu'on pourra s'en convaincre en jetant les yeux sur les planches placées à la fin du très-remarquable livre que vient de publier le docteur Thomas W. Evans, et qui est intitulé : LA COMMISSION SANITAIRE DES ÉTATS-UNIS, *son origine, son organisation et ses résultats avec une notice sur les hôpitaux militaires aux États-Unis et sur la réforme sanitaire dans les armées européennes*; ces planches gravées représentent un wagon-ambulance, coupe, élévation, intérieur, vue du système de ventilation en hiver et du système différent de ventilation en été, lit-brancard vu de haut et vu de côté, mode de suspension, etc. Cette bienfaisante invention, qui fait le plus grand honneur à M. le docteur Evans, a subi de la manière la plus satisfaisante l'épreuve de l'expérience, ainsi que cela résulte du rapport suivant :

« ..... Les exigences du service et la position des différents corps d'armée rendaient inévitable le renvoi de la plus grande partie des blessés dans les États du Nord par le moyen des chemins de fer et non par celui des bateaux à vapeur. Or, les ébranlements et le tangage des wagons ordinaires exposaient plus ou moins les soldats blessés à de douloureuses tortures. Pour les amoindrir ou les prévenir, un membre de la commission dessina le modèle d'un wagon qui, par des moyens mécaniques, devait assurer un transport assez confortable des blessés. Sur les divers chemins de fer communiquant entre l'armée et les hôpitaux, douze de ces wagons ou même un plus grand nombre roulent constamment, tous disposés avec le plus grand soin et la plus grande intelligence pour le bien-être des malades. Chacune de ces ambulances est munie de tout le confort et de toutes les ingénieuses inventions qui se trouvent dans les bons hôpitaux ; les lits-brancards, que l'on peut détacher à volonté sans déranger les malades, sont disposés régulièrement de chaque côté du wagon, et suspendus au moyen de fortes bandes en caoutchouc amortissant les contre-coups. La ventilation y est bien entendue, la lumière est doucement tempérée, il y a des tuyaux pour la communication verbale entre chirurgiens, infirmiers et infirmières. Chaque détail est soigneusement calculé pour donner au patient la position, assise ou inclinée, la plus commode, soit sur des lits, soit sur des chaises d'invalides. Les agents ont

sous la main des approvisionnements, bien empaquetés, de vêtements chauds, de tablettes alimentaires, de thé, de café et de drogues pharmaceutiques ; ils disposent d'un fourneau très-ingénieux pour la cuisine ; il ont des provisions d'eau et une pièce de débarras.

« Les témoignages favorables sont nombreux au sujet d'une amélioration aussi importante. Nous citerons celui du docteur Thurston, directeur médical de l'armée à Nashville : « Le trans-« port rapide, le traitement donné aux patients dans leur voyage, « les soins intelligents des infirmiers qui accompagnent le « train, ont, j'en suis persuadé, sauvé bien des existences. » Les malades et les blessés, et moi-même, ajouterai-je, nous devons à la commission beaucoup de reconnaissance ; mais, dans mon opinion, c'est le « train sanitaire » qui a fait, pour le bien-être des malades, plus que toute autre institution. Citons aussi l'opinion du docteur Barnum, qui a rendu les plus grands services en se chargeant, dans l'Ouest, du service des ambulances par chemins de fer : « Depuis que je m'occupe des trains hospi-« taliers, j'ai fait trasporter 20,472 patients, et j'en ai perdu « seulement un, qui, malgré l'avis du chirurgien et le mien, « demanda avec supplications qu'on voulût bien lui permettre « d'aller mourir au sein de sa famille. »

Ce livre abonde en faits du plus haut intérêt. Après qu'on l'a lu, on déteste et on méprise la guerre plus encore qu'on ne la détestait et qu'on ne la méprisait auparavant. Ce livre aurait pu prendre et porter pour titre : *L'envers de la gloire*. — Emile de Girardin.

STIPULATIONS PROPOSÉES EN FAVEUR DES BLESSÉS DES COMBATS SUR MER.

Lors de la réunion, à Genève, du congrès diplomatique, qui avait pour but d'arrêter, entre les différentes nations, les stipulations à introduire dans le droit des gens, quant au caractère des blessés et de ceux qui leur portent secours, le docteur Le Roy de Méricourt adressa au président, M. le général Dufour, quelques propositions en faveur des combattants des batailles navales. Voici le résumé de

cette note, qui se trouve insérée dans le numéro de novembre 1865 des *Archives de médecine navale*, c'est-à-dire postérieurement à la promulgation du décret du 14 juillet, qu'on trouvera plus loin :

« Si les conditions déplorables dans lesquelles se trouvent souvent les victimes des résultats sur terre excitent un légitime intérêt et demandent des mesures généreuses qui les modifient profondément, en faisant honneur aux progrès de la civilisation moderne, la situation des blessés, dans les résultats sur mer, est parfois autrement grave. Elle mérite donc également l'attention des humanitaires.

« L'agglomération des combattants, dans un espace fort restreint, l'emploi presque exclusif de l'artillerie, la multiplication des projectiles par les éclats de toute nature enlevés aux parois des navires, et à leur mâture; la fréquence des incendies et des explosions sont autant de causes qui expliquent comment, à nombre égal de combattants, les batailles navales fournissent plus de blessés que les batailles livrées à terre. » M. de Méricourt cite, à l'appui de cette assertion, des chiffres empruntés aux bulletins de Trafalgar. L'introduction de la vapeur comme motrice des vaisseaux, les progrès incessants de la grosse artillerie, les dimensions énormes de nos machines de guerre, leur puissante armature de fer, sont privés des résultats encore plus formidables. Déjà les événements de la gigantesque lutte des Américains ont montré quelles peuvent être les conséquences des engagements sur mer.

« Ce serait une erreur de croire que le blindage des carènes à l'aide de plaques en fer doit diminuer le nombre des blessés..... A mesure que les cuirasses sont devenues plus épaisses, le calibre des boulets, leur force de projection ont été augmentés; on ne peut prévoir qui l'emportera dans cette lutte de l'attaque et de la défense. Dès maintenant, il est possible de constater que les boulets, en frappant les plaques en fer, s'ils ne les traversent pas, n'en déterminent pas moins de nombreux éclats enlevés à la muraille en bois qu'elles recouvrent : ces éclats sont d'autant plus meurtriers que les hommes sont réunis en groupes plus nombreux pour servir les énormes pièces actuellement en usage (jusqu'à vingt-cinq hommes par pièce).

Enfin, on ne peut songer sans frémir aux conséquences de l'abordage des vaisseaux béliers qui arriveront avec une vitesse augmentée par leur masse. »

Après avoir montré que, sous le rapport du nombre comme de la gravité des blessures, les chances sont au moins égales sur mer et sur terre, l'auteur compare la situation du matelot blessé et du soldat pendant et après l'action. Tant que le bâtiment n'est pas menacé de couler ou de sauter, les conditions des blessés à bord sont peut-être meilleures que celles des blessés sur les champs de bataille, sous le rapport des soins immédiats; mais, lorsque le feu a cessé, que le sort du soldat est préférable à celui du matelot!

Après un exposé succinct, le docteur de Méricourt exprime les aspirations suivantes en faveur des blessés des combats sur mer :

« I. *Lorsque, dans un combat naval, un navire engagé vient à être menacé prochainement d'une perte totale, soit par une voie d'eau, soit par un incendie, il serait à désirer que, sur un signal convenu, l'ennemi ayant connaissance de cette situation critique, cessât le feu. Le navire menacé pourrait alors procéder immédiatement à l'évacuation des blessés au moyen des embarcations.*

II. *Chaque embarcation chargée de blessés porterait un signe distinctif* (pavillon blanc avec croix rouge au centre).

III. *Le navire ou les navires les plus voisins du bâtiment en danger, seraient tenus de coopérer au sauvetage des blessés.*

IV. *Les blessés reçus à bord des navires ennemis, les chirurgiens et les infirmiers chargés de les soigner, seraient traités comme neutres.*

V. *Après guérison, les blessés recueillis par l'ennemi seraient remis à la nation à laquelle ils appartiendraient, à condition qu'ils ne porteraient plus les armes dans le cours de la guerre qui a donné lieu au combat où ils ont été blessés.*

VI. *Il serait à désirer que, dans ces graves circonstances, il*

fût procédé, sous le rapport de la suspension d'hostilité, comme il est procédé à terre, lors de l'enlèvement des blessés et des morts dans les tranchées pendant les siéges.

Les hommes non blessés ou atteints de lésions qui ne les mettent pas dans l'incapacité de porter les armes, seraient naturellement traités comme prisonniers de guerre lorsqu'ils seraient recueillis à la suite d'incendie, d'explosion et de submersion du bâtiment sur lequel ils étaient embarqués.

VII. *Dans les cas où, à la suite d'un combat sur mer, un bâtiment ne pourrait pas offrir à ses nombreux blessés les soins nécessaires et ne pourrait gagner d'autre port qu'un port du littoral ennemi, il serait à désirer qu'il pût y déposer ses blessés. Après une communication par parlementaire, il serait autorisé à les confier aux soins de l'ennemi, en les faisant accompagner d'un de ses chirurgiens, qui partagerait le sort des blessés. Après guérison, ils seraient rendus, par groupes, à leur nation, sous condition de ne pas porter les armes et après remboursement des frais que leur séjour aurait entraînés.*

VIII. *En aucun cas, les chirurgiens ni les infirmiers de la flotte ne seraient traités comme prisonniers de guerre, lorsqu'ils tomberaient entre les mains de l'ennemi, pendant l'accomplissement de leurs fonctions.*

Nous prévoyons, dit l'auteur, les nombreuses objections que ces vœux peuvent soulever au point de vue des obstacles que leur réalisation apporterait au succès complet des opérations militaires; mais nous croyons que ces objections ne sont pas plus insurmontables que celles que rencontrent les vœux analogues en faveur des blessés des champs de bataille.

Le jour où les nations civilisées voudront réellement s'entendre sur ces stipulations, elles atténueront sensiblement les horreurs de la guerre, en accordant le *privilége des neutres* aux blessés des combats sur mer et sur terre. »

(*L'Union médicale.*)

N° 127 (tome VIII°.) 1865. Décembre.

REVUE
SCIENTIFIQUE ET ADMINISTRATIVE
DES MÉDECINS DES ARMÉES

PARAISSANT TOUS LES DEUX MOIS.

RUE CHILDEBERT, 11, PRÈS LA PLACE SAINT-GERMAIN DES PRÉS.

[illegible] ce qui concerne l'administration ou la rédaction doit être adressé (franco) à M. Victor Rozier, rue Childebert, 11, près la place Saint-Germain-des-Prés, à Paris. [illegible] francs par an. (Pour l'Étranger, le port en sus, suivant les tarifs des postes.) — Pour [illegible], les officiers de santé militaires appartenant à un corps expéditionnaire à l'étranger ne [illegible] pas d'augmentation dans le prix de l'abonnement. — On s'abonne au bureau du journal, par l'envoi d'un mandat de poste à l'ordre de M. Victor Rozier, ou de toute autre manière directe, la modicité du prix de l'abonnement ne permettant pas d'accorder de remise aux libraires ou commissionnaires. — Les abonnements sont faits, pour l'année entière, du 1er janvier au 31 décembre.

Afin d'éviter les difficultés que les souscripteurs peuvent éprouver dans certaines circonstances à faire parvenir leur renouvellement, le journal est servi sans interruption. Tout abonné qui ne le refuse pas à son arrivée, son abonnement étant terminé, est considéré comme réabonné. Le montant de cet abonnement doit être envoyé dans les deux mois qui suivent ; en cas de retard, il est réclamé par lettre.

La *Revue des médecins des armées* paraît tous les deux mois, avec un nombre de pages indéterminé. Les souscripteurs reçoivent en outre et sans augmentation de prix : 1° Le *Bulletin de la médecine et de la pharmacie militaires*; 2° *L'Annuaire spécial du corps de santé militaire*; 3° Un ouvrage de médecine à titre de prime.

[66]

TENUE DE L'ANNUAIRE DE 1865.

10e BULLETIN.

[Les radiations et les nominations sont notées en caractères gras.]

N° de l'Ann. MM.	Position actuelle.	Position nouvelle.	Date.
	Médecins-majors de Première classe.		
4 SAULNIER,	6e dragons.	**Retraité** (2,782 fr.).	23 déc.
—	**Nommé** *Officier* de la Légion d'honneur.		27 déc.
[38 ans de services, 1 campagne.]			
6 BRUN,	Hôp. de Toulouse.	**Retraité** (2,954 fr.).	23 déc.
7 LIANDON,	adj. au secr. du cons. de santé.	**Retraité** (2,628 fr.).	23 déc.
13 DUPARGE,	**Nommé** *Officier* de la Légion d'honneur.		27 déc.
[35 ans de services, 9 campagnes.]			
18 CARMOUCHE,	45e de ligne.	**Retraité** (2,238 fr.).	23 déc.
27 DE LAQUEILLE DE BOUSSAS,	2e cuirassiers (G.I.).	**Retraité** (3,108 fr.).	23 déc.
34 HANSEN,	5e cuirassiers.	**Retraité** (2,590 fr.).	23 déc.
48 MÉRIMÉE,	17e de ligne.	**Retraité** (2,590 fr.).	23 déc.
50 GIULIANI,	13e de ligne.	**Retraité** (2,590 fr.)	23 déc.
76 MOUTIER,	92e de ligne.	**Retraité** (2,590 fr.).	23 déc.
107 ARON,	11e de ligne.	**Retraité** (2,390 fr.).	23 déc.
151 CALCATOGGIO,	48e de ligne.	**Retraité** (2,350 fr.).	23 déc.

Par décret impérial du 23 décembre 1865, les neuf médecins-majors de deuxième classe dont les noms suivent, ont été **Nommés** au grade de *Médecin-major de Première classe* :

266 a. REY,	16e d'artillerie-monté.	»	»
267 a. SPIRE,	4e hussards.	»	»
268 a. MONNIER,	97e de ligne.	»	»
269 a. ROPERT,	Dragons de l'Impératrice (G.I.).	»	»
270 a. POTOR,	13e d'artillerie-monté.	»	»

Pag.	N° de l'Ann.	MM.	Position actuelle.	Position nouvelle.	Date.
53	271	*c.* Leroux,	Corps exp. du Mexique.		
—	272	*c.* Allaire,	Chasseurs (G.I.).		
—	273	*c.* Rondet,	Artillerie-monté (G.I.)		
—	274	*c.* Widal,	Hôp. de la div. d'Alger.		

Médecins-majors de Deuxième classe.

58	39	Aspol,	**Nommé** *Chevalier* de la Légion d'honneur.		2[illegible]
		[20 ans de services, 7 campagnes.]			
59	111	Ridreau,	**Nommé** *Chevalier* de la Légion d'honneur.		2[illegible]
		[24 ans de services, 8 campagnes.]			
58	140	Duval,	**Nommé** *Chevalier* de la Légion d'honneur.		2[illegible]
		[22 ans de services, 10 campagnes.]			
59	147	Licardy,	**Nommé** *Chevalier* de la Légion d'honneur.		2[illegible]
		[21 ans de services, 10 campagnes.]			
—	154	Rogues,	**Nommé** *Chevalier* de la Légion d'honneur.		2[illegible]
		[20 ans de services, 10 campagnes.]			
—	170	Latil,	55e de ligne.	34e de ligne.	2[illegible]
60	178	Martrès,	**Nommé** *Chevalier* de la Légion d'honneur.		2[illegible]
		[21 ans de services, 7 campagnes.]			
62	243	Jogand,	34e de ligne.	55e de ligne.	2[illegible]

Par décret impérial du 23 décembre 1865, les onze médecins aides-majors de première classe dont les noms suivent, ont été **Nommés** au grade de *Médecin-major de Deuxième classe* :

63	276	*a.* Nublat,	Hôp. du camp de Châlons.	»
—	277	*a.* de Séré,	Hôp. de Vincennes.	»
—	278	*a.* Hurst,	Hôp. Saint-Martin.	»
—	279	*a.* Krauss,	Hôp. de Belfort.	»
—	280	*a.* Couquet,	Garde de Paris.	»
—	281	*a.* Tison,	Hôp. de Lyon.	»
—	282	*a.* Hennequin,	Hôp. de Nancy.	»
—	283	*a.* Rigal,	Corps exp. du Mexique.	»
—	284	*c.* Beaunis,	Répétiteur à Strasbourg.	»
—	285	*c.* Sarazin,	Répétiteur à Strasbourg.	»
—	286	*c.* Morache,	En mission en Chine.	»

Médecins aides-majors de Première classe.

65	21	Vernier,	École imp. spéc. militaire.	Hôp. de Versailles.	1[illegible]

Par décret impérial du 23 decembre 1865, les quarante-deux médecins aides-majors de deuxième classe dont les noms suivent, qui ont accompli deux années d'ancienneté de ce grade, ont été **Nommés** au grade de *Médecin Aide-Major de Première classe*, pour prendre rang à la date du 31 décembre 1865 :

73	272	Pellegrin,	Surv. à l'école de Strasbourg.	»
—	273	Papillon,	Hôp. de Rome.	»
—	274	Bleicher,	Hôp. de Rome.	»
—	275	Pingaud,	Hôp. de Rome.	»
—	276	Cros,	Hôp. de Rome.	»
—	277	Hériot,	Hôp. de Rome.	»
—	278	Fournier,	Hôp. de Rome.	»
—	279	Gérard,	Hôp. de la div. d'Alger.	»
—	280	Rinaldi,	H. de la div. de Constantine.	»

N° de l'Ann.	MM.	Position actuelle.	Position nouvelle.	Date.
281	Fabriès,	Hôp. de la div. d'Oran.	»	»
282	Philippon,	Hôp. de la div. d'Alger.	»	»
283	Vanmerris,	Hôp. de la div. d'Oran.	»	»
284	Duchemin,	H. de la div. de Constantine.	»	»
285	Bontemps,	Hôp. de la div. d'Alger.	»	»
286	Barbier,	H. de la div. de Constantine.	»	»
287	Cuvillon,	Hôp. du Mexique.	»	»
288	Klée,	Hôp. de la div. d'Alger.	»	»
289	Brousson,	Hôp. du Mexique.	»	»
290	Renaud,	Hôp. de la div. d'Alger.	»	»
291	Bertelé,	Hôp. de la div. d'Alger.	»	»
292	Jacquez,	Hôp. de la div. d'Oran.	»	»
293	Jossot,	H. de la div. de Constantine.	»	»
294	Gaumé,	Hôp. de la div. d'Alger.	»	»
295	Bertrand,	Hôp. de la div. d'Oran.	»	»
296	Crouzillard,	H. de la div. de Constantine.	»	»
297	Thurel,	Hôp. de la div. d'Alger.	»	»
298	Delmas,	Hôp. de la div. d'Oran.	»	»
299	Louis,	H. de la div. de Constantine.	»	»
300	Rheims,	Hôp. de la div. d'Alger.	»	»
301	Lomet,	H. de la div. de Constantine.	»	»
302	Dumayne,	H. de la div. de Constantine.	»	»
303	Sonrel,	70e de ligne.	»	»
304	Pineau,	Hôp. de la div. d'Oran.	»	»
305	Ricou,	Hôp. de la div. d'Alger.	»	»
306	Arnaud,	Hôp. de la div. d'Oran.	»	»
307	Beaulès,	H. de la div. de Constantine.	»	»
308	Moutet,	Hôp. de la div. d'Oran.	»	»
309	Josien,	H. de la div. de Constantine.	»	»
310	Planque,	H. de la div. de Constantine.	»	»
311	Thomas.	H. de la div. de Constantine.	»	»
312	Aubert,	H. de la div. de Constantine.	»	»
313	Delort,	H. de la div. de Constantine.	»	»

Pharmacien principaux de Première classe.

Par décret impérial du 23 décembre 1865, le pharmacien principal de deuxième classe dont le nom suit a été **Nommé** au grade de *Pharmacien principal de Première classe* :

1	6 Robillard,	Hôp. de Vincennes.	»	»

Pharmaciens principaux de Deuxième classse.

Par décret impérial du 23 décembre 1865, le pharmacien-major de première classe dont le nom suit a été **Nommé** au grade de *Pharmacien principal de Deuxième classe* :

1	6 Coulier,	Professeur à l'école de m. et de ph. mil.	»	»

Pharmaciens-majors de Première classe.

1	1	Duplat,	Hôp. div. de Constantine.	**Retraité** (3,108 fr.).	23 déc.

Par décret impérial du 23 décembre 1865, les deux pharmaciens-majors de deuxième classe dont les noms suivent ont été **Nommés** au grade de *Pharmacien-major de Première classe* :

37	*a.* Bocher,	Hôp. de Belfort.	»	»
38	*c.* Bessier,	Hôp. du camp de Châlons.	»	»

Pag.	N° de l'Ann.	Position actuelle.	Position nouvelle.	Ira

Pharmaciens-majors de Deuxième classe.

Par décret impérial du 23 décembre 1865, les trois pharmaciens aides-majors de première classe dont les noms suivent, ont été **Nommés** au grade de *Pharmaciens-majors de Deuxième classe* :

84	44 *a.*	Delcusse,	Hôp. de la div. d'Alger.	»
—	45 *a.*	Trequet,	Corps exp. du Mexique.	»
—	46 *c.*	Musculus,	Hôp. de Vincennes.	»

Pharmaciens aides-majors de Première classe.

Par décret impérial du 23 décembre 1865, le pharmacien aide-major de deuxième dont le nom suit, ayant accompli deux années d'ancienneté dans ce grade, a été **Nom** au grade de *Pharmacien Aide-major de Première classe*, pour prendre rang à la d 31 décembre 1865 :

86	55	Ulrich,	Hôp. de la div. d'Oran.	»

MOUVEMENTS DE TROUPES.

Le 2e régiment de cuirassiers de la garde, parti de Melun les 21 et 22 décem est arrivé les mêmes jours à Fontainebleau, où il formera, avec le 1er régime même arme, le *régiment de cuirassiers de la garde impériale.*

Le 1er régiment de carabiniers, parti de Tours les 19, 21 et 22 décembre, vera les 29 et 31 décembre à Melun ;

Le 2e régiment, parti de Vendôme les 19, 21 et 22 décembre pour Mel arrivera les 26 et 28 décembre.

Ces deux régiments formeront le *régiment de carabiniers de la garde impé*

1er régiment d'artillerie à pied. — La 3e batterie, partie de Lorient le 2 cembre pour Cherbourg, y arrivera le 4 janvier 1866 ; la 16e batterie, part la Rochelle le 21 décembre pour Rennes, y arrivera le 31 décembre et sera primée à partir du 1er janvier 1866 ; la 1re batterie, à Brest ; la 5e batter Fougères ; la 8e batterie au Mexique ; état-major, les 2e, 4e, 6e, 7e, 9e, 10e, 1 12e batteries à Rennes ; les 13e, 14e et 15e batteries seront supprimées à dat 1er janvier 1866.

4e régiment d'artillerie à pied. — Une batterie, partie de Bourges, le 18 cembre pour la Rochelle, y arrivera le 31 décembre ; la 11e batterie part de B de suite pour se rendre à Bourges ; la 5e batterie à Marseille ; la 10e batte Perpignan ; la 12e batterie à Rome ; la 1re batterie au Mexique ; l'état-major batteries à Bourges ; les 13e, 14e, 15 et 16e batteries seront supprimées à dat 1er janvier 1866.

Nota. Sont supprimés à dater du 1er janvier 1866 :

Dans la garde impériale : le 4e bataillon des régiments d'infanterie.—Le 6e cadron des régiments de cavalerie de réserve et de ligne.—La division d'arti à pied. — Les 7e et 8e batteries du régiment d'artillerie monté. — La divisio génie. — Une compagnie de l'escadron du train des équipages militaires.

Dans les troupes de ligne : le 6e escadron des régiments de cavalerie de re et de ligne. — Les 13e, 14e, 15e et 16e batteries des 1er, 2e, 3e, 4e et 5e régi

illé ie. — La 10e batterie des 7e, 8e, 9e, 10e, 11e, 12e, 13e, 14e, 15e et 16e régi ts. — La 8e batterie des 17e, 18e, 19e et 20e régiments. — La 5e compagnie 1er, 3e, 4e, 5e et 6e escadrons du train d'artillerie. — La 5e compagnie princi e et la 5e compagnie *bis* du 2e escadron du train d'artillerie. — Deux sections vriers d'administration.—Les 10e et 11e sections d'infirmiers.

DIVERS.

La Société médicale d'émulation a procédé, dans sa dernière séance, au re uvellement du bureau pour 1866. Ont été nommés, *président*, M. Simonot ; *ce-président*, M. Martin, médecin principal à l'Hôtel impérial des Invalides ; *rétaire général*, M. Gallard ; *secrétaires annuels*, MM. Linas et de Vauréal. M. le baron Hippolyte Larrey a été nommé, par acclamation, *président d'hon eur*.

— Dans le dernier concours pour des emplois de professeur agrégé à l'école de decine militaire, les questions pour la composition écrite ont été posées ainsi il suit :

Médecine. — Des modes de propagation des maladies épidémiques.

Chirurgie. — Des complications des plaies pénétrantes de poitrine avec lésion poumon.

— La commune de Ferrières (Allier) ne possède pas de médecin en ce moment. te position paraît être assez avantageuse et pourrait convenir à un médecin tuire en retraite, qui, pour ne pas rester inactif, voudrait se livrer à la clientèle le. Ecrire directement à M. le maire de Ferrières.

Il y a aussi un emploi de vétérinaire vacant dans cette commune.

— Nous prions les quelques souscripteurs qui n'ont pas acquitté leur cotisation 1865, pour le *Bulletin de la médecine militaire*, de nous en faire parvenir le ntant le plus tôt possible.

— En raison de l'encombrement qui a lieu en ce moment à l'administration des stes, nous reculerons de quelques jours l'envoi des primes et des autres livres nous ont été demandés. Nous adoptons cette mesure pour éviter à nos abonnés pertes dont quelques-uns ont été victimes les années précédentes, S'il s'en vait parmi eux qui ne voulussent pas attendre, ils seraient servis immédiate nt sur leur demande.

— Nous rappelons à nos abonnés que non-seulement nous sommes en mesure faire prendre leur souscription aux autres journaux et de leur fournir tous les res de médecine ou autres aux prix des catalogues des éditeurs, sans leur faire porter le port des volumes, mais que notre commission s'étend à d'autres ets d'un envoi facile par la poste ou par les messageries, tels que les décora s qui leur ont été conférées, les instruments de chirurgie (à l'exception de x qui sont en argent, que la poste n'accepte pas comme échantillons, seul

mode d'envoi en Algérie), etc., etc. Les livres seuls sont envoyés à nos frais ; le port des autres objets reste à la charge des destinataires. Ils leur sont adressés sous leur responsabilité par la voie qu'ils indiquent.

Les envois par la poste sont aux risques et périls des destinataires, l'administration ne répondant pas des objets qu'elle transporte et ne donnant aucune indemnité en cas de perte.

— Quelques souscripteurs nous adressent en timbres-poste soit le prix d'abonnement au *Bulletin*, soit le montant de livres que nous leur avons fournis. Nous rappelons que les timbres-poste ne doivent être envoyés que comme appoint pour acquitter une somme au-dessous de cinq francs.

BULLETIN BIBLIOGRAPHIQUE.

La vie et les mœurs des animaux (zoophytes et mollusques), par Louis Figuier ; volume in de 385 figures dessinées d'après les plus beaux échantillons du muséum d'histoire naturelle et des principales collections de Paris. Paris, 1866, gr. in-8 de XI-500 pages. L. Hachette, éditeur.

Recherches sur les conditions anthropologiques de la production scientifique et esthétique, par Théodore Wechniakoff ; premier fascicule, in-8° de XXXIII-104 pages, prix : 3 fr.

De la propagation du choléra et des moyens de la restreindre, par le Dr Jules Worms ; brochure in-8 de 44 pages. Prix : 1 fr. 50.

De la préservation du choléra épidémique et d'une hygiène spéciale applicable au traitement de la maladie réalisée, par le Dr Max Simon ; 1 volume in-18 de 200 pages, prix : 2 fr. 50.

Ces trois ouvrages sont édités par MM. Victor Masson et fils.

Conditions sanitaires des armées pendant les grandes guerres contemporaines, par M. le Dr de Valcourt, 1 br. gr. in-8° de 30 pages, Germer-Baillère, éditeur : 50 cent.

Les petites causes de nos maladies, par le docteur Édouard Féraud ; Paris, 1865, 1 vol. in-18 ; charpentier, 5 fr.—Librairie centrale, 24, boulevart des Italiens.

Iodothérapie ou de l'emploi médico-chirurgical de l'iode et de ses composés et particulièrement des injections et des badigeonnages iodés ; par A. Bonnet. Ouvrage couronné par l'Académie des sciences et par l'Académie de médecine.—2e édition, 1 vol. in-8° de XVI-111[illegible] Prix : 14 fr.—(C'est par erreur que la dernière annonce indiquait 9 fr.)—Victor Masson et fils, éditeurs.

Note sur le traitement des fractures de la jambe par l'appareil hémi-périphérique en plâtre, par *M. le médecin principal de 1re classe* Périer, *médecin en chef de la division d'Alger*, lu à la séance de la Société de médecine d'Alger, le 2 mars 1865, par M. le Dr Morand, médecin major à l'hôpital du dey.—Alger, 1865, in-8° de 33 pages, avec 2 planches.

V. ROZIER, Directeur-gérant.

Paris. — Imprimerie de Cosse et J. Dumaine, rue Christine, 2.

LISTE DES OUVRAGES DONNÉS EN PRIME.

[illegible]plément de 40 fr. port compris, ou de 9 fr. si la prime est prise au bureau.

[illegible]. Code des officiers de santé de l'armée de terre ou Traité de droit administratif, d'hygiène et de médecine légale militaires, complété des instructions qui régissent le service de santé des armées.

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[illegible]gier et Duruy. Pansectes pharmaceutiques ou Recueil de tous les statuts, lettres-patentes, déclarations, arrêtés, décrets, ordonnances, règlements, avis du conseil d'État et [illegible]ouveté, circulaires ministérielles et arrêts concernant les pharmaciens civils et militaires; histoire des [illegible]es et des écoles de pharmacie de France, de 4312 [illegible]. Paris, 1837, in-8°. 738 p. Prime pour deux [illegible].—Port 70 c.

[illegible]ssais. De l'Irritation et de la Folie. Ouvrage dans lequel les rapports du physique et [illegible]ral sont établis sur les bases de la médecine physiologique. 2e édit., entièrement refondue. Paris, 1839, [illegible]-8°. Prime pour deux années.—Port 4 fr. 45 c.

[illegible]se. Traité de médecine, texte latin, d'après l'édition de Léonard Targa, avec les titres de l'édition de Haller; traduction française de Ninnin, revue et [illegible], 1 vol. in-8° à 2 col. de 442 p., formant la matière de 3 vol. Prime pour une année.—Port 40 c.

[illegible] tous les exemplaires de cette édition une feuille est jaune. Le remplacement est donné afin d'éviter les réclamations.

[illegible]sal d'une bibliographie universelle de la médecine, de la chirurgie et de la pharmacie militaires, [illegible]. 1863, in-8° de VII-231 pages à 2 colonnes. — Prime pour une année.—Port 25 c.

[illegible]egani. Traité du Siége et des Causes des maladies des Indes, traduction française de Destouet. [illegible]. in-8° à 2 col. de 1,712 p., formant la matière de [illegible]. Prime pour trois années.—Port 1 fr. 45 c.

[illegible]mazzini, Rœderer, Wagler et Jurine. Traité des maladies des artisans, etc., etc. 1 vol. in-8° à 2 col. de 484 p., formant la matière de 3 vol. Prime pour une année.—Port 45 c.

Ce volume contient : le Traité des maladies des artisans, par Ramazzini; le Traité de la Maladie de la Muqueuse, de Rœderer et Wagler; le Mémoire sur l'Angine de poitrine, de [illegible].

[illegible]ssal. Œuvres; édition du professeur Hallé. 4 vol. in-8° à 2 col. de 696 p., formant la matière de 4 vol. Ce volume contient : Traité des Nerfs et de leurs Maladies : *Historia febris epidemicæ biliosæ; Britannæ*, etc., etc. Prime pour une année.—Port 60 c.

[illegible]nermann. Traité de l'Expérience. Barry. Traité de la Dyssenterie, et Maladies goutteuse. 4 vol. in-8° à 2 col. de [illegible] 624 p., formant la matière de 4 vol. Prime pour une année.—Port 55 c.

[illegible]part. Traité des maladies des voies urinaires, avec des notes et des additions; par [illegible]. Ségalas. In-8°, à 2 col. de 494 p., formant la matière de 3 vol. Prime pour une année. — Port 45 c.

[illegible]gendie. Formulaire pour l'emploi et la préparation de plusieurs nouveaux médicaments. [illegible]ième édition. Paris, 1836, in-12. Prime pour une [illegible].—Port 30 c.

Corvisart, Bayle, Avenbrugger. Essai sur les maladies et les lésions organiques du cœur et des gros vaisseaux, par Corvisart. — Nouvelle méthode pour reconnaître les maladies internes de la poitrine par la percussion de cette cavité, par Avenbrugger, traduit du latin et commenté par Corvisart. — Recherches sur la phthisie pulmonaire, par Bayle, suivi de ses travaux et mémoires. In-8° à 2 col. de 479 p., formant la matière de 3 vol. Prime pour une année.—Port 60 c.

Scrive. Traité théorique et pratique des plaies d'armes blanches, à l'usage des chirurgiens d'armée. (Ouvrage couronné par le Ministre de la guerre, en 1843, concours général). Paris, 1861, in-8° de 446 p. Prime pour une année.—Port 45 c.

Baudens (L.-M.). 1° Nouvelle méthode des amputations (amputation tibio-tarsienne), (couronnée par l'Académie), Paris, 1842, in-8°, 48 pages. — 2° Mémoire sur les solutions de continuité de la rotule. Description d'un appareil curatif nouveau pour le traitement des fractures transversales. Paris, 1853. Gr. in-8. 44 pages. — 3° Des règles à suivre dans l'emploi du chloroforme. Paris, 1853. Gr. in-8°, 30 pages. — 4° De l'entorse du pied et de son traitement curatif. Paris, 1852. Gr. in-8°, 31 pages. — 5° Mémoire sur la résection de la tête de l'humérus d'après un nouveau procédé opératoire. Paris, 1855. Gr. in-8°, 28 pages. — 6° Efficacité de la glace combinée à la compression pour réduire les hernies étranglées et combattre la péritonite consécutive. Paris, 1854, in-8°, 32 pages. — 7° Des fractures du membre pelvien traitées à l'aide d'un appareil de M. Baudens. Paris, 2 parties 1854-1855, in-8°, 108 pages, fig. dans le texte. — Ensemble huit brochures.—Prime pour deux années.—Port 50 cent.

Pingrenon (F.-S.-J.). Remarques et observations sur les fractures du crâne, sur la fracture indirecte du corps de la première vertèbre lombaire et sur la flexion permanente, par refoulement de l'os radius chez l'adulte. Paris, 1869, gr. in-8, 86 pages.—Prime pour une année. Port 15 cent.

Choulette (S.). Observations pratiques de chimie, de pharmacie et de médecine légale. 1860. Gr. in-18 de 143 pages.

Avec un supplément de 2 fr. 50 c. port compris.

Gama (J.-P.). Traité des plaies de tête et de l'encéphalite, principalement de celle qui leur est consécutive. Ouvrage dans lequel sont discutées plusieurs questions relatives aux fonctions du système nerveux en général. 2e édition. Paris, 1835. 1 vol. in-8° de XXII-616 p., dont le prix est de 7 fr.

Avec un supplément d'un franc, port compris, l'un des ouvrages ci-dessous indiqués, prime pour une année.

Da-Olmi. Précis historico-physique d'hygiène navale, suivi d'un recueil analytique des meilleurs écrits publiés sur les quatre maladies les plus redoutables aux navigateurs européens en Amérique et aux Indes : le scorbut, le tétanos, le choléra-morbus et la fièvre jaune. Paris, 1828, in-8°, VII-634 pages.

Aubert (L.). De la peste ou typhus d'Orient. Documents et observations recueillis pendant les années 1834 à 1838, en Egypte, en Arabie sur la mer rouge, en Abyssinie, à Smyrne et à Constantinople. Suivis d'un essai sur le hachisch et son emploi dans le traitement de la peste. Paris, 1840, in-8°, 285 p.

Fristo. Petit manuel du chirurgien de bataille, ou conseil sur les blessures les plus fréquentes chez les militaires pendant la guerre. Paris-Metz, 1848, in-8°, 252 pages, pl.

NOTE SUR LES TENTES ET BARAQUES

APPLIQUÉES AU TRAITEMENT DES BLESSÉS, LUE DANS LA SÉANCE DE L'ACADÉMIE IMPÉRIALE DE MÉDECINE DU 27 JUILLET 1869, PAR M. A. HUSSON, DIRECTEUR DE L'ADMINISTRATION GÉNÉRALE DE L'ASSISTANCE PUBLIQUE.

Depuis un certain nombre d'années, les questions d'hygiène ont pris, dans la pratique hospitalière, une véritable prépondérance : administrateurs et médecins, animés d'un même sentiment de généreuse émulation, unissent les efforts ingénieux de l'art et les suggestions d'une infatigable prévoyance pour accomplir avec efficacité la mission de sauvegarder la vie des hommes confiés à leurs soins. De savantes combinaisons président à la construction des nouveaux hôpitaux ; les anciens se modifient ou se transforment ; leur régime intérieur se perfectionne par une large aération, une propreté minutieuse, une alimentation plus réparatrice. La science, chaque jour enrichie par de nouvelles découvertes, facilite et multiplie les moyens de traitement. A aucune époque, on peut le dire, il n'a été mis au service de

FEUILLETON DE LA REVUE DES MÉDECINS DES ARMÉES DE TERRE ET DE MER.

LE CHIRURGIEN-MAJOR.

S'il est une mission dans l'armée difficile à bien remplir, c'est sans contredit celle des officiers du service de santé.

∴

Leur mérite, en effet, ne saurait se résumer dans la façon plus ou moins adroite de porter ou de parer un brutal coup de sabre, et d'ajuster ou d'affronter sans pâlir un coup de pistolet ; au bout de quelques mois de campagne le premier venu peut en arriver là.

∴

Dans un tel poste, en effet, il ne suffit pas d'être doué de la bravoure

ceux qui souffrent plus de ressources intellectuelles et plus de réel dévouement.

Ces améliorations considérables que l'amour si naturel du bien voudrait incessamment étendre, mais que l'insuffisance des budgets hospitaliers force de limiter, ou tout au moins de ralentir, semblent cependant ne pas répondre, d'une manière complète, à tous les besoins de la pratique médicale. On rencontre, en effet, dans les hôpitaux, spécialement dans le domaine de la chirurgie, des maladies ou des affections intercurrentes, de nature infectieuse, qui déroutent toutes les prévisions et ont trop souvent une issue fatale. Ce n'est pas que les accidents qui se produisent ainsi (résorptions purulentes, érysipèle, etc.) soient particuliers aux hôpitaux; ils sont fréquents aussi dans la pratique de la ville, où on les observe presque toujours, en même temps que dans les établissements hospitaliers, et l'un de nos plus savants collègues pourra vous dire qu'en plaçant plusieurs de ses malades à la campagne, dans les conditions d'isolement et d'aération que permet seule la richesse ou une grande aisance, il n'a pu lui-même les éviter; mais il est permis de croire, et pour beaucoup d'esprits convaincus,

la plus intrépide, — cependant chaque jour les chirurgiens militaires peuvent être appelés à en donner des preuves, — il faut, de plus, s'y distinguer par de moins communes sinon de plus rares qualités.

***

Quel que soit le grade qu'occupe le chirurgien dans l'ordre de la hiérarchie militaire, il est traité par tous avec déférence, cordialité ou respect. N'est-ce pas, en effet, de sa main fraternellement dévouée ou charitable que chacun est en droit d'espérer des soins et des secours?

***

Ce n'est pas sans abnégation qu'il embrasse sa carrière. Il sait que pour lui l'avenir n'est pas sans limites. Ses frères d'armes peuvent aspirer aux torsades à épinards, aux épaulettes à étoiles, au bâton de maréchal.

il est aujourd'hui certain que les réunions de malades favorisent le développement de ces affections qui se multiplient ou s'aggravent sous les influences nosocomiales.

Avec une ardeur assurément légitime dans l'étude de pareilles questions, on a disserté et on disserte encore sur le caractère essentiel de plusieurs de ces maladies, et l'on s'est mis à la recherche des moyens propres à les prévenir, là surtout où elles sont le plus à craindre. On a été, dans cette recherche, jusqu'à interroger des champs de bataille lointains, où les faits d'encombrement et les traumatismes les plus divers et les plus compliqués se présentent sur une échelle gigantesque.

La guerre engendre des maux incalculables, en détruisant les richesses matérielles et la vie encore plus précieuse des hommes : elle multiplie les blessures et couche sur le sol une foule de combattants braves et vigoureux auxquels la reconnaissance publique et le devoir de l'humanité commandent de porter les plus efficaces et les plus prompts secours. Mais, presque toujours, à la suite des combats, et malgré toutes les prévoyances des généraux et des administrations militaires, les moyens de recueillir et de soigner

Lui, il est médecin et sera toujours médecin. On l'appelle monsieur le docteur, il mourra monsieur le docteur.

Quelle que soit l'augmentation de ses émoluments, ce ne sera jamais à ceux-ci qu'il sera redevable de sa fortune.

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Mais quand viendra sa dernière heure, il pourra fermer les yeux en paix; sa vie de dévouement et de noble ambition, sacrifiée dans l'intérêt de ses semblables, n'aura pas été pour lui inutilement employée sur la terre.

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En attendant, il vit libre et indépendant aussi bien dans les casernes qu'en campagne. Ses arrêts ont force de lois. Dès qu'il a parlé, tout cède. Il est juste que cela soit.

normalement les blessés font défaut : de là la nécessité de les ramener en arrière pour les diriger, souvent à de longues distances, vers les hôpitaux réguliers des villes, ou de les installer dans les églises et autres bâtiments publics ou privés transformés en hôpitaux provisoires.

Dans ces conditions, il est difficile, on le conçoit, d'éviter l'encombrement et les inconvénients multiples inhérents à de telles installations. On s'est donc attaché, dans les dernières guerres qui ont affligé le monde, à étendre le traitement sous la tente, à perfectionner celle-ci, de manière à assurer plus d'aération, plus d'isolement, et comme il a semblé que ces applications, réalisées sur une très-grande échelle dans la guerre américaine de la Sécession, avaient produit les meilleurs résultats au point de vue de la guérison des blessés, on a été amené, malgré les différences profondes des circonstances et des conditions où se trouvaient les malades, à essayer d'introduire, dans la pratique des hôpitaux civils, ces constructions légères en toile ou en bois qu'on improvise dans les espaces découverts : je veux parler des tentes et des baraques.

Il serait difficile d'assigner une origine exacte à l'idée de

Science et courage ne lui suffisent pas ? Que lui faut-il donc de plus? Promptitude, sang-froid, fermeté inébranlable, douceur de tous les instants, impartialité *quand même*, grande sûreté de main, rare perspicacité de coup d'œil ; élocution affable, volonté énergique ; nature calme et décidée, et un profond amour de la frêle humanité.

Si vous doutez qu'il soit commun de rencontrer ces qualités réunies sous la plupart des habits à basques de nos chirurgiens militaires, c'est que vous n'avez jamais eu recours aux bons soins de ces véritables frères ou pères du soldat.

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Voulez-vous une preuve de ce que j'avance ? Voici :

Nous étions devant Constantine.

Le 11 octobre 1837, c'est-à-dire deux jours avant l'assaut, terrible pour tous, qui devait nous livrer la ville. Le plateau de Mansourah était

placer les malades, et surtout les blessés, dans des baraques de bois ou sous la tente, dans le but de les amener plus sûrement et plus rapidement à la guérison. Bell et Hennen, dans la guerre d'Espagne, ont traité, sous la tente, un grand nombre de blessés anglais. En 1847, à New-York, pendant une épidémie de typhus qui régnait dans les hôpitaux, on plaça les malades sous la tente.

Le point de départ vraiment scientifique de cette pratique semble être la guerre de Crimée. Miss Nightingale fit construire des baraques sous lesquelles l'armée anglaise passa l'hivernage de 1855. M. Michel Lévy s'épuisa en efforts pour faire créer des hôpitaux sous tentes, afin d'y soigner les typhiques. En 1854, il avait pu en faire construire à Varna, et il en obtint les résultats suivants (1) :

Les deux hôpitaux intérieurs de Varna ont reçu, en septembre 1854, 2,314 cholériques, dont 1,389 moururent (mortalité 60,03 p. 100); tandis que, dans trois hôpitaux sous tentes, établis à 6 kilomètres de cette ville, on n'a compté que 698 morts sur 2,635 cholériques (mortalité 26,45 p. 100).

(1) *Traité d'hygiène publique et privée*, tome II, page 542, 1869.

encombré par les divers services des ambulances. Morts, mourants et blessés étaient pêle-mêle entassés ou accroupis, à l'entour des caissons vides du train des équipages. Depuis cinq jours que la place était investie, il n'avait cessé de pleuvoir. Les plus valides se garaient de la pluie sous les voitures. Les autres pataugeaient ou grouillaient dans la boue, attendant l'heure de conquérir sous les tentes, *réservées aux amputés*, une place qui ne pouvait leur être octroyée qu'au prix de l'enlèvement du corps de l'un de leurs frères d'armes décédé.

∴

Le temps était affreux. Le vent, dans sa furie, déracinait les piquets des tentes et faisait tourbillonner celles-ci dans l'espace, abandonnant aux fureurs de l'ouragan les malheureux auxquels les chirurgiens venaient d'amputer un membre.

En 1859, pendant la campagne d'Italie, M. le baron Larrey, à plusieurs reprises et spécialement par une lettre adressée, le 9 juin, à M. l'intendant général Paris, annonça l'intention de réclamer, s'il en était besoin, l'organisation d'hôpitaux sous tentes.

Depuis longtemps, dans un certain nombre d'hôpitaux russes, on a l'habitude de loger, pendant l'été, les malades dans des constructions légères en bois, largement aérées, auxquelles on donne le nom d'hôpitaux d'été.

L'impulsion réelle et décisive est venue des États-Unis. Dans la dernière guerre du Sud, de grands hôpitaux, formés par l'agglomération de pavillons-baraques, furent créés sur des points rapprochés du théâtre de la lutte. De véritables hôpitaux sous tentes furent installés, en outre, partout où l'on combattait. Les ambulances de première ligne, placées cependant hors de la portée des projectiles, étaient formées par la juxtaposition de tentes de 25 mètres carrés environ de surface, et ce système fut même mis en usage dans les hôpitaux permanents, par exemple à l'hôpital Lincoln à Washington.

Les excellents résultats obtenus par les Américains, après

Leur unique couverte de campement leur servait de lit sur la terre détrempée par les rafales et la pluie.

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Le personnel des ambulances était sur les dents ; à peine une tente était-elle réinstallée, que deux autres se décapotaient à leur tour. Au sein du tumulte causé par leur chute, au bruit des plaintes et des cris des blessés, les chirurgiens militaires encourageaient par leur exemple les infirmiers à ne pas se lasser dans leur incessante lutte contre les éléments.

∴

A leur tête était un jeune homme, au front vaste, à l'œil vif, au geste décidé, à la voix brève et facile à reconnaître comme habituée à un énergique commandement.

Les longues bottes où s'engouffraient les jambes de ses pantalons

les amputations, résultats qui, jusqu'à présent, n'ont été égalés dans aucune armée européenne, excitèrent vivement l'attention sur la question des hôpitaux sous tentes. A Berlin, dès 1864, l'hôpital de Bethanie transférait, pendant l'été, son service de chirurgie sous une tente élevée dans le jardin de l'établissement.

La Charité de Berlin ne tarda pas à être dotée, sous le nom de Lazaret d'été, d'une construction en bois, dans la forme d'une salle ordinaire d'hôpital.

La même année, dans la guerre du Schleswig-Holstein, on appliqua le système à la chirurgie militaire, mais dans des proportions restreintes. La guerre de 1866 généralisa bientôt cette pratique en Allemagne.

Après la bataille de Langensalza, le docteur Stromeyer soigna les blessés sous une tente-baraque ; la même méthode fut assez souvent suivie en Bohême. Après les combats acharnés dont ce pays fut le théâtre, on évacua un grand nombre de blessés sur un château appartenant au prince royal de Prusse. On relégua d'abord ces malades dans les écuries du château, où le défaut d'aération produisit des résultats désastreux : mais bientôt les blessés furent trans-

s'enfonçaient dans la boue jusqu'aux tirants, à chaque effort qu'il faisait pour maintenir le coin d'une tente dont il s'était emparé de la main gauche; la droite, armée d'un maillet, frappait à coups redoublés sur les piquets, qui lui rejetaient à la face la vase dans laquelle ils étaient plongés.

∴

— Courage! mes amis, s'écriait-il, c'est pour sauver vos camarades, vos frères d'armes. Allons! encore un coup de main, et nous y arriverons. Courage! courage!

Et il n'abandonnait une tente que pour aller en consolider une autre.

∴

Dans l'un de ses courts trajets, il aperçut un infirmier qui s'était allé blottir sous un caisson. De là le mauvais drôle jouissait en paix

férés dans des baraques construites à la hâte dans le parc, et les guérisons s'opérèrent rapidement. Ce détail m'a été donné, en 1867, par S. A. la princesse royale de Prusse.

Aujourd'hui, la plupart des hôpitaux allemands soignent, pendant l'été, les malades sous la tente; ce système est appliqué à peu près partout, notamment à Francfort, Kiel, Berlin, Dresde, Hambourg, Prague, Leipzig, etc.

Le moment est venu pour nous de tenter ces applications dans des conditions qui offrent, à tous les points de vue, les garanties que l'on doit assurer, lorsqu'il s'agit de la vie des hommes et de la sincérité des tentatives faites pour la mieux préserver.

Des documents statistiques ont été publiés en Allemagne: un excellent travail d'un élève interne de nos hôpitaux, M. Chantreuil, publié dans les *Archives générales de médecine* (1), nous les a fait connaître, et il paraît résulter de la pratique des quatre dernières années que les succès après les opérations sont notablement plus fréquents pour les

(1) *Etude sur quelques points d'hygiène hospitalière*, 1868.

blessés soignés pendant l'été dans des baraques ou sous la tente que dans les salles des hôpitaux.

Quatre systèmes se trouvent en présence : 1° les baraques ; 2° les baraques-tentes ; 3° les tentes-hôpitaux ; 4° les tentes.

1° Les baraques ou hôpitaux d'été, employés en Russie et à la Charité de Berlin, sont des constructions permanentes en bois, ou constituées par une combinaison de la maçonnerie et de la charpente. Les parois latérales, plus ou moins largement vitrées, sont en planches, et leur mobilité permet une abondante aération. Elles pourraient être chauffées en hiver et servir, en cas de besoin, en toute saison. C'est, en définitive, une construction fixe, une maison d'été, une sorte de châlet-hôpital.

2° Les baraques-tentes sont construites partie en bois, partie en toile. Le type de cette construction est la tente du docteur Stromeyer, établie à Langensalza. (Le dessin en a été reproduit par M. Chantreuil, d'après le livre de Fischer sur la chirurgie d'armée.) Le toit est en bois, muni, comme celui des baraques, d'un faux toit pour la ventilation ; la paroi qui correspond aux pignons est en toile ; les

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du pénible spectacle auquel ses camarades venaient prendre part à l'envi.

* * *

— Misérable! s'écria-t-il en le saisissant au collet, vous mériteriez d'être souffleté en tête de votre compagnie. Eh quoi! vos supérieurs s'empressent d'être utiles à vos camarades, et vous, lâche déserteur du devoir... Tenez, éloignez-vous; car, dans ma colère, je ne sais trop quel traitement mérité je vous ferais subir! Rendez-vous à la *garde du camp*, vous y resterez quinze jours.

* * *

Pendant une heure et plus, le chirurgien, c'en était un, prêta encore la main aux plus dégoûtantes besognes, puis, sans changer son habit dont les flaques de boue avaient maculé et en partie fait disparaître sous leurs couches épaisses les riches ornements qui en garnissaient les pans, les parements et le collet; armé de ses instruments de chirurgie, il se remit carrément et froidement au pansement de ses blessés.

Il en amputa *soixante-trois* en vingt-six heures.

* * *

Ce noble cœur, qui dans mainte affaire fut toujours à son poste, à l'endroit le plus périlleux de la mêlée, ne devait pourtant point périr sur le sol étranger.

Mais s'il est mort en France, il a pu, quoique jeune encore, laisser à ses successeurs une longue suite de bons exemples à suivre devant l'ennemi.

* * *

Ce chirurgien, qui commandait en chef le service de santé pendant l'expédition de Constantine, n'était autre que Baudens, mort à Paris, en 1857.

Ch. Dubois de Gennes (*Illustration militaire*).

parois latérales sont tantôt en toile, tantôt en planches, la partie antérieure étant fixe, la partie supérieure pouvant être relevée et former auvent.

3° Les tentes-hôpitaux sont entièrement formées de toiles supportées par une charpente. Le meilleur type à suivre paraît être la tente militaire prussienne, qui mesure 20 mètres de long sur 8 mètres de large, et qui est partagée en trois parties : la tente proprement dite, dans laquelle on place de 20 à 22 malades ; deux autres tentes plus petites disposées à chaque extrémité et destinées, l'une à loger les infirmiers, l'autre à recevoir le matériel. Le toit, fermé de toutes parts, ne permet qu'une aération tout à fait insuffisante.

4° Les tentes, d'une dimension beaucoup plus restreinte, présentent des spécimens assez nombreux, et ont été appliquées à des destinations multiples. La tente américaine, formée par une double toile, mesure 5 mètres de côté, et, sur cette surface de 25 mètres carrés, on installe généralement six malades.

Rapprochées les unes des autres, ces tentes, dont on relève les parois en rapport, peuvent, comme cela a été fait en Amérique, constituer des hôpitaux mobiles qu'on dresse, qu'on enlève, qu'on déplace en moins d'une heure. Séparées, ces tentes peuvent servir à l'isolement de quelques malades. A côté de la baraque d'été, l'hôpital de la Charité de Berlin possède quelques tentes d'isolement.

Pour se rendre compte de l'efficacité relative de ces divers systèmes, l'administration des hôpitaux de Paris a fait construire à l'hôpital Cochin, sur la demande et sur les indications de M. le docteur Le Fort, une tente-hôpital avec deux petites tentes sur les côtés en avant. Les malades y sont placés en commun et en nombre assez considérable. De plus,

voulant entreprendre l'expérience dans des conditions qui pussent répondre à des points de vue divers, elle a fait établir, dans les jardins de l'hôpital Saint-Louis, une baraque plus restreinte qui contient de huit à dix lits, avec deux baraques plus petites encore, où l'on peut isoler et soigner un seul malade.

La tente-hôpital de l'hôpital Cochin réunit, il nous semble, des avantages qu'on ne trouve pas dans les tentes-hôpitaux précédemment construites.

Une disposition très-simple de la charpente a permis de la munir d'un faux toit, si utile pour une bonne ventilation. Elle se compose de deux toiles, partout séparées l'une de l'autre, et qui livrent passage à une couche d'air sans cesse renouvelée, qui contribue puissamment à maintenir la fraîcheur pendant le jour et la chaleur pendant la nuit.

La toile extérieure, perméable à l'air, mais imperméable à la pluie, peut, jusqu'à la partie inférieure du toit, être relevée horizontalement et forme alors une galerie couverte qui permet aux malades de s'asseoir à l'abri du soleil.

La toile inférieure figure un plafond horizontal, fendu au centre, dans toute sa longueur, pour le passage de l'air. Sur les côtés, elle retombe en rideaux qui, glissant à volonté sur des tringles de fer, permettent de donner à la tente la forme d'un toit terminé par un auvent horizontal, et de mettre ainsi les malades tout à fait en plein air pendant la chaleur du jour. Les deux petites tentes établies sur le modèle des tentes d'isolement ou des hôpitaux-tentes de campagne sont une modification de la tente américaine. L'une sert de salle d'opération et de salle de garde pour l'interne de service ; l'autre, divisée en deux compartiments par une cloison verticale, forme un cabinet pour la religieuse et une salle pour les gens de service.

Les baraques qui viennent d'être construites à l'hôpital Saint-Louis occupent un emplacement situé dans un jardin d'une surface d'environ 2,000 mètres. Elles forment un groupe divisé en cinq parties.

En avant et au milieu se trouve la grande baraque : elle mesure 12 mètres sur 7 mètres 50 centimètres, et contient dix lits; à droite et à gauche, et à 3 mètres de distance, sont deux autres baraques de 3 mètres sur 3 mètres; celle de gauche renferme l'office et le cabinet de la religieuse; celle de droite un dépôt pour le linge et un cabinet d'aisances sur caveau pourvu d'un tonneau mobile.

Les deux petites baraques sont reliées à la grande par deux galeries de 3 mètres de long, couvertes, mais complétement ouvertes latéralement, et qui forment en outre comme le vestibule de la salle des blessés.

En arrière, dans l'axe des deux petites baraques, et à 11 mètres environ, se trouvent deux autres baraques; elles peuvent recevoir chacune deux lits : l'un est destiné au malade, l'autre à l'infirmier ou au convalescent qu'on voudrait placer près de lui.

Ces petites constructions ont 3 mètres sur 5 mètres, et sont distantes entre elles de 16 mètres. Au-devant de ces deux baraques sont des galeries ou verandhas constituées par des toiles mobiles tendues sur châssis en bois; ces appendices ont pour destination de tempérer l'ardeur du soleil.

Le mode de construction de ces diverses baraques consiste dans un plancher en sapin raîné reposant solidement sur de nombreux piquets enfoncés en terre; on a ménagé un vide de 25 à 30 centimètres entre le sol et le plancher.

Au préalable, le sol naturel a été enlevé, et la terre végétale remplacée par des gravois et des débris de mâchefer.

L'abri, tout à fait indépendant des planchers, consiste en

quatre fermes en madriers de sapin, reliées par des traverses.

Les parois verticales se divisent en trois parties :

La partie inférieure, de 1 mètre 45 centimètres de haut, répondant aux lits, est pleine, fixe, et formée par des planches posées à recouvrement dans le sens horizontal.

Au-dessus de cette partie, et sur une hauteur à peu près égale, règne une série de châssis vitrés qui sont tous mobiles et se relèvent à l'extérieur, à l'instar des châssis à tabatière et par le procédé le plus simple, de manière à former, tout autour de la baraque, un auvent protecteur contre le soleil et contre la pluie; la section d'ouverture horizontale est de 1 mètre de large.

Enfin, la dernière partie des parois verticales est composée de panneaux en bois pleins, mais mobiles; ces panneaux s'ouvrent à bascule à l'intérieur, de haut en bas, de façon à ménager, sans gêner le malade, un courant d'air puissant qui entraîne, vers le sommet de la baraque, tous les miasmes s'élevant de la partie basse. Ces châssis peuvent rester ouverts sans inconvénients alors que ceux du bas sont fermés.

Quant au toit, il se compose de deux parties superposées. La première partie est en planches de sapin rainées, posées en long et présentant une saillie extérieure de 50 centimètres environ. La deuxième partie est formée d'une toile imperméable posée au-dessus de la partie en planches qu'elle dépasse de 30 centimètres à l'extrémité basse, et de manière à laisser un isolement de 10 centimètres au moins entre les deux parois. Cet isolement a pour but d'établir un courant d'air permanent et de conserver à la toile toute son imperméabilité, car si elle était posée sur le bois même, à la suite de longues pluies, elle perdrait cette qualité essentielle.

Le toit qui vient d'être décrit présente, dans son milieu

et dans toute sa longueur, un vide de 60 centimètres environ, pour assurer une aération constante ; mais, afin d'éviter que la pluie entre par cette ouverture, elle est surmontée d'un petit toit qui se prolonge en recouvrement au-dessus du grand, en laissant toutefois une ouverture de 50 centimètres.

Ces toits ne sont pas garnis de gouttières et l'eau tombe sur le sol ; mais il règne au long des baraques un revers en pavés avec ruisseau pour conduire l'eau à des puisards garnis de cuvettes sypholdes, afin d'éviter toute mauvaise odeur.

Telles sont les dispositions adoptées à l'hôpital Saint-Louis ; avec celles qui ont été réalisées à l'hôpital Cochin, elles constituent un premier essai dont les résultats seront suivis et étudiés par une commission d'hommes compétents.

Quel sera l'avenir de ces installations pour le traitement de certaines catégories de blessés ou de malades? Bien hardi celui qui entreprendrait de le prédire !

La tente simple doit être tout d'abord exclue : les malades y étouffent l'été et y souffrent du froid pendant l'hiver. Les tentes de l'hôpital de Francfort sont à peu près abandonnées ; l'un de nos savants collègues qui les a visitées l'an passé, au mois d'août, les a trouvées vides, bien qu'il y eût à l'hôpital plusieurs malades qui, selon la théorie, eussent dû y trouver place.

Les tentes-hôpitaux et les baraques réalisent beaucoup mieux les conditions cherchées ; mais elles présentent aussi de notables défauts.

Elles sont formées de matériaux absorbants et doivent rapidement s'infecter, malgré une abondante aération. Elles garantissent incomplétement les malades contre les variations souvent brusques de la température ; il serait à peu près impossible de les chauffer, ce qui serait pourtant nécessaire en avril et en octobre. Si l'on fermait les orifices d'aération pour rendre le chauffage praticable, on reproduirait à peu près la salle de l'hôpital ordinaire. On remarquera d'ailleurs que ces constructions, destinées en campagne à abriter des hommes robustes comme les soldats, déjà aguerris contre les fatigues, la chaleur et le froid, doivent recevoir, dans les villes, des individus souvent débilités, dont les organes sensibles sont prédisposés aux inflammations rapides.

Que doit-on rechercher dans les installations propres aux individus atteints de maladies infectieuses? Est-ce l'isolement? Dans ce cas, les tentes et les baraques où sont réunis dix ou vingt malades ne réalisent pas cette condition.

Si c'est surtout la grande aération qu'il convient de procurer, croit-on qu'il ne soit pas possible de l'obtenir dans des bâtiments ordinaires ?

Des constructions en maçonnerie peuvent offrir, à divers points de vue, un avantage considérable sur les tentes et les baraques. Les murs stuqués ou peints à l'huile avec soin présentent des surfaces dures, difficilement imprégnables, qu'on peut lessiver aussi souvent qu'on le veut.

Ne peut-on aussi, dans ces bâtiments, pratiquer une abondante ventilation la nuit comme le jour? A l'hôpital Lariboisière, on renouvelle l'atmosphère des salles 36 fois toutes les 24 heures au moyen de la ventilation mécanique, on pourrait aisément pousser ce renouvellement jusqu'à 50 ou 60 fois. Si cette ventilation est insuffisante, ne peut-on pratiquer largement la ventilation dite naturelle, en tenant les fenêtres ouvertes, même la nuit? Dans ce mode, les

malades seraient garantis contre l'arrivée directe de l'air froid par des stores se levant de bas en haut. Il est encore d'autres moyens puissants d'aération : l'ingénieur de l'administration, M. Louis Ser, a fait établir un modèle de vasistas qui s'adapte à toutes les fenêtres et qui permet d'introduire, par un mécanisme simple, telle quantité d'air que l'on désire à travers une plaque percée de petits trous, qui le divise au moment où il pénètre et l'étend en couches vers le plafond. La fenêtre anglaise à guillotine, qui peut être ouverte à la partie supérieure dans une mesure variable, est encore un moyen très-efficace pour l'aération des salles.

Si, indépendamment de l'aération nécessaire dans toutes les combinaisons à adopter, on croit indispensable d'isoler les malades, ne peut-on le faire dans des chambres bien disposées? N'est-ce pas là un arrangement praticable, même dans certains hôpitaux existants, alors qu'il s'agit de malades peu nombreux qu'il convient de soustraire aux influences nosocomiales directes? L'hôpital qui s'élèvera bientôt sur le coteau de Ménilmontant aura, j'en ai l'espoir, un très-grand nombre de chambres, distantes des salles ordinaires et parfaitement installées, qui offriront une ressource précieuse pour les cas de chirurgie, et même de médecine, dans lesquels l'isolement est une condition de guérison.

Enfin, ne peut-on, dans la saison d'été, et lorsque le temps le permet, déplacer les opérés et les coucher dans les préaux plantés, à l'abri d'une tente ou d'un velum qu'on déplace à volonté (1)? Vivre ainsi au grand air pendant

(1) Ce moyen a été mis en pratique aussitôt qu'indiqué ; une tente a été dressée sous les arbres, dans l'un des préaux de l'hôpital Lariboisière, et, depuis le 2 août, quatre blessés, transférés dès le matin, y sont maintenus couchés jusqu'au soir.

dix ou douze heures de la journée serait assurément une chose éminemment favorable à la réparation des forces et à l'état des blessures.

Quoi qu'il en soit, il suffit que les expériences déjà faites, sous la direction d'hommes sincères et instruits, aient fourni des résultats qu'ils jugent avantageux, pour que nous devions nous engager résolument, à notre tour, dans la voie d'une sage, mais complète expérimentation. En présence d'une innovation sur laquelle les idées ne sont pas encore faites, gardons-nous à la fois d'un enthousiasme aveugle qui exclut la critique et conduit aux pures illusions, et de cette réserve excessive qui équivaut à l'immobilité. L'ennemi que nous avons devant nous ressemble à ces héros mystérieux de la légende, tout bardés de fer, qu'on ne savait comment atteindre ; épuisons les moyens de le combattre : nous serons assez récompensés de nos peines et de nos sacrifices, si nous avons réussi, même dans une mesure restreinte, à sauvegarder la vie de nos semblables (*Journal officiel*).

REVUE ÉTRANGÈRE.

ESPAGNE. — Organisation d'une compagnie sanitaire destinée aux îles Philippines. — Le Ministre de la guerre au gouverneur général des îles Philippines :

« Conformément à l'avis que vous m'avez transmis, prenant en considération le projet de règlement contenu dans votre lettre du 13 avril dernier pour la création d'une compagnie (brigade) de santé, selon les prescriptions de l'ordonnance royale du 13 juillet 1868, compagnie destinée à faire le service de petit état-major dans les îles placées sous votre commandement, tant pour le service des infirmeries que pour celui des hôpitaux, où elle remplacera les prati-

quants civils; ouï l'avis du directeur général du service de santé militaire; prenant en considération les services rendus par les brigades ou compagnies de santé créées dans la Péninsule et dans l'île de Cuba dans le but d'assurer les soins les plus efficaces aux soldats malades, en paix comme en campagne; considérant aussi les économies qui résultent de l'organisation proposée par ledit directeur général, S. A. le Régent du royaume, conformément à l'avis que nous lui avons fait connaître, a daigné disposer que le règlement ci-dessous concernant l'organisation, la discipline et les fonctions de la compagnie sanitaire des îles Philippines serait adopté et mis en vigueur. »

Par ordre de S. E. le Ministre, je donne avis de cette décision à Votre Excellence et lui transmets copie de ce règlement.

Dieu garde de longues années à Votre Excellence.

Madrid, le 15 juillet 1869.

Le sous-secrétaire : José S. Brégua,

Directeur général de l'Administration militaire.

Règlement de la compagnie sanitaire des îles Philippines approuvé par le Ministre de la guerre à la date du 15 juillet 1869.

Art. 1er. Cette compagnie est instituée pour faire le service de petit état-major, selon les besoins, dans les hôpitaux et les infirmeries militaires, ainsi que dans les colonnes d'opérations en campagne.

2. Cette brigade ou compagnie sera composée de :

1 sous-adjudant de 2e classe (1);
1 sous-adjudant de 3e classe;

(1) Le sous-adjudant de 2e classe a rang de sous-lieutenant; celui de 3e classe a un grade équivalent à celui d'adjudant de l'armée française. (*Note du traducteur.*)

2 premiers sergents européens;
2 seconds sergents indigènes;
6 caporaux de 1re classe;
14 caporaux de 2e classe;
20 infirmiers de 1re classe;
28 infirmiers de 2e classe.

3. Cette compagnie de santé sera divisée en deux sections : une qui pourvoiera au service de la garnison de l'île Luçon, l'autre pour celle de Mindanao. Chaque section se subdivisera en autant d'escouades que chacune de ces deux îles comptera d'hôpitaux ou d'infirmeries militaires. Ces escouades seront chacune de la force que jugera convenable le chef du service de santé des îles Philippines, qui, à cet effet, est autorisé à augmenter ou diminuer le personnel desdites escouades.

4. Le commandant en chef de la brigade sera l'inspecteur chef de santé militaire de ces îles. Deux officiers de santé, résidant dans la capitale de l'île, seront chargés, l'un des fonctions de commandant en second, l'autre de celles d'officier payeur et d'habillement; ce dernier sera choisi conformément aux règlements.

Du commandant en premier ou premier chef de service.

5. Le premier chef de service aura les mêmes prérogatives et attributions que les colonels des corps; il approuvera les nominations des seconds sergents et des caporaux; il autorisera le rengagement de ceux qui, par leur bonne conduite et leurs bons antécédents, lui paraîtraient dignes d'être employés, en observant les conditions réglementaires; il réglera les engagements des volontaires, et infirmera les peines disciplinaires lorsqu'il y aura lieu.

Du commandement en second (second chef).

6. Le second chef sera chargé du détail et de la compta-

bilité de la brigade, avec les mêmes devoirs et les mêmes attributions que les officiers de son grade dans les corps de troupe.

Habillement et armement.

7. L'uniforme de la compagnie sera, pour la tenue journalière : d'un pantalon et d'une blouse de cotonnade bleue; pour la grande tenue, d'un pantalon blanc et d'une blouse de même couleur, avec collet et parements des manches *cramoisi* et les boutons du corps ; casquette ronde à visière avec galons et filets cramoisis; schako de l'armée avec galons cramoisis et l'exergue : *santé militaire*, ceinturon de cuir noir avec le sabre court ; ils seront en outre pourvus des effets spécialement appropriés à leur service dans les hôpitaux.

Solde, rations et prestations.

8. La solde de l'adjudant de 2e classe sera de 2,000 écus (*escudos*) par an ; celle de l'adjudant de 3e classe de 1,650 écus.

9. La solde annuelle pour chaque grade de la troupe sera pour les :

Sergents	de 1re classe	570	écus
—	de 2e classe	312	—
Caporaux	de 1re classe	168	—
—	de 2e classe	114	— (1)
Infirmiers	de 1re classe	114	—
—	de 2e classe	111	—

10. Il sera alloué à la compagnie une somme annuelle de 100 écus à titre de gratification de frais de bureau.

11. Comme il est d'une grande utilité que le personnel

(1) La différence de solde entre les caporaux de 1re et ceux de 2e classe est assez considérable, tandis qu'elle est nulle entre la solde de ces derniers et celle des infirmiers de 1re classe; peut-être le texte espagnol renferme-t-il une erreur. (*Note du traducteur.*)

de la compagnie se trouve le plus possible à proximité des malades qu'il doit assister, ce personnel sera, autant que possible, logé dans les hôpitaux; et lorsque le défaut d'emplacement rendra cette mesure impossible, il sera alloué pour indemnité de logement une ration d'hôpital, soit en nature, soit en argent, à raison de 300 millièmes par jour.

12. Le paiement de la solde des hommes de la compagnie sanitaire se fera conformément aux dispositions du chapitre correspondant du règlement du corps de santé militaire; il sera justifié par une feuille de revue.

En marche, ils recevront les mêmes allocations que les soldats de leur grade dans l'armée.

Détail et comptabilité.

13. Le commandant en second de la compagnie sera chargé du détail et de la comptabilité, et pour cela il se conformera aux règles et formules établies pour la comptabilité dans les corps d'infanterie. Il lui sera alloué pour frais de bureau la gratification spécifiée à l'article 10.

14. Les obligations des commandants, officiers et sous-officiers de la troupe, le recrutement, le remplacement, l'avancement, la solde, les rations et les prestations, les récompenses, les retraites, la caisse de secours (*monte pió*), la discipline, et le détail de comptabilité, tant de la compagnie que de ses détachements, se régleront conformément aux dispositions générales qui régissent l'armée et aussi d'après les règlements spéciaux des compagnies sanitaires de la Péninsule et de l'île de Cuba, en date du 6 juin, d'après l'ordonnance ministérielle du 24 mai 1869, en tout ce qui ne se trouvera pas aboli par les articles du présent règlement et par les dispositions spéciales qui régissent l'armée des îles Philippines.

15. Les hommes de cette compagnie qui rempliront avec

zèle leurs fonctions et qui auront obtenu un certificat d'aptitude seront, à circonstances égales, préféré aux autres pour remplir les vacances.

Dispositions transitoires.

16. Le capitaine général, en sa qualité de commandant en chef de toutes les troupes des îles Philippines, prendra les dispositions nécessaires pour que la compagnie de santé fonctionne conformément au règlement ci-dessus, à la date du 1er janvier 1870. A cet effet, on détachera à l'avance de la Péninsule des sous-adjudants et des sergents de 1re classe destinés aux cadres de ladite compagnie.

17. Les pratiquants en médecine et en pharmacie qui se trouvent actuellement dans les hôpitaux militaires des îles Philippines pourront entrer dans la compagnie sanitaire s'ils en font la demande et s'ils s'engagent à servir trois ans pour le moins. Ils seront classés parmi les sergents de seconde classe, les caporaux de première ou de seconde classe, ou parmi les infirmiers, selon leurs moyens, leur aptitude, leur instruction et leur ancienneté de services.

18. Le montant des frais d'entretien de la compagnie sanitaire se soldera conformément aux dispositions de l'article 2, chapitre 23 de l'ordonnance ministérielle, sur les fonds alloués aux pratiquants, pour l'exercice 1869-1870, et figurera, pour l'exercice 1870-1871 et les suivants, sous la dénomination de solde d'entretien de la compagnie sanitaire, conformément à l'article 1er du chapitre 5.

Madrid, le 15 juillet 1869.

Approuvé par Son Altesse le Régent du royaume.

Signé : Prim.

Suivent le seing et le sceau du ministère de la guerre.

Extrait et traduit du *Boletin de administracion militar*. — Antonin de Norroy.

ITALIE. — Médicaments accordés aux familles des sous-officiers a charge de remboursement. — Une décision ministérielle accorde aux sous-officiers détachés la faculté dont jouissent les sous-officiers présents à leurs corps de toucher les médicaments nécessaires à leurs familles dans les hôpitaux militaires et dans leurs succursales.

Cette autorisation, qui a pour but d'éviter à ces familles les lourdes dépenses d'achats de médicaments dans les pharmacies civiles, est réglementée par les dispositions suivantes :

« 1° L'ordonnance médicale sera présentée à la pharmacie militaire, signée d'un médecin militaire *et non d'aucune autre personne* ; elle indiquera le nom et la demeure de l'impétrant et sera visée par l'officier chef de service près duquel le sous-officier est détaché.

« 2° Cette faculté est exclusivement limitée à la femme et aux enfants ; le chef de la famille en sera toujours exclu ; s'il tombe malade, il devra entrer à l'hôpital.

« 3° Dans le cas où la maladie semblerait devoir dépasser trois jours, la continuation de cette faveur devra être soumise à l'autorisation ministérielle.

« 4° Le remboursement de ces médicaments se fera tous les trois mois par les soins du quartier-maître, à l'hôpital qui les aura fournis ».

Cette disposition toute libérale nous paraît sujette à quelques observations.

Pourquoi ne pas étendre cette autorisation au chef de famille dans certains cas prévus et bien déterminés, que le médecin traitant pourrait spécifier sur son ordonnance, par exemple lorsqu'une indisposition légère ne nécessiterait pas absolument l'entrée du chef de famille à l'hôpital, ou bien encore dans ces maladies de longue

durée qui ne sont pas incompatibles avec le séjour du malade au milieu de sa famille ni avec la continuation de son service, telles, par exemple, que les rhumatismes chroniques, les névralgies anciennes, l'asthme, les catarrhes, etc. Il y aurait avantage pour le service et économie pour l'État à ce que le sous-officier, dans ce cas, pût être traité à domicile.

Quant à l'article 3 qui limite à trois jours l'autorisation de toucher des médicaments, sauf ensuite à obtenir l'approbation ministérielle, nous devons supposer que les intéressés peuvent encore toucher les médicaments nécessaires jusqu'à l'arrivée de cette approbation. S'il n'en était ainsi, on comprend facilement combien cet article 3 limiterait, s'il n'annihilait même, les avantages accordés par cette décision si favorable à l'armée italienne. — A. DE N.

RUSSIE. — PERTES DES RUSSES EN CRIMÉE PENDANT LA GUERRE D'ORIENT.— Le docteur russe Hubbenet, professeur à l'université de Kiew, a publié sur le siége de Sébastopol, auquel il a assisté, un rapport plein de douloureux détails. Le passage suivant montre combien ont été funestes pour les Russes les conséquences de cette campagne.

« Sur 169,000 hommes qui se sont succédé dans la défense de Sébastopol jusqu'au 1er novembre 1855, c'est-à-dire jusqu'au moment où le typhus se déclara dans l'armée russe, 30,000 hommes seulement sont restés valides et intacts. Le nombre des blessés s'élève à plus de 76,000 ; celui des morts est de 13,000 ; 46,000 ont été atteints de maladies, et sur ce chiffre 8,500 ont encore succombé ». A. DE N.

N° 146 (tome VIII). 1869 Octobre-Décembre.

REVUE

SCIENTIFIQUE ET ADMINISTRATIVE

DES MÉDECINS DES ARMÉES

PARAISSANT TOUS LES DEUX MOIS.

Rue de Vaugirard, 75 (ancien 93), près la rue de Rennes.

Tout ce qui concerne l'administration ou la rédaction doit être adressé (franco) à M. Victor Rozier, rue de Vaugirard, 75, près la rue de Rennes.

PRIX DE L'ABONNEMENT : SIX FRANCS par an (Pour l'Étranger, le port en sus, suivant les tarifs des postes). — Par exception, les officiers de santé militaires appartenant à un corps expéditionnaire à l'étranger ne subissent pas de réduction dans le prix de l'abonnement. — On s'abonne au bureau du journal, rue de Vaugirard, 75, et chez tous les libraires.

M. Victor Rozier, ou de toute autre manière directe, la modicité du prix de l'abonnement ne permettant pas d'accorder de remise aux libraires ou commissionnaires. — Les abonnements sont faits, pour l'année entière, du 1er janvier au 31 décembre.

Afin d'éviter les difficultés que les souscripteurs peuvent éprouver dans certaines circonstances à faire parvenir leur renouvellement, le journal est servi sans interruption. Tout abonné qui ne le refuse pas à son arrivée, son abonnement étant terminé, est considéré comme réabonné. Le montant de cet abonnement doit être envoyé dans les deux mois qui suivent ; en cas de retard, il est réclamé par lettre.

La *Revue des médecins des armées* paraît tous les deux mois, avec un nombre de pages indéterminé. Les souscripteurs reçoivent en outre et sans augmentation de prix : 1° Le *Bulletin de la médecine et de la pharmacie militaires* ; 2° L'*Annuaire spécial du corps de santé militaire* ; 3° Un ouvrage de médecine à titre de prime.

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TENUE DE L'ANNUAIRE DE 1869.

10e BULLETIN.

[Les radiations et les nominations sont notées en caractères gras.]

N° d'ord.	Ann.	MM.	Position actuelle.	Position nouvelle.	Date.
			Médecins principaux de Première classe.		
35		FROPO,	Gendarmerie (G. I.) et état-major (G. I.).	Hôp. de Versailles.	25 oct.
			Médecins-majors de Première classe.		
86		TÉDESCHI,	Hôp. d'Ajaccio.	**Décédé.**	19 oct.
150		RÉJU,	53e de ligne.	**N.-activité** (inf. temp.).	15 oct.
181		PELIN,	3e tirailleurs algériens.	53e de ligne.	26 oct.
224		LASSIER,	85e de ligne.	**Décédé.**	5 nov.
244		MAUCHE,	Artillerie à cheval (G. I.).	3e tirailleurs algériens.	15 oct.

Pag.	N°	de l'Ann.	MM.	Position actuelle.	Position nouvelle.	Date.
				Médecins-majors de Deuxième classe.		
55	24		Vernay,	4e d'artillerie à pied.	**Décédé.**	19 oct.
—	48		Portafax,	38e de ligne.	37e de ligne.	26 oct.
58	123		Louis,	10e cuirassiers.	1er voltigeurs (G. I.).	26 oct.
—	144		Galand,	1er voltigeurs (G. I.).	Artillerie à cheval (G. I.).	28 oct.
61	211		Vézerie,	82e de ligne.	10e cuirassiers.	26 oct.
63	292		Suquet,	Hôp. de Nice.	82e de ligne.	15 oct.
—	293		Badour,	Surv. école méd. milit.	38e de ligne.	15 oct.
				Médecins aides-majors de Première classe.		
65	16		Boutonnier,	Gendarmerie (G. I.).	Hôtel imp. des Invalides.	25 oct.
71	183		Faucon,	94e de ligne.	Surv. école de méd. milit.	2 nov.
73	270		Goux,	7e de ligne.	Sapeurs-pompiers à Paris.	27 oct.

CONCOURS.

Résultat du concours pour treize emplois de médecin traitant dans le service hospitalier.

Le concours pour treize emplois de médecin traitant dans le service hospitalier (neuf pour la section de chirurgie et quatre pour la section de médecine) a eu lieu du 3 au 18 novembre à l'École de médecine et de pharmacie militaires (1). A la suite de ce concours, ont été désignés au choix du Ministre pour remplir ces treize emplois, les médecins-majors de deuxième classe dont les noms suivent :

Section de chirurgie.

MM. Thierry de Maugras (guides G. I.).
Meige (3e cuirassiers).
Malaval (79e de ligne).
Giard (9e bat. de chasseurs à pied).
Bourot (1er rég. du train des équipages).
Chabert (89e de ligne).
Vincent-Génod (48e de ligne).
Mathis (3e de zouaves).
Arnaud (2e tirailleurs algériens).

Section de médecine.

Azaïs (50e de ligne).
Paoli (32e de ligne).
Guillemin (5e cuirassiers).
de Courtois (64e de ligne).

Les questions écrites sorties de l'urne ont été : pour les candidats en chirurgie : *Des rétrécissements du canal de l'urèthre*, et pour les candidats en médecine : *Diagnostic des différentes espèces d'angine. Leur traitement.*

(1) Le jury d'examen de la section de chirurgie, présidé par M. le baron Larrey, médecin inspecteur, était composé de MM. Marit, Didiot et Perrin, médecins principaux, et celui de la section de médecine, présidé par M. Cazalas, médecin inspecteur, de MM. Champouillon, Martin et Colin, médecins principaux.

Concours pour trois emplois de professeur agrégé à l'École d'application de médecine et de pharmacie militaires.

Un concours s'ouvrira au Val-de-Grâce, le 17 janvier prochain, pour trois emplois de professeur agrégé à l'École d'application de médecine et de pharmacie militaires.

Les emplois se rapportent aux parties de l'enseignement ci-après indiquées :

Hygiène et médecine légale militaire.

Maladies et épidémies des armées.

Chimie appliquée à l'hygiène et aux expertises dans l'armée.

Les épreuves du concours sont déterminées ainsi qu'il suit :

CONCOURS EN MÉDECINE

I. Composition écrite sur une question d'épidémiologie militaire.

II. Leçon sur une question d'hygiène et de médecine légale militaire.

III. Examen clinique de deux malades fiévreux atteints l'un de maladie aiguë, l'autre d'affection chronique ; — leçon sur les deux cas observés.

IV. Autopsie cadavérique, avec démonstration des lésions qu'elle révèle, s'il y a lieu, de médecine légale.

Les deux premières épreuves seront éliminatoires.

CONCOURS EN PHARMACIE

I. Composition écrite sur une question de chimie pharmaceutique.

II. Une ou plusieurs préparations officinales se prêtant à des développements théoriques.

III. Deux expertises relatives : l'une aux cas d'hygiène, l'autre aux cas de médecine légale qui peuvent se présenter dans l'armée ; — explication verbale des phénomènes produits pendant les opérations de ces expertises, et conclusions à en tirer.

IV. Réponse verbale à une question de comptabilité pharmaceutique.

Aux termes de l'article 6 du décret du 13 novembre 1852, pourront être admis à prendre part au concours en médecine les médecins aides-majors de première classe et les médecins-majors des deux classes, et au concours en pharmacie les pharmaciens des mêmes grades.

Les officiers de santé de l'un de ces grades qui désireront concourir, devront adresser au ministre une demande régulière *appuyée d'un avis motivé de leurs chefs directs.*

Cette demande, qui fera connaître pour quelle spécialité se présente le candidat, devra être parvenue au ministre avant le 25 décembre prochain (terme de rigueur) par la voie hiérarchique, c'est-à-dire par l'intermédiaire des généraux commandant les divisions militaires ou des intendants divisionnaires, suivant que l'officier de santé est attaché à un corps de troupe ou à un établissement hospitalier.

COMMISSION DE CLASSEMENT.

Par décision du 20 novembre 1869, le ministre a composé ainsi qu'il suit la Commission chargée de classer les propositions pour l'avancement à chaque

grade, et pour l'admission ou l'avancement dans l'ordre de la Légion d'honneur, conformément aux articles 24 et et 25 du décret du 23 mars 1852 :

MM. Général Bourbaki, président ;
Lebrun, intendant de la garde impériale ;
Danlion, intendant de 1re division militaire ;
Michel Lévy, médecin inspecteur, directeur de l'Ecole impériale de médecine et de pharmacie militaires.
Baron Larrey, président du Conseil de santé ;
Cazalas, médecin inspecteur, membre du Conseil de santé ;
Poggiale, inspecteur, membre du Conseil de santé (pour les pharmaciens).

M. Didiot, médecin principal de 1re classe, secrétaire du Conseil de santé, remplira les fonctions de secrétaire de la commission.

Aucune date n'est encore fixée pour la réunion de cette Commission.

ÉCOLE DU SERVICE DE SANTÉ MILITAIRE DE STRASBOURG.

ÉTAT DES BOURSES ET DEMI-BOURSES, TROUSSEAUX ET DEMI-TROUSSEAUX ACCORDÉS AUX ÉLÈVES DE L'ÉCOLE DU SERVICE DE SANTÉ MILITAIRE A STRASBOURG, (DÉCISION DU 27 OCTOBRE 1869).

1e ÉLÈVES ADMIS EN 1869.

Bourse et trousseau.

Louis, Napoléon-Nicolas. La mère veuve d'un sous-officier de gendarmerie ; quatre enfants dont trois à sa charge, sans autres ressources qu'un modique bureau de tabac.

Emile-Paul, dit Albert. Orphelin sans ressources.

Descarpentries, Albert-Constant. Orphelin sans ressources.

Gazin, Joseph-Alfred. Fils aîné d'un capitaine sans autres ressources que son traitement ; quatre enfants.

Cassan, Antony-François-Xavier. Orphelin à la charge d'une sœur religieuse ; trois enfants sans ressources.

Fabre, Henri-Étienne-Jean-Baptiste. Fils aîné d'une veuve ; cinq enfants ; ressources insuffisantes.

Bregi, Jules-Eugène. Le père fabricant de draps ; neuf enfants à sa charge ; ressources insuffisantes.

Roux, Jean-Baptiste-François-Alexandre. Fils d'un fabricant de draps ; six enfants à la charge du père ; ressources insuffisantes.

Cristau, Charles-Amédée-Jules-Xavier. Fils d'un officier d'administration en retraite ; cinq enfants à la charge du père ; ressources insuffisantes.

Perrin, Augustin-Guillaume-Marie. Le père commerçant ; huit enfants à sa charge ; ressources insuffisantes.

Trudeau, Jules-Eugène. Le père médecin principal de 2e classe ; six enfants à sa charge ; ressources insuffisantes.

Duponchel, Emile. Fils d'un receveur des postes ; huit enfants, dont six à la charge du père ; ressources insuffisantes.

Thouvenin, Paul-Julien. Le père vétérinaire ; six enfants à sa charge ; ressources insuffisantes.

Mille, Gustave-Alexandre. Fils d'un négociant ; cinq enfants à la charge du père ; ressources insuffisantes.

Tartière, Emile-Gérard. Le père marchand ; quatre enfants à sa charge ; n'a de ressources que sa modeste industrie.

Monfort, Henri-Louis-Léon. Fils d'un instituteur primaire ; trois enfants à la charge du père ; sans autres ressources que son traitement.

…in, Léon-Joseph-Alexis. Fils d'une veuve d'un adjudant d'administration sans pension ; trois enfants dont deux à la charge de la mère ; ressources insuffisantes.

…ers, Eugène-Raymond-Joseph. La mère sans aucunes ressources.

…ault, Marie-Clément-Ladimir. Fils d'une veuve ; cinq enfants dont quatre à la charge de la mère ; ressources insuffisantes.

…illard, Louis. La mère, veuve d'un militaire sans pension, sans autres ressources qu'une très-modeste industrie.

…ain, Henri-Anatole. Fils d'une veuve de médecin-major ; trois enfants à la charge de la mère ; ressources insuffisantes.

…rongny, Jules. La mère, veuve d'un garde du génie ; deux enfants ; sans autres ressources que sa pension de retraite.

…on, Urbain-Emile-Alfred. Fils d'une veuve ; trois enfants à la charge de la mère, qui n'a de ressources qu'un modique bureau de poste.

…adoux, Julien-Auguste. Fils d'un inspecteur des écoles primaires ; cinq enfants dont quatre à la charge du père ; sans autres ressources que son emploi.

…, Jean-Denis-Adolphe. Le père, ex-maréchal des logis ; trois enfants ; sans autres ressources que sa pension de retraite.

…ers, Marie-Michel-Georges. Fils d'un professeur de l'Université ; six enfants, dont trois encore à la charge du père, sans autres ressources que son emploi.

…a, Jean-Marie-Henri. Le père instituteur primaire ; trois enfants à sa charge ; sans autres ressources que son traitement.

…at, Louis-Eugène. Le père commerçant ; trois enfants à sa charge ; n'a de ressources que le produit modique de son emploi.

…at, Amédée-Raoul. Fils d'un capitaine en retraite ; deux enfants à la charge du père ; sans autres ressources que sa pension.

…-Poisson, Julien-Victor-François. Le père, ex-régent de collége sans ressources.

…elle, Charles-Joseph-Pierre. Fils d'un marchand ; quatre enfants à la charge du père ; sans autres ressources que son industrie.

…ert, Louis-Gabriel-Hippolyte. Le père, commis de mont-de-piété ; quatre enfants à sa charge ; n'a pour ressources que son modique traitement.

…ais, Jean. Le père tailleur d'habits ; trois enfants à sa charge ; sans autres ressources que le produit modique de son état.

…ert, Marie-Jean-Charles. Fils d'un commis, sans autres ressources que son modeste emploi ; trois enfants.

…t, Jean-Baptiste-Henri-Jules. Le père conservateur du musée de Versailles ; cinq enfants à sa charge ; sans autres ressources que son emploi.

…iaud, Anatole-Honoré. Fils d'un boulanger, quatre enfants à la charge du père, qui n'a pour ressources que le produit modique de son état.

…, Jean-Pierre-Marie. Le père propriétaire ; quatre enfants à sa charge ; ressources insuffisantes.

…ouroux, Jean-Ferdinand. Fils d'un clerc de notaire, sans autres ressources que son modeste emploi.

…at, Elie-Oscar. Le père maçon ; trois enfants, ressources complétement insuffisantes.

…lin, Marie-François-Xavier. Fils d'un cultivateur ; sept enfants à la charge du père ; ressources insuffisantes.

…n, Laurent-Emile. Fils aîné d'un confiseur sans autres ressources que sa modeste industrie ; trois enfants.

…ro, Albert-Marcel. Fils d'un professeur, trois enfants, dont deux à la charge du père ; n'a d'autres ressources que le produit de ses leçons.

…ande, Henri-Jean-Albert-Théodore. Le père capitaine en retraite ; deux enfants à sa charge ; ressources insuffisantes.

…di Borgo, Charles-Dominique. Fils d'un professeur ; trois enfants, dont deux à la charge du père ; ressources insuffisantes.

…elbon, Nicolas-Louis. Le père cultivateur ; quatre enfants à sa charge ; ressources insuffisantes.

CHOPINET, Charles-César-Pierre-Vincent. Fils d'un capitaine en retraite sans autres ressources.

BOURGEOIS, Alexandre-Louis-Félix. Le père major en retraite; deux enfants à sa charge; ressources insuffisantes.

CACHET, Louis-Auguste. Fils d'un receveur des contributions en retraite; trois enfants à charge du père, n'a pour ressources que sa pension de retraite.

VIRENQUE, Louis-Alexis. Le père, chef de musique, sans autres ressources que sa pension retraite.

DUBRULLE, André-Joseph. Fils d'un représentant de commerce; quatre enfants à la charge père, ressources insuffisantes.

WICKERSHEIMER, Charles-Ernest. Fils d'un instituteur primaire n'ayant d'autres ressources que son traitement; deux enfants.

BURLUREAUX, Charles-Clément. Le père, médecin-major en retraite, modeste aisance.

SIMRAT, Pierre. Fils d'un caporal réformé pour blessures à la guerre; ressources insuffisantes.

CHESNEY, Alexis-Ferdinand. Le père propriétaire; quatre enfants à sa charge, le cadet l'aîné; ressources complètement insuffisantes.

PELTIER, Charles-Henri. Cinq enfants à la charge du père, sans ressources.

LERAY, Henri-Armand-Marie. Fils d'un greffier de tribunal, sans autres ressources que son emploi; six enfants, dont trois à la charge du père.

MALJEAN, Joseph-Léon. Orphelin sans ressources, ainsi que ses deux autres frères.

ZINSZ, Jacques. Le père tailleur d'habits, sans autres ressources que le produit modique de son état.

FISCHER, Charles-Auguste. Le père marinier; six enfants dont cinq à sa charge, n'a pour ressources que son industrie modeste.

PÉRIER, François-Savinien-Henri. Fils d'un professeur de l'Université; trois enfants à la charge du père; ressources insuffisantes.

Demi-bourse et trousseau.

BARROIS, Léon-Appoline-Augustin. Fils d'un professeur de l'Université; trois enfants à la charge du père; ressources insuffisantes.

RAVENEZ, Eugène-Marie-François. Orphelin de père; deux enfants à la charge de la mère; ressources insuffisantes.

BERNARD, Adolphe-Charles-Louis. Fils d'une veuve dont les ressources sont modiques.

LAMPS, Gaston-Pierre-Joseph. Fils d'une veuve dont la fortune est modique.

PICHENOT, Arthur-Benjamin. Fils d'une veuve; deux enfants à sa charge; ressources insuffisantes.

GRIVET, Paul-Théophile. Le père commis de la Faculté de Strasbourg; ressources insuffisantes.

HÉRICOURT, Jules. Ressources insuffisantes du candidat et de la mère.

CHOUET, Cécile-Étienne-Blaise. Le père commissaire de police; ressources insuffisantes.

BRINDEL, Louis-Napoléon-Oswald. Fils d'un chef de service des lits militaires; trois enfants à la charge du père; ressources insuffisantes.

MAURICE, Charles. Le père quincaillier; trois enfants à sa charge; ressources insuffisantes.

MOREL-DEVILLE, Henri-Louis. Fils d'un médecin; deux enfants à la charge du père; ressources insuffisantes.

MASSONNAUD, Jean-Eugène-Albin. Le père ancien buraliste; deux enfants à sa charge; ressources modiques.

DARDE, Louis-Ferdinand. Fils d'un propriétaire; six enfants, dont quatre à la charge père; ressources insuffisantes.

DESMONS, Denis-Constant-Émile-Gustave. Le père maréchal-ferrant; trois enfants à charge; ressources insuffisantes.

BEZAGUET, Pierre-Célestin. Le père maréchal-ferrant; trois enfants dont deux à sa charge ressources insuffisantes.

AUBERTIN, Émile-Louis-Isidore. Le père cultivateur; deux enfants à sa charge; insuffisance de ressources.

…LLE, Romary-Constant. Fils d'un ferblantier; deux enfants à la charge du père; ressources insuffisantes.

…QUEU, Eugène-Célestin-Marie. Le père buraliste et débitant de tabac; quatre enfants, dont deux à sa charge; insuffisance de ressources.

…MBERAT, Paul-Antoine-Achille. Fils d'un propriétaire; modiques ressources.

…, Émile-François-Marie. Fils d'un commissaire de police; trois enfants à la charge du père; ressources insuffisantes.

…TTE, Pierre. Le père ex-commissaire de police; cinq enfants à sa charge; ressources insuffisantes.

…QUET, Georges-Alexis-Auguste. Fils d'un commerçant; deux enfants à la charge du père; ressources insuffisantes.

…LIN, Antoine-Georges. Fils d'un marchand drapier; deux enfants à la charge du père; modique aisance.

Demi-bourse et demi-trousseau.

…AIN, Robert-Nicolas-Jules. La mère veuve; deux enfants; modeste aisance.

…ER, Marie-Joseph-Henri. Fils d'un huissier; trois enfants dont deux à la charge du père; ressources insuffisantes.

…ULT, Rémi-Edouard. Le père propriétaire; quatre enfants; ressources insuffisantes.

…RLIN, Emile-Ernest-Louis. Fils d'un fabricant de rouennerie; ressources insuffisantes.

…OUIS, Charles-Léon. Le père féculier; deux enfants à sa charge; modeste aisance.

…RADE, Émile-André. Le père distillateur; trois enfants à sa charge; insuffisance de ressources.

…ILOUP, Joseph. Fils d'un commerçant; trois enfants à la charge du père; ressources insuffisantes.

…ERIN, Jules-Ernest. Le père cultivateur; deux enfants; modeste aisance.

…LAND, Emile-Cany. Le père huissier; deux enfants à sa charge; modeste aisance.

…NT, Jean-Auguste. Fils d'un cultivateur; deux enfants à la charge du père; insuffisance de ressources.

…LIN, Eugène-Joseph. Le père cultivateur; trois enfants; insuffisance de ressources.

…AL, Jean-Antoine-François. Fils d'un propriétaire; deux enfants à la charge du père; ressources insuffisantes.

…ROT, Adrien-Jacques-Etienne. Le père huissier; modeste aisance.

…GNARD, Célestin-Jean-Etienne. Fils d'un propriétaire; deux enfants à la charge du père; modeste aisance.

…E, Louis-Albert. Le père huissier; deux enfants à sa charge; modeste aisance.

…ER, Claude-Marie. Fils d'un conducteur des ponts et chaussées; deux enfants à la charge du père; ressources insuffisantes.

…UET, Jean-Baptiste-Constant-Alphonse. Le père commis négociant; deux enfants à sa charge; ressources modiques.

Demi-bourse.

…UX, Frédéric-Edmond. Le père commis greffier; deux enfants à sa charge; modeste aisance.

2° ÉLÈVES PRÉSENTS A L'ÉCOLE.

Demi-bourse.

…LET, Aimé-Désiré. Fils d'un cultivateur; deux enfants à la charge du père; ressources insuffisantes.

…DOUX, Joseph. Orphelin avec une sœur; ressources insuffisantes pour payer une pension entière.

…L, Elisé-Marius. Deux enfants à la charge de la mère séparée de son mari; ressources insuffisantes.

…UL, François. Le père pharmacien principal; deux enfants à sa charge; ressources insuffisantes.

Demi-bourse complémentaire.

BREUIL, Paul. Orphelin ; ne possède qu'un revenu de 800 fr., insuffisant pour payer demi-pension.

CHOULEX, Pierre-Louis. Le père ferblantier ; deux enfants à sa charge ; ressources insuffisantes.

Quart de bourse complémentaire.

NOQUET, Vital. Le père vétérinaire ; ressources insuffisantes.

ROMAIN, Adrien-Claude-Louis. Fils d'un employé de mairie ; ressources insuffisantes.

KLEIN, Alfred. Le père marchand ; ressources très-bornées.

MENDEVILLE, Albert. Fils d'un contrôleur des douanes qui ne possède que son traitement.

FOURNIÉ, Henri. Fils d'un commerçant ; trois enfants ; ressources insuffisantes.

ADAM, Jules. Le père horloger ; trois enfants ; ressources insuffisantes.

BAYARD, Louis. La mère veuve d'un avoué ; trois enfants ; fortune modique.

BLANC, Pierre-Louis. Fils d'un vérificateur des douanes, sans autre fortune que son traitement.

BELLEAU, Charles-Joseph. La mère est veuve ; ressources insuffisantes.

BUISSON, Louis-Gabriel. Le père médecin principal en retraite ; quatre enfants ; fortune insuffisante.

COLLIN, Henri. Le père limonadier ; deux enfants ; ressources insuffisantes.

DEMANDRE, Albert. Le père infirme ; trois enfants ; ressources insuffisantes.

DUBUJADOUX, Paul. Le père horloger ; trois enfants ; ressources insuffisantes.

GUILLAUMOT, Marie-Félix. Enfant unique d'un inspecteur des contributions indirectes ; ressources insuffisantes.

POTHEAU, Anselme-Alexandre. Le père cultivateur ; quatre enfants ; modeste fortune.

SCRAPP, Jacques-Joseph. Le père marchand ; ressources modiques.

THIÉBAULT, Félix-Louis. Fils d'un commerçant ; deux enfants ; ressources insuffisantes.

VAUTHRIN, Camille. Le père, agent-voyer ; deux enfants ; modeste aisance.

VILLIÈS, Paul. Fils d'un receveur des postes ; ressources insuffisantes.

VOIZARD, Gaston. Le père, instituteur ; deux enfants ; ressources insuffisantes.

WARION, Henri. Le père, libraire ; ressources insuffisantes.

BRUNAT, Pierre-Joseph. Fils d'un commissaire de police qui ne possède que son traitement.

CASTEL, Emile. Fils d'un fermier ; deux enfants ; ressources insuffisantes.

GASSMANN, Jules. Le père, employé de commerce ; trois enfants ; ressources insuffisantes.

GERBAULT, Arthur. Fils d'un pharmacien ; deux enfants ; modique aisance.

QUIVOGNE, Abel. Le père, préposé en chef d'octroi, vient d'être mis à la retraite.

JEHL, Xavier. Le père, boulanger ; trois enfants ; ressources insuffisantes.

DARDIGNAC, Joseph-André. Le père, restaurateur ; cinq enfants à sa charge ; modique aisance.

DAVEZAC, Jérôme. Le père, boucher ; deux enfants à sa charge ; ressources insuffisantes.

ROBUCHON, Léonidas. Le père, imprimeur-libraire ; six enfants, dont trois encore à sa charge ; modeste aisance.

PERÉ, Prudence. Le père, vétérinaire ; six enfants, dont deux à sa charge ; ressources insuffisantes.

ALIBOT, Georges. Le père, médecin ; cinq enfants à sa charge ; ressources devenues insuffisantes.

FERRANDI, Charles-Félix. Le père, propriétaire ; quatre enfants à sa charge ; ressources insuffisantes.

V. ROZIER, Directeur-gérant.

Paris. — Imp. de Cosse et J. Dumoulin, r. Christine, 2.

REVUE

SCIENTIFIQUE ET ADMINISTRATIVE

DES MÉDECINS DES ARMÉES

PARAISSANT TOUS LES DEUX MOIS.

ue de Vaugirard, 75 (ancien 93), près la rue de Rennes.

ui concerne l'administration ou ion doit être adressé *(franco)* à ROZIER, rue de Vaugirard, 75, ère de Rennes.

FRANCS par an (Pour l'Étranger on est en sus, suivant les tarifs des — Par exception, les officiers de ciers appartenant à un corps expé-

M. VICTOR ROZIER, en de toute autre manière directe, la modicité du prix de l'abonnement ne permettant pas d'accorder de remise aux libraires ou commissionnaires. — Les abonnements sont faits, pour l'année entière, du 1er janvier au 31 décembre.

Afin d'éviter les difficultés que les souscripteurs peuvent éprouver dans certains

considéré comme réabonné. Le montant de cet abonnement doit être envoyé dans les deux mois qui suivent ; en cas de retard, il est réclamé par lettre.

La *Revue des médecins des armées* paraît tous les deux mois, avec un nombre de pages indéterminé. Les souscripteurs reçoivent en

Les décrets doivent être datés du 12 mars et non du 10, ainsi qu'il a été imprimé par erreur dans ce numéro.

SOMMAIRE.

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TENUE DE L'ANNUAIRE SPÉCIAL DE 1869. — 18e BULLETIN.

TENUE DE L'ANNUAIRE SPÉCIAL DE 1870. — 7e BULLETIN.

[Les radiations et les nominations sont notées en caractères gras.]

N° de l'Ann.	MM.	Position actuelle.	Position nouvelle.	Date.

Médecins principaux de Première classe.

Par décret impérial du 10 mars 1870, le médecin principal de deuxième classe dont le nom suit a été **Nommé** *Médecin Principal de Première classe :*

12	c. QUESNOY,	Hôt impér. des Invalides.	»	»

Médecins principaux de Deuxième classe.

Par décret impérial du 10 mars 1870, le médecin-major de première classe dont le nom suit a été **Nommé** *Médecin Principal de Deuxième classe :*

43	c. JOURDEUIL,	Hôp. de Lille.	»	»

Médecins-majors de Première classe.

99	LARIVIÈRE,	**Nommé** *Officier* de la Légion d'honneur. [Chevalier du 30 septembre 1857. — 36 ans de services, 6 campagnes.]		10 mars.

Pag.	N°	de l'Arm.	MM.	Position actuelle.	Position nouvelle.	Date
45	29		Jobert,	**Nommé** *Officier* de la Légion d'honneur.		10 mai
			[Chevalier du 16 avril 1856. — 29 ans de services, 8 campagnes.]			
53	252		Berthérand,	**Nommé** *Chevalier* de la Légion d'honneur.		10 mai
			[25 ans de services, 19 campagnes.]			

Par décret impérial du 10 mars 1870, les deux médecins-majors de deuxième classe dont les noms suivent ont été **Nommés** *Médecins-majors de Première classe* :

53	272	*a.*	Rioublant,	17e d'artillerie à cheval.	»
—	273	*c.*	Fretin,	75e de ligne.	»

Médecins-majors de Deuxième classe.

60	197		Sala,	**Nommé** *Chevalier* de la Légion d'honneur.	10 mai
			[18 ans de services, 10 campagnes.]		
—	202		Poupelard,	**Nommé** *Chevalier* de la Légion d'honneur.	10 mai
			[18 ans de services, 7 campagnes.]		
62	272		Massaloup ✉,	5e hussards.	Admis dans le service hospitalier à la suite du dernier concours pour l'agrégation. — 15 [illegible]
64	316		Delahousse ✉,	32e de ligne.	

Par décret impérial du 10 mars 1870, les quatre médecins aides-majors de première classe dont les noms suivent ont été **Nommés** *Médecins-majors de Deuxième classe* :

64	323	*a.*	Guyon,	Hôp. de la div. de Constantine.	»
—	324	*a.*	Milon,	Hôp. de la div. d'Oran.	»
—	325	*c.*	Noizet,	Hôtel imp. des Invalides.	»
—	326	*c.*	Biebuyck,	Hôp. de Vincennes.	»

Médecins aides-majors de Première classe.

67	78		Bordères,	**Nommé** *Chevalier* de la Légion d'honneur.	10 mai
			[24 ans de services, 6 campagnes.]		

Pharmaciens-majors de Deuxième classe.

83	4		Lefranc,	**Nommé** *Chevalier* de la Légion d'honneur.	10 mai
			[21 ans de services, 11 campagnes.]		

DIVERS.

Annuaire pour 1870. — Les souscripteurs du *Bulletin* et de la *Revue* [illegible] vront dans quelques jours l'*Annuaire spécial du corps de santé*. On sait [illegible] par suite d'une décision récente, il sera arrêté à la date du 31 décembre 1869 : en même temps qu'il justifiera mieux son titre, il deviendra d'un puissant secours pour les recherches à faire par les inspecteurs, lorsqu'il s'agit de propositions à établir. Le droit de chacun pourra être ainsi constaté rapidement et d'une manière certaine il y a donc intérêt pour tous à ce qu'il en soit ainsi.

Ceux qui voudront mettre au courant ce volume devront reprendre les bulletins parus depuis le 1er janvier, ou le collationner sur l'état général qui contiendra le prochain numéro; ce travail sera rendu facile grâce au mode adopté pour annoncer les divers mouvements ; mais il devient en quelque

ADMISSION DES MÉDECINS ET PHARMACIENS INSPECTEURS DANS LE CADRE DE RÉSERVE.

On lit dans la *Patrie* :

« Depuis quelque temps, une importante question militaire, celle des médecins de l'armée, est à l'étude, et l'on n'a pas oublié, sans doute, que nous n'avons pas été les derniers à en parler.

« Dans un article récent, nous avons essayé de mettre en lumière cette question, en faisant connaître les justes aspirations de ces hommes de science si utiles, si indispensables, dans les armées modernes, si dévoués dans la nôtre.

« Nous apprenons avec une satisfaction véritable qu'une partie des vœux du corps médical militaire est à la veille de se réaliser, grâce à l'initiative de l'Empereur et aux éclaircissements fournis par le Ministre de la guerre.

« Voici ce dont il s'agit :

« Dans le principe, les officiers généraux seuls étaient admis au cadre dit de réserve, qui est encore une *activité*, lorsque l'âge fixé pour la retraite a sonné. Les autres officiers de l'armée étaient *retraités*, position définitive qui ne permet plus, même en cas de guerre, d'utiliser leur service dans les corps de troupes.

« Lorsque les officiers de la partie administrative furent assimilés à ceux des corps combattants, les membres de l'intendance furent assez heureux pour obtenir le cadre de réserve en faveur de leurs assimilés au grade de général de brigade ou de division (intendant divisionnaire et intendant général inspecteur).

« Les médecins-inspecteurs, bien qu'assimilés, dans l'ordre de la hiérarchie militaire, aux intendants divisionnaires, n'ont pas, comme ces derniers, été admis à la haute faveur du cadre de réserve.

« Il paraît positif que cette juste et légitime satisfaction ne tardera pas à leur être accordée : car on nous assure que le général Le Bœuf est décidé à présenter sous très-peu de jours un projet de loi ou de décret, attribuant le cadre de réserve, comme pour les intendants, aux sept inspecteurs-médecins, et sans doute à l'inspecteur pharmacien, qui font partie des cadres de l'armée, au fur et à mesure qu'ils auront atteint l'âge fixé pour cette position.

« Ici va se présenter sans doute une petite difficulté, qui sera levée probablement par le Ministre.

« Le cadre de réserve est donné aux généraux de division et aux intendants généraux inspecteurs à soixante-cinq ans; il est donné à soixante-deux ans aux généraux de brigade et aux intendants divisionnaires, tandis que l'âge fixé pour la mise à la retraite des médecins et pharmaciens inspecteurs est de soixante-quatre ans.

« Nous présumons que les inspecteurs du service de santé, lorsque le cadre de réserve leur sera appliqué, rentreront dans la catégorie des généraux de brigade et des intendants.

« Quoi qu'il en soit, c'est là une mesure équitable, qui ne peut manquer d'être approuvée par l'armée, fort appréciatrice des services rendus par les médecins militaires.

« Cette mesure peut permettre aussi de présumer que bientôt l'autre aspiration, non moins légitime, du corps de santé, celle de ne plus ressortir de l'intendance, mais du commandement, suivra de près. »

LE SERVICE DE SANTÉ MILITAIRE EN PRUSSE ET SA RÉFORME D'APRÈS L'EXPÉRIENCE DE LA GUERRE DE 1866.

Après la guerre de 1866, S. M. le roi de Prusse institua une commission dont la mission était de rechercher et de proposer à la sanction royale les bases d'une organisation du service de santé militaire conforme à l'expérience acquise dans les dernières guerres.

Les membres de cette commission étaient MM. les docteurs :

Bardeleben, professeur, médecin général consultant.
Boeger, médecin général.
Busch, professeur, médecin général consultant.
Esmarch, professeur.
Esse, directeur de la Charité.
Frerichs, professeur.
De Langenbeck, professeur, médecin général consultant.
De Lauer, médecin général.
Loeffler, médecin général.
Middeldorpf, professeur, médecin général consultant.
Steinberg, médecin général de la marine.
Stromeyer, médecin-major général de l'ancienne armée du Hanovre.
Velten, conseiller médical secret.
Wagner, professeur, médecin général consultant.
Wegner, médecin général.
Wilms, médecin général consultant.

La Commission choisit M. de Langenbeck pour son président.

MM. Grimm, médecin-major général de l'armée prus-

sienne, Krienes et de Hartmann, chefs de division au ministère de la guerre, furent nommés commissaires royaux auprès de la commission ; ces commissaires avaient mission de communiquer à la conférence les idées du gouvernement sur une série de modifications importantes projetées et les travaux préparatoires déjà commencés. Tous les documents nécessaires étaient mis à la disposition de la commission, et un programme de ses délibérations était tracé à l'avance. Mais il était bien entendu que la commission avait toute latitude pour modifier ou élargir ce programme.

La conférence siégea du 18 mars au 3 mai 1867, et ses propositions firent l'objet d'un rapport d'ensemble soumis à l'appréciation royale.

Diverses ordonnances royales successives, et particulièrement l'ordonnance du 20 février 1868 (1), ont sanctionné et définitivement mis en pratique la plupart des propositions adoptées par la commission. Quelques-unes de ces mesures sont encore à l'état de projet, en attendant les changements d'organisation nécessaires à leur accomplissement (par exemple les modifications adoptées en principe pour l'organisation des hôpitaux militaires de l'intérieur en temps de paix).

Nous essaierons de donner, d'après le livre que vient de publier M. Loeffler, médecin général (2), un aperçu des principales réformes adoptées ou proposées, en le faisant précéder d'un exposé sommaire de l'organisation du service de

(1) V. *Revue des médecins des armées*, 1868, t. VIII, p. 420.

(2) LOEFFLER, *Das preussische Militär-Sanitätswesen und seine Reform nach der Kriegserfahrung* von 1866. Auf Allerhöchste Anregung mit Benutzung amtlicher Quellen. (Le service de santé militaire en Prusse, et sa réforme d'après l'expérience de la guerre de 1866. Publié par ordre du roi et d'après les sources officielles). Berlin, 1869.

santé en Prusse, nécessaire pour l'intelligence de la question.

Le service de santé militaire en Prusse emprunte ses caractères particuliers à l'organisation même de l'armée prussienne. Tout Prussien est soldat et doit payer sa dette à la patrie en servant lui-même dans l'armée active pendant trois ans, sans pouvoir se faire remplacer. S'il est capable de subir un examen scientifique dont le programme est fixé ou s'il est muni d'un certificat d'étude d'un certain degré, il est autorisé à ne servir qu'un an, sous la condition de s'habiller et de s'entretenir à ses frais; il a alors le choix de l'arme et du corps, et peut, au lieu de servir dans le rang, faire son temps de service dans un des emplois militaires spéciaux auxquels sa profession ou ses études peuvent le rendre apte. Ce sont là ce qu'on appelle les *Volontaires d'un an*. A l'expiration de leur année de service ils passent dans la réserve et plus tard dans la landwehr. Tous les médecins prussiens servent ainsi pendant une année dans l'armée active, et peuvent être rappelés à l'activité pendant tout le temps de leur inscription dans les cadres de la landwehr, c'est-à-dire jusqu'à l'âge de 39 ans. On conçoit aisément quel contingent médical considérable se trouve ainsi sous la main du gouvernement, dans le cas d'une mobilisation de l'armée. Ce n'est que grâce à cette organisation que la Prusse a pu, à la date du 15 août 1866, avoir 2171 médecins employés à la suite de ses armées (1).

En Prusse le service de santé militaire n'est pas, comme en France, divisé en deux fractions bien distinctes, selon qu'il s'exerce dans les corps de troupes ou dans les établis-

(1) Loeffler, *loc. cit.*, page 290.

sements hospitaliers. L'intendance militaire n'a pas, en Prusse, la même organisation qu'en France, et n'a jamais été chargée de la direction du service de santé de l'armée. Il y a donc là dès l'abord une différence fondamentale entre le système prussien et le système français.

En temps de paix, tous les médecins militaires prussiens sont attachés à des corps de troupes ou à des états-majors; ils soignent eux-mêmes les malades de leur corps dans les hôpitaux de garnison A cet effet, l'effectif médical des corps de troupes est calculé à raison de deux médecins par bataillon (un médecin-major et un médecin assistant). Un régiment d'infanterie de trois bataillons compte par conséquent six médecins (un médecin-major de 1re classe, deux médecins-majors de 2e classe, trois médecins assistants) (1).

(1) Voici quels sont aujourd'hui l'effectif total et la répartition, en temps de paix, du personnel médical de l'armée permanente en Prusse (*Loeffler*, page 298) :

1 *médecin-major général*, chef du service de santé militaire.

14 *médecins généraux* (1 à chacun des 12 corps d'armée, 1 adjoint au médecin-major général, 1 aux écoles médico-militaires).

207 *médecins-majors de 1re classe*, *Oberstabsaerzte* (1 à chacun des 103 régiments d'infanterie, des 66 régiments de cavalerie et des 12 régiments d'artillerie; 22 attachés à des états-majors de places fortes, 1 aux Invalides à Berlin, 1 à l'école des cadets de Berlin, 2 adjoints au médecin-major général).

317 *médecins-majors, Stabsaerzte* (206 dans les 103 régiments d'infanterie, 13 dans les 13 bataillons de chasseurs, 35 pour les régiments d'artillerie, 12 pour les 12 bataillons de pionniers (du génie), 23 attachés à des états-majors de places, 1 au commandement de la landwehr de Berlin, 18 à l'Institut médico-militaire, 6 aux écoles de cadets, 3 aux écoles de sous-officiers).

623 *médecins assistants* (12 aux bureaux des médecins généraux de corps d'armée, 309 dans les 103 régiments d'infanterie, 13 dans les 13 bataillons de chasseurs, 171 pour les 66 régiments de cavalerie, 1 à l'école de cavalerie, 69 à l'artillerie, 12 dans les 12 bataillons de pionniers, 12 pour les 12 bataillons du train, 3 aux écoles de sous-officiers,

Le médecin général du corps d'armée désigne à tour de rôle ceux d'entre les médecins des troupes qui doivent faire le service dans l'hôpital (*lazaret*) de la garnison. Il n'y a pas d'infirmeries régimentaires, comme en France. Tous les malades qui ne peuvent être traités à la chambre, doivent être envoyés au lazaret qui est établi dans chaque garnison et qui tient lieu à la fois d'infirmerie et d'hôpital.

Dans certaines garnisons importantes, comme par exemple à Berlin, il y a plusieurs lazarets, dont chacun est affecté à un ou plusieurs corps de troupes et desservi par les médecins de ces corps. Contrairement à ce qui se fait en France, les militaires malades ne sont jamais envoyés dans les hôpitaux civils, ou du moins ils ne le sont que dans des cas très-exceptionnels. En Prusse, chaque ville de garnison a son lazaret, où le soldat malade est traité par des médecins militaires, et, autant que possible, par des médecins de son propre régiment.

Ces lazarets de garnison sont dirigés et administrés par une commission de trois membres : un médecin, un officier de troupe, un comptable. L'autorité de ces trois membres, ainsi que leur responsabilité, est collective. L'officier de troupe est spécialement chargé de la discipline; le comptable, qui porte le titre d'*inspecteur de lazaret* (Lazareth inspector), est chargé de l'administration; le médecin a la di-

8 aux écoles de cadets, 12 pour les hôtels et compagnies d'invalides).

Une partie de ces places de médecins-assistants sont occupées par des *médecins volontaires d'un an*, ou par des *sous-médecins*. Le grade de sous-médecin, assimilé à celui de sous-officier porte-épée, est un stage de trois mois au moins par lequel tous les jeunes médecins qui entrent dans l'armée sont obligés de passer (V. ordonnance du 20 février 1868 : articles relatifs à l'avancement) avant de pouvoir être admis au rang de médecin assistant, c'est-à-dire d'officier. (Nul, dans l'armée prussienne, ne peut être officier s'il n'a servi 3 mois au moins comme sous-officier porte-épée.)

rection du service médical et pharmaceutique et est chargé de l'instruction des infirmiers ainsi que de leur distribution dans les divers services. Le médecin général et l'intendant du corps d'armée sont chargés, chacun en ce qui le concerne, de l'inspection et du contrôle des diverses parties du service; les commandants de place sont chargés de la surveillance générale. Mais dès aujourd'hui il est admis en principe qu'au lieu d'une commission mixte, ce sera un médecin chef qui sera chargé de la direction du lazaret. L'officier de troupe sera supprimé; le pouvoir disciplinaire passera aux mains du médecin chef, auquel le comptable sera subordonné.

En temps de guerre, il n'est plus possible que les corps de troupes fassent eux-mêmes soigner leurs malades par leurs propres médecins : aussi, dès que l'armée est mobilisée, le système hospitalier change, et il devient nécessaire de former des ambulances ou *lazarets de campagne*, qui ont leur existence propre, indépendante des corps de troupes, et qui ont leur personnel médical propre. Pour remplir les cadres de ce dernier personnel, le médecin-major général désigne, d'après les propositions des médecins généraux, ceux des médecins des corps de troupes ou de la réserve ou de la landwehr qui lui paraissent les plus aptes à remplir ces fonctions. Les vacances produites dans le personnel médical des corps de troupes par ces désignations pour le service hospitalier sont comblées autant que possible par les médecins de la réserve ou dans la landwehr. Au commencement de chaque année, le *plan de mobilisation* de l'armée est arrêté, et toutes les désignations de personnel pour les divers services sont faites d'avance par les autorités compétentes, de sorte que, dans le cas d'une brusque mobi-

lisation de l'armée, chacun connaît la place qu'il doit occuper.

Pour se faire une idée de la quantité du personnel médical qu'exige la formation des lazarets de guerre, il suffira de savoir que, d'après le plan de mobilisation de 1867, chaque corps d'armée en campagne doit avoir :

1° Douze *lazarets* comptant chacun cinq médecins — ci soixante médecins;

2° Trois *détachements sanitaires* (corps spéciaux pour le transport et le premier pansement des blessés), comptant chacun sept médecins — ci vingt et un médecins;

3° Un *personnel de réserve* de douze médecins (pour être employés dans des lazarets de réserve) — ci douze médecins.

Cela fait quatre-vingt-treize médecins pour les ambulances de chacun des douze corps d'armée qui composent l'armée prussienne, c'est-à-dire un total de 1116 médecins présumés nécessaires pour le service hospitalier de l'armée en campagne, sans compter les hôpitaux sédentaires sur lesquels les malades de l'armée peuvent être évacués.

Comme l'effectif médical des corps de troupes doit rester le même en campagne qu'en temps de paix (c'est-à-dire deux par bataillon), et qu'en outre il faut pourvoir au service médical des régiments de landwehr mobilisés, on comprendra qu'en temps de guerre, le service de santé de l'armée prussienne exige, pour être au grand complet, un personnel de plus de *trois mille* médecins.

La direction et le commandement des lazarets de guerre appartiennent aux médecins-chefs qui sont placés à la tête de chacun d'eux. Ce principe fondamental et caractéristique du service des ambulances de l'armée prussienne a été mis en vigueur par le règlement de 1863 sur le service de santé en campagne. Avant cette époque, les lazarets de guerre

étaient, comme le sont encore aujourd'hui les lazarets de garnison, placés sous la direction collective d'une commission composée de trois membres (un officier de troupe, un médecin, un comptable). Les guerres de 1864 et 1866 ont constaté les avantages de la direction des ambulances par les médecins-chefs, mais ont en même temps démontré la nécessité de rendre l'autorité de ces derniers plus effective en leur conférant le droit de punition disciplinaire sur le personnel placé sous leurs ordres. Nous indiquerons plus loin les propositions de la conférence à cet égard et les réformes qui en ont été la suite.

Chaque lazaret de campagne est organisé pour un chiffre de deux cents malades ou blessés. Chaque corps d'armée comptant douze lazarets, emmène donc avec lui un personnel et un matériel suffisant pour hospitaliser 2,400 malades. Parmi ces douze lazarets, un plus ou moins grand nombre, selon les besoins du service, peuvent être attachés à une des deux divisions qui composent le corps d'armée ou peuvent rester à la disposition du quartier général du corps d'armée. Le médecin général attaché à l'état-major de chaque corps d'armée est l'intermédiaire naturel entre le commandement et le médecin-chef placé à la tête de chaque lazaret. Dans l'étendue de chaque corps d'armée, le médecin général exerce les fonctions de directeur et d'inspecteur permanent du service de santé. Le contrôle de l'administration appartient à l'intendance, de même que le personnel du train attaché aux lazarets est soumis à l'autorité du commandant du bataillon du train.

Ni l'intendant ni le commandant du train ne donnent directement leurs ordres au personnel sur lequel ils exercent leur contrôle; ces ordres doivent toujours passer par le médecin-chef du lazaret.

Le personnel qui concourt avec les médecins à l'exécution des services de santé dans les établissements hospitaliers de l'armée, et dont il nous reste à dire un mot, est le suivant :

1° Pharmaciens ;
2° Aides de lazaret (Lazarethgehülfen);
3° Infirmiers militaires ;
4° Employés d'administration et d'exploitation (Oekonomische Beamte);
5° Personnel du train;
6° Brancardiers.

1° Le *service pharmaceutique* de l'armée prussienne n'offre aucune analogie dans son organisation avec celui de l'armée française. En Prusse il n'y a pas de pharmaciens militaires dans les cadres de l'armée permanente. En vertu de la loi qui oblige tout Prussien à être soldat, tous les jeunes pharmaciens civils doivent une année de service dans l'armée, et sont ensuite inscrits dans les cadres de la réserve et de la landwehr. Le personnel pharmaceutique dont dispose ainsi le gouvernement est plus que suffisant pour le service des lazarets en temps de paix aussi bien qu'en temps de guerre. En temps de paix, ce service est d'ailleurs extrêmement simple, car les médicaments nécessaires aux lazarets de garnison sont tous fournis, par voie d'adjudication, par une pharmacie civile de la localité. Il suffit donc, dans chaque lazaret de garnison, d'un *pharmacien volontaire d'un an*, qui est placé sous la direction et la surveillance du médecin traitant, et qui accomplit là son année de service obligatoire et gratuit, au même titre que les médecins volontaires d'un an. Le nombre des jeunes pharmaciens civils qui demandent à faire de cette façon leur stage dans l'armée est toujours supérieur aux be-

soins du service, et on peut leur accorder des sursis d'âge jusqu'à ce qu'ils soient diplômés.

En temps de guerre, on en rappelle à l'activité un nombre suffisant pour placer dans chaque lazaret de l'armée active un pharmacien (appelé *Feldapotheker*, c'est-à-dire pharmacien de campagne), qui pendant ce service temporaire prend rang parmi les employés militaires non assimilés, et qui est placé sous les ordres du médecin-chef du lazaret. Les approvisionnements de médicaments nécessaires aux lazarets de guerre sont fournis par des dépôts de médicaments formés *ad hoc*.

2° Les *aides de lazaret* (Lazarethgehülfen) sont exactement les analogues de nos *infirmiers de visite*. Comme ces derniers ils reçoivent dans une institution spéciale une instruction professionnelle particulière. Ils ne forment pas un corps particulier, mais, comme les médecins, ils font tous partie d'un corps de troupes. Leur effectif est calculé à raison d'un par compagnie, c'est-à-dire quatre par bataillon. Ils sont les auxiliaires naturels des médecins et sont, comme ces derniers, détachés des corps de troupes pour le service des lazarets de paix ou de guerre. Contrairement à ce qui se fait en France, c'est parmi eux qu'on choisit les *infirmiers-majors surveillants* (Revieraufseher).

Cette utile institution des aides de lazaret date en Prusse de 1832, tandis que l'institution analogue des infirmiers de visite ne date en France que de 1860.

3° Les *infirmiers militaires* sont recrutés dans les divers corps de l'armée parmi les soldats qui ont achevé leur instruction militaire première. Ils jouissent de l'avantage de passer dans la réserve au bout d'un an de service au lieu de trois. Il y a beaucoup à dire contre ce mode de recrutement, qui assure la quantité au détriment de la qualité, car ces

hommes quittent le service actif au moment où leur instruction spéciale est à peine terminée. En cas de guerre, le nombre de ceux qu'on peut rappeler à l'activité suffit amplement aux besoins du service des lazarets. Ils sont placés sous les ordres directs des médecins pour tout ce qui concerne le service des malades.

4° L'administration et l'exploitation des lazarets sont dirigées par un employé supérieur, désigné par l'intendance, et portant le nom d'*inspecteur de lazaret* (Lazareth inspector). Dans les lazarets de garnison, l'inspecteur est un des trois membres de la commission administrative. Dans les lazarets de guerre, il est subordonné au médecin-chef pour tout ce qui concerne le service, tout en restant soumis au contrôle de l'intendance pour tout ce qui concerne la comptabilité.

5° Chaque lazaret de guerre possède un personnel et un matériel de train, qui lui est attaché d'une manière permanente, et qui se compose aujourd'hui de cinq voitures et de vingt hommes commandés par un maréchal des logis chef (Wachtmeister). Avant 1867 (c'est-à-dire à l'époque à laquelle il n'y avait que trois lazarets principaux par corps d'armée), le train de chacun de ces lazarets était commandé par un officier qui avait en même temps le droit de punition disciplinaire sur tous les militaires du lazaret, tels qu'infirmiers, etc. On verra plus loin quels ont été les inconvénients résultant de la situation fausse du médecin-chef vis-à-vis de cet officier qui lui était subordonné pour le service, et qui cependant avait *seul* le pouvoir disciplinaire.

6° Les *brancardiers* sont une institution particulière à la Prusse. Destinés à assurer l'enlèvement des blessés du champ de bataille et leur transport dans les lazarets, les

brancardiers remplacent plus ou moins complétement nos mulets de cacolet et de litière. Ils font partie des *détachements sanitaires*, dont il sera question plus loin.

Après cet exposé sommaire du fonctionnement du service de santé militaire en Prusse, nous allons passer en revue les points principaux sur lesquels ont porté les délibérations de la commission de réorganisation de 1867.

I. — LE PRINCIPE DE L'ORGANISATION (1).

On ne se trompera pas en supposant que des hommes d'une aussi haute valeur et d'une compétence aussi incontestable que ceux qui composaient la commission ont considéré à un point de vue suffisamment élevé la question qui était soumise à leurs délibérations. Leur propre expérience acquise pendant la guerre qui venait de finir, réunie à l'expérience acquise dans les autres grandes guerres des dernières années, devait nécessairement leur inspirer la conviction que pour assurer aux soldats blessés ou malades les soins auxquels ils ont droit, il ne suffisait pas de quelques changements de détail dans le fonctionnement du service de santé militaire, mais qu'il fallait avant tout reviser les principes eux-mêmes qui servent de base à l'organisation de ce service.

La commission se trouvait en présence de deux systèmes d'organisation diamétralement opposés, que l'expérience des guerres modernes permet de juger et de comparer.

Le service de santé sous l'autorité de l'intendance, tel est le principe qui, conséquent avec lui-même jusque dans ses

(1) Ce chapitre est à peu près textuellement traduit de l'ouvrage de M. Loeffler, pages 156-162. Les chapitres suivants le sont également en partie.

moindres détails, sert de base au *système français*. Les enseignements de la guerre de Crimée et de la campagne d'Italie de 1859 ont porté la conviction dans tous les esprits sur la valeur pratique et les conséquences fatales de ce système, qui a failli anéantir complétement l'armée française de Crimée. Ce n'est que par une rupture finale avec ces errements que cette héroïque armée, qui avait accompli des prodiges de bravoure, a pu être préservée d'une destruction totale.

L'épreuve pratique du système opposé a été faite pendant la guerre des États-Unis d'Amérique, qui finissait à peine quand éclata la guerre d'Allemagne de 1866. Il est impossible de trouver un contraste plus frappant que celui qu'a offert à nos yeux l'état misérable du service de santé pendant la première année de la guerre d'Amérique, comparé au développement inouï que ce même service avait atteint à la fin de la guerre, et auquel nous pouvons d'autant moins refuser notre admiration qu'il nous est connu non-seulement par les sources officielles américaines (en tête desquelles il faut citer les « circulaires » émanées du département médical du ministère de la guerre américain), mais encore par le témoignage impartial d'observateurs étrangers. Citons notamment l'intéressante relation d'un médecin russe, homme d'esprit autant que d'expérience, le docteur de Haurowitz, et les remarquables rapports inédits de M. le médecin-major Munnich, envoyé en mission aux États-Unis par le gouvernement prussien.

Parmi les résultats obtenus par le service de santé militaire aux Etats-Unis, plus d'un a trouvé en Europe des admirateurs enthousiates; et plus d'une des créations américaines (comme par exemple les gigantesques hôpitaux-baraques) mériteraient d'être étudiées et imitées chez nous;

mais ce qui mérite surtout d'être étudié, c'est le *principe* qui leur a servi de base et qui seul a rendu possible l'essor véritablement fabuleux qu'a pris en si peu de temps le service de santé américain.

Unité de direction et de responsabilité confiée aux mains du corps spécial qui fait du service de santé l'objet constant de ses études et qui seul est compétent dans les questions médicales :

Tel est le principe aussi simple que clair qui fut admis en Amérique comme point de départ de la réforme sanitaire entreprise pendant la guerre même. On mit ce principe en pleine vigueur partout où le concours du personnel de divers services était nécessaire dans un but sanitaire, au département médical du ministère de la guerre aussi bien que dans les hôpitaux-baraques ou dans les navires-hôpitaux.

Le gouvernement américain s'adressa à la science afin de savoir quels étaient les moyens nécessaires pour assurer aux blessés et malades les soins suffisants ; tout ce qui était déclaré nécessaire, il l'accorda sans marchander, et en confia la disposition et la responsabilité aux mains du médecin, dont il assura l'initiative et l'autorité exécutive en lui donnant la position indispensable dans l'organisation de l'armée.

Certes, le principe qui a permis aux Américains d'obtenir d'aussi prodigieux résultats n'était pas absolument nouveau. La Prusse peut à juste titre en revendiquer la priorité et s'enorgueillir de l'avoir adopté, timidement il est vrai et d'une manière très-restreinte, dès 1860, et de l'avoir mis en pratique par le règlement de 1863 sur le service de santé en campagne, en attribuant aux médecins-chefs la direction des ambulances de guerre. Mais ce germe

déposé dès lors dans les institutions prussiennes, combien nous le retrouvons développé et grandi dans le nouveau monde ! Seule en Europe, la Prusse avait dès 1860 formulé officiellement l'idée de confier la direction et le commandement sanitaires aux mains de celui auquel tout le monde en attribue instinctivement la responsabilité et qui seul possède la compétence voulue. Mais, ce qui, en Prusse, n'était encore admis qu'à titre d'essai partiel, entouré d'une foule de restrictions, est devenu, sous le ciel de l'Amérique, la clef de voûte de tout un immense système d'organisation qui dans les circonstances les plus difficiles a produit de merveilleux résultats.

En Europe, l'exemple donné par la Prusse en 1860 et 1863, par la réforme du service de santé en campagne, était resté et reste encore aujourd'hui sans imitateurs. Partout règne encore le préjugé que l'étude et l'exercice de la médecine sont incompatibles avec l'aptitude à l'administration et au commandement. L'expérience d'Amérique nous fournit la preuve frappante du contraire. Malgré le grand nombre d'éléments d'une capacité très-douteuse que la nécessité força d'admettre dans le service sanitaire de l'armée, un ordre remarquable, une activité surprenante et un esprit éminemment créateur se déployèrent dans toutes les branches de cette grandiose organisation : telle est la puissance d'un principe fondamental sain et rationnel, qui attribue les droits de l'autorité à ceux auxquels incombent les devoirs de la responsabilité.

Prétendre (comme on l'a encore fait tout dernièrement en Autriche, lors des délibérations de la commission d'enquête sur la réforme du service de santé militaire) qu'en conférant au médecin des attributions administratives ou disciplinaires, on ne ferait que dénaturer ou rabaisser le

caractère élevé de sa mission, c'est méconnaître les conditions essentielles dont dépend la guérison des malades ou des blessés. Ce n'est pas seulement dans le laboratoire du pharmacien ni dans l'atelier du fabricant d'instruments de chirurgie que le médecin trouve ses moyens de guérison les plus efficaces. Aujourd'hui la science médicale proclame hautement que médicaments et instruments sont impuissants sans le concours d'autres conditions qu'une hygiène bien entendue peut seule réaliser. Vouloir borner le rôle du médecin militaire à la prescription des médicaments, à l'exécution des opérations et des pansements, c'est commettre une étrange erreur. Le capital scientifique représenté par le médecin produit précisément ses plus gros intérêts dans *l'administration et la direction sanitaires*. Si le doute à cet égard avait été permis, il ne le serait plus aujourd'hui devant les preuves fournies par la guerre d'Amérique et devant l'expérience de la guerre de 1866.

Si, pendant cette guerre, le service de santé prussien n'a pas donné tout ce qu'il aurait pu donner, c'est précisément dans le défaut d'unité d'organisation et principalement de direction supérieure, que la commission, se basant sur les faits acquis, en a trouvé les causes.

Elle proposa par conséquent à la sanction royale la base d'organisation suivante :

L'ensemble du service de santé militaire forme un département du ministère de la guerre, placé sous les ordres immédiats du ministre.

A sa tête est placé le chef du service de santé (médecin-major général de l'armée).

Ce département embrasse le matériel et le personnel du service de santé des troupes et des hôpitaux et les établissements d'instruction médico-militaire.

Cette proposition, qui ne faisait que généraliser et appliquer sur une plus grande échelle le principe admis depuis 1863, reçut la sanction royale et fut portée à la connaissance de l'armée par l'ordre suivant :

« Berlin, le 28 septembre 1868.

« D'après les ordres de S. M. le Roi en date du 2 juillet et du 24 courant :

« Il sera créé au ministère de la guerre, à titre d'essai, une *division médico-militaire* qui sera placée sous les ordres immédiats du ministre de la guerre, et dont la direction sera confiée au médecin-major général de l'armée.

« Cette division entrera en fonctions le 1er octobre de la présente année, époque à laquelle l'état-major médical de l'armée devra cesser ses fonctions.

« Seront en général du ressort de la *division médico-militaire* les affaires du service de santé militaire, élaborées jusqu'à présent par les deux départements du ministère de la guerre et par l'état-major médical de l'armée.

« Elle sera spécialement chargée des affaires suivantes :

« Observation de l'hygiène militaire ; police sanitaire et statistique sanitaire de l'armée ; contrôle supérieur au point de vue médical des opérations de recrutement, de réforme ou de retraite ; approvisionnement de l'armée en médicaments, objets de pansement et instruments de chirurgie ; service hospitalier de paix, de campagne ou de siége ; intérêts du corps de santé, des établissements d'instruction médico-militaire, des établissements d'eaux minérales, des pharmaciens militaires, des aides de lazaret et des infirmiers.

« Les ordres émanant de la division médico-militaire et touchant soit l'organisation, soit l'administration des troupes,

seront soumis à la collaboration du département des affaires militaires générales ou du département de l'administration militaire.

« Resteront du ressort du département des affaires militaires générales (sauf le concours, s'il y a lieu, de la division médico-militaire) : le travail résultant des intérêts purement militaires des médecins militaires, en particulier les rapports du corps de santé avec les troupes et la position des médecins dans l'armée, les conditions générales de service de ces derniers ainsi que leur discipline et leur assimilation, et enfin les moyens de transport des ambulances de guerre.

« Les fonds destinés à l'achat des médicaments continueront à être administrés par le département d'administration militaire.

« Pour toutes les affaires qui viennent de lui être attribuées, la division médico-militaire correspondra directement avec les généraux commandants et les autorités provinciales; ses décisions seront notifiées sous la signature suivante : Ministère de la guerre, division médico-militaire. Chaque fois cependant qu'il s'agira de dispositions générales concernant l'armée, les ordres seront notifiés de la part du ministre de la guerre.

« Ministère de la guerre
« DE ROON. »

A partir du 1er octobre 1868, la *division médico-militaire* du ministère de la guerre est entrée en fonctions sous la direction du médecin-major général, auquel a été adjoint le personnel suivant :

3 rapporteurs médicaux (1 médecin général et 2 médecins-majors de 1re classe).

1 rapporteur administratif.

3 rapporteurs-adjoints (2 médecins-majors et un pharmacien-major).

La création de la *division médico-militaire* n'est pour le moment qu'un essai, dont les résultats devront servir de base à une réglementation ultérieure et définitive. Mais sa véritable portée et sa véritable utilité ne seront clairement démontrées que par une guerre. Plus celle-ci paraît éloignée, plus il sera permis d'espérer que la nouvelle institution donnera des résultats heureux et s'affirmera comme un progrès de la philanthropie officielle; en supposant toutefois que le principe qui lui sert de base reçoive son application logique dans toutes les parties du service. C'est à ce point de vue que nous aurons à considérer avant tout la position du médecin dans l'armée, qui fait le sujet du chapitre suivant.

II. — La position du médecin dans l'armée.

Quelle doit être la position du médecin dans l'armée, si le principe d'organisation précédemment admis doit devenir une réalité et porter les fruits attendus?

Dans son appréciation de cette question, la commission, restant toujours sur le terrain pratique, a dû laisser de côté les discussions théoriques et les considérations personnelles. Les campagnes de 1864 et de 1866 lui offraient des éléments d'appréciation suffisants.

Pour bien se rendre compte de l'état de la question telle qu'elle se posait devant la commission, il faut se rappeler que ces deux campagnes ont été faites sous l'empire du règlement de 1863 sur le service de santé en campagne. Ce règlement plaçait la direction responsable des établissements hospitaliers dans les mains des médecins-chefs. Le médecin-chef d'un lazaret (ambulance) avait, par conséquent,

sous ses ordres les médecins, pharmaciens et employés administratifs, les aides de lazaret et les infirmiers, et le personnel du train qui fait partie intégrante du lazaret et qui était placé sous le commandement d'un officier. Mais, par une étrange anomalie, il n'avait aucune action disciplinaire sur tout ce personnel tenu d'obéir à ses ordres. C'était l'officier du train qui *seul* avait le droit de punition sur tous les *militaires* attachés au lazaret, tant sur les soldats du train que sur les infirmiers et les aides de lazaret. Le médecin, chef responsable du lazaret, était obligé, pour faire infliger une punition à un de ces militaires, et pour faire respecter son autorité, de s'adresser à l'officier du train, qui était cependant son subordonné et qui n'avait que le grade de sous-lieutenant, tandis que le médecin-chef était assimilé à un major ou au moins à un capitaine. Il est facile de concevoir combien cette position devait être fausse à certains moments, et combien elle devait nuire à la bonne exécution du service. L'autorité n'appartenait au médecin-chef *qu'en principe*, mais *en fait* elle pouvait être annihilée par le défaut d'entente avec l'officier du train, ou par le mauvais vouloir de ce dernier.

Tout le monde était d'accord pour reconnaître les inconvénients de cette situation et la nécessité de donner au médecin-chef des pouvoirs disciplinaires comme garantie indispensable de son autorité. Mais la législation pénale militaire opposait une difficulté insurmontable à cette innovation.

Il y a en effet, dans l'armée prussienne, deux catégories bien distinctes : celle des combattants et celle des non-combattants. La première porte le nom de catégorie des *personnes militaires proprement dites* (*Personen des Soldatenstandes*, littéralement, personnes de l'état de soldat). La seconde catégorie est celle des *employés militaires* assimilés ou non. Un principe fondamental de la législation militaire est qu'aucune personne de la seconde catégorie ne peut exercer d'action disciplinaire sur les personnes de la première catégorie. Or, les médecins faisant partie, malgré leur assimilation, de la catégorie des employés militaires, il était de toute impossibilité de leur accorder le droit de punition sur les aides de lazaret, les infirmiers militaires, les brancardiers, les soldats du train, etc., qui tous appartenaient à la catégorie des militaires proprement dits.

A moins de renoncer au principe admis comme base de l'organisation, et de retirer aux médecins la direction et la responsabilité du service de santé, il n'y avait qu'un seul moyen de sortir de cette impasse. Ce moyen, qui fut adopté par la commission, consistait à faire passer les médecins dans la première catégorie, c'est-à-dire, à les élever au rang de personnes du *Soldatenstand* ou personnes militaires proprement dites. Pourquoi, en effet, le médecin, partageant la vie et les dangers du soldat, ayant les mêmes devoirs, n'aurait-il pas les mêmes droits ?

Dans cet ordre d'idées, la commission recommanda à la sanction royale une série de mesures destinées à assurer aux médecins militaires la position nouvelle qu'elle croyait nécessaire de leur donner dans l'armée.

Elle proposa d'*organiser un corps d'officiers sanitaires analogue aux autres corps spéciaux, par exemple au corps des officiers du génie.*

Dans la pensée de la commission, les sous-médecins (aspirants officiers sanitaires), les aides de lazaret, les infirmiers militaires, les brancardiers (en un mot tout le personnel sanitaire n'ayant pas rang d'officier), devaient être considérés comme les éléments subalternes naturels d'un

futur *Corps sanitaire*. Mais, en proposant la formation de ce corps spécial, la commission était loin de vouloir proposer des mesures extravagantes, comme, par exemple, de vouloir transformer les médecins en colonels ou capitaines sanitaires. Tout en demandant l'assimilation pleine et entière elle ne songeait nullement à laisser absorber ni même masquer la qualité médicale par la qualité militaire, ni dans le le corps sanitaire, ni dans les établissements qui, tels que les ambulances, sont composés d'éléments provenant de services divers, mais concourant tous à un but sanitaire ; nulle part, les fonctions purement militaires ne doivent être exercées par les officiers sanitaires. La commission admettait au contraire la supposition que des officiers de troupe pussent être détachés auprès d'un établissement ou corps sanitaire, pour y remplir les fonctions purement militaires, exactement de la même manière que des officiers sanitaires sont détachés auprès des corps de troupes pour y faire le service de santé.

Ce sont précisément les propositions extravagantes dont il était question tout à l'heure, qui ont été cause de la supposition que les médecins militaires, jouissant d'une assimilation complète et effective, pourraient élever des prétentions au commandement d'une troupe, dans le cas où l'officier le plus ancien serait accidentellement d'un grade inférieur à celui du médecin. Ce serait là méconnaître complétement la signification et la portée du principe d'organisation admis plus haut. Là où la combinaison du personnel de divers services concourt à un but *militaire*, il est de toute évidence que c'est à l'élément militaire *seul* qu'appartient le commandement ainsi que la responsabilité. Mais, dans la pensée de la commission, *la réciproque doit être admise quand la combinaison du personnel de divers services a lieu dans un but exclusivement sanitaire.*

A cet effet, la conférence dut recommander comme indispensable l'*assimilation complète des officiers sanitaires avec les autres officiers, relativement aux conséquences générales du grade militaire*, notamment en ce qui concerne les honneurs militaires. Car les médecins militaires, n'étant que des employés assimilés, n'avaient jusqu'à présent ni les mêmes droits, ni les mêmes devoirs que les autres officiers. Pour faire disparaître cette différence, et afin de rendre complète l'analogie entre les médecins militaires et les personnes du « *Soldatenstand* » ayant rang d'officier, la commission proposa diverses mesures, comme, par exemple, de faire prêter aux officiers sanitaires le serment aux articles de guerre (*Vereidigung auf die Kriegs artikel*), de les soumettre aux tribunaux d'honneur, de subordonner leur admission dans le corps de santé au choix des officiers de ce corps (1), etc.

Elle fit en outre des propositions relatives à l'*uniforme* des officiers sanitaires, recommandant de leur donner à tous le même uniforme avec les insignes distinctifs des grades tels qu'ils sont usités dans le reste de l'armée.

On peut juger, par la lecture de l'ordonnance royale du 20 février 1868 (2), jusqu'à quel point les propositions énumérées dans ce chapitre ont reçu la sanction royale. Si tous

(1) V. ordonnance du 20 février 1868, *Revue des médecins des armées*, tome VIII, p. 424-426. — En Prusse, nul ne peut être nommé officier dans un corps sans avoir subi auparavant le choix des officiers de ce corps. Si ceux-ci s'opposent à l'admission du candidat, sa proposition est nulle de plein droit. — Le serment aux « articles de guerre » est exigé de toutes les personnes du *Soldatenstand*.

(2) V. Loeffler, *loc. cit.*, p. 318, *Revue des médecins des armées*, t. VIII, p. 420.

les détails de ces propositions n'ont pas été admis tels qu'ils étaient formulés par la conférence, au moins leur principe fondamental a-t-il été adopté. Les membres du corps de santé feront dorénavant partie de la catégorie des personnes militaires proprement dites (*Die Mitglieder des Sanitäts Corps sind Personen des Soldatenstandes*, chap. III, § 13). Grâce à ce changement, leur autorité, qui, jusqu'à présent, était plus nominale que réelle, deviendra effective par le pouvoir disciplinaire qu'ils exerceront sur leurs subordonnés.

Voici d'ailleurs les principales dispositions de la susdite ordonnance :

§ 1. Tous les médecins militaires.... forment le corps sanitaire. A la tête de ce corps est placé le médecin-major général de l'armée.

§ 2. Le médecin général d'un corps d'armée est le chef de l'ensemble des médecins militaires du ressort de ce corps sans distinction de leur emploi auprès des troupes, dans les garnisons ou dans les établissements militaires.

Le plus ancien des médecins-majors de 1re classe de la division fait fonction de médecin divisionnaire.

§§ 3, 4, 5 et 6. Du recrutement du corps de santé.

§§ 7-12. Nul ne peut être nommé médecin assistant (c'est-à-dire entrer dans le corps de santé avec rang d'officier), sans avoir subi auparavant le choix des médecins militaires présents dans la division (de même que cela a lieu pour les officiers de troupe).

§ 13. Les membres du corps de santé font partie de la catégorie des personnes militaires proprement dites (*Personen des Soldatenstandes*).

Les médecins volontaires d'un an et les sous-médecins ont rang de sous-officiers porte-épée.

Les médecins assistants ont rang de sous-lieutenant ou de lieutenant.

Les médecins-majors ont rang de capitaine.

Les médecins-majors de 1re classe ont rang de capitaine de 1re classe ou de major.

Les médecins généraux ont rang de lieutenant-colonel ou de colonel.

Le médecin-major général a rang de général-major.

§ 14. Les médecins militaires ont droit à des soldats-ordonnances pris dans le rang.

§§ 15-20. Dispositions disciplinaires.

Les médecins militaires, chefs de service, exerceront le droit de punition disciplinaire non-seulement sur leurs subordonnés médicaux, mais aussi sur les pharmaciens, les aides de lazaret, les infirmiers militaires et les employés administratifs.

Le personnel du train des ambulances n'est pas mentionné, il reste par conséquent en dehors de l'action disciplinaire des médecins-chefs. L'anomalie signalée plus haut subsiste donc en partie.

§§ 21 et suivants. Dispositions diverses concernant l'avancement, les mutations, les décorations, la sortie du service, l'uniforme, les congés, les réclamations, l'état civil, etc.

III. — Des emplois sanitaires dans l'armée.

Si le service des médecins militaires devait se borner à la prescription et à l'exécution de traitements médicaux et chirurgicaux, il suffirait d'instituer des médecins de trois ordres différents : des *médecins traitants*, des *médecins assistants* et enfin des *médecins inspecteurs*.

Mais le médecin militaire n'est pas seulement appelé à

traiter des soldats malades. Son rôle doit être plus étendu; il doit être le conseil médical du commandement dans toutes les questions sanitaires et hygiéniques et le directeur responsable de l'administration sanitaire.

De même qu'il y a dans chaque bataillon et dans chaque régiment un médecin, chef de service, chargé de diriger et de centraliser tout ce qui concerne le service de santé, de même, il est nécessaire que dans chaque commandement composé de plusieurs régiments il y ait un chef du service médical, dans chaque division aussi bien que dans chaque corps d'armée, dans chaque armée séparée aussi bien que dans l'armée entière.

C'est là le point de vue auquel se plaça la commission. Elle établit en principe *qu'à chaque état-major, soit de division, soit de corps d'armée, soit d'armée, doit être adjoint un chef du service médical.*

Pendant la guerre de 1866, on avait créé des *médecins en chef d'armée* pour chacune des quatre armées qui opéraient sous le commandement suprême du roi de Prusse. Il est de toute évidence que ces fonctions sont de la plus haute importance et qu'elles devront être maintenues dans le cas d'une nouvelle guerre.

Les médecins en chef d'armée eux-mêmes agissent sous les ordres directs du *médecin-major général*, chef de tout le service de santé militaire.

En Prusse, l'institution des *médecins généraux de corps d'armée* est déjà ancienne. L'armée prussienne étant répartie d'une manière normale et permanente en 12 corps d'armée, les médecins généraux fonctionnent comme directeurs et inspecteurs du service de santé dans l'étendue du corps d'armée auquel ils sont attachés, en temps de paix aussi bien qu'en temps de guerre.

(A continuer.)

Mais il n'y avait point, jusqu'à présent, d'échelon hiérarchique intermédiaire entre le médecin de régiment et le médecin général du corps d'armée. Les états-majors de division manquaient d'un organe officiel du service de santé. La guerre de 1866 a démontré d'une manière péremptoire la nécessité de la création de *médecins divisionnaires* chargés d'imprimer une direction unique à tous les éléments du service sanitaire répartis dans les divers corps de troupes ou dans les lazarets attachés à la division.

C'est donc au double point de vue des principes et des nécessités pratiques que la commission formula et recommanda chaudement la proposition de créer dorénavant des médecins divisionnaires, pour l'état de guerre aussi bien que pour l'état de paix.

En campagne, cette institution donnera satisfaction à un besoin urgent en dirigeant et centralisant sur le champ de bataille les forces médicales éparses dans la division.

En temps de paix, les médecins divisionnaires seront d'une utilité non moindre, en partageant avec les médecins de corps d'armée la direction supérieure du service sanitaire dans l'étendue de leur division. C'est à eux que serait dévolu spécialement le contrôle des questions litigieuses de recrutement ou de réforme. Ils pourraient en même temps remplir les fonctions de médecins chefs dans les lazarets de garnison les plus importants.

Conformément aux propositions de la commission, l'emploi de médecin divisionnaire figure dès à présent dans le plan de mobilisation de l'armée. En temps de paix, le plus ancien médecin-major de 1re classe de la division fait fonctions de médecin divisionnaire (V. Ordonnance du 20 fév. 1868, chap. 1, § 2); mais jusqu'à présent ses fonctions sont plus nominales que réelles, en attendant que la

réorganisation projetée des lazarets de garnison soit achevée et permette de rendre sa direction plus effective.

Cette réorganisation des lazarets de garnison a été l'objet de la vive sollicitude de la commission. Nous avons vu plus haut que les lazarets de guerre sont placés sous la direction et le commandement de *médecins-chefs*, mais que cet emploi n'existe pas encore dans les lazarets de l'intérieur en temps de paix, qui sont encore placés sous la direction collective d'une commission de trois membres (V. plus haut, p. 599). La conférence reconnut unanimement la nécessité *de donner aux lazarets de garnison la même organisation qu'aux lazarets de guerre, c'est-à-dire de les placer sous les ordres de médecins-chefs*. Cette réforme, décidée en principe, a été retardée jusqu'à présent par la nécessité de la faire précéder par des modifications dans l'administration et principalement dans la comptabilité des lazarets. Mais les difficultés qui ont motivé ces retards paraissent être sur le point d'être aplanies, et le nouveau règlement sur le service sanitaire de l'armée en temps de paix ne tardera pas à être publié. Déjà, par une ordonnance ministérielle du 22 janvier 1868, diverses modifications, conformes aux propositions de la commission, ont été introduites dans le service médical des lazarets. Au lieu de grouper les malades par corps de troupes, comme cela se faisait généralement jusqu'ici, on les groupera dorénavant par genre de maladie. Le médecin général désignera les médecins-majors de la garnison qui devront être attachés à chacune de ces divisions de malades comme *médecins traitants*; la durée de leur service au lazaret devra être d'au moins six mois; pendant ce temps, ils n'en continueront pas moins leur service régimentaire, mais ne devront être

employés à aucun service hors de la garnison, tel que manœuvres, recrutement, etc. — Le médecin général désigne également les *médecins assistants* nécessaires pour le service des lazarets; mais leur répartition dans les divisions de malades se fait par le membre médical de la commission administrative du lazaret, de même que celle des aides de lazaret et des infirmiers.

Une institution qui démontre clairement qu'en Prusse rien n'est négligé pour assurer au soldat blessé les secours de l'art dans toute leur étendue, c'est celle des *médecins généraux consultants*.

En 1866, quelques-unes des illustrations chirurgicales du pays, étrangères à l'armée, avaient accepté volontairement les fonctions de chirurgiens consultants sur le théâtre de la guerre, ou dans les endroits où il y avait de grandes agglomérations de blessés (entre autres MM. de Langenbeck, Wilms, Middeldorpf, Wagner, Bardeleben, Esmarch, etc.).

Ces illustres chirurgiens ont rendu les plus grands services, tant aux blessés qu'aux médecins eux-mêmes, en assistant ces derniers de leurs conseils et en pratiquant eux-mêmes les opérations les plus importantes ou les plus difficiles.

Le niveau scientifique des médecins militaires prussiens est assez élevé et assez indiscutable pour que, laissant de côté toute espèce de faux amour-propre, ils aient pu accepter le contrôle de ces maîtres de la science, solliciter leurs conseils et leur concours et proclamer hautement les services rendus par eux.

On peut comprendre facilement combien la présence de pareilles célébrités chirurgicales doit inspirer de sécurité au

médecin militaire dont l'expérience n'égale pas toujours le zèle, dont la tâche dépasse souvent les forces et qui, malgré les connaissances les plus solides, peut à chaque instant avoir à résoudre des problèmes nouveaux pour lui. Quand il pourra, dans les cas difficiles, s'éclairer de l'avis d'un de ces hommes dont l'autorité scientifique est universellement reconnue, et que sa responsabilité sera ainsi complétement à l'abri, il n'en agira qu'avec plus de confiance, et sous l'œil d'un pareil maître, il redoublera de zèle et d'émulation.

Mais ce qu'il faut surtout considérer, c'est la sécurité que la présence de ces illustres chirurgiens consultants doit nécessairement inspirer aux familles. Nul Prussien ne pouvant se soustraire au service militaire, l'armée renferme toute l'élite de la jeunesse du pays, et par cela même le gouvernement contracte l'obligation sacrée de ne rien négliger pour assurer aux enfants du pays tous les soins possibles quand ils versent leur sang pour la patrie. Une famille dont le fils aura été grièvement blessé aura des craintes bien moins vives quand elle saura qu'un Langenbeck a été appelé en consultation au chevet du cher malade et a approuvé le traitement suivi ou a lui-même assisté à l'opération qui a été pratiquée.

Aussi l'institution des médecins généraux consultants, toute spontanée et volontaire pendant la guerre de 1866, sera-t-elle dorénavant réglementaire. La commission a formulé un projet d'instruction pour fixer, d'une manière précise, la position et les attributions des chirurgiens consultants (1), qui seront choisis parmi les sommités chirurgicales du pays et auront le rang et les allocations des médecins généraux. Leurs attributions seront essentiellement scientifiques et consisteront surtout à apporter aux médecins traitants le concours de leur expérience ou de leur habileté opératoire ; ils devront inspecter le plus souvent possible les lazarets de leur circonscription et se rendre à toutes les consultations qui leur seront demandées par les médecins chefs ; leur avis sera prépondérant. Si dans leurs inspections ils croient devoir conseiller, dans l'intérêt des malades, des mesures contraires au règlement ou à des ordres existants, ils pourront d'urgence et sous leur propre responsabilité, laisser des ordres écrits qui deviendront immédiatement exécutoires ; dans ce cas ils devront, sur-le-champ, en informer le médecin en chef de l'armée. Ils devront fournir aux autorités militaires ou médicales les rapports qui leur seront demandés, et résumer leurs observations dans un rapport d'ensemble quand ils cesseront leurs fonctions.

(1) V. Loeffler, page 342 (appendice 3).

IV. — Organisation spéciale du service de santé pendant la guerre.

Les cadres du personnel sanitaire des corps de troupes doivent, numériquement, rester en temps de guerre les mêmes qu'en temps de paix. Les médecins ou aides de lazarets, détachés pour faire le service dans les lazarets de guerre, doivent être remplacés dans leurs corps de troupes par des médecins ou aides de la réserve. Ainsi, chaque régiment mobilisé doit avoir un personnel de six médecins, de même qu'en temps de paix.

Mais, en fait, il n'a pas toujours été possible, malgré la réserve médicale considérable que l'organisation particulière de la landwehr met à la disposition du gouvernement, de maintenir l'effectif médical à la hauteur des chiffres fixés par les cadres. Pendant la guerre de 1866, les régiments

d'infanterie ont dû, pour la plupart, se contenter de 4 médecins au lieu de 6 ; les régiments de cavalerie de 2 au lieu de 3, etc.

On s'est demandé s'il ne serait pas possible de réduire l'effectif fixé pour le personnel médical des troupes en campagne. Il est vrai qu'en garnison les médecins des régiments ont à soigner eux-mêmes les malades de leur troupe entrés à l'hôpital ; tandis qu'en campagne ils ne participent pas au service hospitalier. Mais la commission, s'appuyant sur l'expérience de 1866, et considérant que si d'une part le service des médecins de troupe se trouve allégé en campagne par leur non-participation au service hospitalier, d'autre part il se trouve considérablement augmenté par les circonstances de guerre, crut devoir, à l'unanimité, repousser toute réduction dans les cadres de l'effectif médical des troupes, et conseiller au contraire au gouvernement de redoubler d'efforts pour avoir, à l'avenir, des cadres complétement remplis.

Quant au service des *lazarets de guerre*, il avait été réorganisé par le règlement de 1863, qui avait placé ces établissements sous les ordres de médecins chefs. Malgré cela, l'expérience des guerres de 1864 et de 1866 avait déjà démontré la nécessité de nombreuses modifications, et pour la plupart des changements à introduire, les projets du gouvernement concordaient avec les vues de la commission. En traitant de la position du médecin dans l'armée (chap. II), nous avons déjà signalé la plus importante de ces réformes, c'est-à-dire celle qui devait rendre l'autorité du médecin chef plus effective en lui conférant le pouvoir disciplinaire sur le personnel du lazaret. Pour mieux faire comprendre les autres changements qu'il s'agissait d'introduire dans l'organisation du service hospitalier en campagne, nous allons essayer d'exposer le plus brièvement possible la constitution de ce service pendant la guerre de 1866.

En outre du personnel médical des troupes, trois éléments principaux concouraient, en 1866, à donner des soins aux blessés sur le théâtre même de la guerre. Ces trois éléments étaient :

1° Les compagnies de brancardiers (Krankenträger-Compagnien) ;
2° Les lazarets légers (Leichte Feldlazarethe) ;
3° Les lazarets principaux (Schwere Feldlazarethe.)

Les *compagnies de brancardiers* avaient été créées par ordonnance royale du 21 décembre 1854. Elles ne figuraient pas dans les cadres de l'armée permanente et ne devaient être organisées qu'au moment de la mobilisation de l'armée ; chaque corps d'armée devait avoir une de ces compagnies, qui était incorporée au bataillon du train et était composée d'environ 200 hommes (y compris les sous-officiers), sous le commandement d'un capitaine ; en outre, chaque compagnie comptait 3 sous-lieutenants et 3 médecins assistants, et devait pouvoir se scinder en trois sections ; chacune de ces trois sections devait, au moment du combat, se joindre à un des trois lazarets légers du corps d'armée ; l'officier commandant la section de brancardiers devait obéir aux réquisitions du médecin chef du lazaret ; la mission des brancardiers consistait essentiellement à relever et à transporter les blessés, et ils n'étaient en réalité autre chose qu'un personnel de transport adjoint pendant le combat aux divisions volantes des lazarets.

Les *lazarets légers* ou lazarets divisionnaires (Leichte Feldlazarethe) étaient destinés à suivre l'armée le plus près possible sur le champ de bataille, afin de donner des soins immédiats aux blessés ; ils étaient au nombre de 3

par corps d'armée, dont un était attaché au quartier général de chacune des deux divisions, et le troisième au quartier général du corps d'armée. Chaque lazaret léger renfermait deux éléments distincts :

1° La *division volante* (Fahrende Abtheilung), équipée en vue d'une mobilité aussi grande que possible, destinée à rester en contact immédiat avec les combattants, à établir près de la ligne de bataille des *places de pansement* (Verbandplaetze) et à transporter les blessés en arrière aussitôt après le premier pansement;

2° La *division de dépôt* (Dépôt-Abtheilung), portion principale du lazaret, équipée de façon à pouvoir recevoir 200 blessés et à constituer un établissement hospitalier de première ligne.

Chaque lazaret léger était sous les ordres d'un médecin-major de 1re classe, chef et directeur responsable qui avait à sa disposition le personnel suivant : 4 médecins-majors, 8 médecins assistants, 2 pharmaciens, 1 inspecteur de lazaret, un comptable-caissier, 8 aides de lazaret, 5 infirmiers-majors surveillants, 16 infirmiers, 2 cuisinières-blanchisseuses, et enfin un personnel de 39 sous-officiers ou soldats du train sous le commandement d'un sous-lieutenant.

Les *lazarets principaux* ou lazarets de corps d'armée (Schwere Feldlazarethe), moins mobiles que les précédents, mais plus complétement équipés et destinés à former les hôpitaux de campagne proprement dits (de 600 lits chacun), étaient également au nombre de trois par corps d'armée et marchaient avec le gros du convoi; ils étaient organisés de façon à pouvoir se scinder chacun en trois sections pouvant fonctionner isolément.

Chaque lazaret principal avait pour chef un médecin-major de 1re classe auquel était adjoint le personnel suivant : 3 médecins-majors, 10 médecins assistants, 3 pharmaciens, 1 inspecteur de lazaret, 1 comptable-caissier, 1 secrétaire, 9 infirmiers-majors surveillants, 15 aides de lazaret, 32 infirmiers, 1 garçon de pharmacie, 3 cuisinières-blanchisseuses et un personnel de 48 sous-officiers ou soldats du train, commandés par un sous-lieutenant.

Dans chaque corps d'armée, un médecin-major de 1re classe, ancien, avait le titre de *directeur des lazarets* (Lazareth director); il exerçait les fonctions de délégué spécial du médecin général pour le contrôle du service dans les trois lazarets principaux et pour les mouvements que ces lazarets devaient opérer.

On voit, d'après cet exposé, que pendant le combat les compagnies de brancardiers et les divisions volantes des lazarets légers devaient opérer de concert pour relever les blessés, les mettre en lieu de sûreté et leur donner les premiers secours; les divisions de dépôt des lazarets légers devaient former les ambulances de première ligne et organiser le service hospitalier en attendant l'arrivée des lazarets principaux.

Ces trois institutions, c'est-à-dire compagnies de brancardiers, lazarets légers et lazarets principaux, ne contenaient en réalité que deux éléments : l'élément de transport et l'élément hospitalier. Dans les compagnies de brancardiers et les divisions volantes des lazarets légers, c'était le premier de ces deux éléments qui prédominait; les divisions de dépôt des lazarets légers et les lazarets principaux, ayant le même but et une organisation presque identique, formaient l'élément hospitalier proprement dit. La commission et le gouvernement se trouvèrent d'accord :

1° Pour réunir les éléments de transport en une institu-

tion nouvelle, destinée à remplacer à la fois les compagnies de brancardiers et les divisions volantes des lazarets légers, c'est-à-dire renfermant tout le personnel et tout le matériel nécessaires pour relever et transporter les blessés et leur donner les premiers soins; ces formations nouvelles, qui prennent le nom de *détachements sanitaires*, seront au nombre de trois par corps d'armée;

2° Pour supprimer la distinction entre les lazarets légers et les lazarets principaux, et ne former qu'une seule espèce de lazarets appelés *lazarets de campagne*, rendus plus mobiles par leur fractionnement plus considérable; à cet effet, les trois sections de chacun des trois lazarets principaux du corps d'armée devront former chacune un lazaret distinct organisé pour 200 malades, ce qui fera neuf lazarets distincts, auxquels il faudra ajouter les trois lazarets formés en remplacement des divisions de dépôt des lazarets légers. Total : douze lazarets de 200 lits chacun par corps d'armée.

Le nouveau plan de mobilisation de l'armée a adopté les changements d'organisation que nous venons d'indiquer. A l'avenir, au lieu d'une compagnie de brancardiers, de trois lazarets légers et de trois lazarets principaux, chaque corps d'armée emmènera en campagne *trois détachements sanitaires* et *douze lazarets de campagne*.

Voici quelle sera la composition d'*un détachement sanitaire :*

1 capitaine de 2e classe, commandant;
1 lieutenant;
1 sous-lieutenant;
1 trésorier;
1 sergent-major;

12 sous-officiers;
12 caporaux ou rengagés;
124 brancardiers;
2 médecins-majors;
5 médecins assistants;
1 pharmacien;
2 aides de lazarets de 1re classe faisant fonctions de surveillants;
6 aides de lazarets;
8 infirmiers militaires;
6 sous-officiers et caporaux du train, montés;
23 soldats du train;
10 voitures;
22 chevaux de trait;
19 chevaux de selle.

On voit, d'après ces chiffres, que le nombre des brancardiers, qui, en 1866, n'était que d'environ 200 par corps d'armée (sous-officiers et caporaux compris), se trouve plus que doublé. Leur effectif se trouvera encore renforcé par les brancardiers auxiliaires que les corps de troupes devront fournir au moment du combat. La Prusse ne possède pas, comme la France, des mulets de cacolet ou de litière qui peuvent enlever de grandes quantités de blessés en peu de temps; on conçoit dès lors combien la bonne organisation des brancardiers est importante pour elle. A ce sujet M. Loeffler compare le transport des blessés à bras d'homme au transport à dos de mulet; le parallèle qu'il établit est loin d'être favorable à ce dernier mode, dont les avantages paraissent être peu appréciés en Prusse, où il serait d'ailleurs impossible de l'adopter à cause de la rareté des mulets.

Chaque détachement sanitaire sera pourvu de 30 bran-

cards et de 3 brancards à roues ; il aura en outre 6 voitures d'ambulance à 2 chevaux pour le transport des blessés, 2 voitures à 2 chevaux pour le transport des instruments, des objets de pansement et des médicaments, et 2 voitures de bagages. Pendant et après le combat, les colonnes de voitures du parc devront mettre à la disposition des détachements sanitaires le plus grand nombre possible de voitures.

Sept médecins sont attachés à chaque détachement et devront s'établir au moment du combat sur la *place de pansement* organisée par le détachement.

Contrairement aux propositions de la commission, chaque détachement sanitaire est placé sous le commandement d'un capitaine. La commission, fidèle à son principe d'organisation (V. chap. I), voulait que ce fût un médecin qui en eût la direction. Il est vrai que les raisons qui ont exigé impérieusement la direction des lazarets par des médecins, n'existent pas au même degré pour les détachements sanitaires. Dans ces derniers, c'est le service de transport qui constitue l'élément principal ; ce n'est que pendant les courts épisodes des combats qu'ils ont à coopérer au service de santé proprement dit.

Les trois détachements sanitaires qui sont attachés à chaque corps d'armée sont répartis de la manière suivante : un à chacune des deux divisions qui composent le corps d'armée, et le troisième au quartier général du corps d'armée. Pour tout ce qui concerne leur service spécial, ils sont à la disposition du médecin divisionnaire ou du médecin général, aux réquisitions desquels les commandants des détachements sont tenus d'obtempérer.

Il y a peut-être plus d'une objection à faire contre cette organisation des détachements sanitaires. Leur utilité, au

jour du combat, est incontestable ; mais pendant les périodes de repos qui précèdent ou qui suivent les combats, quel sera leur emploi ? Ne serait-il pas plus rationnel de les organiser de façon que, pendant ces périodes, le personnel qui les constitue puisse être utilisé dans les lazarets ? Les brancardiers ne devraient-ils pas être dressés de façon à pouvoir également servir d'infirmiers ? Tous ces éléments réunis ne devraient-ils pas constituer les subalternes naturels du corps sanitaire dont la commission proposait la formation (V. chap. II) ?

Les *lazarets de campagne* (Feldlazarethe), qui seront au nombre de douze pour chacun des douze corps d'armée, auront la composition suivante :

1 médecin-major de 1re classe, chef ;
1 médecin-major ;
3 médecins assistants ;
1 pharmacien ;
1 inspecteur de lazaret ;
1 comptable-caissier ;
3 aides de lazaret de 1re classe, faisant fonctions de surveillants ;
6 aides de lazaret ;
12 infirmiers militaires ;
1 cuisinier ;
1 garçon de pharmacie ;
1 sergent chargé de la police ;
1 sous-officier chargé des écritures ;
1 sous-officier faisant fonctions de capitaine d'armes ;
1 maréchal des logis chef du train ;
4 sous-officiers ou caporaux et trompettes du train, montés ;

15 soldats du train (dont 8 conducteurs de voitures) ;
3 voitures à 4 chevaux ;
2 voitures à 2 chevaux ;
16 chevaux de trait ;
14 chevaux de selle (2 pour le médecin chef, 1 pour le médecin-major, 1 pour chacun des 3 médecins assistants, 1 pour le pharmacien, 1 pour l'inspecteur de lazaret, 1 pour le caissier, 3 pour le personnel monté du train (V. Loeffler, p. 211 et 231).

Le personnel et le matériel de ces lazarets est calculé pour 200 malades, et en cas de besoin ils peuvent se scinder en deux sections. Pour le transport des malades et des vivres, il devra leur être fourni des voitures par les colonnes de parc, selon la mesure des besoins. Ils devront, selon les propositions de la commission, emmener avec eux des provisions de vivres pour trois jours et pour 200 malades.

La nature et la quantité de leur approvisionnement en matériel, en médicaments, en instruments, en objets de pansement, en vivres, etc., ainsi que la composition de leur personnel, firent l'objet de délibérations et de propositions détaillées de la part de la commission (1), qu'il est impossible d'analyser ici, mais qui recevront leur expression définitive dans le règlement sur le service de santé en campagne que le gouvernement prussien fait élaborer en ce moment.

Il serait aussi trop long de nous étendre sur les détails du fonctionnement de ces lazarets. Nous avons déjà dit plus haut que le médecin chef est non-seulement le directeur du service médical et pharmaceutique, mais encore le chef responsable de l'administration et de l'exploitation. Le

(1) Loeffler, *loc. cit.*, pages 238 et suivantes.

personnel dont il dispose à cet effet (inspecteur de lazaret, caissier-comptable, etc.), lui rend des comptes qu'il soumet au contrôle de l'intendance ; c'est lui, en un mot, qui dispose de tout le personnel et de tout le matériel et qui en est responsable envers les autorités militaires, médicales ou administratives de son corps d'armée. Son autorité disciplinaire s'étendra désormais sur tout le personnel médical, pharmaceutique et administratif du lazaret ; le train seul, quoique tenu d'obéir à ses ordres, reste en dehors de son pouvoir disciplinaire. La commission, toujours fidèle à son principe d'organisation, avait demandé que l'autorité disciplinaire du médecin chef s'étendît non-seulement sur tout le personnel du lazaret, y compris le train, mais encore sur les malades ou blessés, particulièrement dans le cas où le lazaret serait forcé de rester en arrière et resterait séparé plus ou moins longtemps du corps d'armée auquel il appartient.

Parmi les douze lazarets de chaque corps d'armée, un ou plusieurs, selon les besoins, peuvent être attachés au quartier général d'une division ; alors c'est le médecin divisionnaire qui règle leur emploi et leurs mouvements. Les autres restent comme réserve au quartier général du corps d'armée, à la disposition du médecin général, et marchent avec la réserve d'artillerie.

La réforme actuelle des lazarets de campagne avait surtout en vue d'augmenter leur mobilité en les fractionnant davantage. Quoique attachés à un corps d'armée, ils pourront cependant, à un moment donné, rester en arrière et se transformer momentanément en *lazarets sédentaires*, jusqu'à ce que la diminution ou l'évacuation de leurs malades leur permette de rejoindre leur corps d'armée.

Si pendant ces périodes d'établissement temporaire ils

se trouvent éloignés de leur corps d'armée, ils passent, comme nous le verrons plus loin, sous les ordres de l'autorité qui fonctionne sur les derrières de l'armée, c'est-à-dire de l'*Inspection générale d'étapes*, dont les organes médicaux sont le *médecin général d'étapes* et les *directeurs des lazarets* dont nous avons déjà parlé plus haut, pag. 630. Ces diverses autorités doivent veiller à ce que les lazarets de campagne restent le moins longtemps possible éloignés de l'armée active, et doivent les faire remplacer le plus tôt possible par le personnel de réserve, dont il nous reste à dire un mot.

Afin de faciliter la création de lazarets sédentaires sur les derrières de l'armée, il a été décidé que, dorénavant, le service hospitalier de chaque corps d'armée aurait un *personnel de réserve* ainsi composé :

3 médecins-majors, 9 médecins assistants, 3 pharmaciens, 3 inspecteurs de lazarets, 3 comptables-caissiers, 3 sous-officiers chargés des écritures, 9 aides de lazaret de 1re classe faisant fonctions de surveillants, 18 aides de lazarets, 36 infirmiers militaires, 3 cuisiniers, 17 soldats du train (comme ordonnances des médecins et employés).

Ce personnel est destiné à servir à l'établissement de lazarets sédentaires, et sa composition est calculée de façon à suffire à la formation de 3 lazarets complets.

Chaque corps d'armée aura également un *dépôt de réserve du matériel* pour les besoins de ses lazarets. Ce dépôt sera placé sous les ordres de l'Inspection générale d'étapes, dont les agents seront chargés de veiller à ce que cette réserve de matériel soit toujours à proximité suffisante de l'armée active.

Voici quel est, d'après le plan de mobilisation, le personnel d'un dépôt de réserve de lazaret :

1 lieutenant, 1 inspecteur de lazaret, 1 pharmacien, 2 fabricants d'instruments de chirurgie, 2 sous-officiers surveillants, 1 sous-officier chargé des écritures, 2 soldats du train.

Ces dépôts devront être approvisionnés de façon à pouvoir remplacer promptement tous les objets employés ou usés par les lazarets : objets de pansement, médicaments et matériel d'exploitation. On a apporté une attention spéciale à pourvoir ces dépôts d'une abondante réserve d'*instruments tranchants*, car on sait combien ces derniers s'usent et se détériorent vite. A cet effet, il sera adjoint à chaque dépôt 2 fabricants d'instruments de chirurgie, dont l'un pourra faire des tournées dans les lazarets du corps d'armée pendant que l'autre fera au dépôt même les réparations d'instruments.

A ces dépôts de réserve de matériel pourront se rattacher les réserves établies par les comités de secours.

En résumé, le personnel médical que chacun des 12 corps d'armée prussiens doit emmener avec lui en campagne pour les besoins du service hospitalier, et qui est réparti dans les lazarets et dans les détachements sanitaires ou qui fait partie du personnel de réserve, est ainsi composé : (1)

93 médecins { 12 médecins-majors de 1re classe. / 21 médecins-majors. / 60 médecins assistants.

159 aides de lazarets, dont 51 employés comme surveillants.

204 infirmiers militaires.

(1) V. l'ordre général de S. A. R. le prince Frédéric Charles, en date du 1er juin 1866, Loeffler, *loc. cit.*, appendice n° 1, page 313.

18 pharmaciens.

12 garçons de pharmacie.

En outre, le personnel médical attaché aux corps de troupes s'élève réglementairement à environ 90 médecins et 140 aides de lazaret, par corps d'armée. Cela ferait donc un total d'environ 180 médecins et 300 aides de lazaret, pour chaque corps d'armée mobilisé, composé, comme l'on sait, de deux divisions d'infanterie, plus la cavalerie, l'artillerie, le génie, etc.

V. — Le service de secours pendant le combat.

Pendant la guerre de 1866, les règlements prussiens ne contenaient encore aucune disposition particulière relativement à l'emploi du personnel de santé *régimentaire*. En l'absence d'une réglementation officielle du concours que les médecins des troupes doivent se prêter entre eux ou doivent prêter au service hospitalier, les médecins et aides de lazaret enrégimentés auraient dû rester isolés auprès de leurs bataillons respectifs, réduits à recouvrir à la hâte les blessures avec des pansements superficiels sans exploration attentive préalable (1). Pour un blessé tant soit peu gravement atteint, le pansement ne constitue un secours véritable que lorsqu'il est appliqué avec soin et après un examen approfondi qui dispense de tourmenter bientôt le blessé par de nouvelles explorations et de nouveaux pansements. Mais pour cela il faut du temps, des aides, et un matériel qu'il est difficile d'emporter sous le feu de l'ennemi. Il n'est pas permis, pour appliquer un pansement peu urgent, de laisser un blessé exposé à de nouvelles blessures, peut-être mortelles. Rafraîchir et réconforter les

(1) Loeffler, *loc. cit.*, page 213.

blessés et ensuite les transporter le plus rapidement possible hors de l'atteinte des projectiles ennemis, tels sont les bienfaits les plus urgents à rendre aux blessés. Ces premiers secours doivent être la tâche des *brancardiers*. Laisser tout le nombreux personnel médical des troupes dans la ligne de combat, où il est isolé, éparpillé, et par cela même impuissant, c'est là incontestablement un gaspillage nuisible au véritable intérêt des blessés.

En Autriche, l'Instruction de 1864 sur le service de santé en campagne dispose que, pendant le combat, *tous* les médecins des troupes engagées doivent être concentrés en arrière de la ligne de bataille sur les places de pansement établies par brigade ou par corps d'armée.

En Prusse aussi, malgré l'absence d'une réglementation générale et officielle, des dispositions avaient été prises en 1866 dans les divers corps d'armée, dans le but de concentrer le personnel médical régimentaire et de rendre ainsi ses services plus efficaces pour les blessés (1).

Mais on se garde bien d'aller dans ce sens aussi loin que les Autrichiens et de ne laisser comme eux aucun médecin avec sa troupe. Il faut toujours avoir égard à l'effet moral que produit sur le soldat la présence du médecin sous le feu de l'ennemi. Ensuite, il y a certainement quelques cas dans lesquels des secours médicaux instantanés peuvent être nécessaires. Mais c'est surtout pour contrôler le service des brancardiers qu'il paraît indispensable de laisser une partie des médecins régimentaires auprès de leur troupe. L'autre partie pourra rendre de meilleurs services sur les places de pansement.

Si, en 1866, le personnel médical des troupes et celui des

(1) Loeffler, pages 79 et suivantes.

lazarets ne se sont pas toujours prêté un concours mutuel et efficace, cela tenait non-seulement aux vacances existantes dans les cadres régimentaires, mais surtout au défaut d'une *direction sanitaire divisionnaire* destinée à régler la coopération de toutes les forces médicales éparses dans la division. Aujourd'hui, cette lacune est comblée par l'institution des médecins divisionnaires.

L'expérience de 1866 et les considérations qui viennent d'être exposées déterminèrent la commission à approuver la proposition faite par les commissaires royaux, à savoir que *la moitié seulement des médecins et aides de lazaret enrégimentés devra accompagner au feu les troupes auxquelles ils sont attachés, tandis que l'autre moitié sera concentrée à quelque distance de la ligne du combat sur les places de pansement* (1).

Il est nécessaire ici de dire un mot de ce que l'on entend en Prusse par *place de pansement* (Verbandplatz).

Les places de pansement sont des établissements essentiellement éphémères, formés au moment même du combat, avant que les lazarets soient arrivés et installés, en vue de donner aux blessés les premiers secours qui doivent les mettre à même d'être transportés ou d'attendre patiemment l'installation des établissements hospitaliers. Réglementairement, et chaque fois que les circonstances n'obligent pas de faire autrement, une place de pansement devra être organisée dans chaque division dès le commencement du combat. Cette *place de pansement divisionnaire* (Divisions-Verbandplatz), ou *place de pansement principale* (Haupt-Verbandplatz) sera le centre de l'activité chirurgicale pendant le combat ; elle sera établie et desservie par le *détachement sanitaire* qui est attaché à chaque division. Nous avons vu plus haut que la composition et l'équipement de ces détachements sanitaires ont été calculés en vue de ce but spécial. Le médecin divisionnaire sera le chef du service sur la place de pansement principale ; le commandant du détachement sanitaire devra obéir à ses réquisitions.

(1) Loeffler, *loc. cit.*, page 218.

Quand la nature du terrain et les circonstances du combat permettront de se contenter d'une seule place de pansement pour la division, cela sera préférable, et alors tout le personnel médical, y compris le contingent fourni par le personnel régimentaire, sera concentré sur ce point.

L'organisation des détachements sanitaires permettant de les scinder en deux sections, il sera possible d'établir une place de pansement principale pour chaque brigade.

Enfin, quand cela sera nécessaire, des *places de pansement régimentaires* (Truppenverbandplätze) ou *places de pansement de nécessité* (Nothverbandplatze) seront établies par les soins des seuls médecins de régiment et avec les ressources de leurs corps de troupes, entre la ligne de combat et la place de pansement divisionnaire.

Dans chaque compagnie, 4 hommes désignés d'avance serviront pendant le combat de *brancardiers auxiliaires* ; chaque bataillon aura une *voiture sanitaire* (Sanitätswagen), attelée de deux chevaux, organisée de façon à pouvoir suivre la troupe partout, et destinée au transport des objets de pansement, appareils, instruments, médicaments, brancards, et pouvant en outre transporter un ou deux blessés. Chaque brancardier et chaque aide de lazaret sera pourvu d'une gourde remplie d'eau et d'une gibecière contenant les objets de pansement les plus indispensables. A chaque médecin sera adjoint un brancardier porte-sac avec un sac d'ambulance (Verband-Tornister). Enfin, chaque soldat

doit réglementairement porter sur lui un petit paquet contenant les objets nécessaires à un premier pansement (c'est-à-dire un peu de charpie, une compresse, une bande) (1).

La place de pansement divisionnaire sera le point central de secours sur le champ de bataille. C'est de là que devront rayonner les patrouilles de brancardiers ; c'est là aussi que seront organisés les convois destinés à transporter les blessés en arrière.

L'*ordre* est une des conditions les plus indispensables au fonctionnement utile et suffisant des places de pansement. Plus l'affluence continuelle des blessés menace d'y introduire le désordre, plus il est nécessaire que le directeur responsable y maintienne une discipline énergique afin d'empêcher le gaspillage du temps, des forces et des moyens. Une seule volonté doit y faire la loi, et cette volonté doit être *compétente*, car le premier et le plus important des moyens de maintenir l'ordre est la répartition bien entendue de la besogne et du personnel (2).

La commission crut devoir indiquer quelques règles à suivre pour le fonctionnement des places de pansement.

Elle recommanda d'y former 3 *divisions*. La *première division* doit recevoir les blessés au fur et à mesure de leur arrivée, les visiter avec le plus de soin possible, et, d'après le degré de gravité de leurs blessures, les répartir en différentes catégories :

Ceux atteints de blessures légères ne nécessitant qu'un simple pansement ou une opération légère (telle qu'extraction de balles, suture, etc.) devront être immédiatement pansés, et expédiés plus loin.

(1) Pour les détails, V. Loeffler. *loc. cit.*, pages 219-224.
(2) Loeffler, *loc. cit.*, page 226.

Les blessés mortellement atteints, chez lesquels le transport ne servirait qu'à augmenter inutilement les souffrances, devront être autant que possible abrités dans un endroit séparé, où il sera possible de leur procurer les adoucissements et consolations nécessaires.

Les blessés chez lesquels l'application d'appareils contentifs ou l'exécution immédiate d'une opération paraissent nécessaires devront être renvoyés à la *deuxième* ou à la *troisième division*.

Dans tous les cas, *le résultat du premier examen devra être immédiatement noté, et la notice devra accompagner le blessé*. Déjà, pendant la guerre de 1866, le ministère de la guerre a fait confectionner dans ce but un grand nombre de petits étuis ou calepins contenant chacun 20 feuillets de parchemin (de 9 centimètres de hauteur sur 6 de largeur) et un crayon. A chaque feuillet est adapté un ruban au moyen duquel il sera facile de l'attacher à une boutonnière du blessé. Chaque médecin de troupe et de lazaret doit être pourvu d'un de ces calepins et d'un certain nombre de feuillets de réserve. La commission donna son approbation à cette manière de procéder, qui est destinée non-seulement à faciliter la tâche des divers médecins entre les mains desquels les blessés pourront successivement passer, mais aussi à éviter à ces derniers des explorations répétées et douloureuses.

A la *deuxième division* incombe la tâche d'appliquer les *bandages contentifs* dans les cas de fractures comminutives, où l'amputation peut être évitée à la seule condition d'une immobilisation aussi complète que possible du membre fracturé. Dans ce cas se trouvent particulièrement les fractures par coups de feu des extrémités inférieures et surtout de la cuisse. De l'avis unanime des membres de la commis-

sion, il fut reconnu que l'application d'un appareil contentif suffisant pour permettre le transport plus ou moins prolongé d'un blessé atteint de fracture de cuisse devait être considérée comme la tâche la plus difficile, mais aussi la plus fructueuse, des places de pansement. A cet effet, la commission recommanda en première ligne les gouttières en fil de fer, de Bonnet, comme méritant la préférence sur tous les autres appareils. Comme cependant il n'est guère possible de les avoir en quantité suffisante sur le champ de bataille, la commission plaça en seconde ligne les bandages plâtrés et recommanda l'augmentation des approvisionnements de plâtre, tout en conseillant de restreindre l'usage de ces appareils aux cas graves.

La *troisième division* aura pour mission d'exécuter les opérations chirurgicales qui ne peuvent être différées sans danger pour la vie du blessé, notamment les ligatures d'artères, la trachéotomie, l'amputation de membres broyés ou enlevés. Les amputations autres que celles dites de nécessité ne devront être faites sur la place de pansement que dans des circonstances exceptionnelles. Il en sera de même des résections.

Il est hors de doute que pour la tâche qui vient d'être esquissée, telle qu'elle incombait en 1866, notamment le 3 juillet, aux places de pansement divisionnaires, les sept médecins attachés à chaque détachement sanitaire ne peuvent suffire. La commission ne pouvait se faire illusion à cet égard, et c'est précisément pour ce motif qu'elle eut à considérer *les moyens de compléter l'effectif médical sur les places de pansement.*

Les sources auxquelles on pourra puiser des renforts sont les suivantes :

1° Le contingent fourni par le personnel de santé des corps de troupes ;

2° Le personnel ou une partie du personnel des lazarets qui ne seront pas encore établis ; un ou plusieurs lazarets entiers pourront d'ailleurs, si le terrain le permet, être appelés à s'établir sur l'emplacement même de la place de pansement ou à côté d'elle ;

3° Le personnel de réserve, encore disponible.

Le médecin divisionnaire ou le médecin général du corps d'armée auront qualité pour disposer de ces diverses sources de personnel, et devront prendre leurs mesures, autant que possible à l'avance, pour que toutes les forces soient utilisées et convenablement réparties selon les besoins.

Quant à l'emplacement des places de pansement, ou à leur changement au fur et à mesure de la marche du combat, il est indispensable qu'en l'absence d'ordres donnés par le général commandant, le médecin chef soit autorisé à donner directement les ordres nécessaires. C'est également lui auquel, en cas de retraite ou de défaite, le règlement prussien confie la désignation du personnel et du matériel destinés à être laissés auprès des blessés abandonnés à la protection de la convention internationale de Genève.

VI. — Le service de secours en arrière de l'armée active.

Pendant la guerre de 1866, les blessés ou malades que l'armée active était obligée de laisser derrière elle étaient soignés : 1° dans les *lazarets de campagne*, qui selon les besoins du moment pouvaient tour à tour s'établir temporairement ou se remettre en marche pour rejoindre leur corps d'armée ; 2° dans les *lazarets sédentaires* ou lazarets d'étapes organisés sur le sol ennemi à proximité du théâtre de la guerre ; 3° dans les *lazarets de réserve* établis sur le

sol de la patrie par les soins de l'État ou des comités de secours.

Ces divers établissements communiquaient entre eux par l'évacuation des premiers sur les suivants, suivant les règles du *système de dissémination des malades*.

Il n'y a pas eu lieu de se repentir du développement donné à ce système, et il n'y a pas, par conséquent, lieu d'en changer.

Mais, dans le fonctionnement de ce service et principalement dans sa direction supérieure, quelques rouages s'étaient montrés défectueux, et la commission eut à s'occuper des réformes dont l'introduction était indiquée par l'expérience de 1866.

Il a déjà été question plus haut (chap. IV) de la nécessité de rendre les lazarets de campagne plus mobiles et plus disponibles en les fractionnant davantage, c'est-à-dire en transformant chacune des trois sections des anciens lazarets principaux en autant de lazarets séparés ayant leur autonomie distincte.

Mais les plus grandes et les plus nombreuses difficultés provenaient de l'absence d'une *direction unique* en arrière de l'armée active. Une fois que l'armée avait franchi la frontière, les divers lazarets qu'elle établissait et laissait en arrière d'elle au fur et à mesure de sa marche, manquaient d'une direction unique, car ils continuaient tous à faire partie et à dépendre de leur corps d'armée. Quand l'armée victorieuse abandonna le champ de bataille de Sadowa pour poursuivre sa marche en avant, elle dut y laisser un grand nombre de lazarets qui, au lieu d'être soumis à une direction commune, continuaient à ressortir chacun du corps d'armée auquel il appartenait. A l'avenir, la direction centrale du service de secours en arrière de l'armée active,

direction dont l'absence s'est fait sentir d'une manière fâcheuse en 1866, fera partie des attributions d'une institution nouvelle, créée sous le nom d'*Inspection générale d'étapes* (General-Etappen-Inspection), par l'ordonnance royale du 2 mai 1867 sur « l'organisation du système d'étapes en temps de guerre ».

L'inspection générale d'étapes, destinée à régulariser et à diriger le formidable courant de va-et-vient qui s'établit entre l'armée active et la patrie, est organisée à la manière d'un état-major général. A sa tête est placé un général de division, portant le titre d'*inspecteur général d'étapes*. Parmi les chefs de service qui lui sont adjoints, se trouve le *médecin général d'étapes*, auquel incombe spécialement la tâche de régler le *mouvement des malades* en arrière de l'armée, et de centraliser la direction de tous les lazarets restés en arrière ou créés sur place ; il sera en même temps le régulateur du *service de santé volontaire* organisé par les comités de secours, dont le zèle quelquefois inexpérimenté a absolument besoin d'un contrôle officiel.

Le personnel sanitaire de réserve et le matériel hospitalier de réserve, qui, comme nous l'avons vu plus haut, sont attribués à chaque corps d'armée, sont à la disposition de l'inspection générale d'étapes pour la formation des lazarets sédentaires. Les lazarets de campagne, attachés au nombre de douze à chaque corps d'armée, passent sous l'autorité de l'inspection générale d'étapes dès qu'ils s'établissent temporairement, au lieu de suivre la marche de leur corps d'armée. Tout le territoire soumis à l'action de l'inspection générale d'étapes est divisé en *rayons d'étapes*, soumis à l'autorité de *commandants d'étapes* ; tous les établissements hospitaliers disséminés sur ce territoire sont répartis en rayons ou arrondissements dans chacun desquels

est placé un médecin-major de 1re classe, *directeur des lazarets*, délégué spécial du médecin général d'étapes pour la direction et l'inspection permanente du service de santé des lazarets. Pendant les guerres de 1864 et de 1866, les directeurs de lazarets faisaient chacun partie d'un corps d'armée; dorénavant, quoique leur nombre reste égal à celui des corps d'armée, ils se rattacheront tous à l'inspection générale d'étapes. C'est cette dernière, en un mot, qui, par l'organe de ses agents de tous les services, est chargée de diriger et de régler le courant d'hommes et de choses qui se développe sur le territoire que l'armée laisse derrière elle. Il est à peine besoin de faire remarquer que l'organisation et la surveillance de la dissémination des malades et des établissements créés dans ce but constituent une de ses attributions les plus importantes.

En 1866, le *système de dissémination* des malades ou blessés fut pratiqué sur une large échelle. La commission proclama hautement la nécessité d'y avoir encore recours dans les guerres futures; elle crut cependant devoir indiquer quelques règles d'exécution qui tendent à en restreindre plus ou moins l'application. Les bénéfices que les blessés doivent retirer de la dissémination peuvent facilement se changer en dangers pour eux, si le choix de ceux d'entre eux qui doivent être évacués n'est pas bien entendu. La commission recommanda d'avoir surtout égard aux conditions suivantes :

1° *Nature de la blessure*, considérée selon la distance du lazaret sur lequel le blessé doit être évacué.

Les plaies pénétrantes de la tête, de la poitrine et de l'abdomen, les fractures de cuisse, les coups de feu au bassin et au genou, ne permettent qu'un transport aussi limité et aussi court que possible.

Les fractures par coups de feu à la jambe ou aux membres supérieurs offrent moins de dangers pour le transport, à condition qu'il ne soit pas trop prolongé. Les autres blessés peuvent être transportés sans danger dans des lazarets éloignés.

2° *Epoque de la blessure*. Les évacuations faites pendant les premiers jours sont moins dangereuses; elles doivent au contraire être évitées pendant la période de réaction.

3° *Nature des moyens de transport*, soit par eau, soit par chemin de fer, soit par voitures ordinaires. Cette importante question du transport des malades, et principalement de l'appropriation et de l'aménagement des wagons ou fourgons de chemin de fer en vue de ce but spécial, a déjà fait l'objet d'une instruction ministérielle, en date du 1er juillet 1861, dont le texte est reproduit par M. Loeffler dans l'appendice IV (pag. 345). La commission en fit également l'objet de ses délibérations et émit le vœu de voir cette question devenir l'objet de nouvelles expériences, qui furent effectivement instituées en 1867 et 68 par le ministère de la guerre et dont M. Loeffler indique les résultats, pag. 249-52.

4° *Nationalité des blessés*. En 1866, les blessés prussiens furent autant que possible évacués sur les lazarets de réserve établis sur le sol de la patrie, tandis que les Autrichiens furent naturellement laissés de préférence dans les lazarets formés en Bohême.

Aussi longtemps que les lazarets de campagne restent avec le corps d'armée auquel ils sont attachés, la *direction des évacuations* appartiendra au médecin général de ce corps d'armée. Dès qu'ils passent sous l'autorité de l'inspection générale d'étapes, les évacuations seront réglées par le médecin général d'étapes ou par les directeurs de lazarèts, ses délégués. Le choix et la désignation des malades

à évacuer seront faits par les médecins chefs des divers lazarets. Quant à l'organisation des moyens de transport, elle concerne les commandants d'étapes.

Toutes les dispositions relatives aux évacuations sur les lazarets de réserve formés sur le sol de la patrie, seront concertées entre le ministère de la guerre et l'inspection générale d'étapes, de façon que la répartition des malades se fasse avec le plus d'ordre possible et selon des règles tracées à l'avance. Dans ce but, il a été nécessaire aussi de régler le fonctionnement du *service de santé volontaire* institué par les comités de secours et la mesure dans laquelle l'intervention privée peut être admise à venir en aide au service de santé officiel, dont elle ne pourra être qu'un accessoire et dont elle sera toujours obligée d'accepter le contrôle. M. Loeffler indique (pag. 256 et suiv.) les conditions et les formalités qui seront imposées aux *lazarets de comités* (Vereins-Lazarethe), c'est-à-dire aux lazarets organisés par les soins des comités de secours. Cette importante question du service de santé volontaire a d'ailleurs été déjà longuement traitée dans un 1er fascicule (publié en 1868) de l'ouvrage de M. Loeffler.

Les chapitres dont nous venons de donner le résumé aussi fidèle que possible suffisent pour donner une idée de l'organisation du service de santé militaire en Prusse. Les chapitres qui suivent traitent du matériel sanitaire de l'armée en campagne (chap. VII), des épreuves scientifiques exigées des médecins militaires et de l'enseignement médico-militaire (chap. VIII), des moyens de parer à l'insuffisance numérique des médecins en cas de guerre (chap. IX), et enfin des locaux affectés au service des malades (chap. X).

Ajoutons enfin que M. Loeffler fait précéder l'étude des

questions d'organisation par l'historique de la tâche que le service de santé prussien eut à remplir en 1866 (V. pag. 10 à 140) et que son ouvrage est accompagné de nombreux tableaux statistiques (1).

MÉLANGES.

JUGEMENTS RENDUS POUR SIMULATION OU DISSIMULATION D'INFIRMITÉS RENDANT IMPROPRE AU SERVICE MILITAIRE ET POUR OFFRE D'ARGENT A UN MÉDECIN MILITAIRE EN VUE D'OBTENIR L'EXEMPTION.

Dissimulations. — Par jugement du tribunal correctionnel de Clermont-Ferrand, en date du 25 février 1868, le sieur Rambosson (Jean-Claude), cultivateur, né le 9 juillet 1845, à Feigères (Haute-Savoie), a été condamné à trois mois de prison et aux dépens, pour s'être fait admettre comme remplaçant en faisant disparaître momentanément, à l'aide de manœuvres frauduleuses, une infirmité le rendant impropre au service militaire.

Un autre jugement, rendu le 5 août 1869, par le tribunal civil de 1re instance de Thiers (Puy-de-Dôme), a, de plus, annulé comme contraire à l'art. 19 de la loi du 21 mars 1832, l'acte de remplacement contracté par le sieur Rambosson.

— Par jugement du tribunal correctionnel de Châlons-sur-Marne, en date du 7 août 1869, le sieur Ferry (Joseph-Auguste), né le 13 septembre 1845, à Saint-Germain (Haute-Saône), a été condamné à 100 fr. d'amende pour s'être fait admettre comme remplaçant en dissimulant, à l'aide de manœuvres frauduleuses, une infirmité qui le rendait impropre au service militaire.

Par le même jugement, le sieur Franck (Hirtz), originaire de l'Alsace et agent de remplacement à Châlons-sur-Marne, a été condamné, comme complice, à 1,000 fr. d'amende.

Le tribunal a, de plus, annulé comme contraire à l'art. 19 de la loi du 21 mars 1832, l'acte de remplacement souscrit par le sieur Ferry, et condamné les deux parties solidairement aux dépens.

Simulations.—Par jugement du 24 juillet 1869, le sieur Patarin (Jean-Baptiste), cultivateur à Naves (Allier), et jeune soldat de la classe de 1868, convaincu d'avoir, en mars 1869, simulé une amaurose, et de s'être ainsi procuré l'exemption du service militaire, a été condamné à deux mois d'emprisonnement.

(1) La première partie du travail dont la fin paraît dans ce numéro, a motivé, de la part d'un certain nombre de nos lecteurs, quelques observations qui nous font craindre qu'on ne se soit mépris sur l'origine et les tendances de cet article. Nous croyons donc devoir déclarer que, si nous avons donné dans leur teneur les appréciations quelquefois erronées du médecin allemand, nous n'entendons en aucune façon en accepter la responsabilité. (*Note de la rédaction.*)

Par le même jugement, le sieur Patarin a été condamné à payer, outre les dépens, 300 fr. à titre de dommages-intérêts au jeune soldat que l'exemption indûment accordée avait fait tomber dans le contingent et à lui fournir ensuite un remplaçant, ou, à défaut, une somme de 2,700 fr.

Un sieur Bastira (Auguste), Italien d'origine et complice du jeune soldat dont il s'agit, ne s'étant pas présenté, a été condamné par défaut à six mois de prison.

— Par jugement du 20 juillet 1869, rendu par le tribunal de 1re instance d'Aix, les nommés Figuière (Claude Félicien-Macaire) et Martin (Marius), jeunes soldats de la classe de 1868, du département des Bouches-du-Rhône, convaincus d'avoir tenté d'obtenir l'exemption du service militaire en simulant l'amaurose à l'aide de belladone, ont été condamnés à un mois de prison.

Par le même jugement, la femme Martel, épouse Félix, cafetière à Arles, le sieur Lieutaud (Félix), cordonnier aux Olives (banlieue de Marseille), le sieur Mistral, cultivateur à Arles, et la femme Martel, épouse Luquet, reconnus coupables de s'être rendus complices des délits spécifiés ci-dessus, en fournissant aux intéressés les substances destinées à leur procurer l'exemption, ont été condamnés : les deux premiers à un an, le troisième à trois mois, et la quatrième à un mois d'emprisonnement.

Les frais de l'instance ont, en outre, été mis à la charge des prévenus.

— Par jugement du 27 juillet 1869, rendu par le tribunal de 1re instance d'Aix, les sieurs Alliaud (Jean-Baptiste), et Lombard (Joseph-Ferdinand), jeunes soldats de la classe 1868, du département des Bouches-du-Rhône, convaincus de s'être temporairement rendus impropres au service militaire en simulant l'amaurose à l'aide de belladone, ont été condamnés à un mois d'emprisonnement.

Par le même jugement, le sieur Etien, aubergiste à Roanne (Loire), le sieur Durand, cordonnier au Pas-des-Lanciers, le sieur Roux (Henri), chapelier à Aix, reconnus complices des délits imputés aux sieurs Aillaud et Lombard, ont été condamnés : le premier, par défaut, à un an de prison ; le second, également par défaut, à six mois, et le troisième à trois mois de la même peine.

Les cinq individus ci-dessus dénommés ont également été condamnés solidairement aux frais de l'instance.

Offres d'argent, en vue d'obtenir l'exemption, au médecin militaire chargé d'assister le conseil de révision.

Par jugement du 10 mai 1869, rendu par le tribunal de 1re instance de Parthenay (Deux-Sèvres), le sieur Cassin (Emmanuel-Honoré), cordonnier à La Chapelle-Saint-Laurent, a été condamné à quinze jours d'emprisonnement pour avoir, dans le courant du mois d'avril précédent, fait au médecin militaire chargé d'assister le conseil de révision des Deux-Sèvres des offres d'argent en vue d'obtenir l'exemption de son fils, compris dans le contingent de la classe de 1868.

Les frais de l'instance ont en outre été mis à la charge du prévenu.

Zur Geschichte

der

Associationsbestrebungen

auf dem Gebiete

der

wissenschaftlichen und praktischen Heilkunde.

Ein Beitrag

zur Förderung der öffentlichen und privaten Gesundheitspflege

von

Dr. F. W. Beneke

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Marburg.

N. G. Elwert'sche Universitäts-Buchhandlung.

1870.

Der »Verein für gemeinschaftliche Arbeiten zur Förderung der wissenschaftlichen Heilkunde«, welcher im Jahre 1852 in Folge einer in meiner Schrift »Unsere Aufgaben« erlassenen Aufforderung auf der Naturforscherversammlung in Wiesbaden begründet wurde, ist nach 17jährigem Bestehen durch Beschluss des Vereinsvorstandes und Ausschusses auf meinen eigenen Antrag zu Anfang dieses Jahres aufgelöst [1]).

Es steckt in diesen 17 Jahren, während welcher ich das Secretariat des Vereins führte, ein gut Theil meiner Lebensarbeit, und es ist wohl selbstverständlich, dass ich nach Abschluss des Unternehmens einen prüfenden Rückblick auf dieselbe werfe zur Feststellung des Geleisteten, zur Erkenntniss der Fehler, welche gemacht wurden und zur Klarlegung der Lehren, welche sich aus den Erfahrungen dieser Jahre schöpfen lassen.

Dieser Rückblick ist, wie ich glaube, nicht ohne ein allgemeineres Interesse, und wenn ich denselben hiermit der Oeffentlichkeit übergebe, so geschieht es nicht nur, um dem Unternehmen einen Abschluss und den Mitgliedern des Vereins einen letzten Rechenschaftsbericht zu geben, um ferner auch das gute Recht des Vereins gegenüber neueren Bestrebungen zu wahren, sondern wesentlich in dem Wunsche, dass die Erfahrungen, welche wir gemacht haben, schon der nächsten Zeit zu Gute kommen mögen. Denn der niemals ruhende Fortschritt der Arbeit und des Wissens

1) Die Mitglieder des Vorstandes des Vereins waren zu dieser Zeit: Geh. M. R. Prof. Nasse zu Marburg; Prof. J. Vogel zu Halle; Geh. M. R. Prof. Beneke zu Marburg; Prof. von Dusch zu Heidelberg; Dr. med. Varrentrapp zu Frankfurt a. M.; Mitglieder des Ausschusses: Dr. med. Alt in Mannheim; Dr. med. Spiess senior in Frankfurt a. M., Dr. med. Noll in Hanau; Med. R. Dr. Hillefeldt in Lüneburg; O. M. R. Dr. Schotten in Cassel.

wird um so mächtiger sein, je richtiger die Fehler, welche die Vorderen gemacht haben, von den Nachfolgern vermieden und je klarer die Hindernisse, welche jene fanden, von diesen erkannt werden. Und dass der Fortschritt unserer Wissenschaft und unserer Thätigkeit in der Richtung erfolgt, welche von dem Verein für gemeinschaftliche Arbeiten eingeschlagen wurde, ist die erfreuliche Wahrheit, welche ich diesen Blättern voranstellen kann und welche das Gefühl der Missstimmung niederschlägt, welches anderen Falles den Rückblick auf unser Unternehmen begleiten würde.

Der Verein ist aufgelöst; aber das Princip, welches ihn in's Leben rief, das Princip der Association und geordneten Arbeitstheilung auf dem Gebiete der medicinischen Wissenschaft, lebt fort, und scheint gegenwärtig in fruchtbarerer Entfaltung begriffen, als man noch vor Kurzem hoffen durfte.

Der Gang meiner Darlegung ergiebt sich aus dem Gesagten von selbst. Ich werde zunächst den Entwicklungsgang des Vereins in Kürze skizziren und darthun, was er während der Zeit seines Bestehens geleistet hat; in einem zweiten Abschnitt alsdann die Fehler und Hindernisse aufzudecken suchen, welche er besass und fand, und welche seiner kräftigen Fortentwicklung entgegenstanden; in einem dritten endlich die Lehren hervorheben, welche aus dem ersten Unternehmen dieser Art in Deutschland hervorgegangen sind und, wie ich hoffe, schon für die nächste Zeit nutzbringend sein werden.

I.

Der erste Anstoss zur Gründung des »Vereins für gemeinschaftliche Arbeiten u. s. w.« wurde durch meine Schrift: »Unsere Aufgaben. Ein Versuch zur Anbahnung gemeinschaftlicher Arbeiten für die rationelle Heilkunde. Göttingen 1852« gegeben. Das Bedürfniss, aus welchem diese Schrift hervorging, war ein wesentlich praktisches. Als oberstes Ziel wurde die Ausbildung einer rationellen Therapie und Gesundheitspflege bezeichnet, und da sich diese nur auf einer klaren Erkenntniss der Ursachen, des Entwicklungsganges und des Wesens der Krankheitsvorgänge begründen lassen, so wurde die Förderung dieser Theile unseres Wissens auch als unumgängliches Postulat für die Erreichung jenes Zieles vorangestellt. Die Grösse und Weite der hiermit bezeichneten Aufgaben liess aber die gemeinschaftliche Arbeit Vieler nach geordnetem Plane als erforderlich erscheinen, und damit war der für die Lösung jener Aufgaben einzuschlagende Weg vorgezeichnet.

Was ich damals hervorhob, war nicht mehr neu. Mit besonderem Nachdruck betonte Virchow es schon im Jahre 1847 [1]), dass »die physiologische Heilkunde es leider nicht zum Heilen gebracht habe« und »dass Mediciner nur derjenige genannt werden könne, der als den letzten Zweck seines Strebens das Heilen betrachte«. Und weiterhin sagte er trefflich: »Täuschen wir uns nicht über »den Zustand der Medicin. Die Geister sind unverkennbar durch »die vielen, immer wieder in den Winkel geworfenen und durch »neue ersetzten hypothetischen Systeme erschöpft. Allein noch »einige Ueberfälle vielleicht, und diese Zeit der Unruhe wird vor»übergehen, und man wird erkennen, dass nur die ruhige, fleissige »und langsame Arbeit, das treue Werk der Beobachtungen und »Experimente, einen dauernden Werth hat. Die pathologische

1) Archiv für pathol. Anatomie I. „Ueber die Standpunkte der wissenschaftlichen Medicin".

»Physiologie wird dann allmählig zur Entwicklung kommen, nicht »als das Erzeugniss einzelner, hitziger Köpfe, sondern als das »Resultat vieler und mühsamer Forscher; die pathologische »Physiologie, als die Veste der wissenschaftlichen Medicin, an der »die pathologische Anatomie und die Klinik nur Aussenwerke sind«.

Aber auch die »pathologische Anatomie« eröffnete uns nur wenig Aussicht auf die Befriedigung unseres therapeutischen Bedürfnisses, und andrerseits handelte es sich eben darum, für »die treue und fleissige Arbeit vieler und mühsamer Forscher« so weit als möglich ein einigendes Band der Art zu finden, dass die Einzelarbeit, fern davon in irgend welcher Weise eine Beschränkung zu erfahren, sich doch leicht in das grosse Ganze einfügen liess. Ein solches Band wollte der »Verein« bieten.

Die grössten Lücken unseres Wissens schienen mir damals auf dem Gebiete der physiologischen und pathologischen Chemie vorhanden, und doch eben dieses Gebiet am fruchtbarsten für die Entwicklung der rationellen Therapie zu sein. Es wurden deshalb diese Lücken und die nächsten Aufgaben, welche zu ihrer Ausfüllung zu lösen waren, mit besonderem Nachdruck hervorgehoben. Aber der weiteren, gleich wesentlichen Aufgaben für eine rationelle Gesundheitspflege, wurde dabei nicht vergessen; »eine durchgeführte, auf feststehenden Thatsachen begründete Klimatologie und medicinische Geographie« wurde insonderheit bereits auf S. 90 meiner Schrift als eine Aufgabe bezeichnet, die »so schwierig sie sei, auch sicher zu eben so wichtigen Anhaltspunkten für Pathogenese und Therapie hinführe«.

Es war eine Folge der ausführlichen und nachdrücklichen Betonung der Stoffwechselfrage in gesundem und krankem Zustande, dass man bald und in verschiedenen Kreisen den Verein als wesentlich zur Bearbeitung dieser letzteren bestimmt glaubte. »Die physikalische und chemische Untersuchung«, schrieb Virchow im VIII. Bande seines Archivs S. 38, »haben die allergrösste Bedeutung, »und wir können der Richtung, wie sie sich namentlich in dem »Verein für gemeinschaftliche Arbeiten zur Förderung der wissen»schaftlichen Heilkunde zu sammeln bestrebt gewesen ist, nur eine »gedeihliche Entwicklung wünschen«. Aber man übersah dabei, dass ich selbst schon in meiner Schrift (S. 4) hervorhob, »wie es

»eine Thorheit sein würde, behaupten zu wollen, dass auf dem »Wege der pathologisch-chemischen Studien das Gebiet der Patho»logie und Therapie zu einem gewissen Abschluss zu bringen sei«, und wie bereits im ersten Lebensjahre des Vereins (Vgl. Corresp. Bl. No. 3. S. 27) auf die praktische Ausführung dessen hingearbeitet wurde, was in meiner Schrift in Betreff klimatologischer und medicinisch-geographischer Arbeiten angedeutet war, und alsbald immer mehr als eine Hauptaufgabe des Vereins hervorgehoben und verfolgt wurde. Und auch die Aufgaben, welche in Betreff der Stoffwechsellehre selbst aufgestellt wurden, sind, wie mir scheint, vielfach sehr einseitig und unrichtig aufgefasst. Allerdings bezeichneten wir als eine der ersten Aufgaben gemeinschaftlicher Thätigkeit: Untersuchungen in Betreff der Statik des Stoffwechsels im gesunden menschlichen Organismus und deren Störungen im Zustande der Krankheit. Kannten wir doch damals, vor jetzt 17 Jahren, kaum die quantitativen Verhältnisse der in 24 Stunden vom gesunden Menschen ausgeschiedenen wesentlichsten Harnbestandtheile! Aber keineswegs war dabei die Ermittlung der Thatbestände, der Quantitäten von Harnstoff, Harnsäure, Phosphorsäure, Kochsalz, Kalk u. s. w. unter verschiedenen Lebensbedingungen das endliche Ziel. Es schloss sich vielmehr dieser Aufgabe unmittelbar die Frage an, auf welchem Wege in jedem einzelnen Falle die Abweichungen des Stoffwechsels von der Norm zu Stande kommen, und die bezeichneten Thatbestände selbst sollten nur als ein unentbehrliches Glied in der Reihe der Beobachtungen gelten, welche nothwendig sind, um in den Ablauf des Lebensprocesses und dessen Störungen einen klaren Einblick zu erhalten. Es sollte und musste in jedem Falle zur Entscheidung gebracht werden, ob eine Gesundheitsstörung und deren Erscheinungen durch eine unrichtige Ernährung, oder durch den Einfluss schädlicher äusserer Potenzen, oder endlich durch constitutionelle Anomalieen, insonderheit durch Störungen der Innervation, herbeigeführt werden, denn damit erst wird uns der Hebel für ein richtiges ärztliches Handeln in die Hand gegeben. Diese Fragen wurden in meiner ersten Schrift bereits ausführlich erörtert, und dass es wenigstens von einigen Seiten anerkannt wurde, welchen Werth ich auf die Erkenntniss der Functionen der einzelnen Intergralen des Lebensprocesses legte, geht mir aus einer Zuschrift

von Liebig's, dem ich damals ein Exemp'ar meiner Schrift zuzusenden mir erlaubte, d. d. 27. Febr. 1852 hervor. »Sie legen«, heisst es darin, »einen besonderen Werth auf die Bedeutung gewisser »unorganischer Bestandtheile des Blutes und der Nahrung, und »sicherlich mit Recht. Die Bekanntschaft mit der Rolle, welche »das Kochsalz im Körper spielt, oder die Alkalien, oder die phos»phorsauren Salze, wäre mir lieber oder vielmehr erscheint mir »wichtiger, als alle die erhabenen Theorieen der Pathologen. Um »Fortschritte zu machen, muss man mit dem Anfang beginnen«.

Die Therapie, welche der Verein fördern wollte, war die rationelle. Da diese aber zugleich eine ganz vorzugsweise aetiologische ist, so wandte er sich nicht nur der Aetiologie der Krankheiten, sondern auch Allem zu, was zur Erkenntniss der Pathogenese und des Wesens der Erkrankungen beitragen konnte, und dazu war die Lehre vom Stoffwechsel im gesunden und kranken Menschen ein unerlässliches Postulat.

Ich durfte es nicht unterlassen, mit diesen wenigen Worten, dasjenige, was der Verein bezweckte, in der Erinnerung wachzurufen, und die Anschauungen, auf denen er begründet werden sollte, in ihr Recht einzusetzen. Die Theilnahme, welche er fand, war aber dennoch eine nur spärliche, und schon bei seiner Begründung in Wiesbaden im September 1852 traten sich verschiedene Ansichten und Stimmungen einander gegenüber. Am Schlusse des ersten Vereinsjahres belief sich die Mitgliederzahl auf 246; die höchste Zahl, welche erreicht wurde, war 396 (im Jahre 1862).

Doch es fehlte nicht an kräftigen Zurufen. So schrieb Vierordt in Tübingen in einer Kritik meiner Schrift [1]): »Dem Vor»schlage des Verf., dass sich ein Verein bilden solle zur gemein»samen Erforschung festgestellter Fragen wünscht Ref. von Herzen »alles Gedeihen, in der Ueberzeugung, dass die Medicin mehr noch, »als jede andere Naturwissenschaft auf Association der Forscher »angewiesen ist. Der Staat ist gewöhnt, andere Zweige der Natur»wissenschaften zu unterstützen, sei es zum Zwecke gemeinsamer »Forschungen oder zur Anstellung schwieriger und kostspieliger »Beobachtungen, oder zur Herausgabe von Schriften; die Aerzte

1) Archiv für physiol. Heilkunde 1852.

»aber sind in ihren Bemühungen leider bisher fast ausschliesslich »auf sich selbst angewiesen. Das wird und muss mit der Zeit »anders werden«. Und von England, dem Lande der Praxis, aus, wurde dem Unternehmen durch Dr. Parkes in der »British and foreign medico-chirurgical review« die wärmste Anerkennung zu Theil. »These considerations«, sagte derselbe in seiner im Corresp.-Blatt des Vereins No. 6 ausführlicher wiedergegebenen Kritik, »simply as they are, strike the mind almost with wonder, that »scientific cooperation has not long ago been carried out more »systematically and fully«. — — »We cannot too strongly urge »upon our fellow-countrymen, who wish to see our art rendered »more useful even than it is, to join in this excellent undertaking«.

Nur in geringem Maasse schien es dabei anfänglich verstanden und aufgefasst zu werden, wie unendlich förderlich die gemeinschaftliche Arbeit auf den Gemeinsinn der Aerzte und die collegialen und socialen Beziehungen derselben wirken werde. »In der gemein»schaftlichen Arbeit«, schrieb ich in meinem 8ten Jahresbericht. 1860. Corresp. Bl. No. 46. S. 723, »liegt ein Quell reicher Freude »und ein sicherer Hebel für ein einmüthiges collegialisches Leben. »Sichere Thatsachen lassen auf die Dauer keine Entzweiung zu; »Ansichten nur sind es und Theorien, die oft das Band der Colle»gialität trennen, und wo immer zwei Collegen zusammentreffen, »der Zustand unserer Wissenschaft bedingt es, dass die Ansichten »divergiren in diesem oder jenem Punkte, so bei den grössten »Klinikern, so bei den jüngsten Praktikern. Was tritt beruhigender »in diesen Dissens ein, als die dritte und vierte Ansicht oder »Erfahrung?« — — — »Aber auch abgesehen von diesem Nutzen »der gemeinsamen Thätigkeit, die Theilnahme an der Schöpfung »grösserer Arbeiten selbst, sie bindet die Gemüther zusammen, und »der College, der im wissenschaftlichen Streben mit uns vereint »ist, steht nicht mehr allein und ist kein Fremdling. Und in dem »an trüben Erfahrungen nimmer armen Leben des praktischen »Arztes sollten wir solche Gewinnste nicht hoch anschlagen? — — »Einigkeit macht auch uns stark und mit ihr und in ihr ehren wir »uns selbst«. — Aber auch diese Anschauungen gelangen, wie es »scheint, zum Durchbruch und es gereicht uns zu nicht geringer »Freude, dieselben noch in ganz jüngster Zeit durch einen Für-

sprecher der gegenwärtigen medicinischen Reform-Bewegung vertreten zu sehen. In seiner Abhandlung »Zur Medicinalreform in Deutschland« in Goeschen's Deutscher Klinik. 1869. No. 29 und 30 sagt M. R. Cohen in Hannover in Betreff der anzustrebenden freien Associationen der Aerzte: »Aus dem Gemeinsinn der Aerzte hervor»gehend und diesen nährend und läuternd, werden sie die »isolirten Bestrebungen für das Gemeinwohl mit einander verbinden, »und dadurch um so grössere und umfassendere Leistungen er»möglichen; und für die Stellung und Hebung des ärztlichen Standes »werden sie dadurch sich wohlthätig erweisen, dass sie die Rechte »und Pflichten des Standes und der einzelnen Aerzte zu schützen »und hochzuhalten sich angelegen sein lassen«.

So gingen wir nicht ohne das Bewusstsein, mit unsern Anschauungen nicht allein zu stehen, an's Werk. Sollte aber die gemeinschaftliche Arbeit zur That werden, so war es klar, dass man sich zunächst über eine bestimmte Arbeitsmethode einigen und dass die Möglichkeit vorbereitet werden musste, die einzelnen Mittheilungen ohne allzuviel Mühe zu einem Ganzen zu verbinden. Der Feststellung einer Methodik für Beobachtungen am Krankenbette, für pathologisch-chemische Untersuchungen, für Leichenuntersuchungen, für Arzneiprüfungen, so wie dem Entwurfe von »Fragen zur medicinischen Geographie« galten deshalb die ersten Bemühungen [1]). Jedem Mitgliede wurden neben diesen letzteren »Schemata

1) Die „Fragen zur medicinischen Geographie", welche den Vereinsmitgliedern zugestellt wurden, waren folgende:

1) Welches ist Ihr Beobachtungsort und welche geographische Lage hat derselbe? (Angabe des Breiten- und Längengrades, der Höhe über der Meeresfläche u. s. w.)
2) Von welcher Beschaffenheit ist der Boden Ihrer Gegend? Wie ist der allgemeine Character der Vegetation?
3) Bieten die atmosphärischen Vorgänge Ihrer Gegend besondere Eigenthümlichkeiten dar? Sind mittlere Warmegrade und Barometerstände, Quantität der atmosphärischen Niederschläge u. s. w. schon bekannt? Welches sind die vorherrschenden Winde?
4) Von welcher Beschaffenheit ist das Trinkwasser Ihrer Gegend oder Ihres Beobachtungsortes?
5) Welches sind die gewöhnlichen Nahrungsmittel in Ihrer Gegend und in welcher Quantität werden sie im Allgemeinen genossen? Lassen sich in letzterer Beziehung genaue Angaben ermöglichen (Diättabellen in öffentlichen Anstalten u. s. w.)?
6) Welches sind die gewöhnlichen Getränke in Ihrer Gegend und in welcher Quantität werden sie genossen? Wie verhält es sich namentlich mit dem Genuss von Spirituosis, Thee, Caffee u. s. w.?
7) Welcher Art ist die Constitution der Einwohner im Allgemeinen?
8) Welcher Art ist der Character, die Intelligenz, die Arbeitskraft, der Wohlstand derselben?
9) Welcher Art sind die gewöhnlichen Vergnügungen derselben?
10) Was ist hinsichtlich der Kleidung und Wohnung (Bauart der Häuser, Wohn- und Schlafzimmer, Heitzung, Ventilation) zu bemerken?
11) Welche Krankheiten kommen endemisch vor?
12) Was lässt sich im Allgemeinen über Art und Charakter der herrschenden Krankheiten, über Häufigkeit oder Seltenheit von Epidemieen u. s. w. bemerken?

für die Aufzeichnung von Kranken- und Sectionsberichten« behändigt. Ein Correspondenz-Blatt des Vereins, welches nicht in den Buchhandel gelangte, sollte dabei den Verkehr unter den Vereinsmitgliedern aufrecht erhalten, neue Untersuchungsmethoden und Beobachtungen rasch zur Kenntniss derselben bringen, Bezugsquellen für Apparate zu Untersuchungen u. s. w. empfehlen; ein »Archiv« die Arbeiten der Vereinsmitglieder selbst aufnehmen.

Die Arbeitsmethodik, welche wir empfahlen, war aber diejenige, welche noch heutigen Tages in voller Blüthe steht und welche die klinische Forschung auf denjenigen Standpunkt gebracht hat, den sie gegenwärtig einnimmt. Wir bezeichneten den am Krankenbette zu befolgenden Gang der Untersuchung und stellten Schemata für Krankheits- und Sectionsberichte auf, wie sie den heutigen besten Berichten zu Grunde gelegt werden; wir suchten Normalmaasse für die physikalische Untersuchung der Brust- und Unterleibsorgane zu ermitteln; wir machten für Harnuntersuchungen die zu immer weiterer Ausbildung gelangten und damals eben erst eingeführten Titrirmethoden bekannt; wir empfahlen die französischen Maasse und Gewichte zu allgemeiner Annahme, kurz wir wählten den Weg der Forschung, der die Thatsachen zu ermitteln und durch eine richtige Verwerthung derselben auf statistischem Wege zu Resultaten zu gelangen sucht. Und selbst in der äusseren Form der Darstellung gewisser Beobachtungen hat die neuere Zeit

allgemein adoptirt, was in meiner Schrift »Unsere Aufgaben« an einem Beispiele als empfehlenswerth bezeichnet wurde: die fruchtbare Methode der graphischen Darstellung. Wohl sind mir damals die stärksten Zweifel an der Möglichkeit der allgemeinen Einführung solcher graphischer Aufzeichnungen ausgesprochen. Aber wo ist heutigen Tages die Klinik, in welcher wir nicht Temperatur- und Pulscurven oder Curven einzelner Harnbestandtheile, des Körpergewichts u. s. w. finden? Und selbst in die Praxis sind dieselben schon der Art übergegangen, dass wir nicht selten mehr an ein Krankenbett treten, dem eine Curventafel zur Seite liegt.

Nicht aber, dass derartige durchgeführte und gründlich durcharbeitete Beobachtungen von allen Vereinsmitgliedern erwartet wurden; denn wie wenige sind in der glücklichen Lage sie vornehmen zu können! Der Verein wünschte vielmehr auf das Lebhafteste die in der Beobachtung und Erfahrung der praktischen Aerzte meistens begraben liegend bleibenden Schätze zu heben und verlangte für die Mittheilungen derselben nur eine derartige Form, dass sie mit Leichtigkeit ausführlicheren Beobachtungen angereiht werden konnten. Jede thatsächliche Mittheilung aus der praktischen Erfahrung, sofern sie sicher begründet war, war willkommen; belehrend und anregend zugleich hofften wir gerade diese kürzeren »praktischen« Mittheilungen werden zu sehen.

Wenige Zeit später wurde alsdann mit der Aufstellung von Mortalitäts- und Morbilitätstabellen vorangegangen, um auch allen denjenigen Vereinsmitgliedern, welche zu ausführlicheren Beobachtungen weder Zeit noch Gelegenheit hatten, eine active Theilnahme an den Arbeiten des Vereins zu ermöglichen, und ein brauchbares Material zur wissenschaftlichen Begründung der Aetiologie der Krankheiten herbeizuschaffen. Der Plan, welchen wir dabei verfolgten, wurde in meiner Schrift: »Mittheilungen und Vorschläge, betreffend die Anbahnung einer wissenschaftlich brauchbaren Morbilitäts- und Mortalitäts-Statistik für Deutschland. Oldenburg 1857« näher dargelegt. Es galt uns als Zweck »ganz nach Art der meteorologischen Beobachtungsstationen durch das freiwillige Zusammentreten einer Reihe von Aerzten pathologische Beobachtungsstationen zu begründen (S. 74)«, und bei erwünschter Zunahme derselben für politisch abgegrenzte Gebietstheile Deutschlands auf die Gründung je eines medicinisch-statistischen Centralbureau's hinzuwirken. Durch die Gründung von »Localsectionen« Seitens des Vereins wurde hierzu bereits der praktische Anfang gemacht. Meine »Mittheilungen und Vorschläge« wurden dann auf der Naturforscherversammlung in Bonn im Jahre 1857 einer besonderen Commission (bestehend aus den Herren Proff. Baum, Credé, Schneevogt, Vogel und Dr. Spiess) unterbreitet, im Wesentlichen von derselben adoptirt, und den verschiedenen Regierungen mit dem Ersuchen um Förderung der Vereins-Bestrebungen zugestellt (Vgl. den Commissionsbericht und die Verhandlungen in Bonn im Corresp. Blatt No. 29). War das aber nicht derselbe Plan, welcher gegenwärtig von der »Section der Naturforscherversammlungen für Medicinalreform« befolgt, in den ärztlichen Kreisvereinen Baden's und vielleicht auch andrer Länder von Neuem berathen, und von Einzelforschern empfohlen wird?

In seinem Vortrage »Ueber den Hungertyphus und einige verwandte Krankheitsformen. Berlin 1868« sagt Virchow: »Den »Hungersnöthen und Nothstandskrankheiten kann man nicht mit »religiösen Mitteln begegnen, vielmehr ist eine weise Fürsorge der »Gesammtheit nur ausführbar, indem man das Netz der wissen»schaftlichen Beobachtungen ausdehnt. Wir sind jetzt stolz darauf, »jeden Morgen in unserer Zeitung zu lesen, was für Wetter es in »einem Paar Dutzend europäischer Orte ist; unsere Landwirthschaft »meint Grosses zu leisten, wenn sie je nach den einzelnen Jahres»zeiten über den Zustand der Saaten und Erndten in einigen »Nachbarländern und in Nordamerika Umschau hält. Aber dies »ist nur der Anfang dessen, was geschehen muss. Im Zusammen»wirken der Meteorologie, der Landwirthschaft, des Handels und »der Medicin, und in der Ausdehnung der wissenschaft»lichen Beobachtungsstationen über die ganze Erdober»fläche, wie sie für einzelne Zwecke schon Alexander v. Humboldt »begründet und zum Theil durchgesetzt hat, wird es künftig möglich »sein, zur rechten Zeit die kommende Gefahr zu entdecken, den »Ursachen der Noth und der Krankheit vorzubeugen, oder, wo dies »nicht ganz ausführbar ist, wenigstens ihre Wirkungen auf das »Aeusserste zu mildern«.

In der Gesellschaft der Aerzte und Wundärzte zu Donaueschingen

vom 1. Juli 1869 wurde kürzlich die Bildung von Local- und Bezirksvereinen zum Zweck der Wahrung der Standesinteressen dringend empfohlen und angebahnt. Dr. Merz referirte dann in längerem Vortrage über die Vereinsthätigkeit, und treffend hob er dabei hervor, »wie die Gesellschaft der Aerzte, neben der Pflege »der Standesinteressen, für die Wissenschaft und für die mensch»liche Gesellschaft fruchtbringend werden, der Verein zu einem »productiven umgestaltet werden könnte und sollte. Die Wissen»schaft erwarte von ihren Priestern mit Recht den Obolus; die Ehre »gebiete es und der Staat verlange es, dass ihn die Aerzte in dem »Bestreben, die Gesetze und Einrichtungen den Naturgesetzen an»zupassen, thatkräftig unterstützen. Nur in dem Grade, als sich »die Aerzte über das Receptschreiben erheben, und sich, als Natur»forscher und Bürger, der Gesellschaft und dem Staate nützlich und »unentbehrlich zu machen wissen, werde ihnen der vorenthaltene »Preis öffentlicher Anerkennung zu Theil werden«. »Als Wächter »der öffentlichen Gesundheitspflege, die sie aus den Stuben der »Bureaukratie vor das zuständige Forum der ärztlichen Vereine zu »reclamiren haben, werden sie jenen wohlberechtigten Einfluss auf »alle Zweige des modernen Staats- und Volkslebens zu üben ver»mögen, der seine feste Basis in dem durch die Naturwissenschaften »gereiften und dem modernen Staate unentbehrlichen Wissen be»gründet weiss«. »Ref. weist auf die Leistungen des Institutes des »Gesundheitsrathes in England und die ihm bereits zu Theil ge»wordene Anerkennung hin; er glaubt, dass Aehnliches auch bei »uns zu erreichen wäre unter der Bedingung einer guten Organi»sation und einer energisch aufgenommenen gemeinsamen Thätig»keit. Die physische Lage der Bewohner einer Gegend lasse sich »erst verbessern und deren Mortalität beschränken, wenn die Ur»sachen aufgeklärt sind, welche der Häufigkeit des Auftretens ge»wisser Volkskrankheiten und deren Beziehung zu dem geogra»phischen, geologischen, meteorologischen und ethnographischen »Charakter der Gegend zu Grunde liegen. Es müsse zunächst die »Häufigkeit der Erkrankungen innerhalb eines abgegrenzten Bezirkes »statistisch genau festgestellt sein und erst auf Grundlage einer »sorgsam gesammelten Morbilitätsstatistik werde es möglich werden, »den ursächlichen Zusammenhang mit lokalwirkenden Verhältnissen

»aufzufinden, die das Prävaliren der einen Krankheit an diesem, »das constante Zurücktreten derselben an einem andern Orte be»dingen. Die Ansammlung des statistischen Materials erfordere »aber die Mitwirkung aller befähigten Kräfte des ganzen Beobachtungs»gebietes. Ref. schlägt mit dem Ausschuss der Gesellschaft vor, »dass sich die Gesellschaftsmitglieder die Aufgabe stellen, das Ver»einsgebiet in dieser Richtung wissenschaftlich auszubeuten, und »zwar sollen zunächst nur die epidemischen Krankheiten genauer »beobachtet und statistisch aufgezeichnet werden. Zu diesem Zwecke »werden Tabellen nach aufgestelltem Muster auf Kosten der Gesell»schaft gedruckt und sämmtlichen Mitgliedern mitgetheilt. Diese »werden gebeten, das Auftreten der angegebenen epidemischen »Krankheiten, deren Verbreitung, die begünstigenden und hemmen»den Einflüsse, aus ihrem Beobachtungsgebiete einzuzeichnen und »die Tabellen alle 2 Monate an das Secretariat der Gesellschaft »einzusenden. Hier würden die ausgefüllten Tabellen gesammelt, »zusammengestellt und eine Uebersicht bearbeitet, und alljährlich »bei der Jahresversammlung mitgetheilt. Wäre ein grösseres stati»stisches Material gewonnen, so könnte es Gegenstand einer wissen»schaftlichen Arbeit werden. Die anwesenden Gesellschaftsmitglieder »erklären sich alle bereit, dem Vorschlag zu entsprechen u. s. w.« [1]).

Ich habe diesen Antrag des Dr. Merz ausführlich mitgetheilt, da er beweist, wie in genauester Weise gegenwärtig in Kreisvereinen wieder aufgenommen wird, was der Verein für gemeinschaftliche Arbeiten bereits vor 12 Jahren als Erforderniss für den Fortschritt der Wissenschaft hinstellte und auszuführen suchte. Und was hier in einem kleineren Kreise beschlossen wurde, gelangte so eben auf Anregung der »Commission für Medicinalreform« auf der Naturforscherversammlung zu Innsbruck als Forderung für alle vorhandenen und noch zu gründenden ärztlichen Bezirksverbände zur Anerkennung.

In den Thesen, welche diese Commission in Innsbruck zur Berathung und zur Annahme brachte, nehmen folgende Sätze eine Stelle ein:

1) Mitgetheilt aus den „Aerztlichen Mittheilungen aus Baden" von Dr. R. Volz. No. 16. 1869. 31. August.

1) »Zur Pflege der medicinischen Wissenschaft, zur Förderung »der öffentlichen Gesundheitspflege, zur Wahrung der ärztlichen, »socialen Stellung erscheint es mehr als je dringend geboten, dass »sich die Aerzte Deutschlands in freien unabhängigen Vereinen zu»sammenfinden, um durch gemeinschaftliche Thätigkeit auch »ihrerseits der Segnungen des modernen Associations»wesens theilhaftig zu werden«.

4) »Die Grenzen der einzelnen Bezirksverbände müssen sich »nicht nothwendig an die politische Eintheilung anlehnen, sondern »werden nach örtlichen Zweckmässigkeitsgründen festgestellt. Die »Bezirksverbände regieren sich selbst; sie halten mindestens zwei »jährliche Generalversammlungen ab, die womöglich Wanderver»sammlungen sein sollen. In diesen Generalversammlungen werden »die geschäftlichen Angelegenheiten des Verbandes berathen; es »werden Vorträge aus dem Bereiche der Medicin und Hygieine »gehalten, denen sich Discussionen anschliessen; es werden praktische »Fragen aus der öffentlichen Gesundheitspflege zur Debatte gebracht »und die Ansicht der Versammlung durch Beschlüsse festgestellt; »es werden gemeinsame Arbeiten der ärztlichen Thätig»keit (Morbilitäts- und Mortalitätstabellen, epidemiolo»gische Statistik u. s. w.) angeregt und Vereinbarungen »über die dabei zu beobachtenden Formalien getroffen«.

5) »Die Section für Medicinalreform bei den Versammlungen »deutscher Naturforscher und Aerzte bleibt vorläufig Centralorgan »für ärztliches Vereinswesen. Von ihr geht die Agitation zur Bil»dung neuer Vereine, namentlich von Bezirksverbänden aus; sie »übermittelt den Vereinen in geeigneter Weise die bei den Natur»forscherversammlungen gefassten Beschlüsse der Sectionen für »Medicinalreform und öffentliche Gesundheitspflege, regt zur Discussion »und Bekanntmachung derselben durch die Vereine an und organisirt »in geeigneten Fällen gemeinschaftliche Thätigkeit sämmtlicher »Vereine«.

Ich komme später auf diese Thesen zurück. Für den Augenblick führe ich sie nur an, um nachzuweisen, wie genau dasjenige, was der Verein für gemeinschaftliche Arbeiten mit seinen Localsectionen seit Jahren erstrebte, jetzt in neuer Weise wiederholt wird, nur mit dem Unterschiede, dass gegenwärtig eine Wander-

versammlung und eine Commission derselben als Centralorgan für die gemeinschaftlichen ärztlichen Bestrebungen auftritt.

Es war selbstverständlich, dass wenn die medicinisch-geographischen, topographischen und epidemiologischen Verhältnisse der gemeinsamen Arbeit unterworfen werden sollten, ihnen eine Kenntniss der meteorologischen Verhältnisse zur Seite stehen musste. Für diejenigen Vereinsmitglieder, welche dieselben anzustellen geneigt waren, wurde deshalb im Corresp. Bl. No. 5. pag. 54 eine »Instruction für meteorologische Beobachtungen«, entsprechend derjenigen für die königlich preussischen Beobachtungsstationen, mitgetheilt. Allein es war kaum anzunehmen, dass diese Beobachtungen von Seiten einzelner Aerzte mit derjenigen Regelmässigkeit und Accuratesse fortgeführt werden, welche für deren Brauchbarkeit eine unerlässliche Bedingung abgeben. Der Verein wandte sich deshalb an die verschiedenen Regierungen, in deren Ländern bis dahin keine meteorologischen Beobachtungsstationen bestanden, und hatte die Freude, im Grossherzogthum Oldenburg alsbald 4, und im Kurfürstenthum Hessen später 5 Stationen auf seinen Antrag hin eingerichtet zu sehen. Auch das Grossherzogthum Baden folgte alsbald dem Beispiel, und gegenwärtig sehen wir fast ganz Deutschland mit einem Netze meteorologischer gleichmässig arbeitender Beobachtungsstationen überzogen.

Aber der Verein stellte sich noch weitere Aufgaben.

Zunächst suchte er durch Stellung von Preisaufgaben zu Arbeiten anzuregen und schwierigere Fragen zu einer bestimmten Lösung zu bringen. Die Arbeiten, welche in dieser Weise hervorgerufen wurden, werden wir unten noch näher bezeichnen. In den späteren Jahren seines Bestehens bemühte er sich alsdann, Uebersetzungen ausgezeichneter ausländischer Werke zu veranlassen, und durch Subscriptionen darauf Seitens der Vereinsmitglieder den Verlag der Uebersetzungen sicher zu stellen. Eine besondere Aufmerksamkeit wandte der Verein endlich der Beschaffung billiger und guter Instrumente zu pathologischen oder physiologischen Untersuchungen zu. Thermometer zu Körpertemperaturmessungen wurden durch das Secretariat des Vereins in Menge bezogen, von demselben normirt, und dann an die Vereinsmitglieder abgegeben. Die jetzt allgemein eingeführten und anerkannten Schoenemann'schen Körper-

gewichtswaagen von Pintus (in Brandenburg und Berlin) wurden zuerst durch den Verein geprüft und empfohlen (Vgl. Corresp. Bl. No. 8, pag. 104). Bezugsquellen und Preise für Microscope, meteorologische Beobachtungsinstrumente, Glasapparate, Chemikalien u. s. w. wurden in dem Correspondenz-Blatt zur Anzeige gebracht.

Was schliesslich die Organisation und äusseren Einrichtungen des Vereins anbetrifft, so leitete ein Vorstand, welcher auf alljährlichen Generalversammlungen neu gewählt wurde, die sämmtlichen Vereinsangelegenheiten, und die Centralstelle für allen Verkehr bildete das Secretariat des Vereins. Dasselbe wurde von einem Mitgliede des Vereinsvorstandes (dem Verf. dieser Blätter) geführt. Ueberall, wo mehre Mitglieder des Vereins an einem Orte oder nahe zusammen wohnten, wurden alsdann Localsectionen mit von den Mitgliedern derselben zu wählenden Localsectionsvorständen errichtet, und der Verkehr zwischen diesen Sectionen und dem Secretariate durch die Localsectionsvorstände vermittelt. Regelmässige Jahresberichte (s. Corresp. Bl. des Vereins) gaben einen Ueberblick über die Leistungen des Vereins, über die Mitgliederzahl, über die vorhandenen Localsectionen u. s. w. Das 8 wöchentlich erscheinende Correspondenzblatt erhielt, wie schon oben erwähnt, die Mitglieder in Kenntniss von allen Vorgängen innerhalb des Vereins, brachte Aufgaben und Anfragen, Cassenberichte u. s. w. Zur Bestreitung der erforderlichen Ausgaben für das Correspondenzblatt, Preisaufgaben, Circulare u. dgl. wurde von jedem Mitgliede jährlich 1 Rthl. erhoben. Das Archiv des Vereins endlich wurde dem Buchhandel übergeben und der Band desselben zu dem Preise von 4 Rthl. abgelassen. Es blieb den Mitgliedern des Vereins anheimgestellt, ob sie dasselbe halten wollen, oder nicht.

Mit dieser äusseren Einrichtung und auf den oben angedeuteten Wegen der Arbeit selbst suchte der Verein seine Zwecke zu erreichen. Aber, nicht ohne Bedauern schreibe ich es nieder, trotz der allgemein anerkannten Richtigkeit seiner Prinzipien, trotz der möglichsten Sorgfalt in der Geschäftsführung, trotz der grossen ihm zeitweilig angehörenden Kräfte — der Verein hat die Frische der Jugendkraft nur kurze Zeit besessen und weit hinter dem, was wir wünschen und hoffen mussten, blieben seine Leistungen zurück. Bereits im Jahre 1863 sah sich der Vorstand des Vereins genöthigt,

die Fortexistenz des Vereins in Frage zu stellen. Auf einer Generalversammlung in Marburg (25. Oct.) wurde jedoch der Beschluss gefasst, den Verein nicht aufzulösen. Unter modificirter Einrichtung und bei gleichzeitiger Beschränkung seiner Aufgaben wurde er noch 5 Jahre fortgeführt. Das Correspondenzblatt wurde mit dem Archiv verschmolzen und jedes Mitglied war fortan zu einem jährlichen Beitrage von 3 Thalern verpflichtet, wogegen ihm das Archiv kostenfrei geliefert wurde. Die gemeinschaftlichen Arbeiten wurden auf das Gebiet der Krankheits- und Sterblichkeitsstatistik, späterhin selbst auf das enge Gebiet der epidemischen Krankheiten beschränkt. Allein auch diese neuen Modificationen führten nur einen flüchtigen Aufschwung herbei, und selbst die epidemiologischen Sammlungen und Zusammenstellungen, so leicht und so nützlich sie waren, mussten alsbald aus Mangel an dauernder Theilnahme wieder eingestellt werden.

Fragen wir nach den positiven Leistungen des Vereins als solchen, so beschränken sie sich auf die folgenden. Es wurden 5 Preisschriften durch ihn hervorgerufen und zwar die Arbeiten Mosler's und Genth's: »Ueber den Einfluss des innerlichen Gebrauches verschiedener Quantitäten von gewöhnlichem Trinkwasser unter verschiedenen Verhältnissen auf den menschlichen Stoffwechsel«; die Arbeit Dr. C. Roerigs: »Ueber die medicinisch-geographischen Verhältnisse des Fürstenthums Waldeck, mit Berücksichtigung der Aetiologie der daselbst herrschenden Krankheiten«; so wie die Arbeiten von Dr. Lehmann in Bad Oeynhausen und Dr. Speck in Strassebersbach (Dillenburg): »Ueber den Einfluss der körperlichen Bewegung, bis zur ermüdenden Anstrengung gesteigert, auf den menschlichen Organismus und insonderheit auf den Stoffwechsel«. Von ausländischen Werken gelangten durch Vermittlung des Vereins zur Uebersetzung in's Deutsche: »Garrod: Die Natur und Behandlung der Gicht und rheumatischen Gicht. 1861«. Uebersetzt von Dr. Eisenmann; — und Toynbee: »Die Krankheiten des Gehörorgans, ihre Natur, Diagnose und Behandlung. 1863«. Uebersetzt von Dr. Moos. — Statistische Zusammenstellungen aus einzelnen, verschiedenen Gegenden Deutschlands über die monatlich beobachteten Krankheits- und Sterbefälle wurden während der Jahre 1854—1859 (incl.) im Archiv des Vereins publicirt, und wiewohl der wissenschaftliche Werth dieser Zusammenstellungen wegen der

Vereinzelung der Beobachtungsorte sowohl, als wegen der Unregelmässigkeit der Beiträge ein nur äusserst geringer genannt werden kann, es liegt in ihnen der erste thatsächliche Anfang einer Association der Aerzte auf wissenschaftlichem Gebiete, der erste Anfang einer gemeinschaftlichen Thätigkeit [1]). Statistische Zusammenstellungen von beobachteten epidemischen Erkrankungen wurden für die Jahrgänge 1865—1867 (inclus.) im Archiv des Vereins veröffentlicht. Allen Mitarbeitern wurden Separatabdrücke der »Epidemiologischen Nachrichten« zugestellt. Die Herausgabe von Tabellen für medicinisch-statistische Aufzeichnungen in der Form kleiner Hefte für je ein Beobachtungsjahr (im Verlag bei Ludw. Denicke in Leipzig), entworfen von einer dazu niedergesetzten Commission, war dabei ein Werk des Vereins, welches der praktischen Durchführung der statistischen Arbeiten mit Leichtigkeit den Weg bahnte und jede äussere Schwierigkeit für dieselben beseitigte. Das von dem Vorstande des Vereins herausgegebene »Archiv des Vereins für gemeinschaftliche Arbeiten zur Förderung der wissenschaftlichen Heilkunde«, von welchem 9 Bände und 2 Supplementhefte erschienen sind, brachte endlich die Arbeiten und Untersuchungen der einzelnen Vereinsmitglieder, sowie einzelne Uebersetzungen beachtenswerther englischer Arbeiten, Auszüge aus Zeitschriften und Kritiken von Werken, welche zu den Bestrebungen des Vereins in Beziehung standen.

Wohl sind diese Leistungen des Vereins nicht fruchtlos gewesen. Aber auch seine besten Freunde und regsten Förderer werden mit mir anerkennen, dass dieselben den Erwartungen, die man von ihm hegen durfte, nicht entsprechen, dass namentlich die gemeinschaftliche Arbeit, die der Verein vor Allem Andern im Auge hatte, sich nicht in gewünschter Weise realisirte.

Wenn aber die Prinzipien, die der Verein verfolgte, die Aufgaben, die er sich stellte, die Arbeitsmethoden, welche er empfahl, noch heutigen Tages in voller Gültigkeit dastehen, was hinderte seine kräftige Entwicklung oder wo lagen die Fehler, welche ihn so weit von seinem Ziele entfernt hielten?

1) Die Sammlungen zweier Jahrgänge (1860 und 1861) liegen nahezu druckfertig noch bei dem Secretariate des Vereins, und ich muss es erwähnen, dass die Publication derselben deshalb unterbleiben musste, weil die Mittel des Vereins nicht mehr genügten, um die beträchtlichen Kosten derselben zu bestreiten.

II.

Zu der Zeit, als der Verein ins Leben trat, hatte die naturphilosophische Schule kaum noch einzelne Vertreter. Nach den bahnbrechenden Arbeiten unserer westlichen Nachbarn war von der Wiener Schule aus durch Rokitansky und Skoda ein neues Licht aufgegangen. Das Archiv für physiologische Heilkunde von Roser, Wunderlich, Griesinger und Vierordt bahnte der Pathologie an der Hand von Physiologie und Anatomie einen neuen Weg, und Virchow's Archiv verschaffte der thatsächlichen Forschung, dem pathologischen Experiment, wie der umsichtigen Durcharbeitung pathologisch-anatomischer Befunde, als den Grundlagen einer pathologischen Physiologie, weitere Anerkennung und zahlreiche Anhänger. Aber in buntem Durcheinander häufte sich das wissenschaftliche Material an. Es war eine Zeit der vollen Gährung, und erst nach und nach klären sich die Bewegungen und wird der Weg betreten, auf welchem die Bestrebungen, von vornherein geordnet, übersichtlich neben einander liegen. Die einzige Zeitschrift, welche damals ein bestimmtes Gepräge besass, war eben das Virchow'sche Archiv. Neben ihm erschienen das Archiv für physiologische Heilkunde, die Zeitschrift für rationelle Medicin, die Prager Vierteljahrsschrift, die »Deutsche Klinik«, Joh. Müller's Archiv für Anatomie, Physiologie und wissenschaftliche Medicin u. a. — aber keine dieser Zeitschriften hatte einen bestimmt ausgeprägten Character.

Wie anders ist es geworden im Laufe von 15 Jahren! Zunächst erschien das Archiv für Ophthalmologie; alsbald das Archiv für klinische Chirurgie; weiterhin das »Deutsche Archiv für klinische Medicin«; das Archiv für microscopische Anatomie; das Archiv für Physiologie; die Zeitschrift für Biologie, ein Jedes gestützt und getragen durch eine Anzahl von Fachmännern oder Specialisten ersten Ranges, ein jedes mit seiner bestimmt ausgesprochenen Aufgabe an der Stirn! Die »Vierteljahrschrift für öffentliche Gesundheitspflege« tritt als jüngstes Glied in die Reihe dieser Zeitschriften

ein, und wir wollen hoffen, dass ihr gelingt, was Oesterlen mit seiner trefflich angelegten Zeitschrift für Hygieine, medicinische Statistik und Sanitätspolizei nicht zu erreichen vermochte. Und nicht nur in der Journalistik wurde die Association der Fachmänner zur Wahrheit. Auch unsere neuesten Hand- und Lehrbücher haben derselben ihre Entstehung zu verdanken. So Virchow's Handbuch der speciellen Pathologie und Therapie; so Pitha und Billroth's Handbuch der Chirurgie; so Stricker's noch im Erscheinen begriffenes »Handbuch der Gewebelehre« u. s. w.

Diese Entwicklungsvorgänge in unserer medicinischen Literatur sind ein unverkennbares Zeichen der Zeit. Die zunehmende Fülle der Aufgaben, die Massenhaftigkeit des rasch und immer rascher sich häufenden Materiales, die ständige Vervielfältigung unserer Untersuchungsapparate, die wachsenden Anforderungen an die Untersuchungstecknik, sie alle treiben zur geordneten Theilung der Arbeit, zur Beschränkung der Arbeitsgebiete des Einzelnen, und zur Association. Mit Recht drängt sich uns dieselbe Nothwendigkeit auf, welche auf dem Gebiete des praktischen Lebens, so wie auf andern Gebieten der Wissenschaft sich längst als solche herausgestellt und zu den bedeutendsten Resultaten geführt hat.

Wird man es in Abrede stellen wollen, dass der »Verein für gemeinschaftliche Arbeiten zur Förderung der wissenschaftlichen Heilkunde« es war, der zuerst diese Theilung der Arbeit und Association auf dem Gebiete der medicinischen Wissenschaft vertrat und in's Leben zu rufen versuchte? Im VIII. Bande des Virchowschen Archivs S. 305 (1855) schrieb Dr. Spiess in Frankfurt a. M.: »Eine Verständigung über einen gemeinsamen Weg und gemeinsames Arbeiten ist vor Allem heutzutage ein unabweisliches Bedürfniss; es handelt sich nicht mehr darum, mit subjectiver Willkür ein Phantasiegebäude der Wissenschaft aufzuführen, womit zur Noth wohl einer allein fertig wird, sondern dieselbe, so weit dies möglich ist, mit wirklichen und erfahrungsmässigen Thatsachen aufzubauen, zu deren Herbeischaffung und Bearbeitung Tausende von Händen erforderlich sind«. Die Zeit ist dem Rufe gefolgt, der an sie ergangen ist, so Vieles auch noch zu wünschen übrig bleibt; freudig aber begrüssen wir noch jetzt die Uebereinstimmung, welche sich in ihm kundgab mit den Ideen, die der Verein für

gemeinschaftliche Arbeiten zuerst aussprach, zuerst vertrat, und zuerst praktisch durchzuführen sich bemühte. Das bleibt dem Verein und das wird man ihm lassen.

Aber dennoch, so richtig seine leitenden Gesichtspunkte waren, der Nothwendigkeit der Abgrenzung der Arbeitsgebiete sowohl Einzelner, als ganzer Genossenschaften hat der Verein nicht in genügender Weise entsprochen, und wiewohl er eine geordnete Theilung der Arbeit von vornherein streng im Auge behielt, wiewohl für diese Ordnung durch die Einrichtung von »Fachsectionen« hinreichende Sorge getragen war, wir erkennen es als seinen ersten und grössten Fehler an, dass er seine Aufgaben und Ziele zu weit steckte und sich nicht von Anfang an auf ein engeres Gebiet beschränkte.

Was der Verein herbeisehnte und in der ersten Einrichtung von »Fachsectionen« (s. Corresp. Bl. No. 1. S. 11) anzubahnen suchte, hat sich in der That in fast überraschender Weise entwickelt, und es mag das als ein Beweis für die Richtigkeit seiner leitenden Ideen betrachtet werden. Aber es hat sich entwickelt nicht in ihm, sondern ausserhalb seiner Kreise. Die Ophthalmologen, die Chirurgen, die internen Kliniker, die Microscopiker, die Physiologen u. s. w., sie haben sich in abgesonderten Kreisen vereinigt und sectionsweise, wie auf den Naturforscherversammlungen, treten sie in der Oeffentlichkeit in ihren Archiven auf.

Es konnte selbstverständlich nicht in dem Plane des Vereins liegen und lag nicht darin, dauernd und bei weiterer Entwicklung der einzelnen Sectionen einen Mittelpunkt für dieselben zu bilden. Es war vielmehr der Wunsch, dass sich diese Sectionen, sobald die Anzahl der Mitglieder derselben gross genug war, selbständig constituirten, und mit dem Stammverein nur eine gegenseitig förderliche Verbindung unterhielten. Wir wollten nur den ersten Anstoss geben zu der Association specieller Fachmänner und die erste Vereinigung derselben vermitteln. Aber auch schon diese Aufgabe war zu weit gesteckt, und die disponiblen Arbeitskräfte nicht ausreichend, um dieselbe mit derjenigen Sorgfalt und Intensität zu verfolgen, welche für die Erreichung grosser Ziele erforderlich ist. Freilich erfolgte auch da, wo es nicht an tüchtigen, leitenden Fachmännern und nicht an Ausdauer fehlte, der Anschluss nur äusserst

spärlich. So musste z. B. die schöne Aufgabe, mit Hülfe des Vereins und durch gemeinschaftliche Arbeit »eine auf bedeutende Zahlen gestützte Statistik über den Verlauf der Geschwülste nach deren Exstirpation« zu gewinnen, welche 1857 von Förster in Göttingen gestellt wurde [1]), ungelöst bleiben, weil die derselben zugewandte Theilnahme allzugering war; und ähnlich erging es vielen andern Aufgaben. Ein verständlicher, aber dem grösseren Fortschritt dennoch sehr hinderlicher Egoismus lässt die Mehrzahl unter uns schwer zu dem Entschlusse kommen, die einzelne und eigene Arbeit in einer Sammlung gleicher Arbeiten aufgehen zu lassen. Aber ich will dennoch der Mannigfaltigkeit der Aufgaben, die der Verein verfolgte, die Schuld beimessen, dass seine Entwicklung so wenig erfolgreich war, und zweifle kaum, dass wenn sich die tüchtigsten Chirurgen und pathologischen Anatomen heutigen Tages zu einer ähnlichen Aufgabe, wie es die Förster'sche war, vereinigten, ein glückliches Resultat erreicht werden würde. Es wäre ein trauriger Beweis für die Hingabe an die Wissenschaft, wenn so grosse Fragen, nur zu erledigen durch die Gemeinschaftlichkeit der Arbeit, noch lange auf ihre Lösung warten müssten. Denn der Meinung, die wir mehrfach haben aussprechen hören, dass eine solche Gemeinschaftlichkeit die freie geistige Bewegung des Einzelnen hindere, dürfen wir auf gutem Grunde entgegentreten. Nur wer nichts Grösseres zu vergeben hat, hält das Kleine ängstlich zurück, und nur wer die Bedeutung und den Werth des Kleinen nicht kennt, kann seine einzige Aufgabe im kühnen Gedankenfluge suchen.

Es war unter diesen Umständen ein durchaus richtiger Gesichtspunkt, welcher Med. Rath Dr. Mettenheimer leitete, als er im Jahre 1867 dem Verein den Antrag unterbreitete: »Derselbe möge sich zu einem Verein für medicinische Geographie, Statistik und Epidemiologie umgestalten, und dem entsprechend den Titel seines Archivs abändern« [2]). Aber wir sollten alsbald erfahren, dass es an beklagenswerthen Hindernissen für die gemeinschaftliche Thätigkeit auch da nicht fehlte, wo ohne eine solche ein wesentlicher

1) S. Corresp. Bl. No. 26. 1857. S. 367.
2) S. Circular an die Vereins-Mitglieder vom 12. Novbr. 1867.

Fortschritt geradezu unmöglich ist. Im Princip war man einverstanden, aber in der Praxis, in der Arbeit selbst, deren Gemeinschaftlichkeit man doch so sehr als erforderlich erkannt hatte, gingen die Bestrebungen auseinander.

Der Mettenheimer'sche Antrag gelangte auf der Vereinsversammlung in Frankfurt a. M. (10. Novbr. 1867) nicht zur Annahme. Aber schon nach Jahresfrist traten unerwartet und theilweise geleitet von Vereinsmitgliedern selbst, drei durchaus Gleiches oder wenigstens sehr Aehnliches bezweckende Unternehmungen hervor, und mit Bedauern mussten wir erkennen, dass diejenige Einmüthigkeit in den in Frage stehenden Bestrebungen fehlte, welche man um der Sache selbst willen so dringend wünschen musste.

Auf der Versammlung der Vereinsmitglieder zu Frankfurt a. M. wurde ausdrücklich »die Verschmelzung des Vereins-Archivs mit dem zu Darmstadt erscheinenden Correspondenzblatt für die mittelrheinischen Aerzte, welches sich als »Organ für Epidemiologie und öffentliche Gesundheitspflege« bezeichnete, in Anregung, und diese Intention durch Circular vom 12. Nov. 1867 zur Kenntniss aller Vereinsmitglieder gebracht. Ein durchaus Gleiches bezweckender Antrag, dahin gehend, dass die medicinisch-statistischen, topographischen und klimatologischen Bestrebungen des mittelrheinischen ärztlichen Vereins mit denen des Vereins für gemeinschaftliche Arbeiten verschmolzen werden, war bereits im Jahre 1860 (13. Oct.) auf der Versammlung des ersteren discutirt und zur Annahme gelangt (Vgl. Circular des Herrn Dr. F. Kellner an die sämmtlichen Aerzte des Grossherzogthums Hessen-Darmstadt, des Herzogthums Nassau und der Landgrafschaft Homburg d. d. 4. Decbr. 1860). Aber ohne dass dem Verein für gemeinschaftliche Arbeiten auch nur eine Notiz darüber zugegangen wäre, wurde im September 1868 auf der Naturforscherversammlung zu Dresden ein Prospectus zu einer »Zeitschrift für Epidemiologie und öffentliche Gesundheitspflege, Organ des allgemeinen ärztlichen Vereins für Thüringen, so wie der ärztlichen Vereine des Mittelrheins, von Dr. H. Pfeiffer, Hospitalarzt in Darmstadt (Vereinsmitglied) und Dr. Schuchhardt, Reg. und Med. Rath in Gotha«, ausgegeben, und die nun monatlich während des ersten Jahrganges erschienenen einzelnen Bogen

beweisen, dass diese Zeitschrift nichts Anderes giebt, als früher in den medicinisch-statistischen, epidemiologischen u. a. Nachrichten des Vereins gegeben wurde.

Nicht minder unerwartet, wenn auch mit theilweise weiter gesteckten Zielen, trat das zweite Unternehmen, die Vierteljahrsschrift für öffentliche Gesundheitspflege, herausgegeben von Goettisheim, Hobrecht, Reclam, Varrentrapp (Vorstandsmitglied des Vereins für gemeinschaftliche Arbeiten) und Wasserfuhr, an's Licht. Mit dem grössten Interesse folgten wir den Bestrebungen, welche sich für die öffentliche Gesundheitspflege auf den Naturforscherversammlungen in Frankfurt und Dresden kund gaben. Die Hoffnung, jetzt die Zeit der gemeinschaftlichen Thätigkeit kommen zu sehen und eine neue Stütze für dieselbe gewonnen zu haben, belebte sich. Der Verfasser dieser Zeilen versäumte es als Secretair des Vereins nicht, sich mit dem Vorkämpfer der öffentlichen Gesundheitspflege, Dr. Varrentrapp in Frankfurt, um so mehr in Verbindung zu setzen, als derselbe selbst Vorstandsmitglied des Vereins für gemeinschaftliche Arbeiten war. Eine Vereinigung der gesammten Bestrebungen auf dem in Frage stehenden Gebiete erschien so wünschenswerth, dass wir jedes Opfer dafür zu bringen bereit waren, und Dr. Varrentrapp schrieb mir selbst unter dem 21. März 1868 entsprechend meinem Vorschlage: »Ich halte kein Feld der Medicin für würdiger und bedürftiger in einer besondern Zeitschrift bearbeitet zu werden, als die öffentliche Gesundheitspflege, zu deren Grundlagen Aetiologie, Epidemiologie, medicinische Statistik u. s. w. gehören. Zu wahrer Förderung auf diesen Gebieten ist nothwendig, dass nicht nur Viele, wie auf andern Gebieten, nach demselben Ziele hin, aber Jeder für sich, arbeiten, sondern man muss gemeinsam, in gemeinsamen Rahmen arbeiten«. Auf der Naturforscherversammlung zu Dresden selbst war es dann wieder der Verfasser dieser Zeilen, welcher den Antrag stellte, dass man sich zur Begründung einer Zeitschrift für öffentliche Gesundheitspflege, medicinische Statistik u. s. w. einigen möge. Aber die von der hygieinischen Section in Dresden erwählte Fünfer-Commission, bestehend aus Goettisheim, Hobrecht, Reclam, Varrentrapp und Wasserfuhr, beauftragt meinen im Interesse der Gemeinschaftlichkeit der Arbeit gestellten Antrag zu prüfen, »glaubte«, wie mir Dr. Varrentrapp am

19. Mai 1869 schreibt, »selbständig vorgehen zu sollen«, und ohne dass dem Verein für gemeinschaftliche Arbeiten auch nur ein Zeichen des Wunsches einer Vereinigung der Kräfte gegeben wurde, trat die »Vierteljahrsschrift für öffentliche Gesundheitspflege« in's Leben.

Kein Gedanke war hiernach natürlicher, als dass die Bestrebungen des Vereins für gemeinschaftliche Arbeiten nur das Missfallen der Fünfer-Commission erregt haben mussten, und dass derselben um die Beihülfe von 200 Aerzten, die seit Jahren zu gleichem Zwecke verbunden waren, nicht zu thun war[1]). Insonderheit, so mussten wir glauben, war es der Vorstand des Vereins, mit welchem man lieber brechen, als sich verständigen wollte, denn an unserer Bereitwilligkeit, einen gemeinsamen Arbeitsplan festzustellen, konnte man nicht zweifeln. Aber schon wenige Wochen später erhielt ich ein Schreiben von Dr. Varrentrapp mit der »Bitte, dass ich der Commission meine Mitwirkung nicht versagen möge u. s. w. u. s. w.«, und ich musste daraus erkennen, dass die Bestrebungen, welche der Verein für gemeinschaftliche Arbeiten verfolgt hatte, denjenigen der »Vierteljahrsschrift für öffentliche Gesundheitspflege« wenigstens nicht gleichgültig erschienen. Und dass der Vorstand des Vereins für gemeinschaftliche Arbeiten von jeher nichts weniger, als persönliche Interessen verfolgte, das konnte und musste der Commission bekannt sein und findet sich ausdrücklich ausgesprochen im achten Jahresbericht des Vereins (Corresp. Bl. No. 46. S. 728), welcher alle hier in Frage stehenden Punkte ausführlich behandelte und den vollen Beifall der damals versammelten Mitglieder erfuhr.

So bleibt uns denn nichts übrig, als den Mangel an Einmüthigkeit zu beklagen, wo man von allen Seiten die Gemeinschaftlichkeit der Arbeit als eine Forderung der Zeit bezeichnet und anerkennt, wo ohne eine solche nimmermehr eine Lösung der Aufgaben zu erreichen ist; und dass in diesem Mangel ein wesentliches Hinderniss für die kräftige Entwicklung unseres Vereins lag, ist so selbstverständlich, dass es keiner besonderen Betonung bedarf.

Das dritte der oben erwähnten Unternehmen erschien in der

1) Das Archiv des Vereins wurde im Jahr 1868 nach der Mittheilung des Verlegers in nahezu 300 Exemplaren abgesetzt.

Form der »wöchentlichen Uebersichten über die Geburten und Todesfälle in den grösseren Städten Deutschlands von Zuelzer«, welche, wie wir aus den Berichten über die Naturforscherversammlung in Innsbruck entnehmen, den Anfang gebildet haben zur Gründung eines »Vereins für die medicinische Statistik Deutschlands«. Ueber die Einrichtung, die Mitglieder, den Vorstand u. s. w. dieses Vereins ist dem Verf. dieser Zeilen bis dahin nichts Näheres bekannt geworden; nur so viel geht aus dem Berichte über die betreffenden Sectionssitzungen in Innsbruck (s. Zeitschr. für Epidemiologie und öffentliche Gesundheitspflege von Pfeiffer und Schuchhardt No. 12. 1869) hervor, dass dieser Verein ganz und gar gleiche Zwecke verfolgt, wie sie eben wieder der Verein für gemeinschaftliche Arbeiten im Auge hatte, und dass, wie es scheint, für die Anbahnung der gemeinschaftlichen Thätigkeit derselbe Weg eingeschlagen werden soll, wie er in letzterem versucht wurde.

In unserm lediglich der Förderung der Sache selbst zugewandten Interesse wünschen wir den jungen Bestrebungen und Unternehmungen den besten Erfolg. Aber was haben wir mit ihnen nun gegenwärtig auf dem Gebiete der öffentlichen Gesundheitspflege, der medicinischen Statistik und Epidemiologie gewonnen? Die Zeitschrift für öffentliche Gesundheitspflege fasst unsre bisherigen Aufgaben nach einer bestimmten Richtung hin zusammen. Aber neben ihr liegt das ihrem Bestreben unentbehrliche Material noch weit zerstreut umher und an einem geordneten Arbeitsplane und der so nothwendigen Verständigung in Betreff dieses letzteren fehlt es. Neben jener Vierteljahrsschrift erscheinen gegenwärtig: die »Zeitschrift für Biologie von Buhl, Pettenkofer, Radlkofer und Voit«, die »Zeitschrift für Epidemiologie und öffentliche Gesundheitspflege« von Pfeiffer und Schuchhardt, die »wöchentlichen Uebersichten der Geburten und Todesfälle aus den grösseren Städten Deutschland's von Zuelzer« (Berlin bei Enslin); das Münchener »Intelligenzblatt für bayerische Aerzte«, welches viele wichtige Beiträge zur Hygieine und medicinischen Statistik liefert. Rechnen wir hinzu, dass wir in Virchow's Archiv, in der »Deutschen Klinik«, in den »Berliner und Wiener klinischen Wochenschriften« der Behandlung hygieinischer Fragen oder statistischen Morbilitäts- und Mortalitätsnachrichten begegnen, so kommen wir zu dem Schluss,

dass es für die in Frage stehenden Bestrebungen noch an dem einigenden Mittelpunkte fehlt, während doch gerade hier allgemein zugestandener Maassen »das gemeinsame Arbeiten in gemeinsamen Rahmen« mehr als irgendwo Bedürfniss ist.

Zu weite Fassung der Aufgaben des »Vereins für gemeinschaftliche Arbeiten« haben wir als ersten Fehler, Mangel an Einmüthigkeit und Sonderbestrebungen einzelner Mitglieder derselben, so wie dadurch herbeigeführte Zersplitterung der Kräfte als erstes Hinderniss für die befriedigende Fortentwicklung des Vereins bezeichnet. Aber ein zweites noch wesentlicheres Hinderniss bot sich uns dar in der geringen activen Theilnahme und der mangelhaften Ausdauer der Vereinsmitglieder bezüglich der Arbeiten selbst, und wir müssen es anerkennen, dass damit wohl ein wesentliches Motiv für jene Sonderbestrebungen geboten wurde. Nur wenige Mitglieder sind dem Verein von vorn herein als Mitarbeiter treu geblieben. Die Mehrzahl derjenigen, welche sich anfänglich oder auch später in anerkennenswerthester Weise an den Arbeiten selbst betheiligten, sprang alsbald wieder ab, bündige Zusagen wurden nicht erfüllt, und es wurde dadurch auf dem Felde der statistischen Erhebungen selbst der Werth der über einen nur kurzen Zeitraum fortgesetzten Thätigkeit vernichtet. Aber es lag und liegt hier nicht ein Werk von Monaten und Jahren vor; erst Jahrzehnde werden uns in den Stand setzen, Resultate zu ziehen und mit den Thatsachen zu rechnen. Ohne einige Resignation jedes Einzelnen ist die Arbeit nicht zu vollenden, und an diesem Punkte wird auch in der Zukunft vielleicht noch manche Hoffnung scheitern. Nicht die präjudicielle Kritik, nur die Arbeit selbst kann uns nützen. Um dem Ziele näher zu kommen, kann das Maass der Forderung an den Einzelnen gar nicht niedrig genug gegriffen werden. Man muss den Maassstab an die Leistungsfähigkeit der möglichst beschäftigtesten Aerzte anlegen. Wir glauben mit der Einrichtung und Herausgabe unserer Tabellenbüchlein zu medicinisch-statistischen Aufzeichnungen in dieser Beziehung jede Unmöglichkeit praktischer Durchführbarkeit abgeschnitten zu haben. Aber trotzdem war die Betheiligung an den statistischen, und selbst nur an den epidemiologischen Arbeiten äusserst gering, von Jahr zu Jahr schwankend, und die erfreulichen Anfänge blieben ohne Fortentwickelung, ohne weiteren Aufschwung.

Soll aber die Kraft und Macht der Association auf dem Gebiete unserer Wissenschaft zur Entfaltung kommen, so muss sie auch eine Association werkthätiger, ausdauernder Männer sein. Mit Versammlungsbeschlüssen, zu denen man gar leicht gelangt, ist wenig erreicht; die Arbeit selbst und allein ist, was wir bedürfen. Und in der That, das Opfer einer einzigen Stunde in jedem Monat, genügend um einen unersetzlichen Bruchtheil des Ganzen zu liefern, ist nicht zu gross auch für den beschäftigtesten Arzt; ja unsere Tabellen sind der Art eingerichtet, dass sie, im Notizbuch des Arztes liegend, nothdürftig in via ausgefüllt werden können.

Die Unregelmässigkeit und Lückenhaftigkeit der statistisch-medicinischen Aufzeichnungen war es denn auch, welche uns von der Publication der ihrem Umfange nach nicht unerheblichen Eingänge der Jahre 1860 und 1861 Abstand nehmen liess. Dieselben liegen, wie oben erwähnt, nahezu druckfertig verarbeitet noch bei dem Vereins-Secretariate. Aber ihr wissenschaftlicher Werth entspricht nicht den sehr beträchtlichen Kosten, welche ihre Drucklegung erforderte.

An Kräften zur Verarbeitung des eingegangenen Materiales hat es während des Bestandes des Vereins nicht gefehlt. Mit einer nicht dankbar genug anzuerkennenden Hingabe und Sorgfalt übernahm unser verstorbener College, Med. R. Stadler in Marburg, während der Jahre 1859—1861 die letzteren umfänglicheren medicinisch-statistischen Zusammenstellungen. Aber wir wollen schon hier darauf aufmerksam machen, dass ein nur noch wenig grösseres Material von Privatkräften und von Aerzten, welche einen praktischen Beruf erfüllen, nicht mehr zu bewältigen ist, und dass in dieser Beziehung schliesslich nur durch die geordneteste Theilung der Arbeit auf der einen, und durch die Bestellung von Beamten ad hoc auf der andern Seite den Aufgaben entsprochen werden kann.

Neben der Bitte an die praktischen Aerzte und Mitglieder des Vereins um medicinisch-statistische Aufzeichnungen stand von Anfang an auch diejenige um pathologische Beobachtungen und insonderheit um die Mittheilung therapeutischer Erfahrungen. Es ist dieser Bitte nur in sehr geringem Maasse entsprochen, und sehen wir uns in unserer gesammten medicinischen Literatur, namentlich der Journalistik, um, so treten ja überhaupt die Mittheilungen praktischer

Aerzte in auffallendem Grade zurück gegen diejenigen der Universitätslehrer und der Hospital-Aerzte.

Es ist selbstverständlich, dass die Beobachtungen des praktischen Arztes in der grossen Mehrzahl der Fälle nicht denjenigen Anforderungen entsprechen können, welche der wissenschaftliche Arzt selbst an dieselben stellt. Aber der denkende Praktiker sammelt in einer Reihe von Jahren dennoch eine Summe von therapeutischen Erfahrungen und pathologischen Beobachtungen, welche, kurz und abgerissen wie sie vielleicht sein müssen, dennoch der Wissenschaft von dem erheblichsten Nutzen sind, und die Scheu und Zaghaftigkeit so vieler Aerzte, mit ihren Erfahrungen und Beobachtungen hervorzutreten, sollte weniger gross sein, als sie allem Anscheine nach ist. Auch in ihr haben die Bestrebungen unseres Vereins ein Hinderniss für ihre Fruchtbarkeit gefunden.

Wodurch ist denn die praktische Heilkunde zum grossen Theil zu dem geworden, was sie heutigen Tages ist? Wer spricht das letzte Urtheil über die Erfahrungen und Mittheilungen der Universitäts-Kliniker oder einzelner hervorragender Praktiker? Es ist, wie mir scheint, eine grosse Verkehrtheit, ständig auf die Exactheit der klinischen Beobachtungen pochen und die »Exactheit« als Fürchtemann für die praktischen Aerzte ins Feld stellen zu wollen. Die praktische Medicin wird auf den Universitäten einmal nicht fertig gemacht, und was man auf diesen Exactheit nennt, ist oftmals ein nicht minder lückenhaftes Forschen und Wissen, wie es fast alle Theile der pathologisch-therapeutischen Forschung noch characterisirt. Wer könnte verkennen, was die strenge Wissenschaft fordert, wer den Werth unterschätzen, welchen zahlreiche Forschungen älterer, neuerer und neuester Zeit besitzen, denen man mit Recht das Lob der Exactheit ertheilt?! Aber wie die Sachen bei der praktischen Heilkunde, auf deren Pflege wir doch nicht verzichten können, bis etwa Physiologie und Anatomie mit ihren Aufgaben fertig sind, einmal liegen, glaube ich nicht zu viel zu behaupten, wenn ich sage, dass mindestens die Hälfte der besten praktischen Erfahrungen der gewöhnlichen ärztlichen Praxis entstammt. Und wie manche solcher Erfahrungen gealterter Männer wird mit diesen unbenutzt und fruchtlos begraben? Und dahin war ein Hauptbestreben unseres Vereins gerichtet: die Schätze der

rein praktischen Erfahrungen zu heben, die praktischen Aerzte zu Mittheilungen zu ermuthigen und zu vereinigen, fern von der so oft auf Universitäten gehörten Klage, dass die Beobachtungen der praktischen Aerzte nicht zu gebrauchen seien. Werde man sich nur klar darüber, was von dem praktischen Arzte verlangt werden kann, stelle man ihm richtige Fragen, und unter Tausenden werden mehr als Hunderte sein, welche vielleicht selbst nützlichere Erfahrungen sammeln, als manche Klinik sie bietet. Das praktische Leben selbst mit seinen Freuden und Leiden, Hoffnungen und Täuschungen, Sitten und Unsitten, Wohlleben und Elend ist der Boden, auf welchem sich die praktische Heilkunde und deren Diener bewegt; nur auf ihm erwächst die praktische Erfahrung und Erkenntniss, welche, dem wissenschaftlichen Fundamente der Universitätsbildung geeint, den tüchtigen Arzt ausmacht.

Aber die Hindernisse, welche der Entwicklung gemeinschaftlicher Thätigkeit auf dem Gebiete der Medicin entgegenstanden, sind hiermit noch nicht erschöpft. Sie lagen und liegen zum Theil noch in gewissen Richtungen und Strömungen unserer Zeit, und ich komme damit auf Bestrebungen unseres Vereins zurück, welche oben bereits angedeutet wurden.

Wir haben der Macht gedacht, mit welcher es uns heutigen Tages zur geordneten Theilung der Arbeit sowohl, als auch zur Association auf dem Gebiete der Medicin hintreibt. Wir erwähnten der Nothwendigkeit der Beschränkung des Arbeitsgebietes Einzelner oder ganzer Genossenschaften. Aber, mit so gebieterischer Gewalt sich diese Nothwendigkeit uns auch aufdrängt, verkennen wir nicht, dass sich der Specialismus zum Theil auf Kosten der allgemeinen Ausbildung entwickelt, und dass es ein unersetzlicher Schaden sein würde, wenn wir an dieser verlören, was wir durch jenen gewinnen. Ich glaube mich nicht in der Annahme zu irren, dass durch die specialistische Richtung unserer Zeit die allgemein naturwissenschaftliche Ausbildung der Mediciner beeinträchtigt wird, und dass diese Gefahr um so grösser ist, als die Forderungen an letztere auch von Seiten der studienleitenden Behörden immer mehr herabgesetzt werden. Diese Vernachlässigung der allgemein naturwissenschaftlichen Ausbildung hat einen doppelten und dreifachen Nachtheil: sie beeinträchtigt die Erhebung des Gemüthes, welche die

heutige Kenntniss des Naturganzen unfehlbar herbeiführt; sie hindert die lebendige Auffassung der grossen Lehren, welche für jedes einzelne Gebiet aus der Einsicht in die die ganze Natur beherrschenden Gesetze hervorgehen; sie trennt endlich die Interessen der Einzelforscher, welche doch, von einem höheren Standpunkte aus betrachtet, überall zusammentreffen und in einander greifen, und gegenseitig den förderlichsten Einfluss auf einander ausüben, ganz abgesehen von dem Gefühle der Zusammengehörigkeit der Arbeiter selbst, welche ein richtiges Verständniss dieser Interessen in ihrem Gefolge haben muss und hat. Der Verein für gemeinschaftliche Arbeiten hatte es zu einer seiner wesentlichen Aufgaben gemacht, auf die Förderung der allgemein naturwissenschaftlichen Ausbildung der Mediciner hinzuwirken. Besonders wurde die Bedeutung derselben von dem Verf. dieser Zeilen in einem den VII. Band des Archivs einleitenden Aufsatz »Zur Orientirung der Leser« pag. 1! hervorgehoben, und eine weitere Begründung seiner Anschauungen versuchte derselbe in einem öffentlich gehaltenen Vortrage: »Die praktische Medicin unserer Tage. Marburg 1863«. Aber der Geist unserer Zeit war und ist, wie es scheint, dieser Auffassung so wenig günstig, dass den bezüglichen Vereinsbestrebungen kaum irgend eine Unterstützung zu Theil geworden ist, und so wenig Aussicht auch dafür vorhanden ist, dass es damit in der nächsten Zeit besser wird, man kann nur hoffen, dass in nicht zu fernen Jahren eine Umkehr stattfindet und die allgemein naturwissenschaftliche Ausbildung des Mediciners wieder in ihr volles Recht eingesetzt wird. Oder fordern die so anerkennenswerthen gegenwärtigen Bestrebungen auf dem Gebiete der öffentlichen Gesundheitspflege dies etwa nicht? Sind nicht für die Erledigung der hier zu Tage tretenden diätetischen, geographischen, culturhistorischen u. a. Fragen ganz vorzugsweise allgemein naturwissenschaftliche Kenntnisse erforderlich? Die Ernährungslehre des Menschen ist nur zu begründen auf einer Kenntniss der Pflanzenernährung und der Ernährungslehre der Thiere; eine medicinische Geographie und die hochbedeutsame Lehre vom Einfluss der Qualität und der Elevation des Bodens können sich nicht entwickeln ohne Kenntniss der Gestalt der Erdoberfläche selbst, ihrer ständigen Metamorphosen, ihrer Cultur, so wie des Einflusses,

welchen diese Metamorphosen auf locale meteorologische Vorgänge und die Beschaffenheit des Bodens selbst ausüben; eine richtige Würdigung des Einflusses endlich der Culturzustände der Völker auf die Erzeugung von Krankheiten ist nicht möglich ohne Kenntniss dieser Culturzustände selbst, und ohne eine verständnissvolle Abwägung des Einflusses der körperlichen, wie geistigen Thätigkeit auf den Ablauf der Lebensvorgänge. Man dringt von vielen Seiten — und zum Theil mit vollem Recht — auf die Errichtung von Lehrstühlen für specielle Zweige unserer Wissenschaft an unsern Universitäten; aber gleich vollwichtig und noch grösser erscheint die Aufgabe, für die Lehre der allgemeinen Physiologie, eingeschlossen insonderheit die Lehre vom Einfluss der vielverschiedenen Berufsarten und Thätigkeiten des Menschen auf seinen Gesundheitszustand, d. h. eine allgemeine Gesundheitslehre, an Universitäten Sorge zu tragen. Vergessen wir dabei nicht, welch ausnehmend hervorragenden Einfluss die geistigen Bewegungen des Menschen auf den Ablauf des Lebensprocesses ausüben, wie jede Störung, Trägheit oder Ueberreizung sofort Störungen der körperlichen Functionen zur Folge hat, und wie also diese Störungen unter den aetiologischen Krankheitsmomenten eine ungemein wichtige Rolle spielen. Je höher wir in den Classen der menschlichen Gesellschaft hinaufsteigen, um so häufiger treten uns diese Momente entgegen und wer sie nicht zu erfassen weiss, wird stets ein schlechter Therapeut bleiben. Das sind Dinge, die sich der physikalischen Untersuchung entziehen, die vielmehr ein psychologisches Verständniss voraussetzen. Nur eine allgemeine philosophische Vor- und Durchbildung, eine gesunde Anthropologie im weiteren Sinne des Wortes, vermag dieses Verständniss herbeizuführen, und über alle Mechanik der Lebensvorgänge sollte die Abhängigkeit nie vergessen werden, in welchem der Mechanismus von höheren, seelischen Kräften steht.

Diesem Bedürfniss allgemein naturwissenschaftlicher und philosophischer Vorbildung wird sich der tüchtige Arzt nicht entziehen können, und wir können es nur beklagen, wenn der Ausspruch desselben in unsern Vereinsbestrebungen so wenig fruchtbar gewesen ist. Aber noch ein zweites Bedauern steht diesem ersten zur Seite; denn ob ich auch oben hervorhob, dass die von uns ausgesprochenen Anschauungen gegenwärtig zur Anerkennung und zum Durchbruch

kommen, es bleibt dennoch auch für die Gegenwart wahr, dass in dem Drange und den Anforderungen des heutigen praktischen Lebens die Ideale des Lebens untergehen, welche das Gemüth erheben, die Menschen zusammenbinden und zu gemeinsamer Arbeit kräftigen, und mit diesem Egoismus unserer Zeit ersteht der gemeinschaftlichen Thätigkeit ein mächtiger Gegner.

Nur jene Zeiten und Verhältnisse schaffen glückliche Menschen und grosse Leistungen, in denen die tägliche, ernste, nüchterne Arbeit, die nach nichts, als nach der Ermittlung der Thatsachen fragt, getragen und gehoben wird nicht nur durch die Liebe zur Kunst und zur Wissenschaft überhaupt, durch das Streben an der grossen Aufgabe des Menschengeschlechtes mitzuarbeiten, sondern auch durch die Liebe zu den Mitmenschen und durch die Freude an der Gemeinschaft im Streben. In solcher Gemeinschaft hört der Egoismus auf, und so tief eingepflanzt er der Brust des Menschen ist, seine nachtheiligen Wirkungen auf den allgemeinen Fortschritt werden in der gemeinschaftlichen Arbeit untergehen. In dieser Richtung zu wirken, war auch ein Streben des Vereins, welches oft genug zwischen den Zeilen, und eben so oft in klaren Worten in seinen Jahresberichten ausgesprochen wurde. An Freunden dieses Strebens hat es nie gefehlt, und es wird nie an solchen fehlen; ja ich glaube, dass die Sehnsucht nach einem Besserwerden unserer socialen Beziehungen weit lebendiger ist, als es auf den ersten Blick scheint; wäre dies nicht der Fall, so würde die Betonung der letzteren in neuester Zeit — von Seiten der Freunde der Medicinalreform — nicht eine so prägnante gewesen sein, wie sie es in Warheit war und ist. Aber die nackte Wahrheit des Lebens lässt uns noch gar wenig von der Macht idealer Momente und von idealem Streben selbst erkennen, und was in dieser Beziehung nicht von innen heraus zur Reife gelangt, es wird sich durch Worte und Wünsche nicht hervorbringen lassen.

III.

Die Hindernisse, welche der glücklichen Entwicklung des »Vereins für gemeinschaftliche Arbeiten« entgegenstanden und welche wir so eben bezeichnet haben, bestehen zum Theil noch fort und fort. Wenn es aber wahr ist, dass die Association auf dem Gebiete der medicinischen Wissenschaft gegenwärtig mehr und mehr als eine Nothwendigkeit anerkannt wird, — und diese Wahrheit spricht aus hundert Blättern —, so muss man sich klar darüber werden, wie jene Hindernisse zu beseitigen und in welcher Weise das Ziel am sichersten zu erreichen ist.

Unser Blick hat sich nach zwei Seiten zu richten. Auf der einen Seite handelt es sich um associirte Bestrebungen auf dem Gebiete der rein wissenschaftlichen Fragen und Untersuchungen, auf der andern um solche auf dem Gebiete der ärztlichen Praxis.

Was die ersteren anbetrifft, so sind die Erscheinungen der Gegenwart kaum misszuverstehen. Die zahlreichen Vereinigungen einer grösseren Anzahl specieller Fachmänner zur Herausgabe von Zeitschriften, als Sammelplätzen der den Fortschritt wesentlich bedingenden und bezeichnenden Arbeiten, sprechen deutlich dafür, dass auch in den academischen und vorwiegend wissenschaftlichen Kreisen das Streben nach einer Association sehr rege ist, denn anders ist es nicht zu erklären, dass in so kurzer Zeit sowohl die Ophthalmologen, als die Chirurgen, internen Kliniker, Physiologen und Anatomen zu gemeinschaftlichen Unternehmungen zusammengetreten sind, und auch unter den Geburtshelfern und Gynaekologen wird, wie ich erfahre, gegenwärtig ein ähnliches Unternehmen in Angriff genommen.

Unterzieht man diese Bestrebungen und deren Leistungen aber einer näheren Prüfung, so stehen wir in der That bereits nicht fern von dem erreichbaren Ziele, und dürfen sagen, dass Deutschland in dieser Beziehung seinen Nachbarländern, insonderheit Frankreich und England, weit voraufgeeilt ist. Während hier das wissen-

schaftliche Material, so werthvoll es zum Theil ist, noch ungeordnet und weit zerstreut angehäuft wird — man denke nur an die Medical Times and Gazette, die Medico-chirurgical transactions, die Edinburgh medical review, die Dublin quarterly review —, die Gazette médicale, die Archives générales, die Gaz. des hôpitaux, die Mémoires de Médicine, de Chirurgie et de pharmacie militaire u. s. w. u. s. w. — laufen bei uns die Bestrebungen grösstentheils schon in ein und derselben Richtung zusammen; die neu ermittelten Thatsachen werden je nach ihrer Zusammengehörigkeit aneinandergereiht; die Arbeitsmethode ist mehr oder weniger festgestellt. Neben den Fragen der Pathologie, der tiefeingreifenden Erforschung des Wesens der Krankheit und ihrer Erscheinungen, beginnen dabei die Aufgaben der Therapie einen hervorragenden Platz einzunehmen, und Arbeiten, wie sie, um nur einzelne zu nennen, Jürgenssen, Liebermeister und Hagenbach über die Kaltwasserbehandlung, Ziemssen und Bartels über die diaphoretische Behandlungsmethode gebracht haben, liefern den Beweis, dass über die Krankheit das Heilen nicht länger vergessen wird. Die Umsichtigkeit der pathologischen Forschung selbst ist dabei eine mehr und mehr befriedigende, und wir sehen neben den anatomischen, uns seit Jahrzehenden beschäftigenden Fragen, insonderheit auch die pathologisch-chemischen, welche wir bei Begründung des Vereins für gemeinschaftliche Arbeiten so sehr zu betonen uns bemühten, in eingehender Weise berücksichtigt. Mit treffenden Worten sagt Virchow in seinem Werke »Ueber die krankhaften Geschwülste. 1863«. Bd. I. pag. 127 mit Bezug auf diese Arbeiten: »Hier ist das Feld für den Forschergeist eröffnet und es ist zu hoffen, dass spätere Untersucher es mit Erfolg unternehmen werden, nach dieser Richtung hin ihre Schritte zu lenken«. Was wir längst in Bezug auf die Lehre vom Stoffwechsel im gesunden und kranken Organismus gehofft, ist bereits zum Theil erfüllt, so Vieles auch noch zu thun übrig bleibt; und was Virchow in Bezug auf »die Natur der kranken Säfte« herbeiwünscht, wird auf den betretenen Wegen seiner Erfüllung entgegengehen.

Die Arbeitstheilung und die Aufgaben, um deren Lösung es sich auf dem vorzugsweise wissenschaftlichen Gebiete handelt, scheinen hiernach für die nächstbevorstehende Zeit geordnet und vorgezeichnet. Eine noch weitere Verschmelzung derjenigen

Bestrebungen und Arbeiten, welche unmittelbar zusammengehören und doch noch getrennt neben einander laufen, bleibt jedoch noch zu wünschen, und dem schon früher von Virchow geäusserten Verlangen nach einer Reduction der noch immer grossen Anzahl medicinischer Zeitschriften in Deutschland, können wir eine lebhafte Beistimmung nicht versagen. Denjenigen Zeitschriften und Archiven, welche eine bestimmte Aufgabe verfolgen und ihr Gebiet möglichst scharf abgränzen, wird die Zukunft gehören, und, worauf wir vor Allem ein Gewicht legen möchten, wenn ihnen ihre gegenwärtigen Leiter oder Herausgeber entzogen werden, so wird ihnen ihre Aufgabe selbst die so nothwendige Continuation sichern; denn nicht mehr durch den Geist, die Arbeitskraft und die persönlichen Beziehungen einzelner Männer werden sie gehalten und getragen, sondern durch die Association einer grossen Anzahl specieller Fachmänner und durch die Sache selbst, welcher sie dienen.

Sollten wir uns auf diesem Wege dann nicht endlich auch der Lösung von Fragen nähern, welche nur und allein durch die gemeinsame Beobachtung und Arbeit zum Austrag gebracht werden können? Sollten wir nicht dahin gelangen können, dass bestimmte Fragen, zu deren Lösung eine grosse Anzahl von Beobachtungen, wie sie dem Einzelnen nicht zur Disposition stehen, erforderlich sind, gestellt und gemeinschaftlich in Angriff genommen werden? Ich erinnere an die oben erwähnte Förster'sche Aufgabe in Betreff der Geschichte der Geschwülste; an nothwendige Maass- und Gewichtsbestimmungen bei kranken Individuen sowohl als bei Leichenuntersuchungen; an bestimmte therapeutische oder pharmakodynamische Fragen u. s. w. — Die Gemeinschaftlichkeit der Arbeit und der Arbeitsmethode ist hier eine unabweisbare Nothwendigkeit und sie wird dem Fortschritt im höchsten Grade förderlich sein. An der Lösung derartiger Fragen können sich zugleich die praktischen Aerzte in fruchtbarer Weise betheiligen; und erst dann wird sich der Segen der Association auf wissenschaftlichem Gebiete klar herausstellen, wenn massenhafte und wohlbegründete Erfahrungen und Beobachtungen zusammengestellt und einer statistischen Verwerthung zugeführt werden können.

Anders liegen die Sachen auf dem Gebiete der Praxis. Die Unabweislichkeit gemeinschaftlicher Thätigkeit wird auch hier von

Jedermann anerkannt; von allen Seiten her ergehen Rufe für eine solche. Aber wir arbeiten noch ohne gemeinsamen Plan, und die Resultate aller Berathungen und Vereinbarungen, welche bisher getroffen wurden, sind nur noch in hohem Grade unbefriedigend und lückenhaft.

Die nächste und grösste Schwierigkeit liegt hier in der mangelnden Opferwilligkeit und der gemeinsamen Verständigung der einzelnen Arbeiter, der einzelnen praktischen Aerzte. Wir lassen der Einrede, dass es dem beschäftigten praktischen Arzte zu genauen Aufzeichnungen seiner Beobachtungen an Zeit fehle, volle Gerechtigkeit widerfahren. Aber wir sind dennoch überzeugt, dass Jeder den äusserst geringen Anforderungen, welche an ihn gestellt werden, zu genügen die volle Zeit hat, wenn anders er nur geneigt ist, dem wissenschaftlichen Fortschritt ein sehr geringes Opfer zu bringen und sich der Erkenntniss nicht verschliesst, dass nur durch die Association möglichst sämmtlicher Aerzte das Ziel, nach welchem wir streben, zu erreichen ist.

Die Aufgabe, um welche es sich zunächst handelt, ist die, dass der praktische Arzt über die in seinem Wirkungskreise allmonatlich vorkommenden Erkrankungen und Todesfälle eine genaue Rechenschaft giebt, und dass er die ursächlichen Verhältnisse derselben so weit, als irgend thunlich zu ermitteln sucht. Der erste Theil dieser Aufgabe ist mit Hülfe der vom Verein für gemeinschaftliche Arbeiten herausgegebenen »Tabellen zu medicinisch-statistischen Aufzeichnungen«, so leicht zu erfüllen, dass von einem äussern Hinderniss kaum noch die Rede sein kann. Die die topographischen, geographischen, geologischen, meteorologischen, socialen u. a. aetiologische Verhältnisse betreffenden Studien bilden aber so sehr Aufgabe jedes praktischen Arztes, dass sich denselben schon ohnedies ein Jeder, dem das Wohl seiner ihm vertrauenden Umgebung am Herzen liegt, unterzieht. Wird man darnach zu viel verlangen, wenn man die Aerzte ersucht, ihre in Frage stehenden Aufzeichnungen und Beobachtungsresultate mitzutheilen, damit sie zur Feststellung wissenschaftlicher Thatsachen und allgemein oder local verbreiteter gesundheitsschädlicher Verhältnisse verwerthet werden?

Der Verein für gemeinschaftliche Arbeit hat sich, wie oben

bereits erwähnt, in seinen Erwartungen solcher Mittheilungen sehr getäuscht. Aber wir halten dennoch an der Hoffnung auf eine allgemeinere und regere Theilnahme daran für die Zukunft fest. Was gegenwärtig in Kreis- und Vereinsversammlungen vielfach angeregt, besprochen und mit fast allseitiger Zustimmung aufgenommen wird, ist eben nichts andres als die Association auf dem Gebiete der praktischen Medicin. Der Gedanke und die Anerkennung der Nothwendigkeit derselben bricht sich gleichzeitig mit der Erkenntniss der enormen Tragweite aetiologischer Untersuchungen und Erfahrungen Bahn, und der erste Schritt zur Realisirung langgehegter Hoffnungen ist damit gethan. Dem Wunsche der Section der Naturforscherversammlungen für Medicinalreform nach Association der Aerzte in Gau-, Kreis- oder Provincialverbänden wird die allgemeinste Billigung nicht fehlen, und die gegenseitige Belebung, welche dieselbe herbeiführen wird, eröffnet für die Thätigkeit der einzelnen Mitglieder derselben eine günstige Aussicht. Mögen diese, durchdrungen von der Ueberzeugung, dass ein Ganzes nur erstehen kann durch die sorgfältige active Theilnahme jedes Einzelnen, sich der an sie ergehenden Aufforderung nicht entziehen! Und sie werden es nicht, wenn anders ihnen um den Fortschritt unserer Wissenschaft und die Förderung des allgemeinen Volkswohls zu thun ist. Die vereinte Thätigkeit selbst wird dann ein Quell der Freude sein und collegiale Eintracht fördern; — der Freiheit, welche der ärztliche Stand gegenwärtig für seine Bewegungen so laut fordert, wird derselbe für würdig erachtet werden, wenn er durch seine freiwilligen Leistungen zeigt, dass er das Wohl der ihm anvertrauten Güter in treuem Sinne pflegt und zu fördern sucht.

Ohne diese Theilnahme der Einzelnen und möglichst aller Aerzte an medicinisch-statistischen und hygieinischen Arbeiten, ohne das Fernhalten aller Sonderbestrebungen auf diesem Gebiete, ist kein wesentlicher Fortschritt möglich. Sie ist der Anfang allen Anfangs. Aber, angenommen dass die Hoffnungen in dieser Beziehung in Erfüllung gehen, es erhebt sich sofort eine weitere und schwierige Frage: die Frage nach der besten Art und Weise der Sammlung, der Verarbeitung und der Verwerthung der Einzelarbeiten und gleichzeitig damit nach der Leitung der gesammten gemeinschaftlichen Thätigkeit.

Um diese Frage zu beantworten, ist es zunächst erforderlich, sich klar darüber zu werden, welches denn der eigentliche Endzweck der in Frage stehenden Arbeiten ist? Die Antwort ergiebt sich zum Theil bereits aus unsern obigen Mittheilungen. Durch Ermittlung der in einem Orte, Bezirke oder Kreise während einer längeren Reihe von Jahren auftretenden Krankheiten, so wie durch Feststellung der in denselben vorkommenden Todesursachen soll zunächst der Grad der Salubrität eines Ortes, Bezirkes u. s. w., so wie das etwaige Prävaliren oder Zurücktreten dieser oder jener Krankheitsformen festgestellt werden. Das Endziel liegt hier in einer durchgeführten Lehre von der Verbreitung der Krankheitsformen über die Erdoberfläche und speciell in unserm engeren Vaterlande. Die zu ermittelnden Altersstufen der Verstorbenen werden dabei Kunde geben von der Lebensdauer der Bewohner verschiedener Orte, Kreise, Bezirke u. s. w., die Altersstufen der Erkrankten von dem Prävaliren dieser oder jener Krankheitsformen in diesem oder jenem Lebensabschnitt. Nach Gewinn dieses thatsächlichen Bodens stellt sich als zweite Hauptaufgabe die Ermittlung der ursächlichen Momente für die hier oder dort vorwiegend auftretenden Krankheitsformen, so wie für die kürzere oder längere Dauer des Lebens. Die Aufmerksamkeit wendet sich dem Boden zu, auf welchem der Mensch lebt; seine Qualität, seine Elevation, seine Configuration, seine Producte kommen in Frage; die Qualität des Trinkwassers, der gebräuchlichsten Nahrungsmittel, der städtischen Einrichtungen, der Wohnungen, der Bekleidung u. s. w. werden Gegenstand der Untersuchung; die Beschäftigungen, die Sitten, der gesammte Culturzustand der Bevölkerung, Wohlstand und Armuth derselben endlich schliessen sich als gleiche Gegenstände der Prüfung an, und auf statistischem Wege wird es darnach nicht schwer fallen, die Ursachen ausfindig zu machen, welche Arbeitskraft und Lebensdauer hier vermindern, dort erhöhen. Auf diesen Ermittlungen baut endlich die öffentliche und private Gesundheitspflege ihre Lehren auf, um das Endziel unserer Bestrebungen, die Hebung der Leistungsfähigkeit und Wohlfahrt des Volkes, zu erreichen. Medicinische Statistik, medicinische Geographie, Aetiologie der Krankheiten und Gesundheitspflege stehen in untrennbarem Zusammenhange, und der Segen, welcher der

Lösung der bezeichneten Aufgaben entspriessen wird, ist handgreiflich. Was Bérgéron in seinem Rapport de la commission des épidemies en 1865 (Bulletins de l'Académie de médécine) sagte, hat für uns und andre Länder dieselbe Bedeutung, wie für Frankreich: »Le jour où l'Académie présenterait au Gouvernement une géographie médicale complète de l'Empire et lui montrerai ainsi sous l'aspect le plus saisissant (au moyen de cartes) les points du territoire où la force de la race menace de s'amoindrir, les causes certaines ou probables de cet amoindrissement, et les moyens les plus rationnels d'en arrêter le progres, ce jour-là l'Académie pourrait se féliciter d'avoir accompli une oeuvre d'utilité publique, une des plus grandes, assurément, qu'il lui fût donné d'entreprendre«.

Es ist klar, dass diese mächtigen Aufgaben nur durch eine Cooperation in grösstem Maassstabe ihrer Lösung entgegengeführt werden können. Eine geordnete Theilung der Arbeit und eine bestimmte, mit der obersten Leitung derselben betraute Centralbehörde, ein Zusammenwirken mit andern staatlichen Behörden, insonderheit den statistischen Bureaux, ist hier eine unabweisbare Nothwendigkeit, und wenn der Verein für gemeinschaftliche Arbeiten es als ein privater Verein unternahm, der Lösung jener Aufgaben näher zu treten, so hat er auch eben die Erfahrung machen müssen, dass private Unternehmungen hier nicht zum Ziele führen, sondern die Beihülfe des Staates und die Einsetzung oberster Centralbehörden von Seiten dieses ein Erforderniss für die praktische Durchführung der Aufgaben bildet.

Das Unzureichende privater Leitung von Unternehmungen, wie sie hier in Frage stehen, und namentlich die durch Commissionen, deren Mitglieder weit entfernt von einander wohnen, ist auch ohne die Erfahrung des Vereins für gemeinschaftliche Arbeiten einleuchtend. Der unvermeidliche Wechsel der leitenden Persönlichkeiten selbst, die voraussichtlich immer nur theilweise Unterstützung, welche dieselben finden, die Schwierigkeit der Cooperation mit staatlichen Behörden, der schwer vermeidliche Mangel einer Uniformität der Arbeiten, der Mangel an unerlässlich nothwendigen Mitteln zur Ausführung der erforderlichen Arbeiten, Publicationen u. s. w., dies Alles lässt eine private Leitung als ungenügend erscheinen, und

namentlich wird eine Wanderversammlung, wie die der deutschen Naturforscher und Aerzte, niemals, wie man es gegenwärtig wieder versucht, der Mittelpunkt für derartige Unternehmungen werden können.

Dieser Ansicht hat bereits vor einem Jahre Niemand treffender Ausdruck gegeben, als unser Vereinsgenosse Dr. H. Ploss in Leipzig, und in vollem Maasse stimmen wir deshalb auch dessen im Correspondenzblatt der ärztlichen und pharmaceutischen Kreis-Vereine im Königreich Sachsen. No. 5. Bd. VI. 1868. niedergelegten Worten bei.

»In einem solchen Zustande«, heisst es dort, »wie bisher kann »und darf die medicinische Statistik keineswegs verharren, wenn »die öffentliche Gesundheitspflege in einer den Anforderungen der »Neuzeit entsprechenden Weise zu einer exacten, durch die numerische »Methode begründeten Wissenschaft erhoben werden soll. Und so »schätzenswerth immerhin alle solche Beiträge für diese Wissen»schaft sind, welche sie der privaten Thätigkeit Einzelner verdankt, »so können doch bei Ermittlung von Thatsachen, die man »lediglich durch statistische Benutzung grosser Zahlen »erkennen kann, ganz allein die officielle Regelung und Besor»gung der medicinisch-statistischen Arbeiten durch die Regierung »zu einem befriedigenden Ziele führen. Denn wie die Statistik »überhaupt, so verlangt auch die medicinische Statistik 1) einen »einheitlichen Plan und gleichmässige Organisation der Erhebungen; »2) eine ausgebreitete und möglichst allgemeine Betheiligung zur »Herbeischaffung des statistischen Materials, und 3) eine genügende »Menge zweckmässig geleiteter Arbeitskräfte zur Verwerthung des »aufgesammelten Materiales. Dergleichen Bedingungen können »nimmermehr durch private Leistungen, vielmehr nur durch die »den Regierungen zu Gebote stehenden Mittel und Kräfte erfüllt »werden«.

Das ist zweifellos der Weg, auf welchem wir uns dem Ziele nähern können, und wir wünschen damit dem Vorschlage Ploss's:

»Die Regierungen aller deutschen Staaten mögen durch einen »»Congress für medicinische Statistik« die Einrichtungen »berathen lassen, welche sich als die zweckmässigsten zur Er»mittlung der Morbilitäts- und Mortalitätsstatistik empfehlen«

die baldigste Ausführung.

Es scheint aber in der That, dass diese Anschauung auch bereits in weiteren Kreisen als die richtige anerkannt wird. Die Thesen, welche von der »Commission für öffentliche Gesundheitspflege« für die Naturforscherversammlung in Innsbruck aufgestellt wurden, documentiren dies. Es will diese Commission eine »aus Verwaltungsbeamten, Aerzten und Technikern bestehende staatliche Centralbehörde, die bei der obersten Verwaltungsstelle eine besondere Abtheilung bildet«, eingesetzt sehen und sie theilt derselben folgende Functionen zu:

1) sie hat für die Erhebung einer fortlaufenden Statistik der Gesundheits- und Sterblichkeitsverhältnisse im Staate zu sorgen;
2) sie hat jährlich einen ausführlichen Bericht über den Gesundheitszustand, so wie über den Fortgang der öffentlichen Gesundheitspflege zu veröffentlichen;
3) sie hat die die öffentliche Gesundheitspflege betreffenden allgemeinen Gesetze und Verordnungen vorzubereiten und zu berathen;
4) sie hat die Ausführung der erlassenen gesundheitspolizeilichen Gesetze als oberstes Verwaltungsorgan zu überwachen und zu leiten; sowie
5) für Heranbildung, Prüfung und Anstellung tüchtiger Gesundheitsbeamten zu sorgen.

Unser Interesse wird hier zunächst durch die ersten drei der »Centralbehörde« zu überweisenden Functionen in Anspruch genommen, und daraus, dass dieselben den übrigen vorangestellt worden sind, darf man schliessen, dass auch die »Commission für öffentliche Gesundheitspflege« denselben einen hervorragenden Platz angewiesen wissen will. Die in jenen Punkten ausgesprochenen Forderungen stimmen aber genau mit denen Ploss's überein, und steht es ausser Frage, dass nur eine derartige staatliche Behörde die oberste Leitung der umfangreichen Arbeiten in die Hand nehmen kann, so darf man nur um so mehr wünschen, dass deren Einsetzung nicht mehr lange auf sich warten lässt. Nur durch eine solche kann den Arbeiten die so nothwendige Continuation und eine regelmässige und nützliche Verwerthung gesichert werden. Auf die Besprechung der übrigen der »Centralbehörde« zugedachten

Functionen gehen wir hier nicht näher ein. Sie werden sich zum Theil von selbst ergeben und es ist einleuchtend, dass dasjenige, was mit der obersten Leitung der öffentlichen Gesundheitspflege in unmittelbarem Zusammenhang steht, der für dieselbe zu berufenden Behörde auch zugewiesen werden muss.

Wird nun aber eine »Centralbehörde für medicinische Statistik und öffentliche Gesundheitspflege in Deutschland« geschaffen — und wir zweifeln nicht mehr daran, dass sie es früher oder später wird —, so bleibt noch eine Reihe von Fragen zu erledigen, deren Anregung an dieser Stelle künftigen Berathungen förderlich sein wird.

Zunächst handelt es sich um die weitere Organisation des Unternehmens: die Einrichtung sowohl der Centralbehörde selbst, als der einzelnen Arbeitskreise, und die zwischen beiden herzustellende Verbindung. Ich kann nicht umhin, in dieser Beziehung an den Plan zu erinnern, welchen ich 1857 in meiner Schrift: »Mittheilungen und Vorschläge betreffend die Anbahnung einer wissenschaftlich brauchbaren Morbilitäts- und Mortalitätsstatistik für Deutschland« auf S. 83 vorgelegt habe. Nach diesem Plane vereinigen sich die einzelnen Aerzte einer Stadt oder eines Landbezirkes zu »Lokalsectionen«, welche einen »Localvorstand« auf ein oder mehre Jahre wählen; zunächst bleiben diese Localsectionen durch ihre Vorstände mit der zu bestimmenden Centralstelle für Deutschland in Communication. Wird jedoch die Anzahl der Localsectionen eine grössere, so wird für dieselben in jedem politisch abgegrenzten Gebiete eine besondere Centralstelle, ein »medicinisch-statistisches Centralbureau«, geschaffen, — politisch abgegrenzt deshalb, weil in dieser Weise jedem Staate früher oder später ein Nutzen aus der Krankheits-Statistik erwachsen kann und sich damit die Hoffnung begründen lässt, dass die einzelnen Staaten das Unternehmen durch Geldmittel unterstützen werden —. Diese einzelnen Centralstellen werden dann aber wieder durch ein »Centralbureau für die medicinische Statistik Deutschlands« zusammengehalten und deren, wenn auch schon ganz selbständig zu haltende Arbeiten und Sammlungen, von dort aus einmal so weit geleitet, dass die Uebereinstimmung der äussern Form, der Arbeitsmethode erreicht, andrerseits aber auch die ganze Summe der Einzelbeobachtungen von bestimmten Gesichtspunkten aus bearbeitet und zusammengestellt wird.

Vergleicht man mit dieser Vorlage vom Jahre 1857 die »Thesen über das ärztliche Associationswesen, welche uns gegenwärtig, im Jahre 1869, von der »Commission für Medicinalreform« vorgelegt worden sind, so wird man wieder die Uebereinstimmung nicht verkennen, welche in Bezug auf den in Frage stehenden Gegenstand zwischen beiden Vorlagen existirt, und nur bedauern können, dass 12 Jahre hingegangen sind, ohne dass dem Plane die Ausführung gefolgt ist. Ueber das Unpraktische der Bestimmung einer Wandergesellschaft zu einem Centralorgan für die einschlägigen Bestrebungen, wenn auch nur zu einem »vorläufigen«, wie es die genannte Commission will, haben wir uns bereits ausgesprochen. Aber unser erster vorgelegter Plan in Betreff der Gliederung der Arbeitskreise erhält durch die Entwürfe der genannten Commission nur eine Unterstützung, denn zur Verwirklichung der in Thesis I (s. o. S. 16) ausgesprochenen Zwecks reichen auch der Commission die bereits bestehenden Localvereine nicht aus; sie will vielmehr »als noth»wendige Mitglieder Bezirksverbände haben, wie sie als Kreis»regierungsbezirk, Gau- oder Provinzialvereine hie und da schon »bestehen, und die Ausbreitung solcher Bezirksverbände nicht nur, »sondern auch deren Vereinigung zu einem Ganzen mit allem Eifer »anstreben«.

Die Nothwendigkeit einer solchen Gliederung leuchtet von selbst ein. Orts- oder Gauverbände, Regierungsbezirks- oder Kreisverbände, Centralbehörde der einzelnen Staaten und oberste Centralbehörde für das ganze deutsche Gebiet würden die einzelnen Glieder selbst sein. Ein jeder dieser Verbände müsste sodann seinen Vorstand haben, durch welchen der Verkehr der einzelnen Aerzte mit den Centralbehörden vermittelt wird, und um von vorn herein alle Maassnahmen auch auf Grund gemeinsamer Berathungen und vielseitiger Erfahrungen zu treffen, würden sich alljährliche oder in anderweitig zu bestimmenden Terminen abzuhaltende Versammlungen der sämmtlichen Regierungsbezirksvorstände und von den Orts- oder Gauverbänden zu delegirender Aerzte empfehlen, Versammlungen, auf welchen die bestehenden Einrichtungen besprochen, und Verbesserungen oder Erweiterungen derselben festgestellt werden könnten.

Soll nun aber die gemeinschaftliche Arbeit auf dem Gebiete

der medicinischen Statistik und Geographie selbst begonnen werden, so ist es selbstverständlich, dass derselben überall dieselben Schemata zu Grunde gelegt werden müssen. Seit mehr als einem Jahrzehend werden bereits derartige Schemata für die Morbilitäts- und Mortalitätsstatistik discutirt, ohne dass eines derselben zur allgemeinen Annahme gelangt wäre. Sollen diese Discussionen immer von Neuem auf die Tagesordnung gesetzt werden? Und wird man schliesslich ein Schema herausfinden, welches allen Anforderungen genügt? Ich glaube es kaum. Greife man deshalb doch nach dem Besten, was wir in dieser Beziehung bisher erreicht haben, und wenn ich hierzu das vom Verein für gemeinschaftliche Arbeiten schliesslich adoptirte, in seinen »Tabellen zu medicinisch-statistischen Aufzeichnungen« wiedergegebene Schema dringend zu empfehlen mir erlaube, so treibt mich dazu nicht eine Vorliebe für Etwas, an dessen Herstellung ich selbst mitgearbeitet habe, sondern die mehrjährige Erfahrung, dass sich mit diesem Schema vortrefflich arbeiten lässt, dass es nahezu allen Anforderungen genügt und dass es, so lange es in Gebrauch war, kaum von irgend einer Seite her Einwendungen erfahren hat. Für die Morbilität befolgt das Schema kein bestimmtes Eintheilungsprincip; es stellt die Krankheiten vielmehr einmal nach aetiologischen, andrerseits nach anatomischen Gesichtspunkten zusammen. Seine Hauptgruppen bilden:

I. Die Infectionskrankheiten, und zwar
   1) die durch Miasmen und Contagien erzeugten Krankheiten;
   2) die durch Parasiten erzeugten Krankheiten;
   3) die durch Gifte erzeugten Krankheiten.

II. Die vorwiegend constitutionellen Krankheiten:
   (Scropheln, Gicht, Rheumatismus, Chlorosis, Lungenphthisis etc. etc.)

III. Die vorwiegend localen Krankheiten:
   1) Krankheiten des Nervenapparates;
   2) » des Respirationsapparates;
   3) » des Circulationsapparates u. s. w. u. s. w.

Für die Todesfälle kann dasselbe Schema benutzt werden. Will man aber, was jedenfalls vorzuziehen ist, die Sammlung der Todesfälle und Todesursachen durch die Forderung ärztlicherseits auszustellender Todesscheine sichern, so liegt in dem vom Wiener inter-

nationalen Congress adoptirten Schema ein durchaus empfehlenswerthes vor. Dasselbe ist von uns im Correspondenz-Blatt des Vereins No. 29. 1857 bekannt gemacht und s. Z. sämmtlichen deutschen Regierungen zugesandt. Es theilt die Todesarten in 6 Klassen und zwar

1) Todt geboren;
2) Verstorben innerhalb der ersten Lebenswoche (wegen Schwäche oder angeborner Missbildung);
3) Tod aus Altersschwäche;
4) Gewaltsamer und zufälliger Tod;
5) Tod durch Krankheiten;
6) Tod aus unbekannten Ursachen.

Alle diese Schemata sind sehr leicht zu verbessern, falls sich in der Praxis diese oder jene Mängel herausstellen, und es erscheint mehr als unnöthig, mit dem Beginn der Arbeit warten zu wollen, bis ein Schema fertig ist, welches all und jeden Wünschen entspricht. Greife man die Arbeit nur an. Die empfohlenen Schemata genügen, um dieselbe erfolgreich werden zu lassen, und wünscht man sie auf Grund von Erfahrungen zu verbessern, so wird eine zweite Auflage gar leicht zu beschaffen sein. Aber die Erfahrungen wollen erst gemacht sein. Ein neugebautes Haus befriedigt seinen Eigenthümer, der selbst den Plan dazu machte, selten vollständig, und es wird ihm später sehr schwer, Aenderungen vorzunehmen. Hier aber sind wir in der glücklichen Lage ohne Zeitverlust, und ohne bis dahin vergeblich gearbeitet zu haben, in kurzen Zeiträumen Verbesserungen und Neuerungen vornehmen zu können.

Was die Nomenclatur der einzelnen Krankheiten anbetrifft, so wird auch darüber leicht eine Verständigung erzielt werden, und ich füge gern hinzu, dass in dieser Beziehung so eben in England derart vorgearbeitet wird, dass eine gleiche Nomenclatur sämmtlicher Krankheitsformen in allen Ländern hoffentlich in nicht zu ferner Zeit zur Annahme gelangt. Von einer besonders dazu niedergesetzten Commission (Dr. Sibson, Dr. Farr, Dr. H. Weber u. A.) ist in London ein medicinischer Nomenclator ausgearbeitet worden und bereits im Druck erschienen, welcher die Synonyma sämmtlicher Krankheiten in englischer, französischer, deutscher und

italiänischer Sprache nachweist [1]). Und dahin muss das endliche Streben gerichtet sein, dass die gleichartigen Erhebungen sämmtlicher civilisirter Länder zusammengestellt und verglichen werden können; dann erst werden die grossen Resultate gewonnen werden, welche sich auf diesem Wege für die allgemeine öffentliche, wie private Gesundheitspflege gewinnen lassen.

Weit schwieriger als alle diese Fragen erscheint mir dagegen die nach der Verarbeitung und Nutzbarmachung des eingesammelten Materials. Finden die Arbeiten eine einigermaasen befriedigende Theilnahme, so schwillt schon damit das Material zu enormen Dimensionen an, und die Verarbeitung desselben ist eine überaus mühevolle und zeiterfordernde Arbeit. Die Publication der Resultate ist wegen des häufig erforderlichen Tabellensatzes sehr kostspielig, und dennoch die möglichste Vollständigkeit der Publicationen mindestens wünschenswerth.

Um diese Schwierigkeiten zu lösen, erscheint es zunächst erforderlich, dass schon die Urtabellen der einzelnen Aerzte mit ihren aetiologischen und die öffentliche Gesundheitspflege überhaupt betreffenden Bemerkungen von den Vorständen der einzelnen Gau-Verbände zusammengestellt werden, und dass die so entstehenden »Generaltabellen« eines jeden Regierungsbezirkes wieder von dem Vorstande dieses zu einem Ganzen verbunden werden. Die Urtabellen würden dabei neben den »Generaltabellen« an die Regierungsbezirksvorstände einzusenden sein, damit vereinzelte, zeitlich oder local beschränkte Beobachtungen ihre besondere Würdigung erfahren können. Die General-Zusammenstellungen der einzelnen Regierungsbezirks-Vorstände würden dann aber weiter an die Centralbehörde des betreffenden Staates gelangen, und hier nicht nur zusammengefasst, sondern auch in einer mit den übrigen Regierungen zu vereinbarenden Form in ihren Hauptresultaten zur Publication gelangen müssen. Die oberste Centralbehörde für sämmtliche deutsche Staaten würde ferner, neben der Herausgabe der »medicinisch-statistischen Nachrichten« für den eigenen Staat womöglich

1) The nomenclature of diseases drawn up by a joint committee appointed by the Royal College of Physicians of London. 1869. Printed by Golbourn, Princes Street, Coventry Str.

jährliche Generalberichte über die wichtigsten Beobachtungen, Verbesserungen, Einrichtungen, Erfahrungen u. s. w. in sämmtlichen deutschen Staaten, so weit sie irgend die öffentliche Gesundheitspflege berühren, herauszugeben haben.

Die Grösse der hier vorliegenden Aufgabe ist eine ganz ausserordentliche, auch dann selbst, wenn man sich auf eine gewisse Reihe von Krankheiten und deren Statistik und auf die vorzüglichsten Erfahrungen und Arbeiten auf dem Gebiete der öffentlichen Gesundheitspflege beschränken will. Die eigene 10jährige Erfahrung hat mich dies hinreichend kennen gelehrt, und die Schwierigkeit wächst dadurch, dass nur Aerzte selbst im Stande sind das in Frage stehende Material zu verarbeiten. Nur die geordneteste Theilung der Arbeit eröffnet hier Aussicht auf praktische Durchführbarkeit.

Machen wir uns dies an einem Beispiel klar. Das Grossherzogthum Baden zählte Ende 1868 589 Aerzte. Nehmen wir an, dass sich 500 derselben an der Morbilitätsstatistik (sämmtliche Beobachtungen auf dem Gebiete der öffentlichen Gesundheitspflege selbstverständlich eingeschlossen) betheiligen, so würden von diesen jährlich 6000 Monatsberichte eingehen. Das Grossherzogthum Baden wird für die innere Verwaltung laut landesherrlicher Verordnung vom 12. Juli 1864 in 11 Kreisverbände (Constanz, Villingen, Waldshut, Freiburg, Lörrach, Offenburg, Baden, Carlsruhe, Mannheim, Heidelberg und Mosbach) eingetheilt. Es fallen demnach durchschnittlich auf jeden Kreisverband 45,4 Mitarbeiter und jährlich 545, oder monatlich 45,4 Monatsberichte oder Monatstabellen. Die monatliche Verarbeitung oder Zusammenstellung von 45 Urtabellen ist aber für einen Arzt, sofern sich derselbe nicht ganz vorzugsweise dieser Arbeit widmen kann und will, schon zu viel, und es ist deshalb erforderlich, dass die Urtabellen, ehe sie an den Kreisverbands-Vorstand gelangen, schon enger zusammengefasst werden. Es würden also die Gau- oder Ortsverbände der einzelnen Kreise bereits eine solche Zusammenstellung herbeiführen müssen, der Art, dass etwa auf jeden Gau- oder Ortsverband 10—12 Mitarbeiter und monatlich also 10—12 Urtabellen entfallen. Gesetzt, man einigte sich in dieser Weise, so würde hiernach der Vorstand eines Gau- oder Ortsverbandes monatlich 10—12 Urtabellen zu einer

Generaltabelle resp. Generalbericht, zusammenzustellen haben; der Vorstand eines jeden Kreisverbandes 3—4 Generaltabellen zu Kreis-Generaltabellen oder Generalberichten zusammenfügen, und die Centralbehörde des Grossherzogthums endlich die 11 Kreis-Generaltabellen verarbeiten und zusammenstellen.

Erstrecken sich die gemeinschaftlichen Arbeiten zunächst nur auf einen Theil der pathologischen Vorkommnisse, z. B. auf die epidemischen Krankheitsformen, so ist die Aufgabe bei dieser Theilung der Arbeit unschwer zu lösen. Erstrecken sie sich auf sämmtliche zur Beobachtung kommende Erkrankungen, so ist die Arbeit für die einzelnen Vorstände schon eine erhebliche, und erfordert ein Opfer an Zeit und Mühe, welches nicht Viele im Stande sind zu bringen; — ja in andern Ländern oder Provinzen wird dann schon eine weitere Arbeitstheilung oder anderweitige Maassnahme unvermeidlich.

Die Provinz Hessen-Nassau hat 2 Regierungsbezirke, den Reg.-Bez. Cassel und den Reg.-Bez. Wiesbaden. Letzterer schliesst die Stadt Frankfurt a. M. und deren Gebiet ein. Im Reg. Bez. Cassel sind nach dem preuss. Medicinalkalender pro 1869 233 Aerzte, im Reg.-Bez. Wiesbaden 195 und in der Stadt Frankfurt und deren Gebiet 117 Aerzte ansässig. Der Reg.-Bezirk Cassel zerfällt in 22 Kreise, der Reg.-Bez. Wiesbaden in 10 Kreise, exclus. Stadt Frankfurt. Nehmen wir an, dass sich in dem Reg.-Bez. Cassel 200 Aerzte an der gemeinschaftlichen Arbeit betheiligen, so entfallen auf jeden Kreis durchschnittlich 9—10 Aerzte und monatlich also 9—10 Morbilitätsberichte. Im Reg.-Bez. Wiesbaden dagegen kommen auf jeden Kreis durchschnittlich 19—20 Aerzte und monatlich eben so viel Tabellen. Die einzelnen Kreisverbands-Vorstände im Reg.-Bez. Cassel werden die 9—10 Tabellen wohl zusammenstellen können; aber für den Regierungsbezirks-Vorstand werden die monatlich eingehenden 22 Kreis-Generalberichte schon ein zu bedeutendes Material, als dass er die Verarbeitung desselben ohne einen grossen Mühe-aufwand und Zeitverlust übernehmen könnte. Im Reg.-Bez. Wiesbaden wird wieder die Arbeit für die einzelnen Kreisverbands-Vorstände zu gross, da Jedem derselben 19—20 Urtabellen allmonatlich zufallen, und hier, wie dort in Cassel beim Regierungsbezirk-Vorstande wird eine besondere Beihülfe zu gewähren sein.

Die hier erwähnten Verhältnisse gestalten sich in Wirklichkeit etwas anders, weil ein beträchtlicher Theil der Aerzte auf die grösseren Städte: Wiesbaden, Cassel u. s. w. entfällt, so dass eventuell einzelne Kreisverbandsvorstände ganz ausserordentlich, andere in viel geringerem Grade in Anspruch genommen werden. Aber es lässt sich an den Zahlen die zu leistende Arbeit doch annähernd übersehen, und darauf kam es hier zunächst nur an.

Preussen hat 36 Regierungsbezirke. Die oberste Centralbehörde des Landes würde demnach monatlich 36 Regierungsbezirks-Generalberichte zusammenzustellen resp. zu verarbeiten haben, eine Arbeit, die sonder Frage eine besondere Arbeitskraft verlangt.

Wer aber soll die Vorstands-Arbeiten im Kreise, in dem Regierungsbezirk u. s. w. übernehmen? Es wäre offenbar am einfachsten, wenn sich die Physiker, welche ohnedies mit den in Frage stehenden Verhältnissen ihrer Kreise bekannt sein sollen, denselben unterzögen. Aber diese Arbeiten lassen sich nicht octroyiren, es sei denn, dass eine angemessene Remuneration dafür geleistet würde. Nach dem Eifer und der Hingabe, welche sich gegenwärtig für die Sache kund giebt, sollte man meinen, es werden sich überall freiwillige Arbeitskräfte finden, und ich zweifle nicht daran, dass dies der Fall sein wird. Aber wie lange wird es damit dauern? Die freiwillige Arbeit hat den unschätzbaren Vorzug, dass sie in der Regel treuer und sorgfältiger ist, als die geforderte und bezahlte; aber sie hat auch den grossen Nachtheil der Inconstanz, des beliebigen Ab- und Zuthuns, und ich habe während der verflossenen 12 Jahre sehr wenige, wenn auch anfänglich noch so sehr von der Sache erfüllte Arbeiter ausdauern sehen. Es wird deshalb kaum anders möglich sein, als dass für die Arbeiten der Kreis-, Regierungsbezirks- u. s. w. Vorstände Remunerationen geleistet werden, und diese denjenigen Aerzten zufallen, welche entweder von den Aerzten der einzelnen Kreise zu Vorständen gewählt oder von den Regierungen bestellt werden. Die Anstellung besonderer Sanitätsbeamten bei jeder Regierung (in jeder Provinz) bleibt dabei vorbehalten. Die Arbeit des einzelnen Arztes wird aber selbstverständlich als eine freiwillige geleistet werden müssen, und man muss hoffen, dass die Opferwilligkeit in dieser Beziehung bald überall gleich gross sein

wird, wie sie sich gegenwärtig z. B. in den badischen Kreisvereinen ausgesprochen hat.

Machen wir nun, um die praktische Ausführbarkeit noch näher zu prüfen, einen annähernden Ueberschlag der Kosten, welche das Unternehmen verursachen würde, so berechnen sich dieselben durchschnittlich für jeden Regierungsbezirk mit je 12 Kreisen [1]) etwa folgendermaassen:

Für 12 Kreisverbands-Vorstände an Remunerationen	=	1200 Thlr.
Für 1 Regierungsbezirks-Vorstand an Remuneration	=	400 »
Für Papier und Druck der Schemata	=	25 »
Für Versendungskosten	=	10 »
in summa		1635 Thlr.

Nehmen wir an, dass ein jeder Regierungsbezirk eine gleiche Summe erfordern würde, so wären für die Beschaffung und die erste Bearbeitung des morbilitätsstatistischen Materiales im Königreich Preussen annähernd 58860 Thlr. erforderlich. Rechnet man dazu die Kosten der obersten »Centralbehörde für allgemeine Gesundheitspflege« mit etwa 6000 Thlr. (3000 Thlr. für den Vorstand der Centralbehörde, 1000 Thlr. für Beiräthe, 2000 Thlr. für Bureaukosten, Inspectionsreisen u. s. w.) und die Kosten für die Publicationen dieser Behörde mit etwa 2000 Thlr., so würde sich eine Gesammtausgabe von 66860 Thlr. für das Königreich Preussen ergeben; während sich im Grossherzogthum Baden bei gleichen Ansätzen

für 40 Gau- oder Ortsverbands-Vorstände	4000 Thlr.
für 11 Kreisverbands-Vorstände	1100 »
für 1 Regierungsverbands-Vorstand . . .	400 »
für Druck der Tabellen u. Versendungskosten	70 »
	5570 Thlr.

als erforderlich herausstellen [2]).

1) Das Königreich Preussen hat 12 Provinzen, 36 Regierungsbezirke und 437 Kreise. Auf jede Provinz kommen durchschnittlich 36,4 Kreise; auf jeden Regierungsbezirk 12,1 Kreise.

2) Ich bin bei diesen Ansätzen von der Annahme ausgegangen, dass die Regierungsbezirks- oder Kreisverbandsvorstände die fraglichen Arbeiten als Nebengeschäfte übertragen erhalten. Viel wünschenswerther noch wäre die Bestellung von Sanitätsbeamten für jeden Regierungsbezirk oder wenigstens jede Provinz, die lediglich zur Leitung der Angelegenheiten der öffentlichen Gesundheitspflege berufen wären. Die Besoldung derselben würde sich kaum

Ich habe, wie ich glaube, diese Ansätze nicht zu niedrig gegriffen, und wenn man bedenkt, was mit dem in dieser Weise herbeizuschaffenden Material geleistet werden kann, so erscheint andrerseits die Ausgabe auch nicht zu hoch. Die Arbeiten laufen schliesslich darauf hinaus, die Quellen der Krankheiten, die Ursachen der Verkürzung der Lebensdauer oder der mangelhaften körperlichen Entwicklung der Bevölkerung, mit andern Worten die Ursachen der verminderten Arbeitskraft und Leistungsfähigkeit eines Staates aufzudecken, und haben in so fern eine hohe national-ökonomische Bedeutung neben der humanen Aufgabe, welche sie verfolgen. Werden und können die Staaten zu solchen Opfern bereit sein? Die Kenntniss von der eminenten Bedeutung der öffentlichen Gesundheitspflege bricht sich in immer weiteren Kreisen Bahn; die Mehrzahl der Landesvertreter in unsern Kammern weiss, um was es sich im letzten Gliede handelt, und kann man dem Volke sagen und zeigen, wie mit diesen Mitteln nur für sein Wohlergehen, für die Abwendung von Krankheit und Elend gesorgt werden soll, so wird die Zustimmung der Landesvertretungen wohl um so weniger fehlen. Zählt man mit Aufwendung erheblicher Mittel die Einwohner, die Anzahl der Pferde, Kühe, Schaafe u. s. w. eines Landes, um national-ökonomische Zwecke zu erreichen, so ist die Kenntniss der Verbreitung der Krankheiten nicht minder wichtig, im Gegentheil von noch höherem Werthe, und da sich Niemand dieser Einsicht verschliessen kann, so dürfen die Forderungen auch nicht eher ruhen, als bis sie nach Möglichkeit erfüllt sind. Ein Staat, welcher ein jährliches Ausgabe-Budget von nahezu 170 Millionen hat, der wird und muss auch jährlich 60—100,000 Thlr. für eine so wichtige Aufgabe aufwenden können, als es die Ermittlung der Verbreitung der Krankheiten und ihrer Ursachen ist. Trotz aller Fortschritte in der Erkenntniss der Krankheiten und deren Wesen hat die Zahl der Erkrankungen, wie sich statistisch nachweisen lässt, nicht abgenommen; wir sind im Heilen ebenfalls nicht viel vorwärts gekommen. In einzelnen Ländern und in gewissen Ständen scheinen sogar die Generationen mehr und mehr an körperlicher Entwicklung

geringer, als auf 1800—2000 Thlr. stellen lassen, wenn man tüchtige Aerzte dafür gewinnen will, und die bezeichneten Summen würden sich dem entsprechend erhöhen; — in Preussen z. B. bei 12 Provinzen um etwa 19000 Thl.

und Leistungsfähigkeit abzunehmen; statt einer Aufblüthe erkennt der Beobachter oftmals eine Depravation der Constitutionen im Vergleich zu vergangenen Zeiten; gleich mangelhaft wie die Leistungsfähigkeit des Körpers ist vielfach die geistige Energie und Erhebung. Die neueren hygieinischen Bestrebungen, die die Verhütung der Krankheiten wesentlich in's Auge fassen, führen hoffentlich zu glücklicheren Resultaten. Aber sie können es nur, wenn man die Verbreitung der Krankheiten durch grosse Zahlen kennt und damit den ersten Schritt zur Aufhellung ihrer Ursachen thut. Wie unendlich lehrreich sind die Erfahrungen von Bowditch und Buchanan über die Abnahme der Schwindsuchten auf trockenem Boden, resp. deren Zunahme auf feuchtem Terrain! Wie mahnend zu tief eingehenden aetiologischen Studien die neuesten Publicationen Engel's über die Procent-Zahlen der bei der Prüfung der Militairdiensttauglichkeit untauglich Befundenen! Wie weittragend die Beobachtungen v. Pettenkofer's und Buhl's über den Zusammenhang der Cholera- und Typhus-Verbreitung mit dem Stande des Grundwassers! Solchen Anfängen und Mahnungen gegenüber schwindet die Geldfrage zu einer Unerheblichkeit; ein ernstes Bedenken kann sie nicht mehr verursachen; — und wenn gegenwärtig sogar in der Türkei Commissionen für Hygieine und öffentliche Gesundheitspflege eingesetzt werden, wenn der Schah von Persien einen »conseil de santè« und einen »Service général de la médécine« geschaffen hat, so liegt darin eine eben so ernste, als beschämende Mahnung, dass Deutschland nicht länger zurückbleibt.

Gesetzt aber, es würde von den Regierungen und Abgeordnetenkammern als eine Unmöglichkeit erkannt, die Krankheitsstatistik und öffentliche Gesundheitspflege in der erwähnten Weise zu fördern, soll deshalb die Arbeit ruhen? Werden sich nicht Aerzte finden, welche geneigt sind einen grösseren Theil der Arbeiten zu übernehmen? Werden nicht Viele bereit sein, ausser der monatlichen geringen Arbeit auch einen Geldbeitrag zu geben zur Deckung der unvermeidlichen Kosten des Unternehmens? Zeitweilig gewiss. Aber nach allen vorliegenden Erfahrungen auf die Dauer eben so gewiss nicht; und eben deshalb scheint es nicht rathsam auf dem Wege der Privatthätigkeit die Arbeit von Neuem in Angriff zu nehmen, um sie aller Wahrscheinlichkeit nach alsbald wieder lahm liegend

zu sehen; — denn, ich kann es nur wiederholen, nur die Continuation der Arbeiten durch eine lange Reihe von Jahren hindurch, nur die ernste Ausdauer kann uns zu erheblichen Resultaten führen.

Es bleibt der Privatthätigkeit immerhin noch die Hauptsache überlassen. Von der Sorgfalt und Genauigkeit der Beobachtungen des einzelnen Arztes hängt das schliessliche Resultat ab. Was uns bisher gefehlt hat und was die gemeinschaftliche Arbeit störte und trübte, habe ich oben ausführlich besprochen! Streben wir dahin, dass auf unserer Seite der Hemmschuh nicht gefunden wird für einen mächtigen und segensreichen Fortschritt! Mit vereinten Kräften werden wir nicht nur das angestrebte Ziel erreichen; die vereinte Arbeit wird ihren Segen auch ausstreuen über unsere gegenseitigen Beziehungen, und je freier sich gegenwärtig die ärztliche Praxis gestaltet, je weniger Hindernisse dem Charlatanismus auf dem Gebiete ärztlicher Thätigkeit in den Weg gelegt werden, um so mehr sollte die gemeinschaftliche ernste wissenschaftliche Arbeit ein Band werden für die tüchtigsten und von der Würde ihrer Lebensaufgaben durchdrungenen Berufsgenossen.

Die in Bonn im Jahre 1857 von der »Commission für medicinische Statistik« gefassten Beschlüsse sind, wiewohl sie sämmtlichen deutschen Regierungen zugestellt wurden, ohne wesentliche praktische Erfolge geblieben. Nur Einzelnes ist erreicht. Das Netz der meteorologischen Stationen ist ausgedehnt und vervollständigt; ärztlicherseits auszustellende Todesscheine sind hie und da eingeführt; in öffentlichen Krankenanstalten werden genaue Aufstellungen über die Krankenbewegung gemacht. Aber ohne eine umfangreichere Beobachtung und ohne Betheiligung der praktischen Aerzte ist die Arbeit von geringem Nutzen. Die Statistik der Krankenbewegung und der Krankheiten in öffentlichen Anstalten giebt stets ein nur sehr dürftiges Bild von den wirklich vorkommenden Erkrankungen. Die Erkrankungen in den höheren Classen der Gesellschaft bleiben fast ganz ausgeschlossen, und gerade in diesen depraviren die Gesundheitszustände im Allgemeinen mehr und mehr, hie und da selbst in einer fast erschreckenden Weise. Wir dürfen deshalb nicht ermüden, den Regierungen die Fruchtbarkeit und Nothwendigkeit der medicinisch-statistischen Arbeiten einleuchtend zu machen, und denselben die Pflege und Unterstützung derselben an's Herz zu legen.

Man beruft sich so oft auf die Erfahrungen in England, die die statistisch-medicinischen Arbeiten als wenig treu und wenig zuverlässig bezeichnen; man behauptet, die in der angegebenen Weise zu ermittelnden Zahlen seien nicht der genaue Ausdruck der Wahrheit. Dieser Einwurf hat sein volles Recht. Aber man darf sich darüber nicht täuschen, dass auf diesem Gebiete niemals Zahlen gewonnen werden können, welche scharf die Wahrheit bezeichnen, und dass es der Wissenschaft, wie der Praxis, dass es mit anderm Worte dem Zwecke des ganzen Unternehmens vollständig genügt, wenn die Zahlen nur annähernd die Wahrheit verkünden. Ob in einem Orte 25 oder 27 p. c. aller Verstorbenen an Lungenschwindsucht zu Grunde gegangen sind, ist ziemlich gleichgültig. Es genügt zu wissen, dass in diesem Orte nahezu der 4te Theil aller Todesfälle durch Lungenschwindsucht herbeigeführt wird, und wenn in einem ähnlichen, in gleicher geographischer Breite und Höhe gelegenen Orte die Procentzahl für die an Lungenschwindsucht Verstorbenen nicht 10 beträgt, so werden wir damit darauf hingewiesen, dass an jenem ersten Orte besondere Verhältnisse vorwalten müssen, welche jene Krankheit herbeiführen und ihre Entwicklung begünstigen; — und das ist es, worauf es zunächst ankommt. Ganz gleich verhält es sich mit andern Krankheitsformen. Möge man deshalb jener Einrede kein zu grosses Gewicht beilegen; die Arbeiten selbst werden alsbald lehren, dass diejenigen im Unrecht sind, welche sie für wenig ersprieslich halten, vorausgesetzt immer, dass die Betheiligung der Aerzte eine möglichst allgemeine und verbreitete ist.

Aber es giebt auch noch einen Weg, die Fehlerquellen, welche bei statistisch-medicinischen Arbeiten dennoch offen bleiben werden, um ein Bedeutendes einzuschränken und auf ein Minimum zu reduciren. Diesen Weg bietet die richtig geleitete, allgemein naturwissenschaftliche Vorbildung der Aerzte, die gründliche Durchbildung des Einzelnen in all denjenigen Fragen, um welche es sich bei der Förderung einer rationellen Gesundheitspflege handelt, und ich komme damit auf jene Forderung zurück, welche bereits oben (S. 33) ausgesprochen und näher motivirt wurde. Wohl verbreitet sich gegenwärtig die Anerkennung der Wichtigkeit hygieinischer Studien mehr und mehr; man verschliesst sich auch nicht länger der Einsicht, dass ohne medicinisch-statistische, geographische und ethnographische

Arbeiten, die Aufgaben der Hygieine nicht zu erfüllen sind. Aber ich glaube mich dennoch nicht in der Ueberzeugung zu täuschen, dass die allgemein physiologischen Studien auf Universitäten gegenwärtig noch nicht mit derjenigen Auffassung und Hingebung getrieben werden, welche allein den richtigen Boden für eine spätere erfolgreiche praktische Thätigkeit in Bezug auf öffentliche Hygieine schaffen. Es sind demnach die Unterrichtsanstalten, an welche wir hier zunächst unsere Forderungen zu richten haben. Auf den Universitäten muss der Grund für jene Auffassung gelegt werden, und eine »allgemein-physiologische Propädeutik für Mediciner« oder eine »allgemeine Physiologie mit besonderer Berücksichtigung der Aetiologie der Krankheiten« sollte auf keiner Universität in den Verzeichnissen der Vorlesungen fehlen. Von hier aus wird und muss sich von Generation zu Generation mehr und mehr die Einsicht Bahn brechen, dass die wesentlichen Aufgaben des Arztes nicht allein im Receptschreiben oder in diesen oder jenen künstlichen Eingriffen liegen, vielmehr ein weites und fruchtbares Feld seiner Thätigkeit auch durch die Aufgaben geboten wird, welche die private und öffentliche Hygieine ihm stellt, und ohne weiteres Zuthun wird damit die Zahl derjenigen wachsen, die der sorgsamen Pflege der letzteren nicht nur ein Opfer zu bringen bereit sind, sondern auch die dazu erforderliche Um- und Einsicht mitbringen! Dahin streben wir! und es wird sich auch hier bewahrheiten, dass die Erndte der Aussaat entspricht.

Der Liebe, mit welcher ich seit 17 Jahren der Pflege gemeinschaftlicher Arbeiten auf dem Gebiete unserer Wissenschaft nachgegangen bin, wird man es verzeihen, dass ich des Unternehmens, welches derselben gewidmet war, noch einmal gedacht habe. Dieselbe Hingebung ist es, welche mich diese Zeilen mit der Hoffnung begleiten lässt, dass sie Eifer und Liebe für eine grosse Sache in immer weiteren Kreisen wecken und beleben. Seien sie zugleich ein Dankesgruss allen Denen, die unsere bisherigen Bestrebungen um die Förderung der gemeinschaftlichen Arbeit unterstützt haben, ein Freundesgruss aber Denen, die mit mir von der Wahrheit durchdrungen sind, dass, wenn irgendwo, hier die Einigkeit Noth thut und stark macht.

Marburg den 12. Novbr. 1869.

Nachtrag.

Die vorstehenden Zeilen wurden im Laufe des November vorigen Jahres niedergeschrieben. Während des lange verzögerten Druckes derselben ist bereits ein grosser, weiterer Schritt zur Förderung der öffentlichen Gesundheitspflege geschehen, der nun die Arbeit fast als eine überflüssige erscheinen lässt. Eine von den Herren Prof. Richter, DDr. Varrentrapp, Wasserfuhr, Spiess sen. und Hobrecht unterzeichnete Petition an den Reichstag des norddeutschen Bundes bekundet, dass bereits auch die vereinigten Commissionen für Medicinalreform und öffentliche Gesundheitspflege eine staatliche Ordnung der Werke der letzteren anstreben. Dieser Bestrebung wird kaum der allgemeinste Beifall fehlen. Möge nun mein Schriftchen ein Ausdruck dieses letzteren sein und die Hoffnung mit auf den Weg nehmen, dass der Petition selbst bald die Ausführung folgt. Was ich dargelegt, mag als die Schilderung eines Entwicklungsstadiums in der Geschichte der Hygieine Deutschlands seinen Werth behalten. In dem, was wir wollen, herrscht wie es scheint, eine erfreuliche Einhelligkeit.

Die Petition selbst gebe ich nachstehend in genauem Wortlaut:

An

den Hohen Reichstag des Norddeutschen Bundes

in

Berlin.

Den Hohen Reichstag bitten die Unterzeichneten,

Derselbe wolle bei dem Bundesrathe des Norddeutschen Bundes beantragen:

I. Die Vorlage eines Gesetzes, betreffend die Verwaltungs-Organisation der öffentlichen Gesundheitspflege im Norddeutschen Bunde;

II. Zu den Vorarbeiten für dies Gesetz die Einsetzung einer mit dem Rechte der Cooptation ausgestatteten Commission von Sachverständigen (Aerzten, Technikern und Verwaltungsbeamten) aus den Staaten des Norddeutschen Bundes;

III. Als Grundlage des Gesetzes die Berücksichtigung folgender, von den vereinigten Sectionen für öffentliche Gesundheitspflege und für Medicinalreform in der 43. Versammlung Deutscher Aerzte und Naturforscher zu Innsbruck 1869 einstimmig gefasster Resolutionen:

»Es sind in jeder städtischen Gemeinde wie in Landbezirken »entsprechende, bis zu einem gewissen Grade selbstständige Ge»sundheitsausschüsse (Sanitäts-Commissionen) zu bilden, die »unter Beaufsichtigung, beziehungsweise Leitung, höherer staat»licher Organe die nächste Sorge für Alles, was das öffentliche »Gesundheitswohl ihrer Gemeinde und ihres Landbezirks betrifft, »zu übernehmen haben.

»Die Gesundheitsausschüsse bestehen aus Gemeindebeamten »und Bürgern, Aerzten und Technikern (Chemiker, Architekt und »Ingenieur), und lehnen sich überall an die politischen Behörden »der entsprechenden Gemeinden und Bezirke an. —

»Die Beaufsichtigung, beziehungsweise Leitung, der örtlichen »Gesundheitspflege ist Sache eines vom Staate für jeden grösseren »Verwaltungsbezirk zu ernennenden öffentlichen Gesundheits»beamten, der neben diesem seinem Amte keine andere Be»schäftigung treiben, namentlich — wenn Arzt — weder ärztliche »Praxis üben, noch Gerichtsarzt sein darf. Derselbe ist gleich»berechtigtes Mitglied der betreffenden staatlichen Verwaltungs»behörde. In seinem Bereiche übt er auch volle Initiative, und »verfügt in Verbindung mit den Gesundheitsausschüssen nach »Massgabe der bestehenden gesetzlichen Vorschriften über die »vorhandenen Polizeimittel zur Abstelllung der ermittelten Uebel»stände. Derselbe ist der staatlichen Centralbehörde für das »öffentliche Gesundheitswesen untergeordnet. —

»Die aus Verwaltungsbeamten, Aerzten und Technikern beste»hende Centralbehörde bildet bei der obersten Verwaltungs»stelle eine besondere Abtheilung, und hat folgende Functionen »zu übernehmen. Sie hat:

a) »für die Erhebung einer fortlaufenden Statistik der Ge»sundheits- und Sterblichkeitsverhältnisse zu sorgen:
b) »jährlich einen ausführlichen Bericht über den Gesundheits»zustand, sowie über den Fortgang der Werke der öffent»lichen Gesundheitspflege zu veröffentlichen;
c) »die die öffentliche Gesundheitspflege betreffenden allge»meinen Gesetze und Verordnungen vorzubereiten »und zu berathen, die Ausführung der erlassenen gesund»heitspolizeilichen Gesetze als oberstes Verwaltungsorgan zu »überwachen und zu leiten, sowie
d) »für Heranbildung, Prüfung und Anstellung tüchtiger »Gesundheitsbeamten zu sorgen. —

»Der Unterricht über die Erkenntniss von Krankheitsursachen »und über Krankheitsverhütung ist an den Universitäten, Fach»und Volksschulen sorgfältig zu pflegen«. —

Januar 1870.

ON THE STRUCTURAL RELATION

BETWEEN

UREA AND URIC ACID, Etc.

By Dr JOHN G. MACVICAR, Moffat, N.B.

Reprinted from the Edinburgh Medical Journal for March 1870.

The chemical formulæ of these two substances, according as we adopt the older or the now more popular notation, stand thus:—

	Old.	New.	
C = 6	Urea, $C_2 H_4 N_2 O_2$	$C H_4 N_2 O$	C = 12
O = 8	Uric Acid, $C_{10} H_4 N_4 O_6$ (bibasic)	$C_5 H_4 N_4 O_3$	O = 16

Here under neither notation does any homology or genetic relationship appear between them. But molecular morphology when applied to both shows a very beautiful and a very simple relation, which, if accepted by the physician, appears to me to be such as should prove of value to him. Moreover, this relation may to a certain extent be exhibited to the eye, and that by the use of such types as are already in the hands of the printer.

But there must be granted these two postulates:—(1.) That the law of symmetry, which is the acknowledged basis of mineralogy, botany, and zoology, is also the basis of the science of those material elements of which minerals, plants, and animals consist. (2.) That the following marks may stand for the organic elements occurring in the preceding formulæ. The first two are the atomic weights on the older scale of the substances they stand for. But they have also a symbolic value in reference to the supposed forms of the elements themselves. Thus, in the molecular morphology referred to,[1] hydrogen is an axial or bipyramidal, and oxygen an equatorial or double concave form; carbon is double convex; and azote is a coupled element, consisting of two menisci, resting on each other by their brims. Each meniscus by itself is intensely active (but being dissymmetrical), it is incapable of being insulated or obtained by itself. It is named zote.

	Moisture.	Ammonia.
Hydrogen.		
8 or ∞ Oxygen.		
Carbon.		
Azote.		(Aqueform.) (Hydrozotic.)

[1] See A Sketch of a Philosophy. Part II. Matter and Molecular Morphology. The Elemental Synthesis. Williams and Norgate.

It is also further necessary to add, with regard to hydrogen, which is the simplest insulable structure possible under the law of symmetry, having only one material element, or unit of weight, for each pole or terminal of the geometrical axis, and three (which is the smallest number that can determine a plane) for its equator, that a symbol representing to the eye its full atomicity (that is, those regions on which it might possibly take into union with itself other atoms) would require to have two similar marks for the poles and three for the equator. Thus:—

Hydrogen  showing its possible atomicity.

Viewed in reference to tangent planes, it is a *trigonal* bipyramid (a doubly-pointed or shuttle trochar!); so also are sulphur, selenium, and tellurium. But all the other supposed forms of the elements, so far as they have been reached, are pentagonal on the equator. Thus, supposing the dot in the following symbol to stand for an atom of oxygen (as with the mineralogists), the equatorial atomicity of azote would be represented thus:—

Nitric acid (neglecting $\frac{1}{oo} = HO$)  $= NO_5$

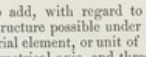
But to find the relation between urea and uric acid it is sufficient to attend to the case of hydrogen alone. And this we may do by following the synthesis of the simplest hydrocarbon under a progressive increase of carbon or escape of hydrogen. First, then, as a single element of carbon saturated with hydrogen, we obtain

Nascent marsh gas $= HCH = CH_2$

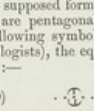
But of such a structure the axis is too long for the extent of the equator; for symmetry culminates in sphericity. When, therefore, a couple of such structures meet, they double. And now they give an exquisite structure, in which all the five points for union in the atom of hydrogen which constitutes the axis are engaged, and the structure is finely differentiated and stable:—

Mature marsh gas $= CH_4C = C_2H_4$

But the equator here consists of three naked arms of hydrogen. When the supply of carbon is greater therefore, it is to be expected that each of these will exist in union with an atom of carbon. Now, this union may take place in so many different ways, that we shall here have many different substances with the same chemical formula. That formula, taken in reference to a single member, must be $C_2H_4+C_3$, that is C_5H_4. But it may be shown that such members under the law of symmetry (sphericity) will tend to aggregate into tetratoms or groups of 4. The prevalent formula therefore will be $C_{20}H_{16}$. Here, then, we have the formula of non-oxygenated essential oils, and as the single element,—

Essential oil  & & $= \frac{1}{4}(C_{20}H_{16})$

Passing on now till the volatility of the hydrogen has enabled it to escape from this structure to the utmost, there remains only one atom of hydrogen as an axis of the structure, kept down by five atoms of carbon, one on each pole, and three on the equator. But an atom of hydrogen loaded with carbon to this extent cannot be raised by the chemist into the aeriform state or separated. It is therefore unknown otherwise than as a carbonaceous residuum containing a little hydrogen. When, however, a single atom more of hydrogen is attached, it may be sublimed in couples which are symmetrical, and in tetratoms which are spherical (overhead of their ethereal atmospheres). Thus the couple

Naphthaline  $= \frac{1}{2}(C_{20}H_8)$

But though the chemist cannot obtain the atom of hydrogen saturated with carbon C_3H in a separate state, it plays, when oxidized and moistened, as might be expected, from its very perfect structure, a very important part in the economy of organic nature.

And here let us remark the wonderful range of functioning which belongs to an atom of hydrogen. While the substance in union on its poles may continue the same, the 3 substances upon its equator may range from 3H to 3C, with many others lying between, as, for instance, in marsh gas, 3Cl, instead of 3H, giving chloroform, etc.

On the subject of oxygen, it is only necessary to remark here, that that element in its most active state exists in single atoms. But in its form, the single atom is so equatorial or oblate, that under the law of symmetry (sphericity), when free, oxygen atoms go in couples, each couple forming an unit volume of oxygen gas, or volume equal to a single atom of hydrogen or of azote.

Both constituents of the atmosphere therefore are coupled elements.

Further, this also is to be remarked of both, that in the interior of both when coupled, in consequence of the concavity of the now central regions of the two parts of which each consists, there is a cell or cavity; and this is precisely a mould for an atom of carbon!

And when in this cavity an atom of carbon has succeeded in the course of vital action in lodging itself, it appears that the utmost analysis of which that action is capable cannot dislodge it again.

There thus remain to be eliminated from the animal frame the two homologous bodies—

$\text{C}\ominus\text{O} = CO_2$ = Dioxide of carbon—carboxygen.

$\text{C}\ominus\text{Az} = CAz$ = Dizote of carbon—carbazote.

Respiration.—Of these, the former is isomorphous and isovoluminous with oxygen gas. Like this gas, it is also parasitic, and so it gives to nature a series of concrete carbonates, analagous to oxides. But it is now no longer mere oxygen gas, greedy of its appropriate food. Its stomach is now completely filled with carbon. In its relations to carbon, therefore, it is completely changed. It wants no more of it. And being symmetrical, and composed in so great part of oxygen, it tends to the aeriform state. And thus escaping from the blood by the lungs or the skin, it is expired, and gains the atmosphere, carrying along with it an amount of carbon, which, if left in the blood, would speedily prove fatal.

Renal Action.—But the latter, the dizote of carbon, cannot attain to symmetry and fitness for the aeriform state. For its azote is what remains of ammonia, in which it existed in union with three atoms of hydrogen; and this fact, added to the demand which carbon has for hydrogen, gives one atom of hydrogen at least always clinging to the atom of carbazote. Hence it remains as a hydracid. And hence, like other hydracids, it cannot in the course of nature be parted from moisture. It cannot be eliminated from the blood except in combination with water. And hence in the most perfect organizations, along with a respiratory, there is a renal apparatus.

Urea.—Separated or conceived as separate from water, this carbazohydric acid must be taken as a monohydrate—that is, as having attached to it an atom of HO on the non-hydrogerent pole—thus securing a certain amount of symmetry:[1]—

Nascent urea = = CH_2NO

But under the law of symmetry (sphericity) this structure is obviously in the same predicament as our original hydro-carbon CH_2 (see p. 2). Its axis is too long for the breadth of its equator. Just as that hydro-carbon, therefore, tended to double into marsh gas, so will this tend to double into

Urea = = $C_2H_4N_2O_2$

[1] The proper point of view is to regard these acid elements as fixed on the poles of an elemental drop of water, which is such that this (urea) matter will be to the water only 13 parts in 1000, though the law of symmetry shows that this quantity of urea may be doubled without danger to health or increased irritation. But this we must pass over at present, and confine our attention to the minim member.

Where and when in the course of the circulation this doubling takes place cannot now be inquired into. But if we suppose it to take place at the time when healthy urine from exhibiting an acid acquires a basic reaction, it would explain this change without our needing to go farther; for, as the hemi-urea is an acidous, so is urea a basic structure.

Uric Acid.—The construction of urea obviously requires that there shall be found at the commencement of the synthesis a simple atom of pure hydrogen only on the pole of the atom of carbazote. But in regions where loose atoms of carbon have been disengaged in abundance, and the action of the system is tending towards the construction of crystallogenetic and stable rather than of such easily transformable molecules as shall be answerable to the purposes of life, it is to be expected that 3 atoms of carbon will fix themselves on the 3 edges of the equator of such single atoms of hydrogen as are suitably placed for such union, and we shall have

Nascent uric acid =  instead of  + 3C;

and (not to overtax the printer with over-elaborate diagrams) after hydrating and doubling (and perceiving that the tetratom of hydrogen which forms the equatorial body in the atom of urea will, in this case, tend to grow into a symmetrically hydrated, that is, a bihydrated atom of ammonia), we obtain on each pole thereof the solidly constructed combination—

Uric acid (monobasic),  = $C_5HN_2O_3$

The entire structure is

$\overbrace{C_5HN_2O_2}^{\text{Pole.}}\,\overbrace{OHamHO}^{\text{Body.}}\,\overbrace{C_5HN_2O_2}^{\text{Pole.}} = C_{10}H_2N_4O_4.2HO.NH_3.$

Thus do we obtain the only known urate of ammonia, which is also regenerated as often as uric acid and ammonia come in contact.

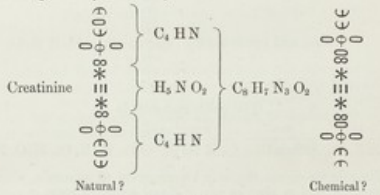
Besides urate of ammonia, uric acid itself, and urate of soda and lime also, are plainly to be expected when the system is bent on constructing uric acid, and is, at the same time, not capable of constructing urate of ammonia. But all except the last, whether generated in the blood or in the bladder, or between the two, are more or less abnormal in man, and must be prejudicial more or less to health.

The question then is, how may the easy construction of uric acid be specifically prevented; or, if formed, how may it be resolved into more soluble and less irritating substances? The theory (of Liebig)

that it is the normal antecedent of urea, and undergoes, in the usual course of healthy vital action, transformation into urea, though not without beauty as a conception, is not supported either by clinical observation or the analogy of nature. And, indeed, the atom of uric acid when considered mechanically (or chemically, which is the same) is so stable, while that of urea is so tender, that though the transformation can be effected in the laboratory, yet in the human body, the problem no doubt is to prevent, as far as possible, the construction of uric acid in dangerous quantities.

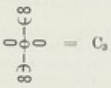
One method of nature for this end appears to be to construct creatinine and hippuric acid, which are much more easily removed from the system, instead of mere uric acid. And another method (more useful but not so easy) appears to be to arrange, through the use of oxygen, the three atoms of carbon (which, by existing in an *equatorial* position, cause all the trouble) into an *axial* position, thus constructing the body of the lactic element, which is soluble enough, and which, when hydrochloric acid is in defect, can do the work of the latter, though not so well. But that by the way at present.

Creatinine.—Let an atom of the as yet uncompleted uric acid (see fig. p. 5) be fixed on an atom of symmetrically hydrated ammonia just as a completed atom of uric acid is in urate of ammonia, and an atom of creatinine results. This we may even attempt to show in a figurative formula (adopting a conventional arrangement of marks for $OHamHO = NH_3O_2 = HN_4O.HO = NH_4.H.O.$, that is, bihydrated ammonia, a structure which plays a most important part in nature, but which the chemist has not yet succeeded in obtaining in a separate state):—



Hippuric Acid.—To construct this interesting body we must leave the region of single members of molecules, to which alone our attention has hitherto been directed, and come to the molecules resulting when these generally very lengthened members place themselves as radii around a common centre, and thus fulfil the law of symmetry (sphericity.) Happily for the progress of science only the numbers of 20 and 12, corresponding to the trigonal and pentagonal regions of union which were alluded to at the commencement of this paper, occur in nature.

Hippuric acid is benzoic acid, its poles surmounted by a nascent uric form, most probably arranged thus—


= $C_9 H_9 N O_2$;

and benzoic acid is a finely balanced dodecatomic molecule, its true formula being (as most usually) double that given in chemical works. For chemical formulæ having generally been estimated in reference to some substance whose atomic weight is known on *one pole* instead of on *both poles*, as the law of symmetry requires, give commonly half molecules.

Glycocoll.—The polar matter which differentiates the atom of hippuric acid, creatinine, and its hydrated state creatine, as also many other molecules in the animal organism, is always the same, namely, the tricarbide of hydrogen in union with the same carb-azotic or carbo-zotic matter, this latter being dimorphous, as I have endeavoured to show in the above two forms of creatinine. But viewed as existing in a separate state, this structure is not in keeping with the molecular structures of the terraqueous globe generally. It is dry, and it contains no oxygen. It must soon be moistened by aqueous matter, and that in the form of HO, a form which supplies oxygen and hydrogen at the same time. Now there are on it four regions (namely, the three naked atoms of carbon surrounding the atom of hydrogen and the azotic pole), on each of which an atom of HO may fix, and on which, if such atoms do fix, all will be duly moistened. We shall thus obtain the polymorphous structure of

Nascent glycocoll  = $C_4 H_5 N O_4$

The chemical formula, as is usual with neutral substances, is cut as close as possible. But to explain the physical and physiological characters of glycocoll, and to place it in its right position among the sugars, we must regard it as a differentiated dodecatom as is usual with us, which, in this case, requires us to double the chemical formula twice. When this is done we obtain, as the remarkable result, an atom of sugar with one of urea on each pole!

Sugar of Gelatine { Urea, $C_2 H_4 N_2 O_2$; Sugar, $C_{12} H_{12} O_{12}$; Urea, $C_2 H_4 N_2 O_2$ } = $4(C_4 H_5 N O_4)$

$C_{16} H_{20} N_4 O_{16}$

Here, therefore, the unorganized matter of the undigested food, of the bile, and of the broken-down tissue, instead of charging the system with uric acid, will give urea and sugar, which will increase and decrease *pari passu*.

The Glycogenic Function.—It is not to be inferred, however, that in this we have the true theory of the diabetic diathesis. Possibly where the vital functions are being vigorously performed, the sugar generated in this way may be given to the blood so early that it may serve the same purpose in the economy as the sugar generated in the liver. And what is that? To this it is to be answered that molecular morphology shows that both terminals of those members which, when symmetrically aggregated around a common centre, constitute an albumenoid molecule, are the simplest and sweetest of all organic structures, the very A B C of vitalized nature, namely, CHO, that simplest hydrate of carbon, which I have called *saccharine*, because the proper molecule belonging to it, is $(CHO)_{12} = C_{12} H_{12} O_{12}$ = an atom of sugar. Where a molecule of an albumenoid, therefore, is going to be constructed, nothing can be of greater value to give it a start than an atom of sugar. Probably there are few functions in the body which are of greater value than the glycogenic power of the liver. And possibly this sugar of gelatine, like the lactic acid, by the genesis of which also the construction of uric acid is prevented, may in good constitutions be turned to a good use.

The Diabetic Diathesis.—But these views also give a theory of the true diabetic diathesis. Thus, let the system be in such a state that, instead of being competent to construct fresh albumenoids when saccharine atoms are given as a nucleus, it lets those which already exist soak or rot from the periphery to the centre, in overmuch water. And then by every albumenoid molecule thus lost, an atom of sugar will at last be exposed. And a deplorable state of things must result,—a state in which the albumenoids of the blood, instead of normally unfolding, engaging moisture, and joining hand in hand to constitute tissue and to impart beauty and mellowness and muscularity, are being digested into mere urine, of which there thus comes to be far too much for health, both as to quantity and weight. Such a state of things it is anything but cheering to contemplate, either as to its issue or its cure. But when the physician sees his way, there is no saying what he may be able to do.

The structural relation between urea and uric acid is then very simple. The two differ only in this, that in the atom of urea the three equatorial arms or radii are 3H, while in the atom of uric acid they are 3C, securing also HO on the pole, and thus rendering the uric atom an acid.

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THE MOTIONS OF THE HEART,

THE CIRCULATION OF THE BLOOD, Etc.,

VIEWED MORPHOLOGICALLY.

BY

JOHN G. MACVICAR, M.A., LL.D., D.D.

(*Reprinted from the Edinburgh Medical Journal for March* 1871.)

There is nothing in nature more wonderful than the persistent action of the heart. Beginning as a *punctum saliens* with the first development of the embryo, it never ceases, perhaps for a hundred years, completing a definite cycle of motions upwards of seventy times every minute, and that—not like the beam of a fine balance set on friction-wheels *in vacuo*, or any mechanism where the resistance is a minimum, but—in opposition to such resistance that, viewed as work, it has been estimated at the raising of a ton, or say fourteen men, from the bottom of a pit 120 (or say rather 43) feet deep in twenty-four hours![1] Nor is the action of the heart less important than it is wonderful. It is the indispensable condition of nutrition, nay, of bodily life; and in reference to all intense mental states or emotions and many other phenomena, it is to the whole frame what the action of the governor on the steam-pipe (which controls the supply of steam) is to the working of the steam-engine.

It is only to be expected, therefore, that ever since the discovery of the circulation of the blood the greatest physiologists should have

[1] A great diversity of opinion prevails as to the force which the heart puts forth. Professor Buchanan of Glasgow, whose views are very considerate, estimating it as a lift, gives 42·3 foot-tons in twenty-four hours. Professor Haughton of Dublin estimates it at more than double—viz., 89·7 foot-tons in the same time; while Professor Huxley of London, in his Table of Physiological Constants, gives it at 90 foot-tons for the left ventricle, and 120 foot-tons for the whole heart.

thought long and done all they could to explain it. And so they have. Still, however, it must be confessed that in the main the action of the heart remains a mystery to this day, except, of course, to those who are content to invoke on all occasions the aid of such conceptions, or no-conceptions, as "vitality," "stimulus," etc.,—terms which do indeed mask ignorance so well that they seem to explain everything, while in reality they explain nothing, but merely re-state phenomena in the technical terms proper to the science of nescience instead of plain English.

My object in this communication is not to attempt more than has been accomplished already by the ordinary method of investigation (which would be vain), but to give a view of the action of the heart with its attached vessels in the light of the hitherto little-studied science of morphology. For, from this point of view, it comes out that the well-known action of the heart and its ramifying and reti-form vessels is that which is proper to them in virtue of their respective forms, as these forms are realized more or less successfully in actual tissues.

But here it will be legitimately asked, What does this mean? And to this I reply, that, as in physics it has been found of much avail for the advancement of science to partition the whole subject of mechanics or the scientific study of *masses* into two, namely, *kinematics*, or a doctrine of pure motion, and *dynamics*, or a doctrine of embodied motion; so in physiology and the scientific study of *molecules*, it is advantageous to partition the entire study into two—namely, *morphology*, or the scientific study of pure form, and *anatomy*, the study of realized form or actual structure.

It has hitherto, at least in modern times, been usual to attend only to the latter, or, at any rate, to regard form as merely the outside of structure, as merely the incidental resultant of structure. But it is here maintained that this order of study ought to be reversed; that structure, at least where it is that of a naturally individualized object, ought to be regarded as the realization of form antecedently conceived and provided for by the specific endowments of the material elements.

The claims of morphology, in order to be admitted, need only to be considered. Thus, that every phenomenon, in order to be a phenomenon, must take place, will not be disputed. Now, to take place, what is it but to demand or assume some space as its own? and what is this but to demand or assume a form? It is usual, indeed, to think and speak of motion as well as of form as if the two were physically separable. But, however it may be in the abstract, a moment's reflection will show that motion, considered as a physical phenomenon, is only an affection of form, and that there can be no motion while there is no form to move. The mechanician, before he can get on at all with his demonstrations, must assume at least his "physical point" or "particle." Now, no point or particle, nor anything whatever, can be conceived as

existing in space but as a form of some kind. Morphology, therefore, or the science of form, is implicated in all scientific studies; and since "form" is not only the most extensive but also the most distinct of conceptions, and is, moreover, that which touches most closely upon "idea," it is certainly most worthy of separate and primary consideration.

What, then, let us ask, without further preamble, are the principles of this new, or rather, indeed, of this very old, science? (Consult Plato.) Happily they may be all explained in a single law, and that none other than the familiar LAW OF SYMMETRY. By this is meant a mode of action proper to the material elements, in virtue of which any individualized group of them, any molecule or organism, ever tends to grow or to be developed as symmetrically as incident forces, etc., will permit. It involves the following phenomena:—

FIRST RESULT.—The form of culmination in all cases, the sphere; meaning by spherical the spherical superficies shell or cell; for this is nothing else than that form in which symmetry is a maximum, inasmuch as symmetry consists in similarity in the relationship of all the parts or particles constituting a form to some one plane or line, ultimately some one point within the form—a condition this which is most completely fulfilled in the case of the spherical superficies, since in it the relationship of all the points is not only similar, but all the same, to one and the same point within the form, namely, the centre.

All the symmetry which Nature displays in all her individualized creations is, according to this view, a nisus towards the construction of the cellular. And surely it should not be regarded as anything wonderful if it should be found to be so. For the hollow sphere being arch all round, is the strongest form under incidental forces which can be constructed, and is, therefore, the fittest form with which to build or in which to dwell. It is also the house or vessel of the largest capacity which can be constructed out of a given quantity of materials, and, therefore, that in which the largest quantity of anything that is valuable may be secluded from exposure to unfriendly agencies, such as cold, oxygen, etc. In a word, the spherical contour is that type of form which reason leads us to expect in nature, in which, as the admirable Hales says, in his Hæmostatics (very valuable to this day, though brought out nearly a hundred and fifty years ago), "the farther we go the more we see the signatures of God's wisdom and power; everything pleases and instructs us, because in everything we see a wise design."

If it be asked how it is, if the cellular be really the choice of Nature, that she so seldom succeeds in her aim, since natural objects possessing a spherical form are but rare, the answer is, that they are rare only where incident forces absolutely prevent their construction. Among the particular objects on the surface of a planet, for instance, they are rare, because there gravitation, on the one hand, always pulling every part and particle towards the centre of the earth, tends to lay all forms flat; and the sunbeam and earth-cur-

rents, on the other hand, tend to draw them right up, or in some one line along. Thus, on the surface of a planet, what we are generally to expect under the law of sphericity, are either what may be called equatorial, laminar, frondaceous, forms; or else axial, prismatic, linear, forms; or both together, that is, such forms as have an axis and an equator only; or a combination of these two, consisting of equatorial elements radiating from an axis.

Now, not to stop here in order to show to what an extent systematic natural history may be assisted by a due regard to such leading ideas as to form, let us hasten to remark, that wherever gravitation, solar radiation, and incident forces in general are neutralized, the sphere is seen to rule. Thus, the disturbing influence of gravitation is obviously neutralized when the centre of gravity is also the centre of form. Now, this is the case with the heavenly bodies; and it is never doubted with respect to all of them, the millions upon millions of them, which exist, and indeed constitute the universe, that they are spherical externally at least, and most probably internally also. Again, gravitation is neutralized, at least nearly, in the case of small structures when holding place in a liquid of nearly the same specific gravity as themselves, as, for instance, in organic elements concreting in the plastic fluid of which they are constructed. Now, in reference to these also when most perfect, it has been found universally, both in reference to plants and animals, that at first they are all hollow spheres or cells; while multitudes of globules, spherules and spheres, spores, seeds, etc. etc., with contents more or less dissimilar to their walls, everywhere abound throughout the whole mineral, vegetable, and animal kingdoms. Such, then, is the first principle of that morphology, of which anatomy generally, or the science of structure, is the realization in matter; and it implies a second principle, which may also be stated, viz.:—

Second Result.—The activity proper to any form, great, in proportion as that form is non-symmetrical and non-spherical. This follows from the theory that the sphere is the limit of the action which aims at the perfection of individualized form, or the form of repose. But here it must be remarked that this repose proper to the spherical, is repose only with regard to the process of construction. When the cosmical law of assimilation [1] has been fulfilled, and the spherical in form attained, the material elements constituting that sphere are then in a situation each to assert its own right to its own individualized existence. Therefore:—

Third Result.—The solution of the cell and the attainment of the liquid or the aeriform state by its constituent elements. It would not do to enlarge here so as fully to explain and vindicate this assertion, but it is necessary to state it, because herein is the secret of secretion, as also of structural change and life generally.

[1] For the origin of this law, its cosmical character, and its sufficiency to explain phenomena without postulating any other, see "A Sketch of a Philosophy," by the Author (*passim*). 1868-1870. Williams and Norgate.

But to proceed. The sphere, then, being the type or ideal of an individualized form in reference to a mechanical system, such as that of the material creation, and these being the principles involved in this theory as to the type of form in nature, we are, in such a hypothesis, not only in possession of a principle to guide our systematic arrangements in natural history, but we are able to propose and solve many problems having most interesting bearings on anatomy and physiology. Thus, we may propose the problem, "to construct out of a suitable plastic fluid a vessel which shall act like a force-pump that works itself, and shall propel the remainder of the plastic fluid through the organism as long as possible." Nor can we merely propose this problem, which is plainly that of a heart. Our morphology enables us also to solve it. And to this let us now proceed. In practical mechanics the most analogous problem and its solution is perhaps the hydraulic ram—a most ingenious and beautiful apparatus for raising water by its own pressure to a higher level than its fountain,—which, however, unhappily, does not require a stethoscope to render audible the noise it makes, else it would doubtless be much more generally used than it is.

First, then, since this organism which we propose to construct is to work itself, and since no work is possible without dissipation of energy from the machine at work, our organism, since it cannot stand altogether alone, must be put in the way of obtaining a supply of energy from some other source as fast as it parts with its own. Now, this is secured for every part of the organization of an animal by the arrangement that the air, which is the great terrestrial storehouse of the energy of nature, is dovetailed into the animal, and made to give up its energy to the animal by continually renewed supplies of combustible matter (food), which are thrown in upon the air when within the animal, as coals are into the steam-engine, developing within the organism—not indeed a tissue of elastic vapour, first to fill the boiler, and then to be duly ramified through the engine, but—a tissue slightly concrete (in which also hydrogen plays an important part), first to fill the skull, and then to be duly ramified through the entire organization. In a word, in virtue of the connexion of the organism with the air and food, that organism is made to be (specially in the nervous system) a store of energy—such a store as tends, as often as it is emptied by work, to be replenished anew by the ambient energy of the universe. The first condition, then, is satisfied.

The second is, that the proposed vessel or chamber which is to act as a force-pump upon the remainder of the plastic fluid out of which it has been itself constructed shall (1) possess a *non-spherical*, as, for instance, a pyramidal or conical or hemiform shape; and (2) be so organized as to its muscular fibres and their fulcra, etc., that it shall be with respect to the plastic fluid contained in it as if it were itself plastic. These conditions fulfilled, it will, under the law of symmetry, which ever acts in the interest of sphericity,

as soon as its non-spherical form has been fully pronounced by the completed inflow of the plastic fluid, tend to make a movement towards its own sphericity. Now this must imply the diminution of its wall or *enceinte;* for the sphere is the smallest *enceinte* possible for a given quantity of fluid, and every movement from a less to a more spherical form of vessel implies a contraction of that vessel. *Thus we obtain a theory of systole.*

But although an organ composed of concrete materials may be constructed so that it may act in certain directions as if it were plastic, yet no such organ can be really plastic or in itself indifferent to form. It cannot but have a specific form—a form proper to itself considered as in a state of intimate equilibrium or repose. This we have indeed already postulated on assuming an organism to possess as its own a non-spherical form. Now this being so, it follows that as soon as it has expelled the plastic fluid which expanded and fully exposed its non-spherical form, it will resume its constitutional or specific form, non-spherical though it be. *Thus we have a theory of diastole.* And thus, without taking into account any ulterior organization framed to facilitate and sustain such a mode of action, an organ such as has been conceived will, as long as life remains to it, go on accomplishing systole and diastole. And indeed it has been found that the heart of a vertebrate, even after it has been cut out of the body of the animal, provided it be kept in possession of its own moisture and temperature, will continue to beat for days.

But to proceed. If, now, at that orifice in the expanding and contracting vessel by which the plastic fluid enters, a valve or some equivalent apparatus be applied to prevent regurgitation, and there be an opening for the exit of the fluid otherwise, and if to this opening there be a pipe attached which bends round and returns into the ventricular vessel again, then there may, as a consequence of the sustained systole and diastole of the vessel or ventricle, be a circulation for which the same quantity of fluid may possibly serve.

But such a circulation would serve no purpose. What is wanted is not merely a circulation, but such a circulation as will supply fresh material all through the body to take the place of that which is constantly being rendered useless by the spontaneous solution of cells and the breaking down of muscular elements which have done their work, and so have lost their self-sustaining energy. What is wanted, then, is not one circular vessel or tube merely with impervious walls, but an infinite number of tubes diffused all through the body, and ultimately more or less pervious. Hence, plainly, the tube issuing from the propulsive organ must be ramified to the utmost, and, as we shall presently see, formed if possible all through the organization into a universally distributed retiform plexus. Moreover, along with this, if what remains of the plastic fluid in the tubular vessels after having been thus distributed is to be brought back again to the ventricular organ, there must plainly also be a

system of vessels the very counterpart of what has been now described, the ends of its finest tubes inserted into those of the intermediate retiform tissue, proceeding parallel to the distributing tubes, and gradually gathered together into larger trunks until the ventricle is reached.

A vascular system, then, established in such a region as the body of an animal, having a central propulsive organ, ventricle or heart, and such that it may both irrigate the tissues of the animal generally and return what of the plastic fluid is not spent in this way to the heart—that is, circulate its contents—must consist of vessels which, except in the remote region which lies between those portions which propel from the heart and those which return to the heart, are *tapering or conical* tubes. Call them arteries and veins, or by any other name, they must be tapering or conical. But in being such they fall, when morphologically considered, under the same category as the ventricle or heart itself. In all animals they may indeed succeed in effecting a radiating mode of ramification, and the geometrical form circumscribing the aggregate of their tips may in some animals define a spherical superficies. But any single tube must be conical; and, if conical, then dissymmetrical; and hence, if organized in accordance with the law of symmetry and sphericity, it also will tend to act like a heart. It will tend to have its contraction of its wider part and its dilatation of its narrower part so as by action to form, as far as possible, the cylindrical or symmetrical in that which by structure is conical or non-symmetrical. Now, such a mode of action, if it be alternate in successive "reaches" of the vessel, or in the whole vessel, being a repetition of the action of the heart accommodated to the organism in which it has been embodied, must similarly tend to propel the plastic fluid within it. But in which direction? From its larger to its smaller diameter, or from its smaller to its larger? To this the answer is, that, considered simply as a conical vessel, it must tend to propel it in the direction in which the force is applied—that is, in this case, in the direction in which the fluid is introduced. Suppose, then, that by the systole of the heart a just measure and no more of the plastic fluid is thrown into the conical vessel where it is in most immediate connexion with the heart, the effect must be a contraction immediately after of the vascular system nearer the heart, and its dilatation in the further region, the latter part taking place synchronously with the diastole of the heart itself. In this way the plastic fluid, notwithstanding an inevitable resistance to its current in a ramifying vascular system, may be successfully delivered with every pulsation of the heart into the more remote ramifications, and into the extreme network, where diffusion into the tissues is to take place. Not that it is to be expected that every beat of the central organ will still be marked there. This would only be if the whole vascular system were constructed of a rigid material: if it be constructed of an elastic material (which it is), then in the

extreme vessels the flow must tend to be uniform and equable, like that from the delivery-pipe in the hydraulic ram or a fire-engine.

Now, it will not be denied that the organization of the arteries is in perfect accordance with these morphological views. Thus, they are not merely elastic tubes capable of contraction and dilatation without injury, but they are elaborately muscular; the muscular fibres being disposed precisely to effect the action which has been described as proper to them, considered as conical forms into which fluid is sent from the larger to the lesser calibre.

As to the reciprocal system of vessels, the veins namely, the plastic fluid or moving force being applied in them at the opposite end, that is their narrow ends, the tendency to the symmetrical or the cylindrical will manifest itself by an opposite rhythm; that is, first a dilatation, which will, of course, be followed by a contraction. They will thus tend to propel the plastic fluid to the wider or more empty part, and so on towards the central organ or heart.

Further; in this view it is implied that there is a dilated state in the tips both of arteries and veins simultaneously. The mode of action is therefore most favourable for the utilizing of the capillary network lying between both for delivering up nutritious particles, and for conveying away such as have been used and are effete.

Moreover, this dilatation of the extreme branchlets or peripheral vessels may be expected to be simultaneous with the systole of the central organ. It will be perceived, therefore, how beautifully the action of each is calculated to sustain that of the other.

But such return of fluid by the veins, in so far as it depends on the mere form of the vessels, cannot but be imperfect. Even in the most favourable situation and circumstances—as, for instance, in utero—stagnation, nay a tendency to regurgitation, and, consequently, to a breaking-up of the current into eddies, or internodes and nodes, may be expected. But if so, then it may also be expected that the plastic fluid at the nodes will be concreted, and so form curtains or valves, loose or open in the direction in which the plastic fluid is, though with difficulty, forced to flow—valves thus calculated to prevent regurgitation.

Thus, what morphology leads us to look for in a conical vessel appointed to be the canal of the plastic fluid, out of which it is itself formed, is (1) when the course of that fluid is from the wider to the narrower end, a system of circular muscular elements provided to assist in establishing the symmetrical (the cylindrical) as the only possible approach to the spherical; and (2) when the flow of that fluid is from the narrower to the wider end, a system of septa (or valves), as the only possible attempt to divide this volume of fluid into spherical portions. And such is the theory of segmentation, partitionment, septa, etc., generally.

Upon the whole, then, it appears that, morphologically considered, the return of the plastic fluid by the veins must be as difficult as its diffusion and radiation by the arteries must be easy.

But here there presents itself one of these harmonies with which all nature is pregnant, and which demonstrates so completely one All-seeing Eye as the author of all. The absence in the veins of a powerful elastic tissue fortified by muscular elements, such as exists in the arteries, leaves their extreme branchlets so lax and thin as to be pervious to the fluid on the outside. Hence a powerful endosmose into them, and, consequently, along with a new supply of fluid to replace what has been given out for nutrition, *a vis a tergo*, helping the flow towards the heart.

Furthermore, let the venous system, after having been gathered together into a main, on entering the ventricle be dilated into an auricle, which is, like the ventricle itself, a non-symmetrical vessel, and the ventricle may be greatly assisted. In a word, as often as the plastic fluid coming in by this main has filled and developed the non-symmetry of this auricle, the latter will contract or accomplish a systole; and as this will be synchronous with the diastole of the ventricle, the plastic fluid, rather than encounter the fluid still returning by the main, will rush in and fill the ventricle. And if there be a pervious septum of a valvular structure between this terminal bulb of the venous system or auricle and the ventricle, to prevent the plastic fluid from returning into the auricle, the circulation may obviously be continuous and complete.

In the light of morphological law, then, we have to expect that the systole and the diastole of the central or auriculo-ventricular organ will be repeated or reflected functionally, though most probably invisibly to such eyes as ours (which are adjusted to enable us to lay hold of our food, not to discover the economy of the universe), in the extremities both of the arteries and of the veins, the systole at the centre corresponding to the diastole at the periphery. And hence an important result in diagnosis. The aspect of the surface shall normally represent or indicate the state or mode of the heart's action. It will tend to be too florid when the systole of the ventricle is overacting, too purply or wan when the ventricle is underacting or unable to balance the systole of the auricle (which must be the last to fail), and to empty it as completely as it fills.

Thus, also, we are able to understand how a natural injection of the peripheral tissue with arterial blood may, on the one hand, be quite transient and harmless, as in the case of anger or blushing (*i.e.*, anger at self), for it bespeaks the heart in a state of high action, while, on the other hand, the same colour may also be a symptom of a very bad state of things. There may, for instance, be a failure or loss of systole in the extremities of the arteries, local or more general, as there is in sphincters generally under paralysis; and similarly in the extremities of the veins. And then a peripheral injection may bespeak inflammation.

And now let us ask what is the use of all this apparatus and continued circulation of plastic fluid? That has not as yet appeared. But the answer is now imminent.

Between two systems of vessels, or, for simplicity of conception, say a system of two vessels, both of which are conical, and which are approached or applied to each other by their small ends, there must be a cylindrical portion. And this portion, being more symmetrical than either of the other two, will tend to be developed more and more as organization advances and culminates. Now, what will this be but a network of capillaries, such as has been frequently anticipated already, and such as actually exists?

And what, when morphologically considered, must be the action of this system of capillaries? This is easily answered: for they are cylindrical. And therefore, while fixed at the ends, they are already as symmetrical as it is possible for them to be. They will not therefore, in virtue of their form, tend to move the contained fluid either this way or that. As to the motion of fluid along their axis, it will be at the mercy of the conical vessels in connexion with them. But yet they will not be inactive. On the contrary, their action under the law of symmetry and sphericity must be most decided. In fact, viewed in reference to the sphere, each is merely an axis. Each is wholly in want of equatorially expanded matter. Hence each must tend, under the law of sphericity, to give out at right angles to its walls such parts or particles of the plastic fluid as can permeate these walls. In a word, the function of the capillaries must be to nourish the tissues which they traverse. Here, then, we see the use for which the circulating system exists; and here, therefore, let us bring our investigation to a close.

P.S.—The Development of Glands.—If there be a single capillary, or a pencil, or tuft of capillaries which is not soldered and fixed at both ends, as has been supposed in reference to the system of capillaries which lies between the venous and arterial systems, but is loose or free at one end, what, let us ask, will happen then? To this it is to be answered, that, under the law of sphericity, that capillary or these capillaries must tend first to become tortuous, and, ultimately, each to coil itself up into a ball like an earthworm in dry weather, a snake, or any animal with a long axis when it goes asleep. And thus, instead of an extended capillary we shall have a glomerulus. Now, many glands maintain permanently this structure, as in the mesentery, the lymphatics, Malpighian capsules of the kidney, testicles, etc. But the morphological action will not usually terminate here. A further action of the law of sphericity demands the solution of the tubular structure of the interior of the glomerulus. Thus the gland will yield a proper secretion; and on dissection it will present itself only as an utricle or follicle. Such gland-elements, therefore, viewed in reference to the whole of their functions, ought to be regarded as something more than merely the subjects of osmose. Their action, also, ought to be viewed as something more than a mere overflowing into their ducts when they are over full. Unless the follicle or utricle be perfectly spherical, which no glandular element having a

duct in connexion with it ever can be, it must tend more or less to a systole and diastole as stimuli dictate, so as to give its secretion not in a continuous current, but in floods and ebbs. And that such is the action of glands is well known.

The Construction of a Heart.—Given a tubular or cylindrical vessel, then, free or at least movable at one or both ends, we are now able to see how it may be developed into a heart, even into such a seemingly complicated heart as exists in the mammalia. Thus, under the law of sphericity, the given tube, instead of continuing extended, must tend to take a turn upon itself, trying, as it were, to form a knot upon itself and become spherical. But if meanwhile there be proceeding along its length currents from its opposite ends, these currents, when passing each other, will give nodal or non-moving plastic matter in the plane between them. And that nodal matter will tend, as in the veins, to concrete into a partition or septum which in this case will be longitudinal. And this, when the turn or quasi-knot on the vessel is symmetrically adjusted in two planes at right angles to each other, may give four valvular septa or partitions, lying across each other, as in the heart of a mammal—all which, observation of the successive stages of the construction of the fœtal heart verifies; which verification, however, I do not adduce, as indeed nothing of this kind, in this paper, generally, leaving verification wholly to the well-informed physiologist.

The Morphological Cause of Muscular Action generally.—The views advanced in this communication apply not only to the actions of the heart and the arteries, but to the action of muscles generally. Most muscles, indeed, differ from the heart and arteries in being symmetrical in form, which the heart and arteries are not; or at least in consisting of muscular fasciculi which are symmetrical. A muscle is most generally fusiform, or lengthened in form either as a whole or in the elements of which it consists. Now to such a form, considered as such, and free to alter from within itself, and alive, action is proper. Moreover, that action ought in every case, according to our theory, to be a movement in the interest of its sphericity, and consequently a shortening of its axis or length, and an enlargement of its equatorial or transverse section or belly—a contraction, in short—implying the approach to each other of its two ends, or of the points between which it is extended. Now, it will not be denied that this is the characteristic action of muscles generally, the state of repose being supposed to be that which the structure of the muscular tissue tends to re-establish, that is, the moderately extended state.

As to the immediate *physical* condition or cause which determines a muscular contraction, it is, according to our views, a development of heat in the muscle, that heat being required to meet the greater capacity for heat belonging to aqueous matter and ammonia when they assume their equatorially expanded or axially contracted forms (for they are both dimorphous), whence also the heat becomes

latent as soon as generated, and the muscle remains cool though acting vigorously, and though the carbon of the effete tissue, entering into union with the oxygen in and around the muscle, is producing an immense quantity of heat.

The *chemical* condition or cause, therefore, of the action of the muscle is the union in it of carbon, etc., with oxygen.

And the *physiological* condition or cause is that current of force sent in upon the muscle which determines that oxidation.

The Manse,
Moffat, N.B.

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PAMPHLETS

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