

history inquiry, and a careful physical examination, perhaps including the interior of the uterus, will permit a clear distinction being made. Fused kidney and kinked ureters offer unusual difficulty in differentiation from renal or ureteral calculus. In this condition the kidneys are in front of the lumbosacral junction and the ureters usually join the kidney at a sharp angle. Calculi in this condition cause localized pain that is confounded with disease of the intestine or of the female pelvic organs; ureteral exploration is confusing, as the ureters are about half their usual length and the renal pelvis is not so amenable to exploration. Many times the diagnosis will be made only by the radiogram or exploratory incision. In double ureter the calculus may be in one of them occluding it, while the other is permeable throughout its length. When this occurs in the ureter that is forked above, ureteral exploration will render but little aid. Reliance for diagnosis must be placed upon the symptoms, urine analysis, and the skiagram. Hepatic disease should be confounded with renal calculus only in so far as a tumor of the liver or distended gall-bladder may be mistaken for an extraperitoneal mass in or about the kidney, and hepatic colic mistaken for renal colic. Usually, such symptoms as jaundice and marked digestive disturbances permit a distinction. If not, urine analysis and ureteral exploration, or, possibly, radiography, will clarify the situation. Many times ureteral calculi have caused a diagnosis of appendicitis to be made. This is scarcely pardonable, however, as the symptoms are commonly at wide variance.

Lucas furnishes an interesting instance of spinal caries being mistaken for renal calculus. He was called to operate and found the child suffering with unilateral pain in the back radiating downward. Incision and drainage proved sufficient. A few days later the same diagnosis was made for the other side. By telegraph he urged searching for a similar abscess on the painful side. It was found and evacuated with relief.

ORIGINAL ARTICLES.

THE ENVIRONMENT IN THERAPEUTICS FROM THE STAND-POINT OF PHYSIOLOGY.¹

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THE object of the present paper is to review briefly a few of the elements of environment in their relation to the treatment of disease, and to point out some of the ways in which modern therapeutic

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practice, especially in hospitals, through neglect of these considerations, sometimes fails to realize all that it might.

With the development of cellular pathology and the discovery of anatomical and bacteriological causes of so many diseases has come an inevitable and useful spirit of materialism in medicine, and a tendency to consider and to concern one's self only with tangible matters—those that can be seen and touched. This has been a useful spirit, and necessary to the transition from the old fantastic medicine of the past to the medicine of the present imbued with and founded upon the principles of science. But with it something has been lost that was of use.

Consideration for the surroundings of the patient has come to be regarded as belonging rather to the care than to the treatment of disease, and so has been left to the nurse. The development of the trained nurse system, too, has contributed to this result, and physicians have often grown unfamiliar with the management of the details of the surroundings of their patients.

But gradually confidence in the potency of many drugs has weakened. Certain of these agents, to be sure, have maintained their position, and probably always will maintain it; but the number of diseases in which we sum up the treatment as consisting of good care and the treatment of symptoms has steadily grown. This list of diseases promises for a long time to be an extensive one, to be shortened only as modern scientific medicine gradually develops specific forms of treatment.

It seems fair, then, every now and then to review the subject of environment in therapeutics, and to examine it in the light of the most recent teachings of physiology, pathology, and experimental medicine, and to see whether it cannot be made worthy of the earnest consideration of the thoughtful physician. It is a very old subject, and one to which much thought has always been given.

Sydenham regarded horseback exercise in the open air as a specific for consumption, and many years ago the open-air treatment of pneumonia was advocated, while mental influence has always been an important part of the armamentarium of every successful physician. The psychological side of environment has long been made use of by neurologists, but mainly in relation to functional neuroses. In a recent work, and one of the most useful that has lately appeared, on "The Psychological Treatment of Nervous Disorders," Dubois makes a powerful and unanswerable plea for the formal consideration of the psychological environment of the individual in many or in most disorders. This work, being based not upon empiricism wholly, but in very large part upon the teachings of modern physiological psychology, deserves the earnest consideration, not only of the neurologist, but of every person who is called upon to care for the sick and injured. It is by no means a new principle in therapeutics, but an old one that needed to be formulated, and whose

place in treatment required to be defined and accentuated; this Dubois has done in a masterly manner.

The use of the psychological side of environment in treatment is limited to no single group of diseases. In the neuroses or in other disorders in which neuroses play a considerable part it must be one of the main dependences; and this principle, as is so well elaborated by Dubois, no longer rests upon empiricism, or upon vague, undemonstrable theories of mental influence, but is firmly founded upon established principles of psychological physiology, both normal and morbid.

But in every case of disease the psychological state of the individual is an important element in maintaining and aiding the reaction of the tissues to any injury, whether of parasitic, metabolic, or other origin. Just as the influence of the environment upon the nervous system is an important element in causing disease, so it can be made equally important in combating disease, not only the neuroses but all organic maladies.

Celsus says "A great many of the inhabitants of cities and towns, and almost all the lovers of learning, have weak stomachs." And then follows a fantastic explanation of this true observation, based upon the faulty idea of physiology, pathology, and psychology current at his writing. Many centuries after, Ramazzini repeated the observation, and also used the same explanation; but now the modern teachings of the anatomy and physiology of the nervous system, and of psychology, and the relation of these elements to one another, have given us a satisfactory scientific explanation of the frequency of digestive neuroses in the classes of persons referred to. Like Celsus, we recognize the frequency of the condition and its dependence upon environment, and we find that modification of this element is the most important single means that we possess in combating the majority of digestive disorders; but the modification of environment from a psychological standpoint belongs to the treatment of every disease, and when it cannot cure, it can often aid other means to either cure or ameliorate.

In hospitals, unfortunately, it is more difficult of application, and as a rule, it is completely neglected. I have seen a clinic in one of the universities of Europe in which the viscera of a patient that died the preceding day were demonstrated and explained in the presence of another patient with the same disease waiting his turn to be lectured upon.

Few hospitals are so arranged that those who are dying shall not be seen or heard by patients in neighboring beds, or so that the psychological side of the environment of the individual shall have any consideration whatever. A few surgical hospitals have recovery rooms in which operative cases can be cared for in some isolation while recuperating from anesthesia, but even here it has generally been done with consideration only for the patients operated upon, and not for the remaining patients in the ward.

In most institutions recovery from anesthesia takes place in the wards, and surely the sight and sounds of the procedure are but poor preparation for similar operations on others. Many other instances might be given of the failure to appreciate the importance of the psychical side of environment in the designing, equipping, and management of hospitals that are supposed to be modern. It is much to be desired that architects, trustees, and others concerned in planning public institutions should give due weight to this important feature, and should realize that it rests not as formerly upon the vague and uncertain ground of hypothesis, but upon the certain ground of the teachings of modern physiological psychology.

Probably the psychical value of segregation is not always clearly understood. The value of sanatorium treatment of many neuroses depends partly upon the association of the patient with others of the same class.

In pulmonary tuberculosis there is a distinct advantage in sanatorium treatment or in treatment in colonies, which cannot be explained entirely on the ground of discipline and methodical and regular life. Contrary to the general belief of the laity, these patients as a rule do best in tuberculosis colonies. The restrictions placed upon their activities and appetite are less irksome, and they fall with more readiness and cheerfulness into a hygienic routine than when they stand alone. They appear to be under somewhat the same psychical influence as soldiers who march farther and with less complaint and exhaustion when in company formation and keeping step than when straggling alone.

One finds the same indefinable but real influence of environment in persons undergoing treatment at health resorts, such as Carlsbad, where the early rising, the nauseous draughts of waters, and the rigid dietetic restrictions are submitted to with the utmost cheerfulness in company, when only open rebellion would often result were the individual asked to go through the same regimen alone.

These will serve as examples of some of the ways in which the psychical side of hospital treatment will bear investigation and modification; and this investigation is all the more indicated, since failure so to consider the environment, cannot be regarded as merely failure to use a measure for good but as perpetuation of conditions that are positively a hindrance to cure.

The physical side of environment includes: (1) Temperature; (2) ventilation; (3) barometric pressure; (4) humidity; (5) light; (6) quiet, noise, etc.

It is not my purpose to take up each of these in detail. Some, as barometric pressure and humidity, do not admit of general artificial variation. The application of others is too obvious to justify discussion. That cheerfulness in the sick-room is to be preferred to gloom, quiet to turbulence, fresh air to a close atmosphere, does not permit of argument; but there have recently been

developed certain general therapeutic tendencies along these lines that promise well enough to justify discussion and wider publication; and there are suggestions that can be made looking toward a more thorough consideration of the question of the physical side of environment, especially from the hospital standpoint, and in relation to physiology, that seem to contain possibilities for much good.

With the discovery of the cause of tuberculosis, has come a thorough rehabilitation of the therapeutics of the disease, together with a conviction of the utter worthlessness, even injuriousness, of most of the older forms of medicinal treatment. Fresh air, feeding, and rest for the disease itself, and medicines only for special indications, and these as sparingly as possible; wherever the disease is well understood, these are the main points in treatment. These measures are based upon the soundest physiological principles. The invigoration of the body furthers the resistance of the tissues to the infection, and so favors cure. At first, the out-door treatment was attempted only in the pulmonary type, and the fresh air was admitted to be of use only because the disease was in the lungs. Then it was found that the non-pulmonary forms of tuberculosis showed just as striking benefit from out-of-door life as did the pulmonary, and now numerous successful institutions in various parts of the world testify to the fact that this is the most satisfactory method of treating tuberculosis of the bones, joints, lymph nodes, and various other parts of the body, where the disease is not susceptible of complete cure by operation. This conclusion, too, is justified by consideration of the physiology of respiration.

A young woman suffered from advanced tuberculosis of the kidney of many months' duration. As a concession to the impaired renal function she was kept closely housed in a warm room maintained at an even temperature, and she was with the same purpose fed upon a restricted diet. She had continuous irregular fever, rapid pulse, progressive loss of weight and strength, and, indeed, all the evidences of an actively advancing tuberculous lesion. She then fell into other hands; the renal function was disregarded, and only the tuberculosis was considered; treatment adapted to pulmonary consumption, or, more properly, to tuberculosis in any part of the body, was instituted; it consisted entirely in rest out-of-doors in all weathers, and forced feeding. Almost at once the temperature became normal, active symptoms subsided, and the evidences of a quiescent tuberculous lesion were substituted for those of an advancing one.

No rational discussion of fresh air can be engaged in without the influence of temperature being considered at the same time. By the use of fresh air in the treatment of disease I mean something quite different from ventilation in the ordinary sense of the term. Most sick-rooms are very inadequately ventilated; many contain

air that is unfit to be breathed even by well persons, and I have never seen a modern, up-to-date hospital that seemed to me to be adequately supplied with fresh air. I believe that the so-called scientific tests of the quality of air in rooms are of only limited value, and cannot be used as a basis of final judgment; I mean, the estimation of the proportion of carbon dioxide and of the number of bacteria, or the amount and quality of dust present. Until some further methods of study are discovered the best test of the air in the sick-room is the sensation of an intelligent and alert physician on entering, or the sensations of an observant nurse after remaining there some hours; while the condition of the patient, his progress toward or from health, his restlessness, and his quiet or sleepless nights will help to a judgment.

In attempting to study the physiological bearing of ventilation, one is beset by the difficulty of determining what are the essential and effective elements of good and bad ventilation. All agree that there are certain well-defined symptoms that regularly appear when people remain in an atmosphere which is called close or stuffy, that is, one that has been occupied and breathed for a considerable time without the air being renewed. The principal symptoms are a feeling of heaviness and oppression, headache, drowsiness, malaise, vertigo, tinnitus aurium, nausea, and faintness. If the conditions are maintained for a longer time, there is loss of appetite, coated tongue, indigestion, nausea, constipation, and nervousness, and, subsequently, if the evil be persisted in, the general health may become seriously impaired, secondary anemia and malnutrition being pronounced features, together with a generally increased susceptibility to the infectious diseases.

It was long a matter of dispute whether these conditions were due to the fact that the air contained poisonous substances, given off from the body, or whether the increased amount of carbon dioxide was the essential feature.

Ransome¹ claimed to demonstrate toxins in the exhaled breath and in the water of condensation from such breath. Merkel² and Brown-Séguard and d'Arsonval³ came to a similar conclusion. These poisons, which they called anthropotoxins, could not be isolated, but their existence was claimed to be proved by experiment. Most subsequent observers have come to the opposite conclusion, namely, that no such toxins exist in the air of expiration—Hermans⁴ (confirmed by Rauer), Lubbert,⁵ Kriegel, Mehl, Hermanek,⁶ Billings, Weir Mitchell, and Bergey.⁷

More recently, under the direction of Flügge, Heyman, Paul, and

¹ *Journ. Anat. and Phys.*, 1870, iv, 209.

² *Arch. f. Hyg.*, 1892, xv, 1.

³ *Compte rendu*, 1888, cvii., 106 & 165.

⁴ *Arch. f. Hyg.*, 1883, 1, 5.

⁵ *Ztschr. f. Hyg.*, 1, xv.

⁶ *Arch. f. Hyg.*, 1900, xxxviii, 1.

⁷ *Smithsonian Contributions to Knowledge*, 1895, vol. xxix, No. 989.

Ercklentz,¹ in an elaborate series of experiments upon men and animals, together with extensive chemical tests, confirm the results of the latter group, and declare that the anthroptoxins have no existence. They find that the deleterious effects of close atmospheres consist, not in the carbon dioxide, but in the elevated temperature, humidity, and absence of air currents. Paul placed men in small, close chambers until the atmosphere became very impure, but kept the air in active motion by fans, and found that no symptoms were developed. He then placed them in a similar environment but with the air still, and had them breathe pure fresh air through tubes. Here the regular symptoms of bad ventilation occurred, but were dissipated when the same air was put in active motion.

Flügge concludes that the sensation of well-being experienced with good ventilation is due to the abstraction of heat from the body through the evaporation of moisture from the surfaces, and that the removal of expired air plays a relatively unimportant part. Hence, he concludes that the features to be sought after in the atmosphere are coolness, dryness, and active motion. He considers the CO₂ content relatively unimportant. Rubner finds that it takes but slight motion of the air markedly to increase heat loss.

It has been found difficult to establish the point at which CO₂ in the atmosphere becomes a distinct injury to health. Paul found that animals died when CO₂ reached 14 per cent., and that it was immaterial whether this was produced by the respiration of other animals or by the action of chemicals. The atmosphere of large cities contains about 4 parts of CO₂ in 10,000; that of the open country about 2.5 parts. It has been generally assumed that in rooms it should never go above 10 parts. Flügge's conclusions point to the unreliability of CO₂ determinations in deciding whether an atmosphere is fit for human beings. He seems to conclude that many atmospheres may be good enough to be breathed which are not good enough to be lived in.

His experiments and conclusions carry much conviction with them, and suggest some valuable points in the management of the environment of the sick, such as the use of fans, and the attempt to secure lower temperature and more motion in the air.

It is a matter of practical experience that most modern artificial ventilation systems are satisfactory only to the architects and engineers who have installed them; they are entirely unsatisfactory to those who must live in them.

In view of the above conclusions from experiment it seems probable that this results because the ventilation is devised purely from the standpoint of respiratory requirements, based upon the oxygen needs of the individual, rather than from the cutaneous needs.

¹ Ztschr. f. Hyg. u. Infek., 1905, xlix, 433.

I have had noted and charted the humidity of wards of different type, and at the same time that of the outside air. Even with windows wide open, the humidity in the ward is much above that of the exterior, while it rises still higher proportionately to the number of occupants, and inversely according to the number of windows that are open. These differences are greater in cold weather, but are also present when the temperature outside and within are about alike.

In the modern system, moreover, special effort is made to avoid sensible air currents, while in Flügge's experiments such currents were one of the chief factors in relieving the symptoms resulting from a close atmosphere. In practice in the sick-room and the ward I have always found draughts a far less serious bugbear than they are generally considered to be.

I have put these principles in operation in the hospital wards, and while sufficient time has not yet elapsed to enable me to give numerical results, yet the outcome up to the present has been encouraging and sufficient to justify the continuance of the experiment.

Moreover, I suggest the possibility that air that has been drawn through long, closed ducts, and then superheated over coils of steampipe has lost certain qualities that belong to fresh air. This suggestion is a vague one, I admit, and is not susceptible as yet of scientific demonstration, but is based upon actual experience in hospital wards, and the observation of the difference in the progress of patients in closed wards supplied with a modern artificial ventilating system, and in the same wards after the ventilating system has been cut off and the windows opened.

Canned foods contain the same chemical substances as do the same material when fresh, but they are less well suited to constant, continuous human consumption.

There has long existed a tradition that the sick-room or ward should be maintained at a constantly even temperature, or as near such as may be possible. I should like to know the origin of this tradition, and whether it is founded upon theory or experience. Surely in health the body finds an even temperature far from grateful, and, on the contrary, craves the alternations which, in most parts of the world, are supplied throughout the year by the changing seasons, and through the day by the changing relation to the sun. There are diseases, to be sure—for example, certain cases of nephritis, in which extreme changes of temperature are probably injurious, and in which exposure to extreme cold is to be avoided, although even here one may question whether we have not been overafraid of such influence.

Dr. Northrup has recently seen a case of acute nephritis in a child show marked and rapid improvement, and go on to recovery, when removed from the hospital ward and placed upon the open

roof of the building in midwinter. This, to be sure, is an experiment, and is not to be recommended at present for general adoption. In this case the environment was changed because the child was doing badly and showed unfavorable nervous symptoms.

I have, however, tried the effect of marked alternations in the temperature of sick-rooms and wards, opening the windows wide in midwinter, and have found only improvement to result. This improvement, it is true, has followed the combination of change in temperature and the admission of fresh air, and I have concluded from it, as far as temperature itself is concerned, merely that in most cases there is no advantage to be had from the maintenance of the sick-room at an even or at any fixed temperature.

The experiment has been tried in medical wards containing such patients as are generally to be found in any acute hospital, and thus far has indicated that except in cases of advanced disease of the kidneys and heart, and with consideration for the personal comfort of the patient, the temperature of the room or ward may be disregarded.

At present, as a rule, the temperature is adopted to meet the comfort of thinly clad nurses, or, in private practice, of some elderly relative.

In most hospitals the rule obtains that the wards are to be kept at as near as possible to 70° F. both day and night; thus, as far as treatment by this feature of environment is concerned, forcing all patients alike into one class, no matter what the nature of their disease may be.

The influence of good ventilation in pneumonia has long been recognized, and is insisted upon by all who write upon this disease, but the idea has never become popular with the laity, though recently it is growing easier to obtain a reasonable supply of air for the patient when one is dealing with intelligent people. The majority of the medical profession are equally ignorant, however, and sin in the same direction. But even good, normal ventilation is not sufficient for a patient with pneumonia. He should have fresh air; as near as possible an approach to out-door treatment, unless there is some special contraindication.

Von Leyden¹ devotes thirty-two pages to a masterly discussion of the treatment of pneumonia, but dismisses the question of environment with but a few scanty and insufficient words. Most textbooks preface the section on the treatment of pneumonia with the statement that the room should be kept at an even temperature. I have demonstrated by abundant experience not only that there is no advantage in the maintenance of an even temperature, but that the natural daily fluctuations of temperature are of value to the patient, and I believe it would be a distinct step in advance if

¹ Die Deutsche Klinik, ii, 243.

we would discard from the sick-room the ordinary thermometer, and put in its place the wet and dry bulb thermometer, or one of its more readily interpreted and sufficiently accurate substitutes.

In tuberculosis the worst possible environment is a close, warm room, such as is maintained, as a rule, for pneumonia. Far better, but still inadequate, is a normally well-ventilated room, but by far the best is absolute out-of-doors. As a result of actual trial I have concluded that the same rule holds good for pneumonia.

In the case of adults, I have kept them in either a small room, or in the end of a ward, between two widely opened windows, with an absolutely free circulation of air, and at a temperature in winter that compelled the nurses to wear overcoats.

Dr. Northrup has carried the children with pneumonia to the roof in the early morning and kept them there throughout the day, and this in winter and often without even a wind-break.

I realize the difficulty of estimating the value of any plan of treatment in pneumonia from a study of the mortality statistics, that is, in a moderate number of cases; so I will merely state that the experiment was tried on my service at the Roosevelt Hospital and the Presbyterian Hospital, and in Dr. Northrup's service at the Presbyterian Hospital during the past winter, and the ultimate results, as far as mortality is concerned, were at least as good as with ordinary closed-ward treatment. More definite data can be obtained from a study of the symptoms, and we have noticed that exposure to the open air has had somewhat the same effect upon the nervous symptoms as has the cold bath in typhoid.

Nervousness and restlessness diminish, delirium is less frequent and less active, the patients sleep better at night, and the tongue is less likely to be dry.

I have not noticed any influence upon the duration of the disease, or upon the incidence of complications. I have been surprised to note that, as a rule, the patients have liked the treatment, and have not complained of the cold. In no case has the patient caught cold or developed a complication that could fairly be ascribed to exposure to a low or changing temperature.

Impressed with the satisfactory behavior of the nervous symptoms in pneumonia, I was encouraged to try the treatment of typhoid fever by the same environment.

The number of cases at my disposal was too small to admit of safe generalization, but as far as the experiment was carried the results were satisfactory, and suggested the likelihood that the fresh air treatment in this disease would be found in certain cases a satisfactory substitute for cold baths. The behavior of the tongue and of the nervous system suggested the conditions that are found when cold baths operate successfully. Even if of moderate benefit, though less so than baths, it would still be of much use in many

cases in which baths are contraindicated, or in which it is not possible to carry them out satisfactorily.

In private practice baths are of limited utility, and are not widely used, requiring so much and such skilled assistance as to be available only for the wealthy, while, unless carried out in the best manner, they are not free from danger. I suggest the substitution of fresh air treatment under those circumstances, which, in addition, has the advantage of harassing the patient less and subjecting him to no risk of injury.

The influence of fresh air upon the nervous system is easily demonstrable in many different diseases; but by fresh air I mean not what would be regarded as good ventilation in living-rooms, but fresh air as it is met with best out-of-doors, or, if this cannot be arranged, in rooms with wide-open windows. The evil effects of the opposite condition upon the nervous system are easily demonstrable. After a night spent in a room with closed windows and a temperature maintained by artificial heat, following wakefulness and restlessness through the night, there is apt to be headache, mental depression, a lack of buoyancy, a coated tongue, and a lack of appetite in the morning. These symptoms are not easily explained, but do not seem to be due primarily to deficient oxygenation, for they need not be present in persons who have diminished breathing space from disease of the lungs, and whose oxygenation is markedly below the normal. In several diseases in which disturbance of the nervous system plays a prominent part, these symptoms have diminished under the influence of a continuous stay in the fresh air. I have treated cases of typhoid fever lately by placing them before open windows, covered only by a sheet. The number of cases so tried has been too small for generalization, but the results are that such treatment may approximate in its effects upon the nervous system to those of cold baths, and the patients have found the procedure a pleasant one. One young woman with severe typhoid fever was kept in a room with wide-open windows, in which the temperature was at times 36° F. Along the line of Flügge's demonstration, I would suggest the use of fans systematically for these cases in warm weather. In no case have any unfavorable symptoms resulted from the treatment.

From many similar observations, I may quote two patients with cerebrospinal meningitis, who entered the hospital at about the same time, and occupied beds in the same ward, which was ventilated by the modern closed aspiration system and had the windows permanently closed. Both patients were severely ill with the ordinary symptoms of the disease. They were mildly delirious during the day, and were actively delirious during the night, and slept only when under the influence of opiates. Then the ventilating system was cut off from the ward, and the windows opened, the temperature falling to from 50° to 55° or even lower, and with a

very free circulation of air, the winter wind blowing freely through the room. At once the patients began to sleep better, and from this time no opiates were needed.

The same experience was met with in other cases of cerebrospinal meningitis, which was epidemic in New York in the winter of 1904 and 1905. Subsequently these cases were regularly segregated in special rooms where the fresh air method was carried out as an important element in their treatment.

In pneumonia it is especially the nervous symptoms, delirium, restlessness, etc., that are improved by out-door treatment.

Several years ago when the importance of this segregation and rational treatment of cases of tuberculosis in public institutions was first recognized, the late Dr. Dent, of the Metropolitan Hospital for the Insane on Ward's Island, removed the cases of tuberculosis in that institution to tents, and subjected them to modern, out-door treatment. He was prepared to see improvement in their pulmonary symptoms, but was surprised to find an equal or even more marked improvement in their nervous symptoms, especially a diminution in restlessness and violence, and a lessened need for restraint. He then tried the same environment upon the other inmates of the asylum, and found an equal improvement in their nervous symptoms; the number of the disturbed patients was less, and restraint was much less often called for. Some of the most successful sanatoria for the treatment of neurasthenia find absolute out-door life one of the most useful elements of treatment.

The influence of environment upon digestion is almost equally striking. By good or bad ventilation, by cheerfulness or gloom, by amusement or boredom, the appetite can be made vigorous or fickle, the tongue clean or coated, the digestion good or bad, and even the activity of the bowels may be modified. Nothing is more striking in places devoted to the out-door treatment of tuberculosis than to notice the enormous quantities of food that are taken with relish and digested with comfort by frail men and women whose lives are spent in steamer chairs on open piazzas without any activity, either bodily or mental. I have known patients with acute phthisis, when living thus constantly out-of-doors both day and night, maintain both appetite and digestion unimpaired until a few weeks before death. Experience surely suggests that it is the out-door element in the treatment chiefly that has kept the digestion thus vigorous.

In some of these very severe cases of nervous dyspepsia in which the usual remedies are of no avail, even when combined with rest in bed, I have known improvement begin when to the rest of the treatment was added fresh air out-of-doors; and I believe that this element is capable of being made of much use in combating this obstinate disease.

There are certain diseases in childhood in the management of

which environment can be made to play an important part, and in relation to which this form of treatment has been too much neglected. I saw a good example of these recently in conjunction with Northrup, to whom we owe many valuable and vivid suggestions in this direction. A boy of five, in good circumstances, had shown a mild type of rickets from an early age, in spite of the best feeding and suitable medication. Talking, walking, and dentition were delayed. There was a pot-belly and a slight rickety rosary, and the other symptoms of the disease were present, but in mild degree. Careful and judicious treatment, dietetic and medicinal, had failed to remove the trouble, although the child was living in the country in excellent surroundings. Then, at Northrup's suggestion, the entire scheme of life was changed. The parents were persuaded to build an open playground on the roof, and this the child occupied throughout the entire day, never going into the street nor to Central Park, although this was not more than a few hundred yards from his home. The bed-room windows were opened wide, and so thorough was the ventilation that a fur coat had to be provided for the trained nurse's use when she had occasion to get up in the night. In this way there was obtained for the child continuous life in the open air, free from dust contamination of the street, together with absolute freedom from nervous excitement and the stress of competition with the other children of the family—with a marked diminution in the number of visual, aural, and other mental impressions received.

The result was better even than had been expected, and though no new diet or medication was instituted, the child made more progress in the next two months than he had made in as many years. Here the treatment was entirely by environment, and I would suggest a wider application of the same principle in similar cases, and especially an effort to attempt its introduction in hospitals for children.

In the case above described, it was not entirely the open-air life, for he had passed the preceding two years in a healthful locality in the country, but it was the judicious combination of all the elements of environment that could be made of benefit to him.

In New York City the children's playground on the roof is becoming a common feature of many homes.

Last year during the summer in one of the Metropolitan Hospitals, in order to allow repairs to the wards, the children were removed to the yard and temporarily housed in tents. Not only was there marked and obvious improvement in the patients, but the commissary department of the institution drew attention to the bills for food, and complained that these were nearly doubled. There was some consolation, however, in noticing at the same time that there was a considerable lowering in the size of the bills for drugs.

The little hospital for non-pulmonary tuberculosis in children maintained by the Association for Improving the Condition of

the Poor at Coney Island, New York City, constitutes one of the best practical lessons in the use of environment. Here, the little patients spending the entire year on the seashore absolutely out-of-doors, or with unclosed windows, in all weathers, make remarkable progress, while colds and sore throats are unknown.

Several years ago in one of the Lying-in Hospitals of New York City, a patient with puerperal fever was put upon the roof, and kept there during the course of the disease. I have recently adopted the plan of putting these cases in an environment as nearly resembling out-of-doors as possible, and without regard to atmospheric temperature, combining this with as near perfect quiet as can be obtained in a hospital, and with forced feeding. The number of cases treated has not been large enough to justify a definite conclusion, but the results thus far certainly encourage a continuance of the experiment.

The influence of light upon disease is difficult to determine accurately. This agent is known to hinder the growth of bacteria and to aid in their destruction, and also to increase tissue oxidation. Curiously, the absence of a normal amount of light in the environment has been found by Weber to give rise to symptoms similar to those produced by a close atmosphere, namely, diminution of energy, depression of spirits with loss of appetite, indigestion, coated tongue. This field deserves further study. Sun baths or the exposure of the whole body to direct sunlight are used extensively in many sanatoria, and a valuable action upon the nutrition and upon the nervous system is claimed for them.

The action of x-rays, the Finsen light, radium, and other applications of light in the treatment of diseases indicate that this agent may be used with advantage in therapeutics, while Nevin's claims that epithelioma of the skin may be caused by the action of direct sunlight also suggests the potency of the light rays.

The exact part that light may be made to play in the management of environment in disease requires extensive observation and experiment to establish, but it is a field that would repay investigation. Meantime, consideration of the lighting and coloring of hospital wards and sick-rooms may certainly be made to play an important part in the therapeutic and the psychological side of environment.

But it is especially in connection with hospital practice that I desire to emphasize the importance of escaping from the trammels of tradition, and of starting anew to work out the treatment of the patients in part through environment, and of attempting to apply to the treatment of many diseases those principles that have proved of such inestimable value in a few, and which need not in any way interfere with such other therapeutics as may be indicated, whether specific or symptomatic. At present, as far as environment is concerned, the average hospital is an inelastic unit. Drugs may be varied to suit the needs of individual patients, and even the

diet to some extent, but the environment is rigid, and is adapted to but a small part of the inmates, if any.

In many institutions the profligate use of coal maintains the temperature of wards uniformly day and night at as near as may be to 70° F. A closed system of ventilation maintains an atmosphere that causes headaches in nurses and physicians who must spend many hours in the wards. The patients are assigned to this or that service, being distributed to suit the convenience of the visiting physicians. Hence, it comes that the sun shines alike upon the patient with acute tuberculosis, who needs it, and upon the one with cerebrospinal meningitis, who suffers the keenest photophobia. The bright, sunny ward, with raised curtain shades and walls painted a light color, is admirably adapted to the convalescent or the neurasthenic, but poorly adapted to the needs of patients with typhoid fever in the acute stage.

Almost more difficult to reconcile are the conflicting needs of the man with acute nephritis, general anasarca, and suppression of urine, and of the one with acute lobar pneumonia. But both, as a rule, must have the same atmospheric temperature, the same kind of ventilation.

I realize that the natural limitation of the function of the hospital precludes the possibility of providing separate rooms, or even small wards, for the patients. Moreover, the construction of most hospitals makes it difficult to provide for each individual the exact environment he would find best. Yet in most cases an intelligent effort to apply to hospital patients those principles of treatment by environment which are the outgrowth of modern scientific medicine, and some of which I have already briefly outlined, will undoubtedly result in making hospital results correspond more closely to those obtained in private practice.

In institutions with more than one ward devoted to each sex, these wards should be assigned to groups of patients according to their therapeutic needs, rather than to individual visiting physicians.

Thus, the wards could be made to vary in temperature, air currents, light, and quiet; and so some approximation at least of adjustment of surroundings to the needs of the sick could be carried out. The slight increase in administrative difficulty would be more than counterbalanced by added efficiency of service.

During the last year in two of the hospitals with which I am connected, I have attempted to carry out the above plan. In one institution I was allowed no expenditure of money whatever. The medical wards are the long, narrow type, containing twenty-eight beds each. At the far end is a hallway lying between the lavatories, and having a very large double window, and closed off from the wards by doors. This was used as an out-door space, the windows being widely opened and the door to the ward kept closed.

Here the temperature was not far above that of the street, and here were kept certain cases of pneumonia, or typhoid fever, or acute tuberculosis, within the limits of the space at my disposal.

One end of the ward itself was maintained with closed shutters and open windows, and here the air was fresh and the temperature varied with that out-of-doors, ranging from 45° to 60° or more. The closed shutters brought about a subdued light. In the other end the windows were closed and the shades raised.

I was surprised to find that the temperature in the two ends of the ward varied at times as much as four degrees, while the free circulation of air through the open windows made the apparent difference much greater.

Thus, without the expenditure of any money and with no structural changes whatever, I was able to secure in this ward three essentially different forms of environment, and kept the patients distributed in accordance with the nature and progress of their complaints.

In the other hospital, there had been certain superficial structural changes introduced, which made the conditions much more satisfactory. The ward had been partitioned and the wall of one part painted a dull green, and the windows provided with green shades. Here the windows are kept open, and acute cases, needing fresh air, quiet, and a subdued light can be given a suitable environment.

Meantime, suitable provision is being made on the hospital roof for the accommodation of all patients that would be benefited by absolute out-door surroundings.

I have been interested to notice that since the introduction of the above changes the health of the nurses has materially improved.

I would here put in a plea for the more general and systematic use of hospital roofs, and would suggest that the architectural definition of roof be changed, as far as it applies to hospitals, and that hereafter, this structure be defined as the floor of the top story.

The children's playground on the roof is rapidly becoming a familiar feature of the newer houses built in New York, while more and more hospitals are learning that their roof space can be made one of the most valuable therapeutic assets. With the downfall of tradition as the ruling spirit in the construction and utilization of hospitals, it might fairly be hoped that the assumption that medical hospital treatment is for the most part expectant might be done away with, and that our activities in behalf of our patients might rival even if they do not equal those of our confrères of the surgical side.

In the foregoing discussion it is not intended to try to cover more than a small portion of the environment in disease, but rather to

call to its consideration more general thought than, as a rule, it receives, and to suggest that the adjustment and maintenance of this element in therapeutics, both in private and in hospital practice, be reviewed in the light of the modern teachings of physics, physiology, and experimental medicine.

THE PHYSIOLOGICAL LIMITATIONS OF RECTAL FEEDING.¹

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THE title of the subject that has been given me to discuss implies, of course, a question to be answered; and the essence of that answer may be compressed into the statement that the limitations of rectal alimentation are very narrow—much more narrow, indeed, than is commonly appreciated. In saying this I mean only its limitations as a means of furnishing food, not, of course, its therapeutic limitations as a means of combating symptoms. There is a widespread feeling that when one is using rectal alimentation and the success of the measure is not interfered with by irritation of the bowel, one is using a substitute for natural feeding by the mouth that, while not perfect, is by no means a bad substitute. It is somewhat generally believed, indeed, that in a very considerable proportion of cases, the results are so good that the patients maintain a nutritive equilibrium or actually gain tissue, even though no food is taken in the normal way. This is not merely a common belief in the profession at large; it is the teaching of a large proportion of clinical instructors. As a general belief, however, it is extremely erroneous.

If one examines into the reasons for this prevailing opinion, one finds that it is partly due to the mere acceptance of tradition, partly founded upon expressed opinions of clinicians; these opinions, however, being in most instances the result of loosely gained impressions rather than of accurate observation. When patients so fed have been carefully observed, especially when they have been weighed, it is usually found that they lose in general nutrition and that they often lose a great deal of weight; and if the actual absorption is determined, the results seem, in almost all instances, still less encouraging.

Patients may, as is frequently claimed—and, indeed, they often do—feel better as the result of exclusive rectal alimentation than they did before; but this is by no means direct evidence that they have improved in nutrition. It is more commonly evidence that the local disease that is the cause of their chief complaints has improved.

¹ Read at the meeting of the Association of American Physicians, Washington, D. C., May 15 and 16, 1906.