PARENTERAL AND ENTERAL INFECTIONS.

In addition to the enteral causes of the nutritional disturbances of infancy there are parenteral ones, such as bronchitis, otitis media, pyelitis, etc., in which the intestinal mucous membrane and the secretions are probably so affected that nutritional states develop.

The treatment for parenteral affection consists, generally speaking, in treating the parenteral state, such as a catarrh of the lungs, after the disappearance of which the nutritional disturbance subsides. If in doubt as to whether the enteral nutritional state or the parenteral infection is the more important, it is essential to be guided chiefly by the weight curve, and treat the case accordingly as already explained. Of enteral infections which have to be distinguished from the nutritional disturbances are typhoid fever, dysentery, etc. The infectious diarrhoeas will not react to food as do the nutritional disturbances.

CONCLUSION.

Reviewing the nutritional disturbances from the first conception of clinical entities to the present well defined states, we are impressed by the necessity for the closest possible observations of clinical facts, the dovetailing of which into their suitable pigeon-holes needs infinite care, patience, and accurate deduction. In the future as in the past much will be learned from scientific investigation as to the importance of metabolic processes with regard to a single substance (like urea) in one of the food states; but it would appear as if, generally speaking, more inductive information is likely to ensue from careful clinical and biochemical methods applied to all four states in the same investigation. This would make a valuable comparison between the four states themselves and normality. Slight or marked differences between these states are likely to suggest new lines of investigation on a broader scale, which may lead to a clearer conception of the processes involved than the one substance investigated. Ultimately we may find the necessity for increasing the number of states of nutritional disturbances.

The Harveian Lecture

ON

THE HEART BEFORE HARVEY.

DELIVERED BEFORE THE HARVEIAN SOCIETY ON
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BY

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"... les opinions de son siècle, parce que ce sont les préjugés qu'on oublie le moins."—*Sénac*.

WHEN I had the honour of receiving your invitation to give this lecture it seemed to me that Harvey, apart altogether from the nature of that work which made his name immortal, provides some good examples of human limitations. It is a common defect in observation that we do not see or appreciate things for which we are not looking; in other words, we are the slaves of preconception, or of prejudice, if we use the word in its true sense. The preconception may be fundamental, so deep down under our actions that it does not appear on the surface, but it is there all the same; and it has sometimes seemed to me that part, at any rate, of genius, when applied to research, is the power of seeing things as they are, more or less, and not as they might be expected to be. A preconception leads, among other things, to lessened appreciation, or even complete want of appreciation, of points which tell against itself, and in the course of time it becomes almost part of ourselves, a sort of natural law or fact, about which there is no doubt whatever and no question possible.

It was a preconception of such a nature that had to be overcome by Harvey. He found the old belief to be incomplete, in discordance with facts, and opposed to reason, whereas the system proposed by him was complete and in absolute accord with fact and theory. But he was striving against a most ingenious and coherent—though false—belief concerning the functions of the heart and the vascular

system in general, and this belief had held the field unchallenged for fifteen hundred years. I fancy that there are many medical men who, if they were suddenly faced with the necessity of giving grounds for their belief in Harvey, would find it difficult to answer convincingly: it is enough for them that it is the accepted view, that it fits in with all they know of physiology and medicine, and that it serves its purpose very well. In the same way the pre-Harveian physicians had found that the prevailing beliefs on the vascular system met all their requirements, in medicine and in biological science, and they found it very hard to admit that they were unreasonable. Moreover, they had the sanction of at least fifteen hundred years of medical experience—a respectable period of time which completely eclipses any claim to consideration on the same score that might be made by the modern man. The modern and the ancient are alike prejudiced in favour of the current view of their period, and unable to see any need for change; we, to-day, hold of course that fundamental change in the matter is unthinkable, because we now have the proper conception of the circulation, but let us not forget that that standpoint was also the one occupied by the men who were Harvey's antagonists. Their honesty of purpose was shown by their later whole-hearted acceptance of his views, but their obstinacy of opposition was only due to their strong preconceptions. It is with the nature of their belief that I want to deal, and at the same time I will try to show how it was that this wrong belief held its ground for so many centuries before it was overthrown by Harvey.

Modern physiology and medicine are boundless subjects, but they had their origin in the science and philosophy of ancient Greece, and it is not necessary for us to go further back or further afield than to Greece if we wish to see this origin; nor is it necessary to say anything about Hippocrates, as the views of his time were expanded later by Galen, but something may be said about Aristotle's teaching, which was seemingly not in accord with the general belief. He looked on the heart as the source of "vital heat" which, though not the soul, was an absolutely necessary concomitant or agent of the soul; and the aorta and vena cava served similar functions in that they carried this "vital heat" in the blood to the left and right sides of the body respectively. Aristotle's view of the structure of the heart is well known: he describes it as having three cavities, and much argument has centred round this description in the laudable endeavour to understand what he meant by it; we need not go into the matter, but every now and then, during the succeeding centuries, the idea cropped up in one form or another.

When Alexander the Great died, some three hundred years before the Christian era, his generals seized his several possessions. Egypt fell to the share of Ptolemy, who seems to have been a man of foresight and discrimination. He conceived the idea of making Alexandria the leading city of the world in learning and in commerce. His immediate successors carried on this policy, and the city became a centre to which the leading minds naturally gravitated, and in which all that was best in philosophic thought was undoubtedly represented. The medical sciences were fostered like the other branches of learning, and it was in Alexandria, in the reign of Ptolemy Soter, that Erasistratus enunciated his theory of the carriage of "vital spirits" by the arteries throughout the body. This idea of the arteries containing "air" has been wrongly attributed to Aristotle: it is purely Erasistratean, and, according to Galen, seems to have resulted from his difficulty in accepting Aristotle's teaching, in which two main vessels were supposed to do work which might be done by one only. Whatever we may think about it, it must not be forgotten that the idea itself was not unreasonable from the standpoint of the vascular physiology of the day, as we will see shortly. We depend on Galen for what we know of the work of Erasistratus, for his writings have not been preserved, but he certainly described with accuracy the valves of the heart, indicating the directions in which they opened; yet he had no notion of a circulation of any sort, and, like his followers, he seemed to be more concerned with making the facts he described consistent with the philosophical conceptions of his time than with altering the theories to bring them into line with the facts.

The facilities which evidently existed in Alexandria must have made it one of the first, if not absolutely the first, of the centres of Greek medical thought. Not much information is obtainable about this side of life in Alexandria, but it seems probable that these facilities were not increased as time went on—in fact, it is probable that they got less. The later Ptolemies were a race of feeble men and diabolical women, and the country was degenerating under their rule. Rome, at first benevolent, became threatening; at last her hand closed down on Egypt, which became a Roman province about thirty years before the birth of Christ.

The Roman genius differed widely from that of the Greeks, but at least tolerated the arts and sciences. Hence the learned men of Alexandria and of other Greek schools might be expected to have more opportunity for study under Roman rule than in the turbulent times preceding it. The study of human anatomy, however, was not possible under Roman law, and this most important avenue of advance was therefore closed to them. Nevertheless, within the first century of the Christian era the great figure of Galen arose in the medical world, and it was essentially the vascular physiology of this ancient master which was overthrown by Harvey fifteen hundred years later.

It must not be thought that the views advanced by Galen were the products of his own brain. They were, like almost all other creeds in medicine, reflections and restatements of the philosophical views of the day, accumulated during centuries of research and thought; but Galen summed them up, made them into a compact and coherent whole, gave them a foundation of observation and seeming fact of experiment, and applied them to his system of medicine and physiological anatomy, with the result that they seemed to satisfy clinical wants and to meet all demands—except those of the real facts of the case. We must see, then, what was taught by Galen concerning this side of vital physiology.

The body was held to possess four humours: blood, phlegm, yellow bile, and black bile; these were tempered by combinations of the four qualities—heat, cold, moisture, and dryness. The body, containing such matters in its composition, was informed by three intangible essences or "spirits," with two of which we are particularly concerned. The spirits were natural, vital, and animal. The natural spirits were derived from the products of digestion, were elaborated by the liver, and distributed from it by the veins throughout the body; the blood in the veins therefore moved in a peripheral direction from the liver. The vital spirits, the most subtle and important, were, as their name implies, concerned with the maintenance of life itself and of its properties in the body. They were elaborated in the left ventricle, by its peculiar and innate power, from blood and air, and were distributed by the arteries throughout the body. It can be understood that, except for the question of fact, it would be of little moment whether the passage of these spirits through the arteries were simple, as Erasistratus believed, or joined with blood, as Galen taught; for the two authorities the spirits were produced in the left ventricle and transmitted by the arteries, and the other point was of secondary importance. Galen disposed of the Erasistratean belief by a simple experiment on the living animal.

The animal spirits were elaborated in the brain from the vital spirits, and manifested themselves in the functions of the nervous system; they need not be considered further here.

The anatomical necessities of this system of spirits were met very well. The vena cava passed up from the liver to reach the upper parts, opening into the right ventricle on the way; hence there was no "auricle" as we understand the term, the tricuspid valve guarding the direct opening from the vein into the ventricle, and the appendix being a lateral pouch of the wall of the vein. The blood in the vein carried natural spirits, which were wanted for three reasons—to supply the necessary crude material on which the air could act to produce vital spirits, to be sent by the pulmonary artery to the lung for its nourishment, and to nourish the actual substance of the heart itself, through the coronary sinus, which would be described as arising

from the vena cava before it opened into the heart. The passage of blood from the right ventricle to the left, where it would be charged with vital spirits, was considered to be effected through small pores in the interventricular septum. The difficulty in finding these was explained by the assumption that they collapse after death; it is of interest to recall the fact that many anatomists after Harvey's time, including the famous Morgagni, have described the occasional occurrence of such channels, other than the well known opening sometimes seen at the top of the interventricular septum. Galen also certainly suggested the possibility of blood finding its way to the left side by the pulmonary circuit, but his remarks on this point are not very clear.

The elaboration of vital spirits in the left ventricle necessitated the passage of air to this part, and this was effected by the pulmonary veins; the common stem of these veins constituted what we now consider the greater part of the left auricle, but this was called the "venous artery," and considered to open directly into the left ventricle through the mitral orifice. The pulmonary veins were held to have a double current in them, for they not only brought air to the heart, but transmitted from this organ the fuliginous vapours which arose like smoke from the activities of the left ventricle. This backward passage of vapours from the ventricle caused some trouble to the followers of Galen, as well as to the physiologist himself, and led to varied accounts being given of the valves, some maintaining that they did not close completely, and others holding that they were permeable to vapours, and so on, but the general belief was nevertheless that such vapours were eliminated from the lungs, to which they had been brought by the pulmonary veins. This passage in two directions in the same vessel was also illustrated in the divisions of the portal vein: the products of digestion were not only brought to the liver by these vessels for elaboration, but the natural spirits required for the nutrition of the alimentary tract were compelled to use the same channels to reach their objective, and a certain amount of discrimination—referred by Galen to his useful properties of attraction and repulsion—was exhibited in some of the vessels, as, for instance, in the passage of black bile by the splenic vein, etc.

It can be seen, then, that the structure of the heart was neatly, if artificially, fitted in with the physiological theories, and it remained to account for the conditions before birth. Galen was not a man to shirk a difficulty of this sort, and he triumphantly turned it into another link in his chain of physiological vascular functions by means of the assumption of the absence of motion of the heart before birth. The assumption was not difficult in itself. Remembering that Galen was conversant with the views of Aristotle, one might be tempted to think that he had purposely put on one side that biologist's observations on the beating heart of the embryo chick, but it seems more probable that the difference between the chick in the egg and the foetus *in utero* was looked on as too great to allow direct argument from one to the other. If the heart is the source of vital spirits, requiring air for its action, and if the lungs are not used, so that no air is available, it would seem to be only right that the heart should be quiescent, and the necessary spirits, natural and vital, be supplied from the mother through the direct connexion which was believed to exist between her vascular system and that of the foetus. It was held that the umbilical vessels were in direct continuity with vessels in the uterus, artery with artery and vein with vein, the placenta being a supporting structure for these inosculation, and in this way both natural spirits and vital were transferred through vein and artery respectively. The foramen ovale and ductus arteriosus were thus brought in as necessary physiological structures, the foetal heart being quiescent: the foramen, opening from the vena cava, brought (maternal) natural spirits to the lung for its nutrition, taking the place of the non-acting pulmonary artery, and the ductus arteriosus carried (maternal) vital spirits to the same organ, which, though functionless, had to be kept in a state of high "vitality" ready for the time of functioning.

It is interesting to note that the belief in the quiescence of the foetal heart persisted for a long time, and the direct

continuity of maternal and foetal vessels was taught for many years after Harvey's death. Arantius, in the sixteenth century, seems to have been the first to discredit this continuity, being followed by several other anatomists. Harvey, of course, knew that the foetal heart was not quiescent, and followed Arantius in his views on the placental vessels. Many well known names, however, appeared in support of the older belief in continuity. It was completely upset by Hunter, but I find it again in the 1795 edition of Cheselden's *Anatomy*; I cannot say when it made its last public appearance.

Returning now to the vascular system, it must be admitted, I think, that Galen left behind him a very ingenious and wonderfully—though not exactly—complete account of its physiological working, including the foetal conditions. It was vitiated by assumptions which we now know to be false, but which are perhaps excusable in the then circumstances of anatomico-physiological information. The whole theoretical mass fitted in very well with the pathological views and clinical practice of the day, and made a structure, more or less complete, which could only be overthrown by the destruction of the fundamental falsities on which it was built; this was, in essence, the accomplishment of Harvey.

We must now, having gained some idea of the vascular physiology of the Greek schools, pass on to the question of the delay of fifteen centuries before it suffered correction. The answer has to do with the rise and fall of empires, of peoples, and of faiths. The Roman Empire, which had perhaps passed its zenith when it took Egypt under its sway, was certainly declining when Galen died. It is a common saying that the Greek genius was exhausted at this time, and there is no doubt truth in the saying if we remember that exhaustion is not the same thing as death; but it seems likely that the absence of any originality in the men who lived immediately after Galen is to be referred at least as much to the conditions under which they must have lived. Rome was unable to preserve order in the outlying dependencies, and even at home it showed the beginnings of inward decay. As for the Alexandrian and other Greek schools, they were in the middle of the maelstrom of disorder.

In the fourth century the empire was divided into the Eastern Empire, with Byzantium as its seat of government, and the Western Empire, where Rome remained as nominal mistress of the Western world. But Rome was tottering to her fall, and in the fifth century she passed out of history as mistress of the world, being overpowered and taken by Goths, Franks, and Burgundians, and other "barbarians." Thus, in the sixth century we find the eastern end of the Mediterranean surrounded by countries nominally under the rule of Byzantium, but in a state of general unrest; towards the west, the "barbaric" peoples were plunged in that semi-darkness from which they were to emerge as the nations of Western Europe of to-day.

Byzantium itself, then, seems to have been the place most suitable for the furtherance of the arts and sciences, but the mixture of Latin and Greek and Oriental would not appear to be the best from this point of view; at any rate, nothing was done there in the way of originality in medical science, and no doubt the Christianity which was the official religion looked with disfavour on certain forms of investigation, and hindered progress along these lines. Alexandria was still a great seat of learning, but no advances in medicine were made there, and Galen was taken as the master who provided a standard for those that followed after him.

In the seventh century the followers of Mahomet subdued Persia, and then turned their attention to the West. They flooded Palestine and Syria, submerged Egypt, ran along the north of Africa, and overflowed into Italy and Spain; their efforts in Italy were temporary and unsuccessful, but in Spain they gained a firm footing, and even crossed the Pyrenees into France; they were thrown out, however, and did not repeat the effort at extension. This great invasion was the precursor of Arabian dominance in medicine. The Greek-Latin civilization of Byzantium, gorgeous but decaying, was hardly able to do more than hold its own on and around the Bosphorus, the Western peoples were still in their strong and lusty childhood, and

the victorious Arabians were thus the dominant power. In medicine, the Greek storehouses of information opened to them by their conquests were antechambers of a new world to their learned men, and they adopted Greek medicine with enthusiasm. But they got little further than this. The Oriental mind seems to tend towards occultism and mystic learning, and the chief gains in the science due to the Arabs were in the regions of chemistry and botany, which were given their full mystical value; astrology and magical charms seem to have been added to the therapeutical armamentarium of the practitioner also by Arab influence.

In anatomy and physiology they did nothing. Their faith forbade them even to portray a part of the human body, and in these matters they were content to accept in its entirety the teaching of their Greek masters, and hand it on as they received it. Thus the Arabian physicians, who represented medicine after the seventh century, taught and practised Greek medicine; but it was debased Greek science, for it can be understood that translations made by men totally ignorant of the subject with which they were dealing, and carried on and transmitted by others who had no means of verifying or even of wholly comprehending the matters concerned, were not calculated to give a clear idea of Greek thought or to enable others to realize it. The vital character of the original was lost, and the result was certainly only a debased copy of it.

The Arabian mastery in medicine was fairly complete. In Byzantium, and probably to some extent in the southern parts of Italy, the original Greek was still the main influence, but elsewhere the Arabs were paramount. They might be looked on as the trustees of the Greek heritage, holding it during the growth of the Western nations, who alone would be able to take it over from them in the future.

The possibilities that had been dormant in the old "barbaric" peoples showed themselves first in the splendour of the Renaissance in Italy; the other Western nations followed more slowly in the same path. They were like growing children, curious and inquiring, but still yielding to authority, not questioning in any important matter the sayings of those who stood to them as teachers. Thus the Arab-Greek physiology passed without question. It is impossible to lay down a fixed date and say that at this time the Italian Renaissance began, but we can in a general way say that it was vivifying Italy while our Norman kings were on the throne of England, and in the thirteenth century we find Mundinus (1270-1318) making human dissections and teaching anatomy with great distinction at Bologna. Among the books* I have here is a beautiful edition of his *Anathomia*; from his diction it may be perceived that his anatomy is Arabian in origin. I need not quote the account of the heart given by him, but can say that he opens and exposes both ventricles, taking care not to injure the middle ventricle, which he takes to be represented by the spaces which pass through the septum from right to left, more widely open on the right side. He mentions the valves in their proper positions and directions, but considers that the tricuspid valve does not shut completely, because it is necessary for some of the blood which has reached the heart from the liver to be propelled out for further circulation. Perhaps he may be credited with perceiving the necessity for propulsive power behind the blood conveying the natural spirits, but otherwise, so far as can be judged from his scattered remarks and crude descriptions, he had no shadow of doubt about the truth of the accepted physiological views; it was one of the sources of strength of the Greek conception that it did not depend on any minor detail for its acceptance, but was like a broad-based edifice on which the individual could erect his own little turrets and make his own small windows for looking through without affecting the building. Mundinus had held the heart in his hand, and one can see his rude description is of the actual heart, but he forced into it what he thought he ought to see, the result of the preconceptions of his training.

The childhood of the Western nations passed; we know that a time comes when our children, who once looked on

* Several old books were brought, and some lantern slides shown.

us as the final authority on every possible point, begin to question our wisdom and belittle our judgement, and frequently push their information to a point beyond that reached by us. In like manner the growing nations were approaching a time when they would no longer take things for granted, nor blindly follow authority. Two events in the fifteenth century—the fall of Byzantium or Constantinople and the invention of printing—are credited with great influence on the progress of medicine and the sciences. So far as printing is concerned, its effects are so incalculable and evident that we need not say more about them. The fall of Constantinople brought to Italy much of the old Greek treasures which had been stored in that city, and thus opened to Western scholars a direct avenue to the learning of Greece and the ebullitions of the Greek genius. It became quite “the thing” for scholars to journey to Italy to study and translate these manuscripts, and it is interesting to note that our own Linacre was among the most famous of these travellers. It is generally held that the advent of the supply of the pure undefiled Greek writings had much to do with increasing the vital energy of medicine and its sciences, leading to advances and new discoveries, and no doubt there is truth in the belief. But I confess that I find myself a little sceptical; at any rate in anatomy the Arabian influence seems to have persisted for a century after the fall of Constantinople, nor is there much reason to suppose that the Greek resurrection would set doubting a world of men who had accepted the Arabian statements without question. It seems to me a natural and inevitable result of the growth of the proper mentality of the Western nations: they were reaching the adolescent stage and wanted to inquire into things for themselves, and under those conditions advances were bound to come, the truth was bound to be slowly sifted from the false, and our special subject, vascular physiology, was as certain to be put on a proper foundation as anything could be in this world of uncertainty.

Thus we find in the sixteenth century tentative efforts being made toward the solution. At first, at the beginning of the century, we have the old belief. This copy of Magnus Hund's book, one of the rarest anatomical books, was published in 1501: it was once supposed to be the first anatomical work with cuts, but that is not the truth. Woodcuts as illustrations were introduced about 1461, but they only found their way into anatomical or medical books toward the end of the century. Not considering de Ketham's “fasciculus,” we have Jacques Peylig's work which appeared in 1499. I have compared the cuts in this with those in Hund, and they are undoubtedly copied from the same originals, but what these were I cannot say. In a couple of the drawings from Hund, the heart, in the pericardium, shows the outer form of the two ventricles; it is placed obliquely, has two structures above the ventricles which may be meant to represent appendices, and possesses certain vessels leaving or going to it which I have not yet been able to place with any satisfaction. Like the other early writers on the subject, Magnus Hund seemed to look on his illustrations as in themselves sufficient, and did not take the least notice of them in his text. Such a picture of the heart is, of course, merely formal, almost like that on a playing card, and the description of the organ shows the usual conception of structure and function which had been current for so many centuries.

As the sixteenth century goes on, however, we begin to find evident signs of the growth of the spirit of inquiry. We can pass over the obscure crudity of Berengarius's description, and the evident influence of Mundinus on Massa: Massa talks of three ventricles, and his account of the heart, fuller than that of Mundinus, is not much of an improvement on it. In this century, however, we find an outburst of anatomical activity, and greater freedom in expression of individual views. The actual investigation of anatomical structure was not confined to professional anatomists, but was largely undertaken by artists, who might, indeed, be looked on as leaders in the revival, particularly in the study of skeletal and muscular anatomy, since the great names of Leonardo, Michelangelo, and Raffaello are found at the end of the fifteenth and early

part of the sixteenth centuries. These men were not concerned with physiological ideas, but in this century, however, we find Servetus, Columbus, Cesalpinus, and the greatest of all, Vesalius. In one of Vesalius's early illustrations of a heart, from one of his “fugitive sheets,” there is no appearance of auricles as we know them, though the appendages are well shown. I have found this to be a common deficiency, probably due to the teaching that the heart only has ventricles, and that those parts which we term the atria of the auricles are parts of the vena cava and pulmonary vein (*arteria venalis*) respectively; in the case of Vesalius the explanation might hold, for this great anatomist and accurate describer failed altogether to get any true conception of the circulatory process. Others, however, pushed the matter further. Michael Servetus was the first to describe clearly the pulmonary circulation; he was followed on the same lines, and almost in the same words, by Realdus Columbus, then by Arantius and Cesalpinus. All these anatomists have been credited, at one time or another, with knowledge of the circulation, but if we turn to their accounts of the veins and liver—a very good test of their views—it is found that they were all quite innocent of any conception of the circulation. The same test disposes at once of Nemesius, Bishop of Emesa in the fourth century, who has also been said to have known it. In all these cases the passage through the lungs, which had been postulated by Galen, was simply adopted to supply the left heart with the material for its manufacture of “vital spirits,” the perforations in the septum having lost caste with most writers.

This, then, was the state of knowledge of the heart and vascular physiology when Harvey made his onslaught on the belief. Riolan still taught a way through the septum, but with many, if not most, the pulmonary route was accepted: on this subject Harvey credits Columbus with the description, being apparently ignorant of Servetus. The vital spirits were still elaborated in the left ventricle and discharged in small quantities by the aorta, and some thought they ebbed back again at times, especially during sleep. The natural spirits were elaborated in the liver and transmitted by the veins. The structure of the heart was quite well known, but did not seem incompatible with the theories, and it was really these theories of the double flow of blood, with its double origin, that had to be destroyed by Harvey, for it was the fundamental idea on which the whole superstructure rested.

THE LARVA OF THE WARBLE-FLY AS A HUMAN PARASITE.

BY

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OWING to its rare occurrence, the following account of a case of myiasis due to a warble-fly may be of interest.

On February 19th last I was called to an outlying farm to see a boy, aged 4 years. His mother told me that he had not suffered from any previous illness. In November and December last he lost flesh, colour, and appetite, but did not complain of any pain. During the whole of January, 1924, he had recurrent attacks of urticaria on the front and sides of the neck.

Early in February he complained of severe pain in the left ear which lasted a few hours. Next day the left cheek was red and swollen. This swelling subsided in an hour or two, and was immediately followed by extreme swelling of the left eyelids so that the eye could not be opened. The swelling was not red or painful, and it entirely disappeared in about three days. The day following its disappearance the boy was suddenly seized with severe vertical headache, and vomited. The pain lasted several hours, but in twenty-four hours he appeared to be quite well and continued so for about four days, when the swelling in the left eye returned, with vomiting, and pain in the left side of the forehead. The eyelids were red and there was some thin purulent discharge.

When I saw him the next day I found the left eyelids slightly swollen and red, the conjunctiva somewhat injected, and the tongue dirty. Temperature and pulse were normal. The boy was well nourished and did not appear to be ill.

In a day or two all swelling and redness had disappeared, and nothing further occurred until February 29th, when he vomited, and the left eye became swollen. Next day I found him in bed, and was told that he had passed a sleepless night, owing to very severe pain in the left side of the head.